THE VALUE OF NON-NATIVE FISH SPECIES: A STUDY OF RECREATIONAL ANGLING IN THE AMATHOLE DISTRICT

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ABSTRACT

Experience has shown that effective fisheries governance requires a sound understanding of fisheries as systems incorporating both ecological and human dimensions. The Ecosystem Approach to Fisheries requires that the human components of these systems be considered when developing management and governance frameworks. While the potential for inland fisheries to contribute towards societal welfare and the development of rural livelihoods is becoming increasingly apparent, developing South African inland fisheries requires a careful consideration of both their positive and negative impacts, given that they revolve mainly around five of the world‟s top 100 invasive species. This thesis aimed to explore the value of inland recreational fisheries to rural livelihoods in the Amathole District of South Africa, to the regional economy, and to anglers themselves. Three methods were used to isolate this value. Economic impact analysis was used to estimate the combined total economic impact of the 2011 Divisional Tournament (n=31) and the 2012 Amatola Bass Classic (n=100) on the regional economy of the Amathole District, estimated to be R106 625. The travel cost method was applied to data from the 2012 Amatola Bass Classic in order to estimate the social welfare generated by this tournament. The Negative Binomial model, corrected for truncation and endogenous stratification, estimated this value at R 1 960 090. The sustainable livelihoods framework was used to conduct a broad-based analysis of the value of *Amatola Wild Trout*, the firm which constitutes the fishery surrounding the rural village of Cata. It was found that the fishery had been responsible for a modest pecuniary impact on the community of Cata within its first two years of establishment, although significant improvements in human capital were found to have resulted from the development of the fishery. These results provide insights into the economic dimension of fisheries in the Amathole District, and will prove useful when weighing up the positive and negative impacts of non-native fish species, particularly when informing decisions regarding their potential eradication.

TABLE OF CONTENTS

PART B: THE FISHERY AT WRIGGLESWADE

LIST OF TABLES AND FIGURES

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADM	Amathole District Municipality
ATC	Association of Tourism in Cata
AWT	*Amatola Wild Trout*
BRC	Border Rural Committee
CLRA	Communal Land Rights Act
CPA	Communal Property Association
CV	Contingent Valuation
DAFF	Department of Agriculture, Forestry and Fisheries
DEAT	Department of Environmental Affairs and Tourism
DIFS	Rhodes University Department of Ichthyology and Fisheries Science
DLA	Department of Land Affairs
DPW	Department of Public Works
DWA	Department of Water Affairs
EAF	Ecosystem Approach to Fisheries
EPWP	Extended Public Works Programme
FAO	United Nations Food and Agriculture Organisation
IES	International Ecotourism Society
ILO	International Labour Organisation
IMPLAN	Impact Analysis for Planning
ITCM	Individual Travel Cost Method

IUCN	International Union for the Conservation of Nature
LED	Local Economic Development
MIFA	Melbourne International Festival of the Arts
MLRA	Marine Living Resources Act
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act
NEPAD	New Economic Partnership for Africa‟s Development
NFEPA	National Freshwater Ecosystems Protection Act
NGO	Non-Government Organisation
PSC	Project Steering Committee
RFP	Rhodes University Rural Fisheries Programme
RSA	Republic of South Africa
SANPAD	South Africa Netherlands Programme on Alternatives in Development
SAQ	Stutterheim Aquatic Club
SLF	Sustainable Livelihoods Framework
SNB	Standard Negative Binomial model
SP	Standard Poisson model
SURUDEC	Sustainable Rural Development in the Eastern Cape
TCM	Travel Cost Method
TGF	Trip Generating Function
TLGFA	Traditional Leadership and Governance Framework Amendment Act
TNB	Negative Binomial model, corrected for endogenous stratification and truncation
TROM	Target Resource Orientated Management
TSLEDP	Thina Sinako Local Economic Development Programme
USA	United States of America
ZTCM	Zonal Travel Cost Method
ZTP	Poisson model, corrected for endogenous stratification and truncation

PREFACE

This thesis is a deliverable of an initiative between the South Africa Netherlands Research Programme on Alternatives in Development (SANPAD), The South African Institute for Aquatic Biodiversity (SAIAB) and Rhodes University. The overall aim of this broader project (#10-06) is to guide emerging inland fisheries policy by undertaking case studies surrounding the social, economic and ecological consequences of stocking South African impoundments with five of the world‟s 100 most invasive fish species.

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I acknowledge that all references are accurately recorded and that, unless otherwise stated, all work herein is my own. I certify that this thesis has not been submitted for a degree at any other university.

James Wolmarans Kinghorn 24 March 2013

PART A: INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 MOTIVATION, AIM AND OBJECTIVES

1.1.1 Motivation

The Ecosystem Approach to Fisheries

Holistic fisheries management and governance requires a careful consideration of the ecological as well as the human dimensions of the systems within which they are located. During the twentieth century, fisheries governance and management was characterised by the target resource orientated management (TROM) approach, focussing on the specific species which were to be governed or managed in any given context. More recently the effectiveness of such an approach was called into question. Increasingly, fisheries researchers and managers have been realising the need to adopt frameworks which encompass the human dimensions inherent in fisheries (De Young *et al.*, 2008). Schlanger and Ostrom (1992), as well as Kooiman and Chuenpagdee (2005), have argued that the most logical way of developing appropriate fisheries governance mechanisms is through a sound and holistic understanding of the systems which they aim to govern. The Ecosystem Approach has been recognised as an effective alternative to TROM, capable of including not only a broader array of ecological variables to explain fisheries dynamics but also the social and economic drivers impacting on these systems (Arlinghaus and Cowx, 2008; Beard *et al.*, 2011). In 2003, the United Nations Food and Agriculture Organisation defined the Ecosystem Approach to Fisheries (De Young *et al.*, 2008: 3):

> [A]n ecosystem approach to fisheries (EAF) strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties of biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries.

This approach has been broadly acknowledged as the dominant paradigm within which present day fisheries research and management is conducted (Arlinghaus and Cowx, 2008; De Young *et al.*, 2008; Beard *et al.*, 2011). Accordingly, the thesis presented here has strived to contribute towards a greater understanding of the human dimension inherent in fisheries by providing information on the economic contribution of inland recreational fisheries in South Africa.

The ecological dimension

South African fisheries revolve primarily around non-native fishes, five of which are listed on the International Union for Conservation of Nature (IUCN) list of the world‟s 100 most invasive species (IUCN, 2008). Literature documenting the impacts which these fishes have had on native species has been unanimously negative, highlighting extirpations of native fish populations (Cambray, 2003; Swartz *et al.*, 2004; Ellender *et al.*, 2011), the transfer of parasites (Stadtlander *et al.*, 2011) and disruptions in the community structure of ecosystems resulting from predation (Gaigher, 1979; Lowe *et al.*, 2008; Weyl *et al.*, 2010). Globally, fishes are one of the most threatened groups of aquatic animals (Vié *et al.*, 2009), and Tweddle *et al.* (2009) consider alien invasive fishes to be the most significant threat to the native fishes of South Africa.

The economic dimension

Recreational fisheries generate significant welfare throughout the world (Weithman, 1999; Peirson *et al.*, 2001; Welcomme and Naeve, 2001; Arlinghaus and Cooke, 2009; Brand *et al.*, 2009; Potts *et al.*, 2009; Cowx *et al.*, 2010). This welfare is sometimes underestimated by decision makers (Cowx, 1998; Cooke and Cowx, 2004, 2006; Arlinghaus, 2006; Hickley, 2009) as the value present in the sub-sector is too often ill defined (Cowx *et al.*, 2010; Beard *et al.*, 2011). However, the contribution of recreational fisheries towards rural livelihoods and food security is becoming increasingly apparent in both academic research and policy-making (NEPAD, 2005; Weyl *et al.*, 2007; Ellender *et al.*, 2009; Hickley, 2009; Cowx *et al.*, 2010; Du Preez and Lee, 2010; Beard *et al.*, 2011; DAFF, 2012). Globally, those concerned with fisheries management have realised the need for a greater understanding of the human dimensions of fisheries, and this has resulted in a call for information regarding the economic contribution of fisheries (Cowx, 2002; De Young *et al.*, 2008; Cowx *et al.*, 2010; Beard *et al.*, 2011). The call has been echoed by those engaged in South African fisheries research (Andrew *et al.*, 2000; Weyl *et al.*, 2007; McCafferty *et al.*, 2012).

1.1.2 Aim and objectives

This study aimed to explore the economic value of inland recreational fisheries based on non-native fish species in the Amathole District of the Eastern Cape to the regional economy, to rural livelihoods, and to anglers themselves.

The first objective of the research presented here was to determine the economic impact of two fishing tournaments held at Wriggleswade Dam, the 2011 Eastern Divisional Tournament and the 2012 Amatola Bass Classic, on the Amathole District‟s regional economy. This was achieved through the use of economic impact analysis.

The second objective was to estimate the net benefit which accrued to the anglers who participated in the 2012 Amatola Bass Classic. This entailed the use of the travel cost method.

The third objective was to conduct a broad-based investigation into the value of the recreational fishery as a means to support livelihoods in the rural village of Cata. The sustainable livelihoods approach was employed to achieve this objective, and the findings were considered in light of local economic development discourse.

The remainder of this chapter provides a context for the research presented in this thesis. The economic valuation of any resource should be based on a sound understanding of its nature and of its relationship to those whom it is of value to (Atkinson *et al.*, 2012). Section 1.2 provides a historical overview of recreational fisheries governance in South Africa. Given that a consideration of the economic dimensions of fisheries will be crucial for the development of holistic governance principles, the ways in which the value of fisheries can be ascertained will be the subject of Section 1.3. Following this will be an overview of the Amathole District, where both study sites used in this research are located.

1.2 INLAND RECREATIONAL FISHERIES IN SOUTH AFRICA

The Marine Living Resources Act (Act 18 of 1998) defines recreational fishing as “any fishing done for leisure or sport and not for sale, barter, earnings or gain” (MLRA, 1998: 12). Recreational anglers are usually employed and so do not rely on fishing to provide them with income or food security, but they may sell or consume their catch (Ellender *et al.*, 2009).

Globally, fisheries typically have their roots in food production. History shows that it is only once economies have become relatively developed that leisure time becomes more abundant,

giving rise to widespread recreational activities including angling. The classic model for fisheries development thus begins with subsistence and commercial fisheries, becoming more recreationally orientated as societies develop (Smith, 1986). South African fisheries are unconventional in this regard. Traditionally, very few of South Africa‟s pre-colonial inhabitants practiced fishing in inland waters, and the first facet of fisheries to be developed by colonists was recreational angling (McCafferty *et al.*, 2012).

1.2.1 A brief history of inland recreational fishing in South Africa

British colonists did not find native freshwater fishes to be suitable for recreational angling, so they set about introducing species which they thought more appropriate. The common carp, *Cyprinus carpio*, was the first, introduced during the 1700s (de Moor and Bruton, 1988), followed by the brown trout, *Salmo trutta*, in 1890 and then the rainbow trout, *Oncorhynchus mykiss*, in 1897 (Pike, 1980; Manning, 1908). Four species of black bass (*Micropterus salmoides, Micropterus dolomieu, Micropterus punctulatus and Micropterus floridanus*) were introduced in the 20th century, and in order to improve the yields of the newly established fisheries other non-native fishes were introduced as fodder fish (de Moor and Bruton, 1988). McCafferty *et al.* (2012) discuss how these species were distributed widely by hatcheries such as those at Jonkershoek (Western Cape), King Williams Town (Eastern Cape), Tetworth (KwaZulu-Natal) and Lydenburg (Gauteng). This was often with the aid of provincial nature conservation departments, still oblivious to the negative impacts which these fish would have on ecosystems (McCafferty *et al.*, 2012).

With the promulgation of the Union of South Africa in 1909, fisheries management was decentralised, becoming the mandate of provincial conservation departments (Hey, 1977). In the Cape Province, legislation had long since been established, with Act No 10 of 1867 encouraging the importation of non-native fishes for use in the recreational angling industry (Hey, 1977). This allowed for the channelling of financial resources toward the protection of non-native species. In 1942, the Inland Fisheries Division was formed, which set about enacting the Inland Fisheries Ordinance, No. 12 of 1947, formulated to ensure the protection of aquatic fauna from potential sources of harm such as water pollution (Hey, 1977). Subsequent legislation, including the Cape Province Nature Conservation Ordinance (No. 19 of 1974), the Natal Nature Conservation Ordinance (No. 15 of 1974), the Orange Free State Nature Conservation Ordinance (No. 8 of 1969) and the Transvaal Nature Conservation Ordinance (No. 12 of 1983) all specified fishing seasons and areas, as well as bag-limits,

licence requirements and other measures intended to promote sustainable fishing practices (Hey, 1977).

Recreational needs dominated the development of fisheries up until the second half of the twentieth century, when their potential for commercial utilisation, as well as for rural development and food security, was first realised (McCafferty *et al.*, 2012). Changing attitudes towards non-native species, driven by the increasing awareness of their negative impacts on biodiversity, led to the removal of the protective measures previously afforded to species such as trout and bass by the Cape Department of Nature and Conservation. Authors such as Hamman (1986) and Walmsley and Pike (1989) called for an urgent revision of policy, and contributed towards a movement which lead to the closure of most of South Africa‟s state hatcheries (Skelton and Davies, 1986; Rouhani and Britz, 2004).

1.2.2 Current legislation governing South African inland fisheries

More recently, the ever mounting evidence of the negative impacts which non-native fishes have on biodiversity, reviewed by McCafferty *et al.* (2012), led to the formation of the National Environmental Management: Biodiversity Act (NEM:BA) in 2004. Under NEM:BA, non-native species are categorised according to the threat or risk that they pose to biodiversity. Given that eradicating non-native species which have established breeding populations is highly impractical in many contexts (Gozlan *et al.*, 2010), NEM:BA emphasises that they should be managed through the use of a zoning system instead. Theoretically, this system should allow for the legitimate and beneficial use of non-native fishes within specified water-bodies where their removal is unfeasible. In other systems, where their threat towards native biota is well documented and their removal is achievable, eradication programmes have already been piloted (Marr *et al.*, 2012).

Hara and Ngwexana (2010) provide a detailed break-down of the access rights, legislation, regulation, management and governance systems which currently determine the use of South African inland fisheries. Inland fisheries are not yet a legally recognised sector in South Africa (Weyl *et al.*, 2007). In terms of the National Water Act (Act 36 of 1998), all water in South Africa is owned by the state. The biological resources contained within inland waters fall under the jurisdiction of various provincial environmental affairs departments who manage these biological resources in terms of the National Environmental Management Act (NEMA, Act 107 of 1998). The principles informing NEMA are sustainability, biological

diversity, ecosystem resilience and the precautionary principle. Furthermore, access to the water (and therefore to fish) is also controlled by whoever happens to own the land surrounding the water in question (Hara and Ngwexana, 2010).

The multiple authorities and interest groups controlling access to fisheries create a confusing institutional context, and this is one reason that inland fisheries remain under-utilised in South Africa (Weyl *et al.*, 2007). Schlanger and Ostrom (1992) distinguish between *de facto* and *de jure* property-rights, the latter being grounded in law and the former depending more on informal institutions existing between resource users for their legitimation. Whether *de facto* or *de jure*, Schlanger and Ostrom (1992) discuss how the rights of alienation and exclusion have been shown to provide the incentives necessary for resource users to invest the various forms of capital necessary to ensure efficient levels of resource extraction. But the authors also warn against a "blind faith in private ownership, common-property institutions, or government intervention" to solve common-pool resource management dilemmas (Schlanger and Ostrom, 1992: 262). Instead, the development of sound policy for the governance of these resources requires in-depth information on the conditions which promote efficient property-rights regimes, the stability of such regimes given changing contexts, as well as the costs of attempting to enforce *de jure* laws on resource users who are not in agreement with them (Schlanger and Ostrom, 1992).

In 2009, a departmental restructuring process resulted in fisheries being transferred to the Department of Agriculture, Forestry and Fisheries (DAFF) (DAFF, 2010). DAFF has a specific mandate to "maximise the economic potential of the fisheries sector" (DAFF, 2010: 11). According to Weyl *et al.* (2007), the best way of achieving this will be to develop a national inland fisheries policy which can guide local government in its efforts to use fisheries as drivers of pro-poor local economic development.

There are over 3000 dams and reservoirs worth considering for use in the development of South African inland fisheries (Weyl *et al.*, 2007). Most of them are located on state-owned land, controlled by the Department of Water Affairs. Others belong to municipalities, private individuals and provincial nature conservation departments. Dams located in rural areas are of particular interest. According to the Department of Agriculture, Forestry and Fisheries' Strategic Plan for 2012/13 to 2016/17 (DAFF, 2012), many of the dams being considered are

located in former homelands[1]. They are thus ideally situated as targets for use in rural development, but being situated within communal areas, control over access to the dams is subject to the pending outcomes of the Traditional Leadership and Governance Framework Amendment Act (TLGFA) (no. 41 of 2003) and the Communal Land Rights Act (CLRA) (no. 11 of 2004). According to Pollard and Cousins (2008), both these acts were contested, resulting in amendments which allow Traditional Councils to become Land Administration committees. These Traditional Councils have not yet been established in some cases, and until they have been, the CLRA cannot be implemented (Hara and Ngwexana, 2010). Land tenure in communal areas is thus uncertain, and this will undoubtedly have undesirable consequences, in terms of contested authority and custodianship, for future development initiatives.

1.2.3 The contribution of inland recreational fisheries to welfare

Leibold and van Zyl (2008) estimate that there were around 2.5 million South African recreational anglers in 2007. Of these, about 1.5 million were involved in freshwater angling. This study is particularly interesting, given that it covers the two types of fisheries which this thesis considers. The authors found that there were around 45 000 anglers who practiced flyfishing (typically for trout but also for yellowfish and marine species on a smaller scale), generating a total economic impact of R3.5 billion in 2007. Around 20 000 anglers were found to be involved in bass fishing, with a resulting total economic impact of R1.2 billion. In terms of expenditure, the flyfishing industry appears to be similar to the bass fishing industry except that bass fishing experiences a greater proportion of capital outflows (15% as opposed to 8%). The study is not peer reviewed, and although the multipliers used appear reasonable (0.1 for fixed costs and 0.3 for variable costs), the findings are based on a very small sample of anglers. Furthermore, much of the information was derived not from anglers themselves but from certain anglers‟ „expert‟ opinions regarding the spending habits of their fellows. Given that this sampling technique is far from objective, the findings of Leibold and van Zyl (2008) cannot be used for much more than as a point of interest. They are presented in Table 1.1.

[1] Under the South African pre-1994 National Party government‟s policy of separate development, ten self-governing homelands were established for the resettlement of black people who were not recognised by this ruling party as citizens of South Africa. These homelands served as labour reservoirs which housed unemployed people, many of whom were forcibly removed from their previous homes. Homeland areas have historically occupied a marginalised position within the national economy (SAHO, 2012).

Table 1.1 The economic impact of flyfishing and bass fishing in South Africa

Type of fishing	Flyfishing (% of total)	Bass fishing (% of total)
Direct economic impact	2.9 billion (83)	1.1 billion (94)
Indirect economic impact	710 million (20)	225 million (19)
Induced economic impact	136.5 million (4)	36 million (3)
Economic outflow	266 million (8)	186 million (15)
Total economic impact	3.5 billion (100)	1.2 billion (100)

Source: Leibold and van Zyl, 2008

There have been two peer-reviewed studies to determine the value of specific recreational fisheries in South Africa: Brand *et al.* (2009) estimated the value of yellowfish-dependent recreational angling on the Vaal River to be around R 133 million per season and du Preez and Lee (2010) calculated the direct economic contribution of the recreational trout fishery at Rhodes, a rural village in the northern part of the Eastern Cape province, to be around R 5.5 million per annum. McCafferty *et al.* (2012) point out that while these studies have shed much needed light on the economics of the recreational fishing industry, much more research is needed regarding the economics of the diverse array of other recreational fisheries supported by South Africa"s rivers and dams.

Recreational angling has value not only to those who practice the activity. In addition to the value accruing to anglers themselves from angling, social welfare is generated through the formation of angling clubs and societies which serve as places where relationships are formed and productive ideas are exchanged (Hickley, 2009). Spending time outdoors can also lead people to have a deeper understanding of the environment in which they live, thus fostering a more responsible steward-like attitude and a desire to preserve the environment for the benefit of all who depend on it for their existence (Hickley, 2009). The costs involved in recreational angling are borne solely by the anglers themselves, and since these benefits are reaped by society in general it is possible that this scenario has resulted in recreational angling being under-supplied as a good (Tietenberg and Lewis, 2010). Information asymmetries can also lead to the under-provision of goods, and this is the subject of the following paragraphs (Weyl *et al.* 2007; Tietenberg and Lewis, 2010).

1.2.4 The contribution of inland recreational fisheries to livelihoods

Inland fisheries currently contribute substantially towards African livelihoods, and their development has the potential to contribute to regional economic development (NEPAD, 2005). According to Weyl *et al.* (2007: 497), the fish populations supported by South Africa‟s 3000 major dams are under-utilised, partly because of "a lack of historic involvement in fishing, a cultural resistance to fishing, a lack of fishing gear, or a lack of knowledge of the potential of the resource".

There have been a few notable attempts to develop commercial and subsistence fisheries in South Africa (Weyl *et al.*, 2007). As discussed previously, recreational fisheries have historically been managed by the provincial environmental departments and revolve chiefly around non-native species. Considering the mounting evidence of the negative impacts which these species have had on native biota, and the lack of information surrounding the positive impacts which these species have had in fostering industries which support rural livelihoods, the management of non-native species based recreational fisheries no longer involves promotion or active management of any kind (McCafferty *et al.*, 2012). The international experience shows that participation in fisheries is significantly influenced by marketing. Hickley (2009) discusses how the sale of recreational fishing licences decreased in the USA and France between 1995 and 2006, while steadily increasing in England and Wales. According to Hickley (2009), this difference can be attributed to England and Wales‟ persistent promotion of angling in the media. If it is the case that recreational angling is under-supplied, then marketing the activity could lead to a growth in participation, which could in turn promote the generation of social welfare and generate livelihoods in rural areas through tourism creation (Leibold and van Zyl, 2008). Du Preez and Lee (2010) found that recreational trout fishing as tourism has the potential to form the basis of a local economic development initiative, an encouraging result given the difficulties experienced by rural communities in diversifying their livelihoods.

The 2012/13 – 2016/17 DAFF Strategic Plan articulates the department‟s plans to develop both a policy and a programme on inland fisheries. The plan points out the potential for the sector to create tens of thousands of jobs, chiefly within "the former homelands, where many storage dams have been built, and where their recreational and fish-harvesting potentials have been especially neglected" (DAFF, 2012: 4). Hara and Ngwexana (2010), having reviewed the 2001 – 2008 Agriculture Strategic Plan, point out that a major set-back within this

industry has been the lack of government capacity to implement their programmes. This has partly been due to a lack of funding and poor leadership, and provides a warning for those who plan to engage with government on a practical level following the development of a South African inland fisheries policy.

The policy which DAFF plans to develop within the coming years would do well to be based on a sound understanding of all dimensions of South African inland fisheries. While information on the ecological components of these systems is important, little research has been conducted into the human dimensions of South African recreational fisheries. There exists at present a considerable body of evidence which supports the eradication of non-native species where possible, and it is essential that the positive impacts of these species be considered before it is decided that eradication is desirable from a social welfare perspective.

1.3 VALUING NATURAL RESOURCES

1.3.1 The nature of value

The research presented within this thesis has been carried out within the conceptual framework of environmental economics. Environmental economics is theoretically grounded in neoclassical microeconomics, and is thus based upon selected premises of the ethical theory of utilitarianism. While utilitarianism, as defined by Henry Sidgwick (1874) and Jeremy Bentham (1789), encompasses the welfare of all sentient beings, neoclassical economics is concerned exclusively with that of humans (Mill, 1864). It is for this reason that values, when considered from within the sub-discipline of environmental economics, are only relevant insofar as they are anthropocentric (Grafton *et al.*, 2004). The value which people attach to natural resources can be stratified into three distinct components, depending on their relationship to those resources. These components are *use value*, *option value* and *non-use value* (Atkinson *et al.*, 2012).

Use value refers to the value ascribed to a particular resource which is used by a sector of society. For example, the value which anglers place on the activity of fishing would form part of the use value of those fish. Option value, in this context, comes from anglers merely having the option to fish, and is determined by the amount of benefits received by people simply through their knowing that the option to use a resource exists (Pearce and Turner, 1990).

Non-use value refers to that part of value placed on some natural resource by people who do not intend to ever make use of it. This category can be further divided into *existence value* and *bequest value*. People derive existence value from a resource simply by being aware of its existence. Bequest value reflects the value which society places on preserving natural resources for the use of future generations (Tietenberg and Lewis, 2010). Another form of non-use value which is not commonly acknowledged is *contributory value*, the value which components of natural systems have due to their supporting function within those systems (Fromm, 2000).

1.3.2 Economic valuation methods

Market-valuation and non-market valuation

The broadest way of categorising valuation methods concerns the nature of the resource which they aim to value. Some resources are traded and thus a market exists for them. In this case market forces determine the price at which these resources can be bought and sold, which can in turn be assumed to be equal to its value. Methods which make use of this approach can be classed as market-valuation techniques (Atkinson *et al.*, 2012).

Many resources provide goods and services which are not traded in markets and which, as a result, do not have a price. These goods must be valued using non-market valuation methods. Since so many environmental resources are not commonly traded, literature documenting the advance of techniques designed to value preferences for non-market costs and benefits has grown at an almost exponential rate in recent times (Atkinson *et al.*, 2012).

Revealed-preference and stated-preference

Non-market valuation methods can be further divided into revealed-preference methods and stated-preference methods. The former rely on the observation of decisions which people make in their day to day lives and uses these decisions to infer the value which they derive from certain resources. Since they require people to be actively engaged with the resource in question, revealed-preference methods are only capable of measuring use-value. One such method involves a consideration of the costs which people incur in purchasing substitutes for natural resources, such as bottled water (Atkinson *et al.*, 2012). This class of methods also makes use of the „weak complementarity" concept first discussed by Mäler in 1974. This concept is well illustrated by the travel cost method, which involves calculating the costs incurred by people in order to make use of a resource and, assuming that this cost is at least equal to the value which people derive from the use of the resource, allows one to estimate

the net benefit accruing to resource users (Hotelling, 1949). The hedonic price method also forms part of this class. This method requires economists to assume that differences in property prices, or in the prices of goods or services, can be explained by environmental factors. This allows for an estimation of the value which people derive from those factors (Triplett, 1986).

In order to estimate non-use values, economists must turn to stated-preference methods. This entails the creation of hypothetical scenarios which aim to produce surrogate markets for the goods and services which are to be valued. Contingent valuation (CV) is the most popular of these methods. In very basic terms, the method entails asking people what they would be willing to pay to preserve a particular resource or what they would be willing to accept to forfeit their access to the resource (Ciriacy-Wantrup, 1947). Choice modelling is another stated-preference method, one which does not rely on stated pecuniary values, but requires people to rank their preferences for resources instead. This allows for the determination of the relative values of resources (Atkinson *et al.*, 2012).

Methodological individualism and methodological collectivism

All of the methods discussed thus far stem from neoclassical microeconomics and are characterised by methodological individualism. This is evident both in their point of departure and in the assumptions which they require their practitioners to make (Groenewegen *et al.*, 2010). These methods begin with individuals, since environmental values are deemed to be determined by the preferences of these individuals. This requires the assumption that people‟s preferences are stable and predetermined (Hausman, 1994). An alternative approach, exemplified by sub-disciplines such as historical economics, institutional economics, and Marxism, is that of methodological collectivism (Dugger, 1979). This approach has its point of departure in the broader environment within which people make their decisions, otherwise known as structure (Groenewegen *et al.*, 2010). The assumption made here is that people‟s decisions, and thus the value which can be inferred from these decisions, are determined by the context in which they are acting. The difference between the two approaches is outlined schematically in Figure 1.1.

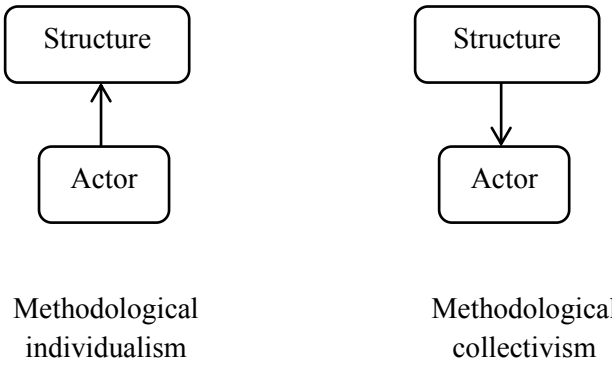


Figure 1.1 The relationship between actor and structure
Source: Adapted from Groenewegen *et al.*, 2010

One such broad-based method, characterised by methodological collectivism, is the sustainable livelihoods approach (Chambers and Conway, 1992). This method requires practitioners to first consider the context within which households make decisions, as well as the resources available to those households. Only once this contextual profile has been established does the analysis proceed to identify the decisions available to households (Krantz, 2001). The method has households as its unity of analysis, and not individuals, which also differentiates it from the methods discussed earlier.

1.3.3 The three methods employed in this thesis

All three methods employed in this thesis rely on the „weak complementarity" concept. Economic impact analysis is not characterised as a revealed-preference method, but it is not very different in its assumptions. The method utilises the assumption that the value of a resource is at least equal to the amount of money which accrues to a regional economy because of its existence (Tyrell and Johnston, 2006). Likewise, the travel cost method assumes that a resource is at least equal to the amount of money that people are willing to spend in order to gain access to it (Ward and Beal, 2000). The third method, the sustainable livelihoods approach, is not conventionally used to value resources. A key product of the analysis, however, is termed „livelihood outcomes" and this can be loosely translated to the benefits which a community derives from the use of resources (Carloni and Crowley, 2005). In this respect, the assumption made in this thesis is that the value of the resource in question is at least equal to the benefits which accrue to a community through the use thereof.

The fundamental difference between the methods is that the travel cost method and economic impact analysis both rely on methodological individualism while the sustainable livelihoods approach takes a methodologically collectivist line. The merits of these differing approaches

will become apparent in Parts B and C, where the results produced by the different methods are reported. Part D will provide concluding remarks, and the discussion here will revolve partly around the different forms of results revealed through the use of these methods.

1.4 STUDY AREA

The Amathole District was selected as the study area which would form part of an initiative of the South Africa – Netherlands Research Programme on Alternatives in Development (SANPAD), to which this thesis is a contribution. The area is home to a number of native and non-native species (De Moor and Bruton, 1988; Tweddle *et al.*, 2009), making it a suitable region within which to explore the social, economic and ecological consequences of stocking South Africa‟s waters with non-native fishes. Beginning in the earlier part of the 20th century, five of the world‟s 100 most invasive species (largemouth bass, smallmouth bass, common carp, brown trout and rainbow trout) were introduced into the Amathole District‟s waters through formal stocking programmes (De Moor and Bruton, 1988). They have since spread throughout the region, invading the streams historically inhabited by three IUCN red-listed species, *Barbus amatolicus* (Vulnerable), *Barbus trevelyani* (Endangered), and *Sandelia bainsii* (Endangered) (Tweddle *et al.*, 2009; Ellender *et al.*, 2011).

Amathole means “calves”, the isiXhosa name for the mountain range and forest making up the northern border of the district (Du Plessis, 1973). The Amathole District was home to 1 664 259 people in 2001. Of these, just over a million were between the ages 15 and 65 years (Stats SA, 2001). The employment status of residents of the Amathole District between the ages of 15 and 65 as determined in 2001 by the national census is presented in Figure 1.2. The district is partly comprised of the former Ciskei Homeland.

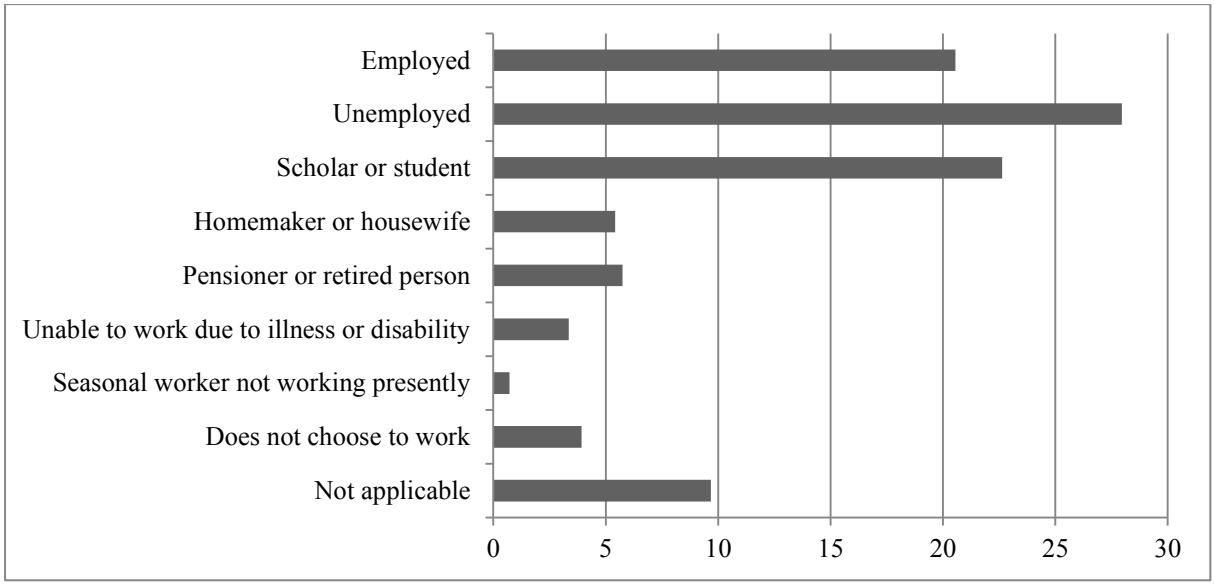


Figure 1.2 Employment statuses as a percentage of people, between the ages of 15 and 65 years, living in the Amathole District

Source: Stats SA, 2001

The public services sector contributes the majority of the district‟s employment, 75 000 jobs. Other relatively large sectors include “manufacturing (25 000 jobs); trade (25 000 jobs); and agriculture (17 000 jobs)” (ADM, 2012). There are three Spatial Development Initiatives in the area: the East London Industrial Development Zone and two other Spatial Development Initiatives, the Fish River and Wild Coast, which lie partly within the District.

The Amathole District has a rich historical heritage. Nine colonial/frontier wars took place within the District between 1779 and 1878, and the area was home to some of the most influential fighters against the Apartheid Regime, such as Nelson Mandela, Thabo Mbeki and Steve Biko. The District government envisages using this heritage as a competitive advantage, and four heritage routes have been established, “named after Xhosa kings and heroes. These are Makana, Sandile, Maqoma and Phalo Routes.” (ADM, 2012). There are also three more general tourist routes falling partly within the District, including “the Sunshine Coast (Port Elizabeth to East London), the Wild Coast (East London to Port Edward), the Friendly N6 (East London to Bloemfontein) and a fourth route, the *Amathole Mountain Escape*, falls wholly within the district in the northern reaches.” (ADM, 2012).

For the present project, two recreational fisheries within the Amathole district were chosen to be studied. Each has been developed in its own way and each has a distinct model of management. The first is located at Wriggleswade Dam and the second at the village of Cata,

just north of Keiskammahoek. Both the study sites under consideration form part of the *Amathole Mountain Escape*, and both fall under the administration of the Amahlati Local Municipality. The location of the two sites is illustrated in Figure 2.2.

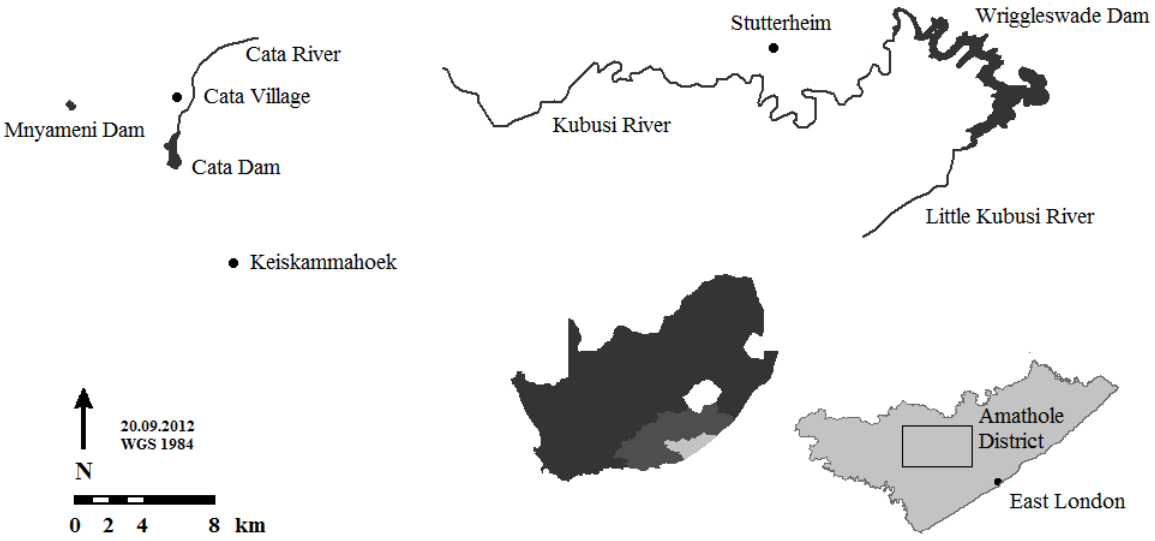


Figure 2.2 Wriggleswade Dam and Cata Village, located within the Amathole District Municipality, showing 3rd order tributaries and dams

PART B: THE FISHERY AT WRIGGLESWADE

Quantitative methods are the most popular way of discerning the value of natural resources, and two such methods were applied to the fishery at Wriggleswade Dam. This part of the thesis concerns Wriggleswade Dam exclusively.

CHAPTER 2

THEORY AND CASE STUDIES

Wriggleswade Dam is host to a number of bass fishing tournaments each year. This means that the fishery is suitable to be studied using quantitative methods. The theory surrounding two widely used quantitative methods, both useful for determining the value of a resource, will be reviewed in this chapter. Section 2.1 begins with economic impact analysis and Section 2.2 covers the travel cost method.

2.1 ECONOMIC IMPACT ANALYSIS

When applied to tourist activity, economic impact analysis can be used to estimate changes in regional spending, output, income, and employment associated with events, resources or developments (Tyrell and Johnston, 2006). The process considers two scenarios and essentially asks what the economic difference would be between a world in which an event took place and a world in which it did not. So it can be seen that one of the scenarios will always be hypothetical. Economic Impact Analyses are frequently used in decision making (Frechtling, 2006). The appeal of the method lies in its ability to provide actual figures which can be compared and contrasted far more simply than qualitative data. Those responsible for generating policy, as well as the media and the public in general seem inclined toward accepting the quantifiable and will often use figures relating to financial flows and employment generation to substantiate their positions towards developments (Snowball, 2008). The method can play a crucial role when motivating the use of public funds. For example, local government or even private institutions will use the method to justify the need to develop infrastructure where it can be shown that improved access to a particular location will have a large economic impact (Tyrell and Johnston, 2006).

When determining the economic impact of an event, the first step is to track the changes in monetary flows that occur as a result of the event. This can be done by recording the changes in the expenditure of all those involved in the event (Tyrell and Johnston, 2001). These changes are then categorised depending on the industries on which they have had an impact. Next one must consider the indirect impacts of the expenditure by looking at the flow of money through the affected industries (Stynes and White, 2006). In doing so one can determine not only changes in income and output, but also changes in factors of production (including labour), thus revealing changes in employment which come about as a result of the event. Finally, there are induced impacts. These refer to the spending of employees that can be attributed to increased earnings resulting from the event (Munn *et al.*, 2010).

However, the method is susceptible to several forms of bias, all of which can be reduced through careful survey design and meticulous analysis (Crompton, 2006). Several ways of doing this will be discussed in the following sections, including which sources and types of expenditure to consider, displacement costs, defining sampling units clearly, being aware of the effects of differential survey timing, categorising expenditure accurately, the treatment of outliers and estimating appropriate multipliers to calculate indirect and induced impacts. It should be noted that when the method is used to calculate the value of a resource it will only capture part of that value, the use value. In most cases it is likely that other types of value, such as option value and non-use value may represent a significant portion of the overall value (Lee and Han, 2002). Section 2.1.1 will cover the first step required to calculate the economic impact of an event: isolating and recording the changes in spending that it generates.

2.1.1 Measuring and categorising expenditure

The cornerstone of a reliable economic impact analysis is the accurate measurement of expenditure. This entails the development of a framework which can account for the source of the expenditure, the geographic starting point of the expenditure, the destination of the expenditure and the reason for the expenditure (Tyrell and Johnston, 2001). If this is done properly, one will be able to distinguish the *net economic impact* of the event from the *gross economic impact* of the event. While the latter measures all the expenditure which occurs during an event, the former measures only that expenditure which has come about as a result of the event. For example, a tourist who purchases a drink from a shop during a festival may or may not be doing so as a result of the festival. The tourist may not even have been aware

of the festival prior to her arrival. So in order for the drink to be added to the net economic impact of the festival, it must be certain that the tourist would not have purchased the drink had it not been for the festival. This is the one and only criterion which needs to be fulfilled in order for expenditure to become part of net economic impact.

Sources and types of expenditure

Expenditure during an event can come from a number of sources. For a fishing competition, the most obvious source would be the competitors themselves. There would also be spectators, volunteers, media representatives, umpires, sponsors, advertisers and vendors. For simplicity, some practitioners have opted to measure only the expenditures of specific groups (McHone and Rungeling, 2000). This ensures that no expenditure is double-counted. For example, a spectator might purchase something from a vendor, who then goes on to purchase something from another vendor. If one counts both of these transactions there will be an overestimation of expenditure. However, in the case that one considers only the expenditure of certain groups, there is a risk of underestimating expenditure. Tyrell and Johnston (2001) refer to studies which they conducted on the ESPN Extreme Games and the NBC Gravity Games. At both these events, sponsor expenditures were larger than any other source. Had Tyrell and Johnston neglected to take this expenditure into account, they would have underestimated expenditure by a considerable amount. Tyrell and Johnston (2001) therefore suggest considering the expenditure of all sources but tracking the circular movements of these expenditures to ensure that they are only counted once.

Crompton"s (2006) definition of economic impact stipulates quite clearly that only spending by tourists should be included. Furthermore, only tourists whose primary motivation for visiting can be attributed to the event in question should be considered. The majority of authors seem to agree that the expenditure of local residents should not be incorporated into an economic impact analysis, since this kind of spending represents recycling of money within the local economy (Baade *et al.*, 2008; Crompton, 2006; Frechtling, 2006; Styne and White, 2006; Wilton and Nickerson, 2006). However, if one ignores the expenditure of local users, one will probably underestimate total impact as it is very possible that some spending by local residents would not have occurred in the absence of an event or a resource (Johnson and Moore, 1993). Furthermore, Dwyer *et al.* (2006) point out that while this money may originate within the local economy being considered, its destination could be different from what it would have been in the absence of the event. In deciding on whether to include local

spending there appears to be a trade-off. If it is not included, the practitioner risks underestimating expenditure. If it is included, however, there is a risk that expenditure will be overestimated, especially considering how difficult it is to prove that local spending would not have occurred in the absence of the event.

A study conducted by McGrath *et al.* (1997) reveals how much difference the inclusion of residents can make. McGrath *et al.* (1997) calculated the economic impact of the South African linefishery on the GGP of KwaZulu-Natal and the Eastern and Western Cape. The authors were not clear on how the study area was further sub-divided, and it is thus impossible to ascertain at which scale „residents" would be excluded from the estimations. If residents were considered as people living within a certain province, then this would exclude a great many more people than if residents were considered as people living within a certain region within that province. In any case, where residents were included, McGrath *et al.* (1997) found that recreational fisheries contributed R 128 million to the gross geographical product (GGP) of KwaZulu-Natal and the Eastern and Western Cape. Where residents were excluded, the number drops to R 5 million. Including residents resulted in an estimation that 7 680 people were employed as a result of recreational fishing, while excluding residents brought the figure down to 300. Including residents is one way of ensuring that the economic impact of a particular resource or event will appear larger than it really is (further discussed in Sub-section 2.1.4).

Most economic impact assessments do not include durable goods. This is because there is no way of showing that the goods were purchased solely for the event and they will in most cases be used for much more than just the event in question (Stynes and White, 2006). However, Kirchner *et al.* (2000) conducted an analysis of the Namibian shore-angling fishery and included the costs of any fishing equipment which had been purchased within Namibia within the year prior to sampling. McGrath *et al.* (1997) included annual expenditures on rods and reels, as well as other equipment and „beach vehicles". While it is possible that both these studies overestimated the net economic impacts in question, one could also argue that the sort of expenditure under consideration could be termed as „running costs". As long as this expenditure took place within the impact area this rationale makes sense (Tyrell and Johnson, 2006). Another approach was adopted by Leibold and van Zyl (2008), who estimated the value of the entire South African recreational angling industry to be R18.8 billion in 2007. While the results of the study are highly questionable, their treatment of fixed costs is

noteworthy. The authors included fixed costs by estimating the total value of durable items including vehicles, trailers, caravans, boats and their engines. They then estimated that the total value of these items, R47.1 billion, would depreciate by 13 % per annum. The annual value of fixed goods was thus concluded to be R6.12 billion, one third of the total economic impact.

Displacement costs

There may be cases in which people who would normally have visited a tourist destination are deterred by an event and choose to go elsewhere. Matheson and Baade (2004) refer to this as *the crowding out effect*, and cite a popular article from Forbes magazine regarding the 2002 FIFA World Cup to illustrate. "The total number of foreign visitors to South Korea throughout the tournament was estimated at 460,000, a figure identical to the number of foreign visitors during the same period in the previous year" (Matheson and Bade, 2004: 1090-1091). According to the article, the net increase in tourists as a result of the event was zero because of the decrease in usual tourists and business travellers from Japan which accompanied the increase in tourists attributed to the World Cup. This is not to say that the net economic impact of the event was zero. Lee and Taylor (2004) conducted an economic impact assessment on the very same event and found that foreign World Cup tourists spent on average 1.8 times as much as foreign leisure tourists. Thus, despite the fact that numbers of foreign leisure tourists decreased during the event, the relatively larger expenditures of World Cup tourists meant that the event generated an economic impact of $ 1.35 billion. Theoretically, the crowding out effect should be counted as part of the opportunity cost of hosting the event, what Crompton (2006) terms a *displacement cost*. Crompton cites a popular article by Williams (2001), the case in question being the Super Bowl. According to some studies, the Super Bowl is capable of generating economic impacts in the region of $250 million. Since the article simply states „economic impact", neither referring to net or gross, technically this would be true. According to Phillip Porter, an economist from the University of South Florida who has examined the data from 15 of these events, once one considers displacement costs "[t]he net economic impact of a Super Bowl is virtually zero" (Porter, cited by Williams, 2001). Again, while there may not necessarily be any difference in the amount spent during one of these events, the nature of the spending is likely to be very different (Tyrell and Johnston, 2001). This means that the recipients of the spending will also be different. Williams (2001) argues that much of the money spent during a Super Bowl event accrues to the NFL, its licensees and nationally owned hotel chains. Thus displacement

costs further highlight the point that the secondary impacts of the expenditure attributed to an event are likely to be very different from the secondary impacts of the expenditure which would have occurred in the absence of an event.

Sampling units

The most obvious sampling unit would be the individual. Gazel and Schwer (1997), however, have shown that this approach often yields inflated results due to an oversampling of primary payers and because there is a tendency amongst members in a group to report the same expenses. According to Stynes and White (2006), the best way to determine how many people to include in a sampling unit is to ask groups of respondents how many people their reported expenses cover. In this way one avoids the problem of dividing shared costs between people and average party costs can be divided by average party sizes to determine average spending per person.

Time

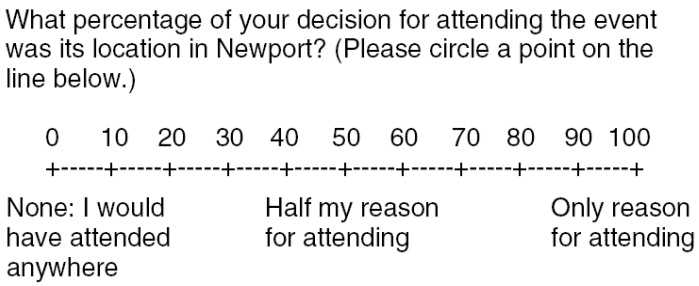
The part of the trip during which respondents are interviewed determines the answers which will be given. Interviewing respondents at the beginning of their trip could lead to an underestimation of spending since they might incur unexpected costs at a later stage. Stynes and White (2006) recommend a mail-back survey which can be completed shortly after the trip. The problem with this approach is that response rates tend to be relatively low. Alternatively, one could conduct a partial interview on site and follow it up with a phone-call after the respondents have returned home. This is the method recommended by Pollock *et al.* (1994). The follow-up survey should be conducted as soon as possible to avoid recall and telescoping errors (Stynes and White, 2006).

Spending categories

There are two reasons why spending categories should be defined in enough detail. Firstly, by including a sufficient amount of detail respondents will be more likely to recall all expenditures as they will be prompted by each individual category (Pollock *et al.*, 1994). Secondly, by knowing which types of goods were purchased, the practitioner will be able to assign each instance of expenditure the correct multiplier depending on the industry in which it was produced (Stynes and White, 2006), although this only applies to studies being done in regions for which accurate multiplier data exists.

Distinguishing event-motivated expenditure from location-motivated expenditure

One must keep in mind that some tourist sites generate expenditure on their own. Thus there will always be some part of the gross economic impact which is not attributable to the event. For example, the expenditure of someone who happens to be at the location of the event regardless of the event should be excluded from the net economic impact (McHone and Rungeling, 2000). Consider the following case: A man plans to visit his son at University. He decides that the best time to do so would be during an annual event held in the town where the University is located. Had the event not occurred, the man would have visited the town anyway. Thus, the man‟s expenditure during the event cannot be attributed to the event and does not form part of the net economic impact. Crompton *et al.* (2001) refers to these people as *time-switchers*. A similar example would be someone who decided to attend an event in a location where they happened to be because of some other event. If a woman was attending a conference in a town where a festival happened to be taking place, and if during her free time she decided to attend that festival, her expenditure could not be said to have resulted from the festival. This is because one cannot rule out the possibility that she would have spent the money elsewhere within the town had there not been a festival. This type of person is known as a *casual* (Crompton *et al.*, 2001). When calculating the economic impact of the Springfest, Crompton *et al.* (2001) found that time-switchers and casuals accounted for 48.7% of all visitors. Including their expenditure would have greatly overestimated the net economic impact. On the other hand, Janeczko *et al.* (2002) point out that there are cases in which people who are visiting a place could be led to stay longer because an event is taking place there. These are time-switchers in a completely different sense. They would have gone home, but the event has kept them spending money in a place instead of going home to spend it there. As with many other areas of economic impact analysis, a longer questionnaire could capture this, but this could also lengthen the data collection procedure to the extent that people lose interest and in doing so introduce a different form of bias stemming from their reduced concentration (Janeczko *et al.*, 2002). Tyrell and Johnston (2001) distinguish between the reasons for respondents‟ expenditure with the following question:



Using a continuous variable as opposed to a categorical variable has an advantage in that a specific proportion of the person‟s expenditure can be attributed to the event, rather than either all of it or none of it (Tyrell and Johnston, 2001).

Outliers

Outliers are observations which deviate markedly from other observations in the sample. The problem with outliers is that they distort the mean and their presence can result in data with high standard errors, rendering them statistically unreliable (Johnson and Bhattacharyya, 2011). One solution would be for a practitioner to use the median instead of the mean in the case that extreme outliers are present in the data. Another more frequently used method is to trim or censor outliers when calculating the mean. For example, if one wished to estimate a 5% trimmed mean, one would do so by dropping 2.5% of the observations at both the lower and upper ends of the distribution (Stynes and White, 2006).

2.1.2 Calculating indirect and induced economic impacts

The multiplier effect

The *multiplier* effect refers to the process by which initial expenditure is channelled through various sectors of the economy, creating a ripple effect of spending and re-spending (Snowball, 2008). The effect is illustrated schematically in Figure 2.1, which represents a tourist‟s expenditure on petrol within a hypothetical impact area. The initial spending forms part of the *direct* economic impact (Crompton *et al.*, 2001). The business which supplied the tourist with petrol would then go on to channel that money into various inputs for the business, one of them being labour. The portion of the tourist‟s money which goes towards paying the wages of employees constitutes an *indirect* impact of this spending. The employees of the petrol station would then go on to use part of their wages to purchase consumable products, and this third round of spending is known as the *induced* impact (Crompton *et al.*, 2001). In some cases, employees themselves will buy petrol, and this will then be rechanneled into the inputs of the petrol supplying industry, which will recycle back

into their own wages. One can imagine how this completes a theoretically infinite cycle, with the initial spending by the tourist cycling round the economy indefinitely. Considering that part of the money is lost to leakages from the local economy at every part of the cycle (such as through the paying of income tax and the purchasing of imports), the amount of the initial spending in circulation decreases until it is negligible (Crompton *et al.*, 2001). The factors which determine the size of leakages will be discussed in the following paragraphs.

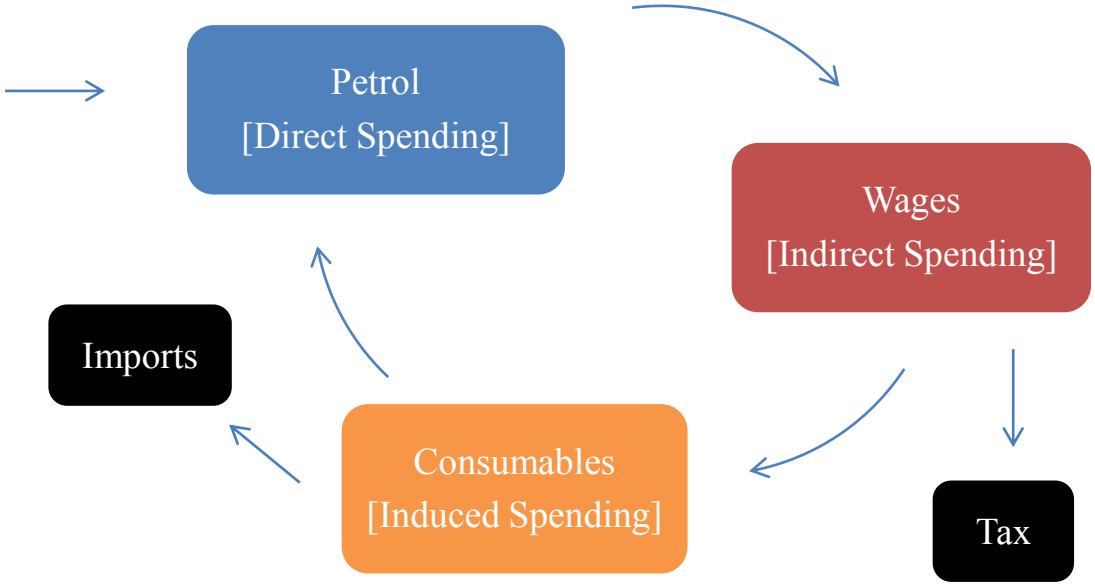


Figure 2.1 An example of the multiplier effect
Source: Adapted from Crompton *et al.*, 2001

From this discussion, it follows that the more industries supply goods and services locally, the more money will remain in the impact area. If most of the goods and services consumed in the area are imported from surrounding areas then most of the money will be lost to leakages. This will result in an economy with a relatively small multiplier. In a study done to determine the economic impact of the South African National Arts Festival, Antrobus and Snowball (2004) found that, on average, Grahamstown businesses imported 87% of their stock from other cities in the Eastern Cape. This means that a great deal of any first-round spending within Grahamstown would, in its second round of spending, go towards paying for imported goods and so be lost to the local economy. Thus, Antrobus and Snowball (2004) estimated that Grahamstown has a small multiplier of 0.18. A comparison of multipliers is given in Table 2.1 and is discussed further in the following section.

Matheson (2004) points out the dynamic nature of multipliers. Consider the example of a hotel. The hotel uses capital which can either be supplied locally or come from outside the region, as is common with multi-state or multinational hotels. In the case that capital is supplied locally, returns to that capital will be reaped locally and channelled into the direct household income of the owners of the capital. Where capital is sourced elsewhere, the returns to that capital will be channelled elsewhere and effectively leak out of the local economy. In the case of a mega-event, the increase in demand for hotel rooms can lead to a change in the size of the multiplier. This will not happen if capital is supplied locally, since the increased demand will not affect the relative flows of money. If capital comes from somewhere else, however, the increase in demand can have one of two effects. If extra labour is employed temporarily, the event could lead to an increase or decrease in the size of the multiplier, depending firstly on whether the labour is sourced locally, and secondly on whether the increase in wages required is greater than the increase in returns earned from capital. If labour is sourced locally and the increase in wages is greater than the increase in returns to capital, then the multiplier will be relatively larger during the event. In the event that labour is brought in from outside of the local economy, this will translate into a leakage and decrease the size of the multiplier. Antrobus *et al.* (1997) found that of the 378 temporary jobs created by the 1996 South African National Arts Festival, a mere 36% were taken by people residing within the impact area. Finally, if extra labour is not employed and managers simply expect regular staff to absorb the increase in pressure, while returns to capital sourced outside the local economy increase, then the multiplier will shrink relative to its non-event level.

Some studies do not consider multiplier effects at all. Du Preez and Lee (2010) carried out a study to determine the contribution of trout fly fishing to the economy of Rhodes, situated in the northern part of the Eastern Cape. Du Preez and Lee simply calculated the economic impact by adding all costs incurred by their respondents except those relating to transportation. However imprecise the estimation of indirect effects might be, there is little doubt that the economic impact of R5 035 834 estimated by du Preez and Lee (2010) is an understatement, since no indirect impacts were considered. That being noted, given the rural nature of Rhodes, indirect impacts would likely have been small.

Determining multiplier sizes

Ideally, indirect and induced impacts would be determined through the use of input-output models, one of the most popular being the Leontief model (Lindall, 2007). The Lieontief model depicts inter-industry flows as a matrix, allowing one to calculate the impact of a change in output in one industry on another (Fletcher, 1989). IMPLAN is a software package which utilises the Leontief model. It was developed in 1984 by Scott Lindall and Doug Olson at the University of Minnesota. Lindall and Olson later went on to form MIG, Inc. This company offers the software package, region-specific data and technical support to its customers, allowing them to conduct Economic Impact Analyses anywhere in the United States provided that they have expenditure data (Lindall, 2007). Certain authors are sceptical about the results produced by those who are not familiar with the intricacies of the model, and who are thus ill-equipped to make certain crucial adjustments to parameters given the distinct nature of each event (Tyrell and Johnston, 2006; Crompton, 2006).

Crompton (2001) distinguishes between two different multipliers used by the IMPLAN system. The *sales* multiplier is determined by the effect of an extra unit of spending on local economic activity. On the other hand, the size of the *personal income* multiplier depends on the effect which an extra unit of spending has on residents‟ personal incomes. In more recent literature, Munn *et al.* (2010) refer to the sales multiplier as a type-1 multiplier and the personal income multiplier as a Social Accounting Matrix (SAM) multiplier. Since leakages are generally far greater in industry than they are within households, Crompton argues that the personal income multiplier will usually be larger. Crompton (2001) also states that this is the multiplier which is likely to be of most use to policymakers. This is because policymakers are primarily concerned with the costs incurred by residents through taxes which have been directed towards the event and the benefits received by residents as a result of the event.

Both Chen *et al.* (2003) and McGrath *et al.* (1997) used input-output models to conduct economic impact analyses of fisheries. That Chen *et al.* (2003) had a far smaller study area is reflected in the multiplier used, 0.28 as opposed to McGrath *et al.*‟s (1997) 0.823. See Table 2.1. Chen *et al.* (2003) observed that the secondary impacts came primarily from the tourism sectors of hotels and lodging, eating and drinking, as well as recreation services including boat rentals, boat operation, boat launching fees, fishing guide fees and fishing license fees. Spending in these sectors then generated additional spending by restaurants and hotel employees in a third round.

In order to calculate the economic impact of the Melbourne festival, the City of Melbourne and Melbourne International Festival of the Arts (MIFA) used earlier estimates of value added multipliers obtained by Price Waterhouse using input-output tables developed by the Centre for Economic Research (Melbourne Festival Study, 1996). The multiplier of 1.1 is much larger than those used in the other studies considered here as Melbourne is an urban area with relatively more industry, and thus a region in which much of the initial spending would have remained in the impact area during successive rounds of spending.

Unfortunately input-output models are not available for many regions. Another option is to conduct a survey of local business, as was done by Antrobus and Snowball (2004). Such a survey will reveal the extent to which local expenditure leaks into other economies and therefore what proportion of expenditure can be expected to recirculate within the local economy. Another option, estimation, is less accurate but requires a great deal less in terms of time and money. Shahidsaless *et al.* (1983), Baaijens and Nijkamp (2000) and Greenberg *et al.* (2002) all found the size of the multiplier to be positively related to both population size and the physical area of the regions which they studied. As a general rule, Shahidsaless *et al.* (1983) found that the closer a region is to a larger market, the more likely the region will be to import goods and services from that market. This is known as Central Place Theory.

Kirchner *et al.* (2000) obtained their multiplier using national income accounts, making a number of simplifying assumptions. This is known as the Keynesian multiplier or response coefficient. The multiplier (K) is obtained by dividing Gross National Income (Y) by the sum of government net current expenditure (G), gross physical capital formation (I) and exports of goods and services (E)

$$K = Y/(G + I + E) \tag{2.1}$$

Leibold and van Zyl (2008), in their study of the South African recreational angling industry, used two distinct multipliers depending on the nature of the goods purchased. For consumable goods they used a relatively larger multiplier of 0.4, as opposed to the 0.1 used for durable goods. This is because consumable goods are more often produced locally and so have larger direct and induced impacts, whereas durable goods used in the angling industry, such as vehicles and boats, are often produced in other countries and so their economic impact would be limited to the income generated by distributers and retailers (Leibold and van Zyl, 2008).

Table 2.1 Previously studied regions and their corresponding multipliers

Authors and Date	Type of Study	Region of Impact	Multiplier	Method of Determination
City of Melbourne and MIFA, 1996	Festival	Melbourne, Australia	1.1	Input-output matrix
Antrobus *et al.*, 1997	Festival	Grahamstown, Eastern Cape	0.18	Business Survey
McGrath *et al.*, 1997	Fisheries	KwaZulu-Natal, Western Cape, Eastern Cape	0.823	Input-output matrix
Kirchner *et al.*, 2000	Fisheries	Namibia	0.9	National Income Accounts
Chen *et al.*, 2003	Fisheries	Lake Fork area, Texas, USA	0.28	Input-output matrix
Leibold and van Zyl, 2008	Fisheries	South Africa	0.1/0.4	Business Survey

2.1.3 Long run impacts

Pio *et al.* (1988) point out that economic impact analyses are generally short term in nature. They fail to take into account the long-run benefits generated by events. International mega-events, such as a football world cup, are opportunities for a country to showcase its infrastructure and enthusiasm and can lead to improved relations between residents and visitors from abroad. In countries where conditions are found to be favourable for business, international events could even generate positive spin-offs in the form of increased foreign direct investment (Matheson and Baade, 2004). Kang and Perdue (1994) calculated a more long term impact of the 1998 Olympics Games hosted by Seoul. The "Olympic Impact Curve" estimated the impact over three years at $ 1.3 billion.

2.1.4 The cost of introducing bias intentionally

Unfortunately, economic impact analyses are often conducted by practitioners with a specific agenda. In many cases incentives exist for practitioners to apply what Crompton (2006) terms „mischievous" procedures. Consulting firms which fail to deliver results that are pleasing to clients are unlikely to receive repeat business or referrals, giving them an incentive to manipulate the results of their studies to produce satisfactory results (Crompton, 2006). The consequence is that policymakers are too often misled about how to manage their scarce resources most efficiently. Unreliable data leads to poor decisions which can have dire

consequences for the tax-payer (Crompton, 2006). This, in turn, discredits the economic impact method in general and, where biased results have been published for tourist events, can even portray the tourism industry in a negative light. A series of studies with questionable credibility conducted throughout the 1980s in the United States of America led to a feeling of disillusionment with the method and with the tourism industry:

> "The inevitable result of the misuse of economic impact methodology has been the growth of a backlash against the idea that tourism has any role to play in local economic development. Although this cynicism is rarely published in industry journals, it is expressed frequently in private conversations and sometimes even public addresses by officials." (Smith, 1989, cited by Crompton, 2001: 87).

That people would question the ability of tourism to contribute to local economic development, given the wealth of information which exists to the contrary (Ekanayake and Long, 2012), shows how harmful deceitful applications of the method can be.

If these studies are conducted in as unbiased a manner as possible, however, they have the potential to generate useful policy recommendations. Munn *et al.* (2010) used input-output analysis to determine the economic contribution of fishing, hunting and wildlife-associated recreation expenditures to the southeast U.S. regional economy. *Economic contribution analysis*, as opposed to economic impact analysis, takes into account the expenditure of residents. Since their study area was relatively large and encompassed industrial areas, they found that fishing expenditures generated significant indirect and induced impacts, with a sales multiplier of 1.31 and a personal income multiplier of 1.58. Despite their inclusion of residents, the authors found that fishing expenditures were dominated by trip-related costs, accounting for 46 % of overall expenditure. Contrasting the personal income multipliers used for fishing with those used for hunting revealed that fishing related expenditure had a relatively larger impact on output, whereas hunting related expenditure generated more employment. Thus, if the goal of policymakers in the southeast U.S. was to increase employment, promoting hunting related recreation more than fishing related recreation would be wise. Lastly, the study reported that the direct impacts of freshwater fishing (US$9.53 billion) to be twice as large as marine fishing direct expenditures (US$4.55 billion).

2.2 THE TRAVEL COST METHOD

Where the market fails to capture the full value of resources, one must turn to non-market valuation techniques. The travel cost method (TCM) is a widely used revealed preference method, employed to calculate the use value of resources to those who make use of them.

The TCM was originally proposed by Harold Hotelling in 1947. Hotelling‟s idea was based on the microeconomic theories of demand and consumer choice. He suggested that as the distance which visitors must travel to reach a site increases, so does the cost of reaching that site. In accordance with demand theory, this translates into declining visitation rates the further visitors are from the site being considered (Hotelling, 1949). If one assumes that the cost of travelling to a site represents the price of accessing that site, then gathering data on the differential travel rates corresponding to various distances allows economists to estimate functions which can reveal the demand for sites (Randall, 1994). These functions, known as trip generating functions, usually incorporate additional explanatory variables. Variables relating to the users are income, age, gender and educational attainment (Ward and Beal, 2000). Other variables include the price and quality of substitute sites as well as the site being considered (Caulkins *et al.*, 1986). The TCM falls into the category of non-market valuation techniques (Ward and Beal, 2000).

Assuming that the information gathered on visitors can be extrapolated to a broader population, a somewhat controversial assumption, this can then be taken a step further (McConnell, 1992). If one isolates a particular resource as being the reason why visitors frequent a site, one can use the trip generating function to calculate the consumer surplus afforded to society by that resource and the value which society places on the resource. It is important to note that the travel cost method is only capable of measuring use value. Non-use value may in itself represent a significant portion of the overall value. For example, Lee and Han (2002) used contingent valuation to estimate the value of five national parks in South Korea and found that use values accounted for an average of 45.9% of each park‟s total value.

Three distinct forms of the TCM are commonly used. One of these forms is the Zonal Travel Cost Method (ZTCM), first conceived of by Hotelling and developed substantively by Clawson and Knetsch (1966). Another is the Individual Travel Cost Method (ITCM), conceived by Brown and Nawas (1973) and advanced by Gum and Martin (1974). Both these

methods are still widely in use because both have unique merits. The applicable technique should be selected depending on the data being considered. Rolfe and Prayaga (2007) conducted a study to determine the value of recreational fishing at three dams in Queensland, Australia. Their initial attempts to fit models to the data were unsuccessful. According to Rolfe and Prayaga (2007), there was too much heterogeneity to produce robust results. Their solution was to stratify the data, dividing the anglers into those who fished frequently and those who did not. They found a significant difference in the two groups of anglers with regards to travel costs, distance travelled, days spent fishing, length of holiday and number of people in group. Rolfe and Prayaga (2007) then proceeded to analyse the two groups in different ways. For the frequent anglers they used the ITCM and for the occasional anglers they used the ZTCM, avoiding the problem of overdispersion, an issue which will be discussed in Section 2.2.2 of this chapter.

Walsh *et al.* (1992) surveyed 156 travel cost analyses which had been done between 1968 and 1988. The purpose of the survey was to identify the factors which were most pronounced in providing benefits to visitors. The following variables were found to be significant at the 10 per cent level or higher in determining the value of the sites considered in the meta-analysis: the kind of recreation provided by the site; whether or not the opportunity cost of travel time was included in the study; the cost of travelling to substitute sites; and whether the zonal or individual method was used. The study found that some activities were valued at a significantly higher level than others, including big game hunting and anadromous fishing (fishing for migratory species such as the Pacific Salmon). The findings also confirmed *a priori* expectations regarding the coefficient signs, showing that the empirical applications of the method in the cases examined had been consistent with economic theory. For example, overall travel costs were found to vary inversely with the number of trips made to visit a site and the price of substitute sites was found to vary directly with the number of trips made.

2.2.1 The zonal travel cost method

The ZTCM groups visitors according to the costs which they must incur to reach a site. This produces zones around the site being considered. Originally these zones were concentric rings but later they were further developed to reflect the more complex spatial nature of travel costs (Ward and Beal, 2000). The next step is to estimate the population of each zone using census, or some other form of reliable demographic, data. This allows economists to calculate the visitation rate of each zone. Take the example of a lake. It costs visitors in the first zone

surrounding the lake on average R100 to reach it and 200 people out of the zone‟s population of 1000 make use of the lake in a month. For visitors from the second zone, it costs R200 to travel to the lake, resulting in 100 people out of a population of 1000 visiting in a month. The assumption made by Clawson and Knetsch (1966) here is that if one were to impose an entrance fee of R100 on lake visitors, the number of visitors from the first zone would fall from 200 to 100. This sort of speculation has been criticised by authors such as Randall (1994), who highlights the fact that people living in different areas are likely to have different preferences and questions the ability of trip generating functions to predict peoples‟ responses to changes in prices.

Other limitations of the ZTCM have been pointed out in addition to that highlighted by Randall (1994). When individual travel times and travel costs are averaged to determine zonal values, a strong correlation develops throughout the various zones. This multicollinearity can be overcome by omitting travel time from the regression analysis, although this solution renders the ZTCM incapable of gauging the impact of travel time on individuals‟ decisions (Brown and Nawas, 1973). One solution to this problem will be discussed in Section 2.2.6. Secondly, the aggregation of socioeconomic variables required to estimate zonal averages makes these variables statistically insignificant. This is known as a loss of information efficiency and presents researchers with a dilemma: include all relevant variables and be sound in theory or exclude problematic ones for the sake of agreeable empirical estimates (Ward and Beal, 2000)?

Fleming and Cook (2008) maintain that the ZTCM is capable of producing plausible estimates of the benefits which certain sites provide to society. The utility of the method can be seen in their study of Lake McKenzie on Fraser Island, off the coast of Australia. Fraser Island receives over 300 000 visitors a year. This sheer quantity of visitors has led to pressures such as erosion, litter-disposal, human-wildlife interactions and the contamination of freshwater resources, which threaten the unique ecosystems found here. In order to prevent environmental degradation, conservation authorities have realised the need to limit the visitors to the island. Doing so will benefit the local environment but will come at a cost to society in the form of a reduced consumer surplus. In this case, the ZTCM was employed as a means to determine the magnitude of this cost.

2.2.2 The individual travel cost method

Most commonly, the ITCM utilises the number of trips taken to a visit a site by individuals or households within a given time-period as its dependent variable. Since many people will only visit a site once during any period, the dependent variable is often equal to one. This produces a peculiar distribution and can also result in biased estimators (Ward and Loomis, 1986). The following discussion will centre largely on how this bias, made manifest in endogenous stratification and overdispersion, can be reduced.

The trip generating function

Employing the ITCM will generate a regression with a dependent variable of non-negative integers. The most appropriate way of generating a demand curve from this sort of data is to use count data models, and this technique is now standard practice (Creel and Loomis, 1990; Parsons, 2009). A theoretical underpinning for the use of count data distributions in modelling the demand for recreation sites is provided by Hellerstein and Mendelsohn (1993). The argument is based on the restricted choice model, wherein individuals are assumed to maximise utility (U) by choosing a combination of X_1 (the number of trips to a recreation site) and X_2 (the quantity of a vector of other goods), as seen in Equation 2.2.

$$\max_{X_1 \in I, X_2}[U(X_1, X_2, \in; \beta) | P * X = p_1 x_1 + p_2 x_2 = Y] \quad (2.2)$$

Standard count data models, such as that based on the Poisson distribution, place probability masses at non-negative integer values and are characterised by skewness to the left, reflecting the relative concentration of data points. Also, the models assume that variance changes in proportion to the conditional mean (Cameron and Trivedi, 2001). This is known as equidispersion and is symbolised in Equation 2.3, where the first two moments of the Poisson distribution are equal ($E[Y] = \mu = V[Y]$).

$$\Pr[Y = y] = \frac{e^{-\mu}\mu^{y}}{y!}, y = 0,1,2, \ldots, \quad (2.3)$$

However, the Poisson distribution is considered theoretically unsound when applied to travel cost data for three reasons. Firstly, the individual travel cost method employs data collected on site. This means that non-visitors are not sampled and presents a problem known as the truncation of non-users. The problem lies in the inability of the demand curve which is generated to make predictions about the behaviour of people who did not visit the study area (Parsons, 2009). Another problem is that those visitors who frequent the site more often than others have a greater chance of being sampled, and this is called endogenous stratification

(Parsons, 2009). Lastly, the data collected are often characterised by many individuals who have made few trips and a few who have made many trips. This produces variation which is greater than the mean, and so violates the assumption of the Poisson distribution that variance changes with the mean (Parsons, 2009). A solution employed by Boker *et al.* (1996), takes the product of the size of the travelling party and the number of trips taken in a given period as the dependent variable. The same technique was used by Bhat (2003) and again by Martínez-Espiñeira and Amoako-Tuffour (2008). The technique does require one implicit assumption: that the size of the travelling party, as well as other variables, is the same for previous trips as it is for the one sampled.

Another solution which addresses truncation of non-users as well as endogenous stratification was devised by Shaw (1988), and entails weighting each observation by the expected value of visits. Shaw demonstrates how this is done using the Poisson distribution in Equation 2.4.

$$\Pr[\mathrm{Y} = \mathrm{y}|\mathrm{Y} > 0] = \frac{e^{-\mu}\mu^{y-1}}{(y-1)!}, y = 1,2, \ldots \quad (2.4)$$

It follows that subtracting 1 from each of the dependent variables solves both problems. This has been applied by Fix and Loomis (1997), Hesseln *et al.* (2003), Loomis (2003), Bin *et al.* (2005), Hagerty and Moeltner (2005) and Martínez-Espiñeira *et al.* (2006). The third problem, overdispersion, cannot be addressed by the Poisson model and leads to artificially low standard errors with inflated t-statistics in the usual maximum-likelihood output. Worse, where the Poisson model has been corrected for truncation of non-users and endogenous stratification, the presence of overdispersion will result in inconsistent and biased estimates of consumer surplus (Grogger and Carson, 1991). The Negative Binomial model accounts for overdispersion by adding a parameter, α, which measures it. This allows one to test for overdispersion by performing a likelihood ratio test on α.

Once a Marshallian demand function has been estimated, the area below the curve can be calculated using integration. This area has been shown to be equal to consumer surplus, sometimes referred to as net benefit (Parsons, 2009). The area can be calculated fairly simply, using the negative inverse of the travel cost coefficient ($-1/\hat{\beta}$) (Creel and Loomis, 1990; Shrestha *et al.*, 2002; Du Preez and Hosking, 2011). While there will be some error associated with the use of Marshallian demand, McConnell (1992) has shown it to be insignificant in light of the overall estimation error.

Three notable examples

Du Preez and Hosking (2011), in their application of the ITCM to the trout fishery at the village of Rhodes in the north Eastern Cape, a province of South Africa, used four different econometric specifications: the standard Poisson specification, a Poisson specification adjusted for truncation and endogenous stratification, a standard negative binomial specification and a zero truncated negative binomial specification. Du Preez and Hosking (2011) found all four models to be suitable in some respects, with no differences in the signs of coefficients between the models and similar coefficient sizes. Some variation was found with regards to the statistical significance and the goodness of fit measures implied by the models. A major difference found between the two types of models concerns the issue of over-dispersion. The Negative Binomial models both include a parameter which measures over-dispersion (α), and both models found this parameter to be highly significant. This implies that the Poisson models, which do not account for over-dispersion, are limited in their ability to reflect the fact that a small number of visitors take many trips while a large number of visitors take only a few trips within the given period. This narrowed down the choice of models, with the standard negative binomial specification and a zero truncated negative binomial specification being the preferred candidates. Du Preez and Hosking (2011) concluded that since the zero truncated negative binomial specification accounts for over-dispersion as well as truncation, it was the most suitable model. The consumer surplus estimated by this model was R13 072 per trip in 2007 ($ 1 836[2]) (see Table 2.2).

Shrestha *et al.* (2002) reported the results of their study to determine the value of recreational fishing in the Brazilian Pantanal, using three econometric specifications. Like du Preez and Hosking (2011), they reported their results using the Poisson specification adjusted for truncation (but not for endogenous stratification) and the standard negative binomial specification. In addition to these two specifications, they also used a non-linear model. One of Shrestha *et al.*‟s (2002) findings worth noting here is that income was only significant when the non-linear model was used, indicating that income does determine the amount of trips made, but in a non-linear way. The coefficient sign for this variable was negative, a result which the authors call counterintuitive. It seems strange then that the authors did not comment on the negative coefficient of the variable pertaining to anglers‟ education levels, which was significant in all three models.

[2] Using the 2007 USD-ZAR exchange rate of $1=R7.12

Another finding of Shrestha *et al.* (2002) concerns the standard negative binomial specification. The over-dispersion parameter (α) estimated by the model was insignificant, unlike with du Preez and Hoskings‟ (2011) data. This demonstrates the diverse nature of data which can be encountered when conducting travel cost analyses and calls for a dynamic, experimental approach when selecting econometric specifications. The Poisson model was thus found to be as suitable as the Negative Binomial model, providing an identical estimate for per trip consumer surplus of $540.54 in 2002 ($826.00 in 2011 prices) (see Table 2.2).

Martínez-Espiñeira and Amoako-Tuffour (2008) conducted a travel cost analysis of recreation demand in Gros Morne National Park in Newfoundland, Canada. Their substantive contribution was to use not only the same models as by Shrestha *et al.* (2002) and du Preez and Hosking (2011), but they also included an additional model which they referred to as the „generalised truncated and endogenously stratified negative binomial‟ (TNB) model. Where the negative binomial model incorporates a parameter used to measure over-dispersion (α), it was developed on the assumption that this parameter only varies with regards to the mean. The standard negative binomial model thus constrains the degree of overdispersion, allowing it to vary only as a constant multiple of the mean. The TNB, on the other hand, computes the parameter in its relation to all other variables observed, capturing a degree of heterogeneity which exists as a result of the interplay between overdispersion and all independent variables included in the model. As expected, Martínez-Espiñeira and Amoako-Tuffour (2008) found that the new model fitted their data better than the others, as evidenced by a slightly higher pseudo-R^2 value and also a higher χ^2 value. The per trip consumer surplus estimated by this model was $1 596 in 2008 ($1 691 in 2011 prices) (Table 2.2).

Table 2.2 Previous estimates of per trip consumer surplus

Authors, Date	Place	Type of Recreation	Average Length of Trip (days)	Per Trip Consumer Surplus in 2011 USD	Per Day Consumer Surplus in 2011 USD
Shrestha *et al.*, 2002	Brazilian Pantanal	Angling	6.26	$ 826	$ 132
Martínez-Espiñeira and Amoako-Tuffour, 2008	Gros Morne, Canada	Hiking, angling, swimming, whale watching	3.93	$ 1 691	$ 430
Du Preez and Hosking, 2011	Rhodes, Eastern Cape	Angling	4.90	$ 1 836[3]	$375

2.2.3 Fixed costs

Most studies omit fixed costs, such as the costs of vehicles, as they are rarely, if ever, purchased to be used for a single trip. It could be argued, however, that the boating costs incurred when fishing form part of the travel costs. Rolfe and Prayaga (2007) used Equation 2.5 to calculate total costs, in which TC = total cost.

TC = trip cost + fishing cost + annual boat expenses / number of annual fishing trips (2.5)

2.2.4 Incorporating multi-site or multi-purpose trips

A problem arises when visitors have planned their trip in a way which allows them to take advantage of multiple sites in one trip. Perhaps the most obvious way of avoiding this issue is by redefining one‟s study area to include all sites visited on multiple trips (Mendelsohn *et al.* 1992). While this may be acceptable in certain contexts, it does nothing to address the actual problem when researchers are concerned with specific sites (Ward and Beal, 2000). Ideally, the costs of travel must be divided between the sites to accurately reflect the respective benefits which visitors have received from them.

Smith‟s (1971) solution for the valuation of any given site was to only incorporate the cost of travelling the distance from the previous site visited. Ulph and Reynolds (1981) point out that this could result in an underestimation of consumer surplus in the case that a highly regarded site is visited after a site which has merely been used as a stopover. A more appropriate solution surely requires collecting more information than utilised by Smith (1971). One way

[3] Using the 2007 USD-ZAR exchange rate of $1=R7.12

to overcome the problem is to ask respondents how much time they spent at each respective site, dividing overall costs between the sites and weighting accordingly (Stoeckl, 1993). This technique, however, undermines the ability of the method to produce demand curves which are consistent with economic theory. For example, Stoeckl (1993) conducted a study of Hinchinbrook Island in Queensland and found that when she applied the technique, the resulting average cost to visitors from Tasmania (many of whom visited other sites in the same trip), 2000km away, was $187. Meanwhile the average cost to visitors from Townsville, 100km away, was estimated at $389.

Another way of dealing with this issue is the one first proposed by Clough and Meister in 1991. The total travel costs of all visitors should be included in the function, regardless of whether other sites were visited or not. Following this, the zonal consumer surplus estimates should be adjusted according to the average proportion of the total trip which visitors from each respective zone spent at the site. This method was also used by Fleming and Cook (2008), who found their estimates to be consistent with demand theory.

Finally, Rolfe and Prayaga (2007) took a more direct approach, asking visitors to rate the relative importance of each site visited during the same trip. They then ascribed an appropriate proportion of overall travel costs to the site which they were analysing.

2.2.5 Substitute sites

Both the quality and price of alternative sites determines the demand for a given site. Caulkins *et al.* (1986) found that omitting substitute sites from the trip generating function biases the slope coefficient in a way which is dependent on the correlation between the price of the site in question and other sites. If the correlation is positive, then omitting substitutes will result in the price elasticity of demand for the site being considered being biased towards zero. If the correlation is negative, then omitting substitutes will produce a function which overstates elasticity. This finding is consistent with demand theory. If the spatial distribution of visitors lies largely between two substitute sites, it is likely that there will be a negative correlation, since those visitors who are close to one site will be further from the other and *vice versa*. An example would be two angling sites on either side of a city. If visitors live roughly equidistant from the two sites, there will likely be a positive correlation. Rosenthal (1987) confirmed these findings, concluding that substitutes should be included if the consumer surplus is to be accurately estimated. It follows that if the prices of substitute sites are uncorrelated, omitting substitute prices will not bias the results (Kling, 1989).

It is precisely when substitute sites should be included, that is when their prices correlate strongly with the site being considered, that including them can result in multicollinearity. The more the prices correlate, the more difficult it will be to disentangle the separate effects of the site and its substitutes. This results in high standard errors and produces statistically unsound findings. So where the correlation exists researchers face a trade-off which is similar to that mentioned previously in Section 2.2.1. One can follow the theoretically sound path and include the price of substitutes, but this will result in high standard errors; or one can omit the price of substitutes and have a model which produces empirically pleasing results but doesn‟t include all of the most significant variables (Ward and Beal, 2000).

Another complication arises when one tries to decide what sites should be included as substitutes. This is clearly a subjective question (Ward and Beal, 2000). For some people a fishing trip is solely about fishing and the utility which they gain from it is determined purely by how many fish they catch. In this case a substitute site would need to be comparable in terms of the fishing experience which it offers. Others might enjoy the experience in a broader sense, taking in the scenery and perhaps incorporating other activities, such as bird watching, into their trip. Whether or not a site would be considered a substitute for people like this would depend on much more than the quality of fishing.

The solution offered by Freeman (1993) is to ask visitors which sites they visit frequently and then choose from that list sites which have similar attributes. Another idea is for researchers to select sites which they believe to be suitable substitutes and then test their choices using the substitute price coefficients produced by the trip generating function. The general reaction toward the idea of researcher-defined substitutes has been negative. Models using researcher-defined substitutes have been found to be as inaccurate as models which ignore other relevant variables (Stoeckl, 1993). Peters *et al.* (1995) conducted an analysis to gauge the difference between a model which relied on researcher-defined substitutes and the same model except with user-defined substitutes. The difference in consumer surpluses estimated by the two modes was statistically significant and led the authors to question the validity of researcher-defined substitutes.

2.2.6 The value of time

Had visitors not been to a site, they could have spent the time doing virtually anything else. Thus, the time which they spend travelling to a site as well as the time which they spend at a site has an opportunity cost. If this opportunity cost is not added to other „out-of-pocket“

costs, the result will be an underestimation of consumer surplus (Bishop and Heberlein, 1979; Du Preez, 2011). In a simplified model of the world, such as the one proposed by neoclassical economists in their labour supply model, there is a trade-off between income and recreation. Here the opportunity cost of time is simply the foregone wages which one would have earned if one had been working. In reality many people have jobs in which they work a set number of hours per week and use the rest for various types of recreation. Thus the conventional income-recreation trade-off may apply to self-employed people or those who have a more casual way of determining their weekly hours, but it cannot be applied to retirees, students, unemployed persons or the many people whose work schedules are more standardised (McKean *et al.*, 1995; Ward and Beal, 2000). For these people, the opportunity cost of leisure time can by no means be assumed without an intimate knowledge of their preferences (Shaw, 1992). To further complicate matters, Palmquist *et al.* (2004, cited in Amoako-Tuffour and Martínez-Espiñeira, 2008) point out that for many people time is not as easily divisible as it is in the idealised „neoclassical world". Free time is only available to many people in pre-determined blocks, and moving time around between these blocks is a costly activity in itself.

As noted earlier, the incorporation of travel time when using the ZTCM results in multicollinearity due to the correlation between aggregated travel time and travel cost variables. Cesario and Knetsch (1970) point out that if the cost of travel time can be estimated, it can simply be added to the travel cost variable, solving this problem. Moreover, not including travel time as a cost is likely to lead to a considerable underestimate of the benefits which accrue to visitors of a site. For example, Bishop and Heberlein (1979) found that the total consumer surplus estimated using the travel cost method with time costs assumed to be half the income rate were nearly four times as large as those where time costs were assumed to be zero. Drawing on literature from economics and the field of transport planning, Cesario (1976) suggested that the value of an individual's time is equal to somewhere in the range of one-third to one-half that individual's wage rate.

McConnell and Strand (1981) calculated an estimate of the opportunity cost of time using the following equation,

$$r = \mu_0 + \mu_1 c + \mu_2(\alpha)(1 - t)I \qquad (2.6)$$

where r is the number of trips per year, c is out-of-pocket costs per trip, α is travel time per trip, and I is the average income per hour of the individual being considered. By dividing the coefficient μ_2 by μ_1, McConnell and Strand (1981) obtained a fraction which they used as an

estimate of the income foregone while visitors travel. Applying the technique to a sample of anglers in the Chesapeake Bay region, they estimated the opportunity cost of time to be 61.2 per cent of the participants‟ incomes. The defining characteristic of this technique is that it assumes that the opportunity cost of time is directly related to income.

In a study which took on a completely new approach, examining peoples‟ willingness to trade travel time and cost as a means to determine the opportunity cost of travel time, Ward (1983) found no relationship between this opportunity cost and income. Ward‟s (1989) solution was to adapt McConnell and Strand‟s (1981) approach, dropping the assumption that the opportunity cost of an individual‟s time is related to that individual‟s income. Ward‟s (1989) suggested equation,

$$r = b_0 + b_1 c + b_2 \alpha \qquad (2.7)$$

has as its coefficients $b_1 = \delta r/\delta c$, and $b_2 = \delta r/\delta \alpha$. So it can be seen that Ward‟s coefficients are different, b_1 being the marginal change in the number of trips per year divided by the marginal change in out-of-pocket costs, and b_2 being the marginal change in the number of trips per year divided by the marginal change in travel time per trip. With the opportunity cost of time being fixed with regards to travel time, this model assumes that the cost of time remains fixed for trips of differing durations. Shrestha *et al.* (2002) used this approach to estimate the value of time to recreational anglers in the Brazilian Pantanal. Shrestha *et al.* (2002) found that the marginal increase in direct costs required to induce one less fishing trip per year was $413.22. By including a „total travel time‟ variable in their trip generating function, they were also able to calculate the marginal increase in travel time required for anglers to make one less trip per year as 17.64 hours. This allowed the authors to infer that the value of their subjects‟ time was $23.43 per hour.

Another model was developed by Bockstael *et al.* (1987), one which maintains Ward‟s separation of money costs and time costs, but incorporates the opportunity cost of visiting alternative sites as well as discretionary time and income as additional explanatory variables. The resulting equation,

$$r = b_0 + b_1 c_r + b_2 \alpha_r + b_3 c_a + b_4 \alpha_a + b_5 I + b_6 DT \qquad (2.8)$$

begins in the same way as Ward‟s, adding the opportunity out-of-pocket costs of visiting alternative sites (c_a), the opportunity time costs of visiting alternative sites (α_a), income (I),

and discretionary time (*DT*). The discretionary time variable allows one to measure the impact of differing trip durations on the opportunity cost of time.

Following Shaw‟s (1992) conclusion regarding the differing preferences of individuals, McKean *et al.* (1995) conducted a study which made use of the model developed by Bockstael *et al.* (1987) as well as the conventional, earlier models. McKean *et al.* (1995) considered the nature of each individual‟s employment status, applying the model which was best suited to their income-leisure trade-off and found large variations in the estimated values of time. They concluded that the large deviations, both within the data and between the estimated values and average hourly incomes, suggested that income is a poor proxy for an individual‟s valuation of time. The reason for this is twofold. Firstly, students, retirees and unemployed people‟s incomes do not necessarily reflect their valuation of time. Secondly, institutional constraints prevent a great many people from exchanging leisure time for work time. McKean *et al.* (1995) also found that time is valued at a relatively lower rate for longer trips.

Despite the findings of Ward (1983), Shaw (1992) and McKean *et al.* (1995), many authors continue to value time at some fraction of the wage rate. Englin and Cameron (1996), Coupal *et al.* (2001), Bin *et al.* (2005) and Hagerty and Moeltner (2005) all used thirty three precent of the wage rate. Amoako-Tuffour and Martínez-Espiñeira (2008) followed the dynamic approach of McKean *et al.* (1995), determining visitors‟ opportunity cost of travel time on a case-by-case basis and using maximum-likelihood to determine the relevant proportion of income to be applied in each case. Amoako-Tuffour and Martínez-Espiñeira (2008) also corrected for overdispersion and the effects of on-site sampling and found that in most cases, the commonly used proportions tended to overestimate the opportunity cost of time and, in doing so, the consumer surplus derived from recreation.

A final note with regards to the opportunity cost of travel time is that there may be cases in which it is actually negative, that is, a benefit. The point that there are cases where people enjoy travelling to a destination, whether it be because of pleasing scenery or some other reason, was first raised by Walsh *et al.* in 1990. Thus, to accurately compute total travel costs, one should not only take into account the costs but benefits as well. Again, this would call for a more in-depth survey to investigate people‟s preferences regarding the matter.

There are opportunity costs for travel time as well as for on-site time. Like travel time, accounting for on-site time has always been a controversial issue. McConnell (1992) points out that the time spent on-site provides visitors with benefits which must be at least as great as the time cost incurred. Thus, if enough information is gathered on people‟s preferences, this time cost can be estimated. While this estimation might be appropriate to valuing resources in a static way, it can by no means be applied in a predictive way because this would require extrapolating the time costs of sampled visitors to a larger population of people with different preferences. This limits the utility of the demand curves which incorporate on-site time.

In conclusion, attempting to value the opportunity cost of time remains the weakest point of travel cost analyses (McKean *et al.*, 2003). Time can be incorporated into trip cost using an estimation of the opportunity cost of respondents‟ time, or added as a stand-alone explanatory variable, allowing one to predict what the value of each respondent‟s time might be. These options will be further explored in the results of the present study.

The following section will discuss how the preceding literature review, along with focus groups and piloting, allowed for the development of a well refined survey instrument. Following this, the data collected with this instrument will be analysed using some of the models previously discussed. The results will be compared to those of Shrestha *et al.* (2002), Martínez-Espiñeira and Amoako-Tuffour (2008) and du Preez and Hosking (2011).

CHAPTER 3

STUDY SITE AND RESEARCH METHODS

Having discussed the two methods used to study the fishery at Wriggleswade Dam, the following chapter presents a short description of this fishery as well as a discussion on how data were collected for the methods used.

3.1 STUDY SITE

Wriggleswade Dam is a popular bass fishing destination located approximately 30km outside of Stutterheim, the Seat of the Amahlathi Local Municipality. The dam was built by the Department of Water Affairs in 1991 for municipal and industrial use (DWA, 2009). The land surrounding the dam is used for farming, with the exception of the Stutterheim Aquatic Club (SAQ), which owns land on the western bank of the dam where a clubhouse, boat-launching site and camping facilities have been developed. Wriggleswade has a surface area of 1000 ha. Wriggleswade‟s size, coupled with the diversity of aquatic habitats within the dam and the existence of suitable infrastructure, allows the SAQ to host one of South Africa‟s largest bass fishing competitions, the Amatola Bass Classic, as well as smaller regional and provincial level competitions. These competitions attract large numbers of anglers, making the site suitable for the application of quantitative research requiring large sample sizes. Wriggleswade Dam is shown in Figure 3.1.

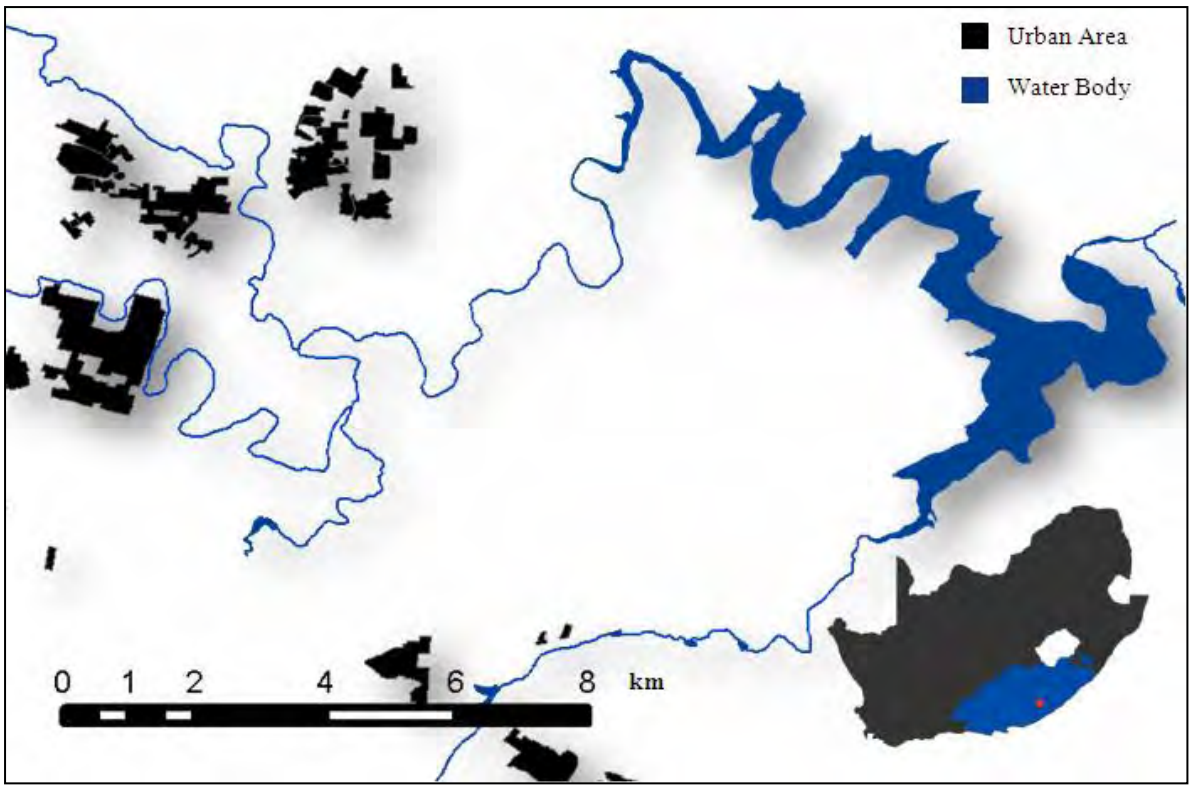


Figure 3.1 Wriggleswade Dam, with Stutterheim to the west

The Amatola Bass Classic attracts around 200 anglers each year. In the year that the Divisional Tournament was sampled, it was attended by 45 anglers. National level tournaments are usually attended by around 50 anglers, and then there are the smaller club-level tournaments, with about 20-30 anglers fishing in each (Schwartz, Pers Comm., 2012). The exact amount of tournaments held annually at Wriggleswade varies, as many of them change their location each year. The Amatola Bass Classic is held exclusively at Wriggleswade Dam though. According to Ms Amanda Cohen, the manager of the SAQ, regular visitors to the dam (ie. those not involved in competitive angling) are comprised mainly of carp anglers and sailors, and the rest (about twenty per cent of the total) are bass anglers (Cohen, Pers Comm., 2012).

3.2 RESEARCH METHODS

Both research methods used in this part are grounded within mainstream neoclassical microeconomics, and can be defended on epistemological grounds using the doctrine of scientific realism (Maki, 2009). Microeconomics utilises methodological individualism, which focuses on individual agency as the primary determinant of economic distributions (Groenewegen *et al.*, 2010). In employing utility theory, practitioners within the field of microeconomics aim to deduce from the behaviour of individuals estimates of the value

which they attach to resources, based on a set of postulates which hold their preferences to be stable and rationally determined (Grafton *et al.*, 2004).

Both economic impact analysis and the travel cost method required the collection of quantitative data using questionnaires administered on-site by trained research assistants. This section will discuss the development of a questionnaire which was used to gather data for both these methods. Sub-section 3.2.1 will provide a general outline of the questionnaire used. Next, sub-section 3.2.2 will consider how the questions were adapted and changed through focus groups and piloting. Sub-section 3.2.3 and 3.2.4 will take a closer look at how this process informed the development of questions used to gather data for economic impact analysis and the travel cost method respectively. The final sub-section will discuss the sampling procedure used at the 2011 Divisional Tournament and the 2012 Amatola Bass Classic.

3.2.1 Questionnaire outline

The questionnaire used for the Amatola Bass Classic (Appendix 2) was comprised of the following six sections:

1. Travel Information
2. Details of Expenditure Directly Related to the Classic
3. General Angling Related Expenditure
4. Personal Information
5. Ecological Perceptions
6. Contingent Valuation

The first section was designed to gather information for use in conducting travel cost analysis. This included questions to see how far respondents had travelled and how long it had taken them, and also whether any substitute sites existed.

The majority of the questions used in economic impact analysis were included in section two, although one question in section one was designed to check for time-switchers and casuals.

Section three considered the fixed costs which anglers undertake regularly in order to fish, which were subsequently divided by the number of times that each respondent went fishing in a given period to obtain an average amount spent on fixed costs per fishing trip.

The purpose of section four was to gather personal information such as income and education levels which would be used to construct explanatory variables for the travel cost analysis.

Section five collected information regarding participants‟ environmental awareness. This information was later used to construct an environmental awareness indicator which was used in the travel cost analysis

Section six included questions pertaining to the maximum amount respondents would be willing to pay towards a catchment management programme for the Kabusi river catchment, within which Wriggleswade is situated. One of the original aims of this thesis was to use contingent valuation to determine the value which anglers at Wriggleswade place on being able to fish in a healthy catchment, but this aim was abandoned as the data collected was not deemed to be reliable enough for a robust study of this value.

Since the majority of anglers interviewed in the 2011 Divisional Tournament would likely participate in the 2012 Amatola Bass Classic as well, the questionnaire used for the Divisional was shortened and did not include the ecological perceptions or contingent valuation sections. This was to ensure that the answers given in these sections during the Classic survey would not be skewed (Pollock *et al.* 1994). Furthermore, the questionnaire was kept as short as possible to ensure that anglers would be willing to participate in the Classic survey.

3.2.2 Questionnaire development

The draft questionnaire to collect quantitative data at Wriggleswade Dam was circulated amongst staff and post-graduate students in the Rhodes University Department of Economics and Economic History for comment. Observers raised the point that it was necessary to make the questions as easy to answer as possible, and comments also ensured that sensitive questions would be asked in the most unobtrusive ways possible. For example, instead of asking someone to report their age, it was decided that the survey would ask respondents which year they were born in.

The questionnaire was then reviewed by the Departmental Ethics Committee. This ensured that all necessary steps were taken to assure respondents that the information which they were willing to provide would be treated as confidential and only published in aggregate, that their

participation was entirely voluntary, and that they had the right to terminate the interview at any time (Bryman, 2008).

Two focus groups were held with researchers familiar with the project context to refine the questionnaire. The first comprised those participating in the broader SANPAD project, including the current Dutch co-chair of the SANPAD joint committee, Dr Leo Nagelkerke, who provided valuable insight into the way people would respond to contingent valuation and helped to point out ways of making questions easier to understand. The second focus group was held with Ashley Westaway of the Border Rural Committee (BRC) and Qurban Rouhani of the Rural Fisheries Programme (RFP), both instrumental in establishing the *Amatola Wild Trout* fishery at Cata, and therefore deemed to hold potentially valuable insights for fisheries research at Wriggleswade Dam.

The questionnaire was first tested on recreational anglers in July 2011 in a series of piloting exercises conducted in the KwaZulu-Natal Midlands. This ensured that there was only a very slight chance that anglers interviewed during piloting would be interviewed again at Wriggleswade Dam during the *2011 Divisional Tournament* or the *2012 Amatola Bass Classic*. Piloting revealed key areas where the questionnaire needed to be changed to improve its accuracy. The following sections will discuss these areas specifically, in relation to the relevant methods for which the data were collected.

3.2.3 Economic impact analysis

In terms of economic impact analysis, insights were gained into the timing of interviews, in checking for time-switchers and casuals, and in stratifying sampling units.

Timing

While Stynes and White (2006) warn against recording expenditure before the end of a trip, time limitations did not allow for the sampling of all anglers on the last day of fishing. Also, unexpected costs were not deemed to be a significant issue in the context of the Amatola Bass Classic as opportunities for such expenditure were very restricted. The only two places where respondents could have spent more money than expected were the tuck shop and bar. So while there may have been additional expenditure on things like food and drinks, the quantity of this expenditure is not likely to be great, and excluding this expenditure is consistent with obtaining a conservative estimate.

Time-switchers and casuals

Checking for time-switchers and casuals is relatively simple but, given the findings of Crompton *et al.* (2001), seems a crucial step in economic impact analysis. The following questions were designed to probe this:

> 1.10 Is the main reason for your trip to fish the *Amatola Bass Classic*?
>
> Yes ☐ No ☐
>
> 1.11 *If no to 1.10*... What was your main reason for making this trip?

Sampling units

When recording the spending that anglers had incurred in order to participate in the 2011 Divisional Tournament, some confusion was noted. Although the question specifically asked anglers to report only spending in addition to what they normally would have spent, interviewers did not feel as though this was properly understood much of the time. The solution was to lengthen the question to ensure that this point could be driven home adequately. So, from:

> 2.1 Please indicate how much you spent, divided between the various categories and in addition to your normal spending, in order to come fishing here this weekend
>
> Accommodation _____ Food and Drinks _____
>
> Petrol _____ Entrance fee _____
>
> Other (*please specify category and amount*) _____

The question was changed so that the interviewer would have the chance to communicate this point twice. The new question was as follows:

2.1 If possible, I"d like to ask about the money which you"ve spent, in addition to your normal spending, in order to participate in the Classic. Would it be easier for you to provide me with your personal expenditure, or are you sharing costs with others?

Individual ☐ As a group ☐

2.2 *If 'as a group' to 2.1*... how many people are you sharing costs with? _____

2.3 Please indicate how much you spent, divided between the various categories and in addition to your normal spending, in order to come fishing here today

Category	**Amount**	**Location**
Accomodation		
Food and Drinks		
Petrol		
Entrance Fee		
Other: _____?		
_____?		

The new question addressed two other issues as well. Firstly, by providing respondents with the opportunity to report expenditure as a group or individually, double counting was avoided (Gazel and Schwer, 1997; Stynes and White, 2006). Although the Divisional questionnaire did address this concern by including a box at the beginning in order to link different questionnaires where spending was shared between them, this technique might have made things unnecessarily complicated in the case of the Classic, where six researchers would have had to coordinate their activities instead of just two. Lastly, including a space for the location of the spending to be reported allowed for a more accurate determination of relevant expenditure (Pollock *et al.* 1994). The two questions can be seen in context in Appendices 1 and 2.

3.2.4 Travel cost analysis

Most information used in travel cost analysis is fairly straightforward to collect. Data are needed on distance travelled, the type of vehicle used, the amount of time used travelling, and on other demographic variables. Two areas which were informed by the literature review and by piloting were the treatment of substitute sites and fixed costs, both discussed below.

Substitute sites

One of the survey‟s objectives was to determine how important the site was for people‟s enjoyment of the fishing tournament. This information is useful when conducting a travel cost analysis as the existence of viable substitute sites can affect people‟s decision to incur costs in order to attend an event. Initially, the following question was used to gauge the importance of the location:

On a scale of 1 to 10, with 1 being not important, and 10 being very important, how important is this particular location to your angling experience?

1----------2----------3----------4----------5----------6----------7----------8----------9----------10

Unimportant Very important

The question was modelled on the following question, which was used by Tyrell and Johnston (2001: 96) during their sampling:

What percentage of your decision for attending the event was its location in Newport? (Please circle a point on the line below.)

0 10 20 30 40 50 60 70 80 90 100

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

None: I would have attended anywhere | Half my reason for attending | Only reason for attending

The advantage of using a continuous variable is that a specific proportion of the respondent‟s expenditure can be assigned to the place being considered. However, piloting revealed that people found this question difficult to understand, and so a simplified approach was taken:

1.12 If you hadn't come to this tournament, would you have gone fishing elsewhere?

Yes ☐ No ☐

1.13 *If yes to 1.12...* Where? _____

While the first approach would have yielded results which may have been more valuable for analysis, the cognitive requirements were deemed too high and a trade-off was made so that respondents would remain interested for questions to come.

Fixed costs

Fixed costs are not generally incorporated into travel cost analysis. However, Rolfe and Prayaga (2007) argue that some of these costs can be taken into account when people make decisions, and thus can be used to estimate the value that people place on the activities that they are used for. The questionnaire therefore included questions to determine how much people spend annually to maintain their boat and how many trips their boat was used for in an average year. Dividing the first answer by the second reveals the average fixed costs per trip, which can then be added to other travel costs. See Equation

$$Average\ fixed\ costs\ per\ trip = \frac{Annual\ expenditure\ on\ boat\ maintainence}{Number\ of\ trips\ boat\ used} \quad (4.8)$$

Travel cost analysis was applied to the *2012 Amatola Bass Classic*, where of the 100 anglers interviewed, 65 % had travelled in their own vehicles. The data gathered for the *2011 Eastern Divisional Tournament*, however, were not comprehensive enough for the method to be accurately applied.

3.2.5 Sampling procedure

The Eastern Divisional Tournament, held at Wriggleswade Dam, was sampled on the weekend of the 19th and 20th of November, 2011. One assistant, a fellow Rhodes University Department of Economics masters student, was employed to aid in collecting data. Of the 45 anglers who participated in the event, 31 were interviewed. Although the sample size was small, the results would prove useful in contrasting the economic impact of smaller events with that of the Classic

Having gone through the process of departmental critique, Departmental Ethics Committee approval, focus groups, piloting and the Divisional Tournament sampling, the questionnaire used for the *2012 Amatola Bass Classic* (the twelfth version of the survey) was deemed robust enough to gather sound information. The *Classic* occurred on the weekend of the 9th to 11th March 2012. A team of 6 research assistants, all social science students at the postgraduate level and with some experience in collecting social data, were given training prior to the event and exhausted the population of anglers at the event who were willing to participate in the survey. 100 anglers were interviewed over the course of the weekend, out of a total number of 206 (48%).

CHAPTER 4

RESULTS AND ANALYSIS

The following chapter is divided into three sections. The first outlines summary statistics for the anglers surveyed at Wriggleswade Dam. The second provides an economic impact analysis for two tournaments held at this dam and the third presents an application of the travel cost method to the larger of these tournaments.

4.1 SUMMARY STATISTICS

The general characteristics of the anglers interviewed at Wriggleswade Dam are summarised in this section of the chapter. Where possible, comparisons are made between those participating in the Classic and those fishing in the Divisional Tournament. The insights gained by this sort of general consideration are valuable when considering the findings of the more detailed analyses presented in the following two sections of the chapter.

4.1.1 Demographics

All of the respondents of the 2011 Divisional Tournament were white males. 91 % of the 2012 Classic participants were males, and of these 96 % were white.

Respondents from the Divisional Tournament came from similar sized households to those from the Classic. A χ^2 test produced a χ^2 value of 4.46 (P=0.615), showing that the distribution of observations across the various classes was not statistically different for the two sets of anglers from the respective tournaments at the 95 % level of confidence. The percentages of respondents falling into various categories divided by household size are shown in Figure 4.1.

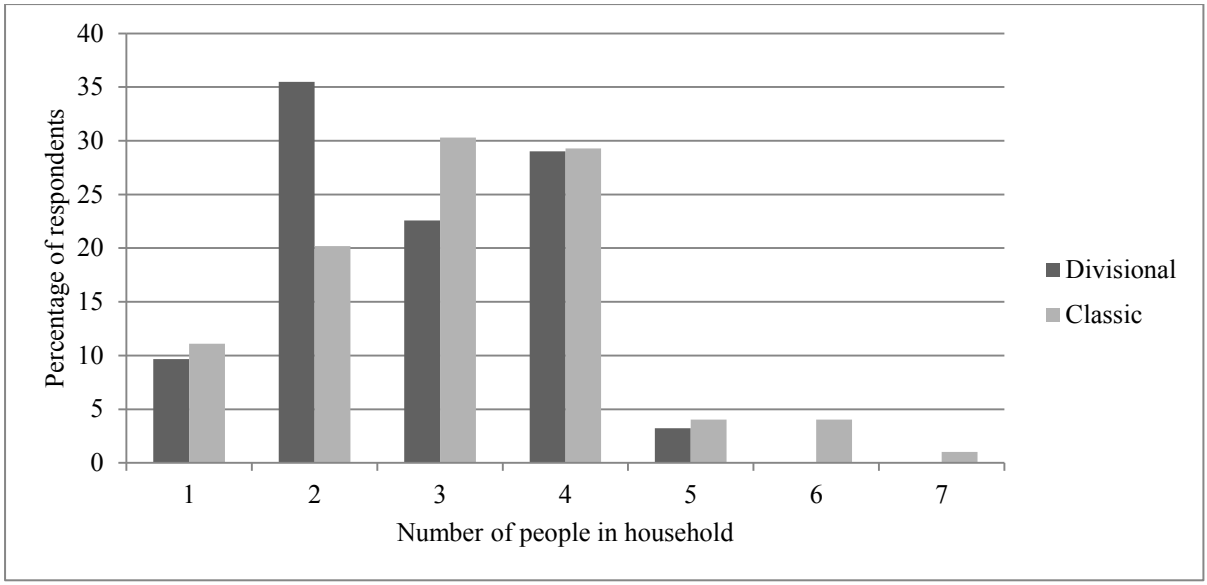


Figure 4.1 Household Size, 2011 Divisional Tournament (n=31) and 2012 Classic (n=99)

Respondents from the Divisional Tournament were, on average, older than those interviewed at the Classic. The median age of those anglers who were interviewed at the Divisional Tournament was 45 years. Anglers sampled at this tournament were concentrated in those categories between 31 years old and 60 years. In the case of the Classic, the median age of respondents was 40 years, and the majority (30 %) fell within the 41-50 years category. A detailed breakdown of age cohorts is given in Figure 4.2.

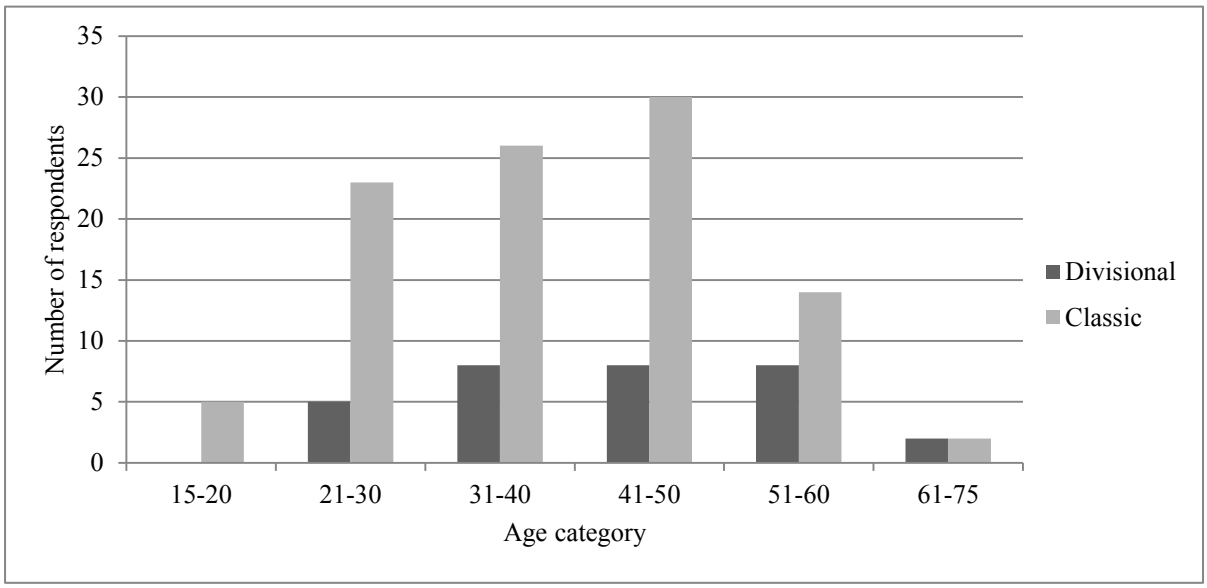


Figure 4.2 Age by Category, 2011 Divisional Tournament (n=31) and 2012 Classic (n=100)

A one-tailed t-test confirmed the hypothesis that respondents from the Classic were significantly younger than those from the Divisional at the 95 % level of confidence, producing t=2.166 (P=0.016).

4.1.2 Income

The 87 respondents from the Classic who provided information on their monthly individual incomes after tax deductions can be divided into three similarly sized categories: 28.8% earned less than R10 000 per month, 34.5% earned between R10 000 and R20 000 per month and 36.8% earned more than R20 000 per month (Figure 4.4). In the case of the Divisional, only 16 % earned less than R10 000 per month, 32% earned between R10 000 and R20 000 per month, and 52 % earned more than R20 000 per month (Figure 4.3). At a glance, a relatively higher proportion of the Divisional anglers appear in the upper income cohorts. But a χ^2 test failed to confirm the hypothesis that the distribution of observations across cohorts is different for the two sets of variables, producing a χ^2 of 12.77 (P=0.120). Juniors were not included in calculations involving income, except where they were able to provide information on household income.

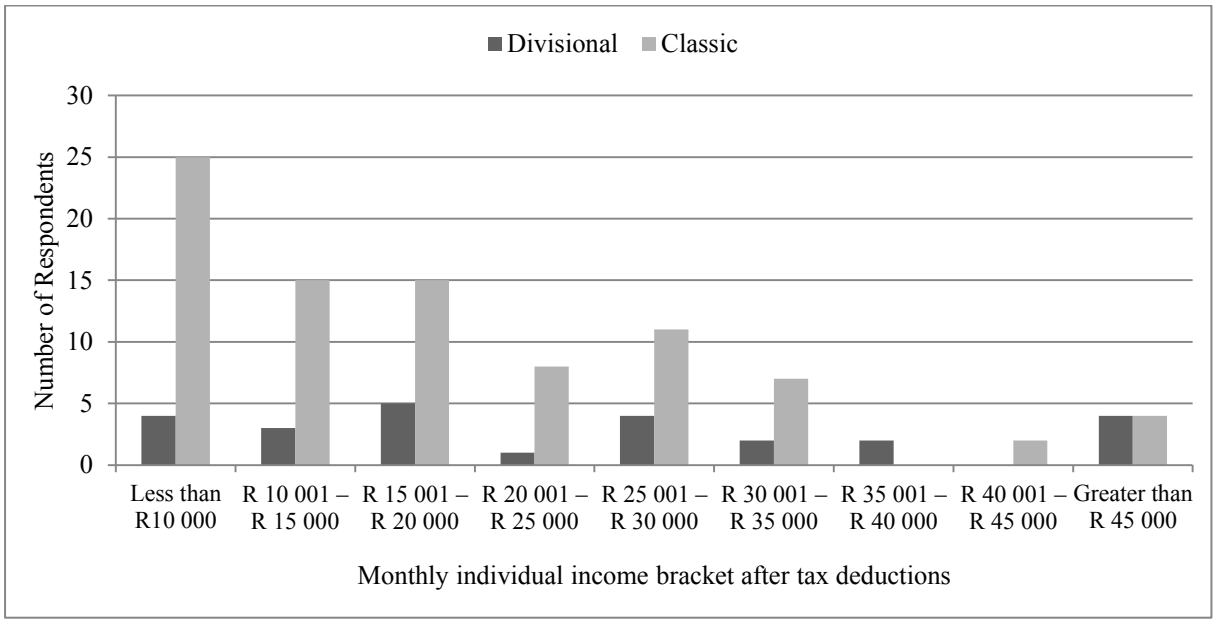


Figure 4.3 Monthly individual income bracket after tax deductions, 2011 Divisional Tournament (n=26) and Amatola Classic (n=88)

Of the 84 respondents from the Classic who provided information regarding their monthly household income after tax deductions, 41.5% were from households with incomes totalling less than R30 000 per month, 30.5% from households with between R30 001 and R50 000

per month and 28.0% from households earning more than R50 000 per month (Figure 4.4). Anglers from the Divisional had higher household incomes (χ^2 test, $p<0.05$), with 35 % of the households earning less than R30 000 per month, 27 % earning between R30 001 and R50 000 per month, and 38 % earning more than R50 000 per month (Figure 4.4). This result makes sense in light of the finding that Divisional anglers were older than Classic anglers.

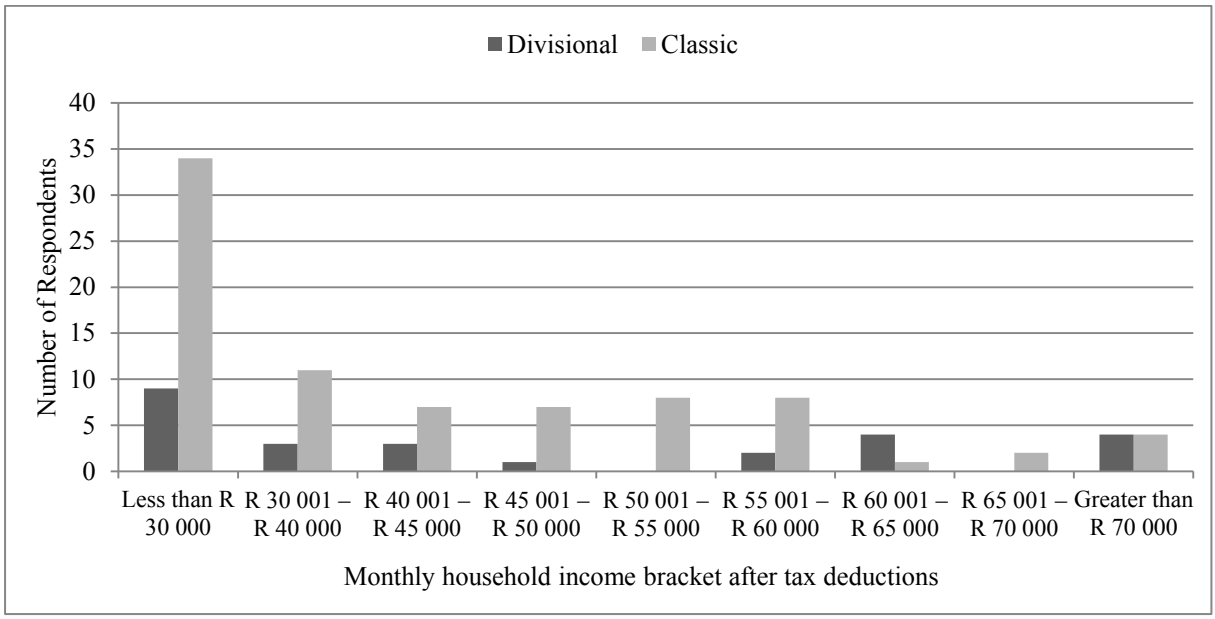


Figure 4.4 Monthly household income bracket after tax deductions, 2011 Divisional Tournament (n=26) and 2012 Classic (n=84)

4.1.3 Education

The majority of anglers from both tournaments listed either Grade 12 or a diploma or certificate of sorts as their highest form of education attained. Only one angler from the Divisional and three from the Classic had not attained Grade 10. This is shown in Figure 4.5. A χ^2 test confirms what figure 3 shows graphically: that the distribution of observations across education cohorts cannot be shown to be statistically different. $\chi^2 = 1.90$ (P=0.862).

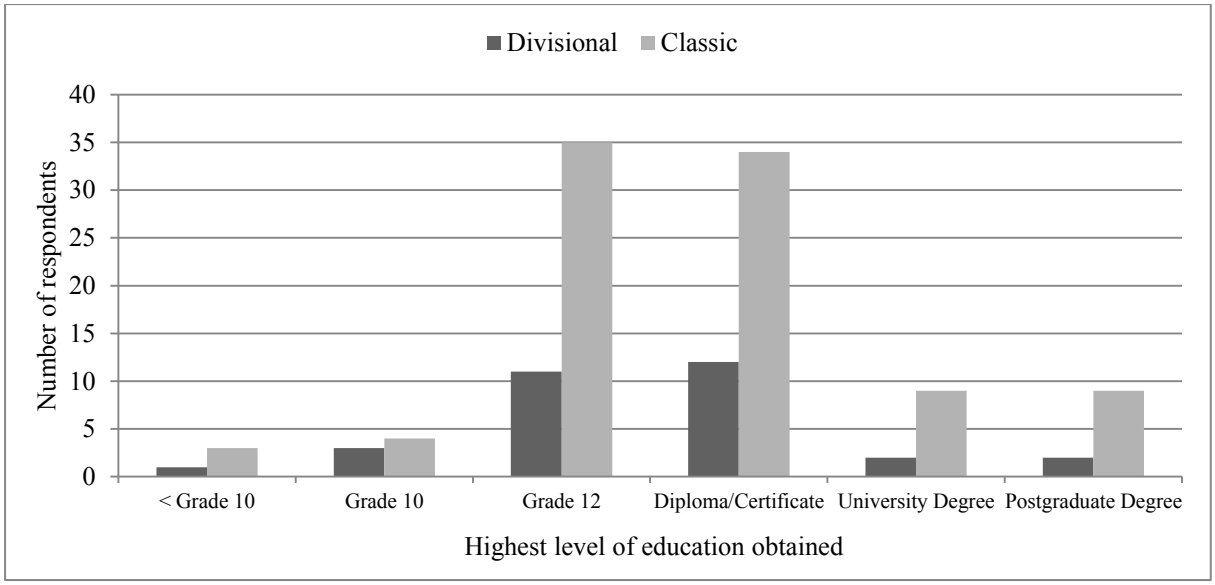


Figure 4.5 Highest level of education obtained, 2011 Divisional Tournament (n=31) and 2012 Classic (n=99)

4.1.4 Provincial origin of anglers

Twenty-five of the thirty-one anglers interviewed at the Divisional were from the Eastern Cape. Of these, seventeen originated from the Amathole District. Five were from the Western Cape and one respondent was from Gauteng. Of the ninety-one respondents from the Classic who provided information on their home town, sixty-eight were from the Eastern Cape and of those, fifty were from the Amathole District. Eleven were from the Western Cape, six from Gauteng, five from KwaZulu-Natal and one from Mpumalanga (Figure 4.6). A χ^2 test failed to show a statistically different distribution of anglers between provinces for the two tournaments, producing χ^2=2.90 (P=0.58).

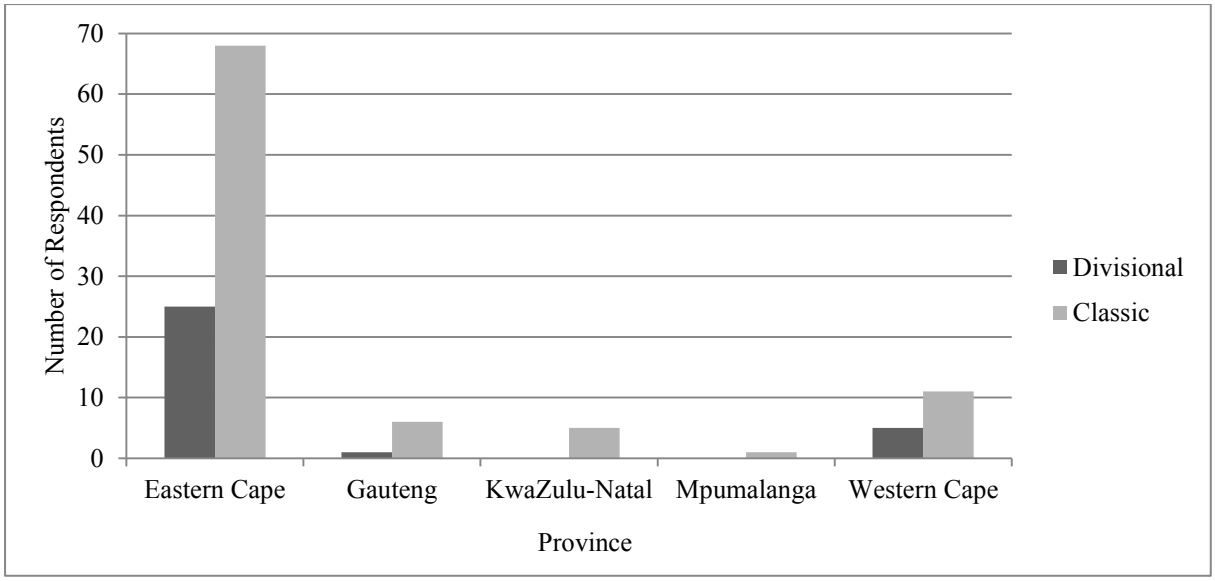


Figure 4.6 Home province, 2011 Divisional Tournament (n=31) and 2012 Classic (n=91)

Given that such a small proportion of the anglers who participated in the Divisional were from outside the Eastern Cape, not much can be gained from considering other variables in light of the province from which these anglers originated. However, the participants of the Classic had a wider provincial distribution, making an analysis by province more feasible.

Classic participants from provinces (with the exception of the single angler from Mpumalanga) other than the Eastern Cape were willing to travel further, and spend considerably more on their tackle, equipment and clothing (Table 4.1). A one-tailed t-test, comparing average annual angler expenditure from the Eastern Cape to that of all other provinces, confirmed this observation at the 95 % level of confidence with t=-3.0655 (P=0.003).

Table 4.1 Mean annual expenditure on fishing tackle, equipment and clothing by province, Classic 2012 (n=91)

Province	Mean annual expenditure on fishing tackle, equipment and clothing	Number of Respondents
Eastern Cape	9229	68
Gauteng	31833	6
KwaZulu-Natal	33360	5
Mpumalanga	6000	1
Western Cape	31145	11

Although the sample size does not allow for a statistical test, anglers from KwaZulu-Natal appear to have spent more than others in order to participate in the Classic, particularly on food and drinks (Figure 4.7). Had there been more than one respondent from Mpumalanga, it is likely that the average spending for this province would have been higher. Respondents from the Eastern Cape spent less than respondents from other provinces in order to participate, given that that they did not need to travel as far. These anglers also spent less on accommodation, as did those from Gauteng, due to their strong professional and social connections to the organisers of the event.

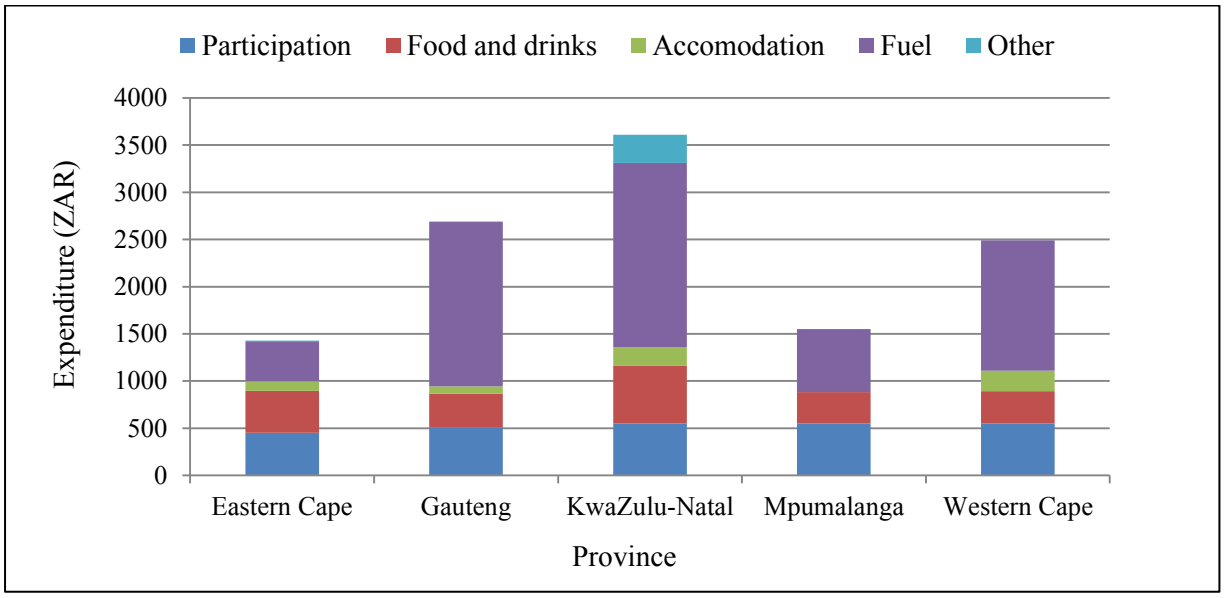


Figure 4.7 Mean per capita expenditure on various categories by province, Classic 2012 (n=97)

Detailed expenditure breakdown revealed that participants from provinces other than the Eastern Cape spent a greater amount on fuel, as they needed to travel further (Table 4.2). The respondent from Mpumalanga reported anomalous spending: apparently nothing was spent on accommodation and very little on petrol.

In terms of the total amount spent to attend the tournament, respondents from outside the Eastern Cape spent significantly more than respondents from within the Eastern Cape. This was confirmed at the 95 per cent level of confidence by a one-tailed t-test where t= -3.128 (P=0.003).

Table 4.2 Mean per capita expenditure on various categories by province, Classic 2012 (n=97)

Province	Participation	Food and drinks	Accommodation	Fuel	Other
Eastern Cape	451.32	444.08	101.31	425.08	6.25
Gauteng	504.17	359.72	80.83	1741.94	2.50
KwaZulu-Natal	550.00	610.00	200.00	1950.00	300.00
Mpumalanga	550.00	333.33	0.00	666.67	0.00
Western Cape	550.00	341.50	219.50	1380.00	0.00

4.1.5 Environmental perceptions

The questionnaire administered to those fishing in the Divisional Tournament did not include a section on environmental perceptions, as this would have lengthened the survey and many of the same anglers would be surveyed again four months later at the Classic anyway. Those interviewed at the Classic were asked ten questions to gauge their general awareness of environmental issues such as global warming and to see if they engaged in activities such as reading environmental magazines, watching environmental programmes or recycling. The questionnaire is included as Appendix 2. Respondents were scored one point for each answer which was either correct or which affirmed their interest in environmental matters. The mean environmental awareness score was 5.44 ± 1.58 and average scores displayed an interesting correspondence with educational level (Figure 4.8).

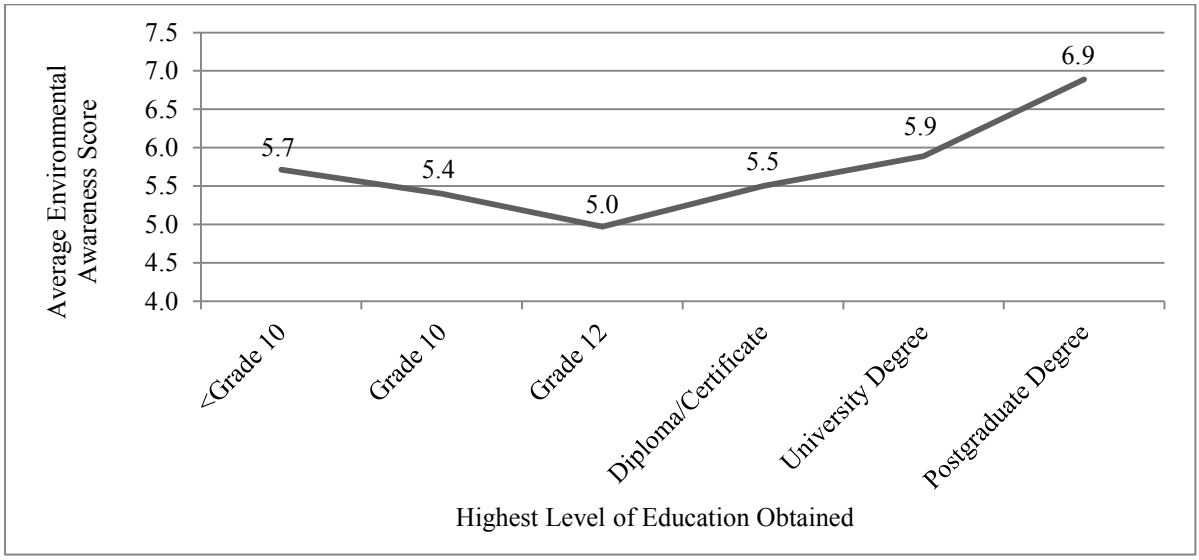


Figure 4.8 Average environmental awareness score by highest level of education obtained, Classic 2012 (n=100)

4.1.6 Conclusion

Anglers from the two tournaments considered appear to be homogenous in most respects considered here, the only differences being that anglers from the Classic are younger and come from households with lower incomes than anglers from the Divisional Tournament. Table 4.3 summarises the comparative statistics presented in this section.

Table 4.3 Comparative summary of anglers from the 2011 Divisional Tournament and the 2012 Amatola Bass Classic

Sex and Race	Mainly white males in both tournaments
Household Size	Divisional = Classic
Age	Divisional > Classic
Individual Income	Divisional = Classic
Household Income	Divisional > Classic
Education	Divisional = Classic

Those respondents interviewed at the Classic who came from outside the Eastern Cape spend considerably more than those from within the province, particularly in terms of fuel, to attend the tournament. This finding supports the use of travel cost analysis to determine the net benefit of this tournament to anglers, given that those who travelled further were also willing to spend more on attending the tournament and can thus be assumed to have obtained a greater amount of value from fishing in the tournament. This assertion is supported by the fact that Classic respondents from outside the Eastern Cape also spent significantly more annually on fishing tackle, equipment and clothing than did those from within the province. The travel cost analysis is presented in Section 4.3, and is preceded by an estimation of the value that the two tournaments under consideration have to the regional economy of the Amathole District.

4.2 ECONOMIC IMPACT ANALYSIS

The following analysis was carried out using Microsoft Excel, Version 14.

4.2.1 Direct economic impact

Time-switchers, casuals and sampling units

Time-switchers and casuals were not found to be of any concern for either tournament. All respondents interviewed for both the Divisional and the Classic reported that attending the respective tournament was the main reason for their trip.

The question which asked respondents to report their expenditure, as discussed under the heading of *Sampling units* in Sub-section 3.2.3, was found to be much more appropriate in its newly developed form which was used to sample the Classic. The main reason for this was the inclusion of a space where respondents could report the location of their expenditure. This allowed for a more accurate determination of direct economic impact in the case of the Classic, while analysis of the Divisional data required assumptions to be made regarding the location of expenditure. For the Divisional Tournament, in the case that respondents residing outside the impact area reported spending on petrol it was assumed that these costs would have been divided equally within and without the impact area. For costs relating to food and drinks, it was assumed that this spending occurred in the respondents‟ area of origin.

2011 Eastern Cape Divisional Tournament

The total amount spent which can be directly attributed to the *2011 Eastern Cape Divisional Tournament* was R 58 899. R 24 654 of this was spent within the Amathole District, of which R 12 808 was spent by outsiders and can thus be labelled as the net direct economic impact. The mean amount spent per person was R1 414.

2012 Amatola Bass Classic

R 319 003 was spent as a direct result of the *Amatola Bass Classic 2012*. The amount was greater than the amount spent for the Divisional for two main reasons. Firstly, the participation fee for the Classic was R550 per person, while the participation fee of the Divisional was only R100 per person. Secondly, there were 206 anglers participating in the Classic, with 45 in the Divisional. Of the total amount, R 157 912 was spent inside the Amathole District and R 161 091 was spent outside the Amathole District. The net direct economic impact of the Classic was R 73 059. There may be a case for including local

spending as part of the impact and this will be discussed later. The mean expenditure per person for anglers and those accompanying them was R 1 596. Figure 4.9 contrasts the direct spending for the two tournaments considered.

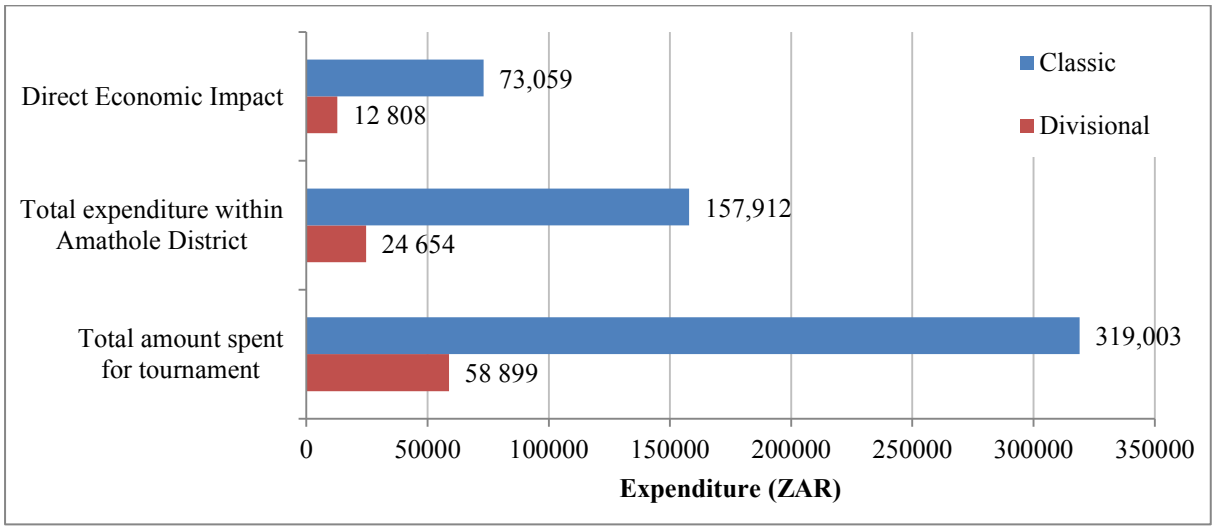


Figure 4.9 Direct economic impact and total expenditure within the impact area in relation to the total amount spent, *2011 Divisional Tournament* and *2012 Amatola Classic*

The direct economic impact presented in Figure 4.9 includes all spending of outsiders within the impact area which can be attributed to the tournaments. Since the participation fee constitutes money spent in the impact area, it can be assumed that it forms part of the direct economic impact. However, closer analysis reveals a more complicated picture. In 2012, the Classic raised R110 000 in participation fees. Of this, R75 000 was used to purchase a boat (which was partly sponsored) for the main prize. The boat was purchased in Johannesburg, which is outside the impact area. A further R12 000 was spent printing t-shirts and caps for the tournament in King Williams Town (inside the impact area). This left R23 000 which was used by the Border Bassmasters club to finance members‟ trips to participate in Interprovincial and National level tournaments, which are more often than not held outside the impact area, but on occasion held at Wriggleswade Dam. It will be assumed that this R23 000 was subsequently re-spent within the impact area. Added to the R12 000 for printing, and this gives a direct impact of R35 000 resulting from expenditure on participation fees.

In the case of the Divisional tournament, the money raised in participation fees was spent exclusively on managing the Wriggleswade Bassmasters Club and maintaining clubhouse

facilities. All R4 500 raised in participation fees was thus included in the direct economic impact.

4.2.2 Indirect and induced impacts

Estimating the multiplier

Determining the size of the multiplier was a tenuous procedure, given the lack of district-level data on industry in the Eastern Cape. The multiplier was estimated using previous studies as benchmarks and then considering these in light of the nature of expenditure and a fairly superficial comparison of the economies in question. A more robust method would have been to gather primary data on industries in the Amathole District and use this to calculate leakages from the economy, as done for the City of Grahamstown by Antrobus *et al.* (1997) in their analysis of the National Arts Festival. The costs involved in such an analysis, and on such a scale, would not have been possible given the time and budget constraints of the present study.

Forty-eight percent of the combined direct economic impact of the events resulted from the purchase of petrol. The provision of petrol does generate some income and employment locally, but most of the revenue collected goes towards national or multi-national level corporations, and so the induced impact of this spending within the impact area is not likely to be great. Twenty-eight percent of the combined direct economic impact was for accommodation. This income was collected by the Stutterheim Aquatic Club, and was used to maintain the clubhouse and camping facilities as well as to finance the employment of three permanent members of staff. The indirect and induced impacts of this spending are likely to be substantial. Finally, the proportion of the combined overall expenditure on food and drinks is relatively small (17 %). It is quite difficult to say what proportion of this would remain in the impact area, as there is much variation within the types of industries that provide food and drinks. A more detailed expenditure breakdown could have shed light on this matter, but the benefit of this information was not deemed worth the time that it would have taken to obtain.

The relative differences in the proportions of direct economic impact between categories for the two tournaments are highlighted in Figure 4.10. Spending on participation fees and on food and drinks contributed larger proportions of the overall direct economic impact in the case of the Classic than in the case of the Divisional, while the divisional saw a greater relative proportion spent on petrol (Figure 4.10). This makes sense, given that a larger

proportion of Classic participants originated from outside the impact area as compared to Divisional participants. These minor differences might be used to motivate the estimation of a different multiplier for each of the tournaments. The benefit of such an attention to detail would not likely have a great difference, however, as will be shown in the sensitivity analysis to follow.

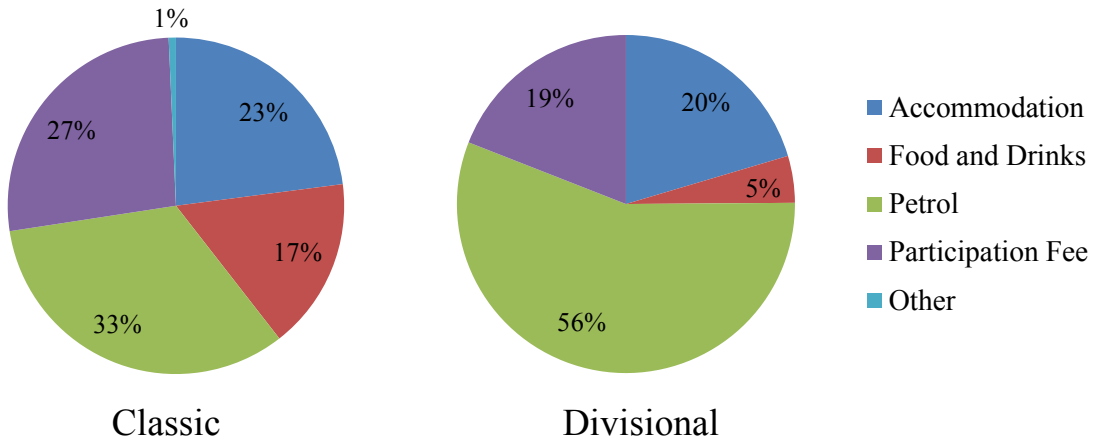


Figure 4.10 Expenditure breakdown of the direct economic impact, *2011 Divisional Tournament* and *2012 Amatola Bass Classic*

The multiplier calculated for Grahamstown by Antrobus *et al.* (1997) was particularly informative when estimating a multiplier for the Amathole District, given that Grahamstown is situated within an adjacent district, the Cacadu District. The multiplier calculated by Antrobus *et al.* (1997) was 0.18. Given that the present study considers an entire district containing the relatively large industrial centre of East London, as opposed to a small City, the multiplier was deemed to be larger than that used by Antrobus *et al.* (1997), probably closer to the regional multiplier calculated for the Lake Fork Region in Texas by Chen *et al.* (2003) of 0.28 (see Table 2.1). On the other hand, the Amathole District, as with most of the Eastern Cape, is relatively undeveloped. The District‟s manufacturing sector employs 27 000 people and is concentrated in the "automotive, textile, pharmaceutical, electronics and food-processing industries" (Amathole, 2012). In light of the type of spending being considered, the food-processing industry would be most relevant to this study, though it is difficult to say what proportion of locally sold processed food comes from within the region without conducting a more detailed input-output analysis. The District houses the East London Industrial Development Zone, and two other Spatial Development Initiatives, the Fish River

and Wild Coast SDIs lie partly within the District. Industry level information on these zones and initiatives is not readily available however, and so their effect on a District-scale multiplier is also unclear. The present study thus makes an informed assumption that the multiplier for the Amathole District impact area is likely to be smaller than that of the Lake Fork area of Texas. The multiplier of 0.8 used by McGrath *et al.* (1997) for the combined provinces of KwaZulu-Natal, Western Cape and Eastern Cape seems quite large, given that Leibold and van Zyl (2008) used multipliers of 0.1 for consumables and 0.4 for durables with the even bigger impact area (which we would thus assume to have less leakages) of South Africa.

Given the information just discussed regarding the nature of spending as well as a consideration of previously used multipliers, it was estimated that indirect and induced impacts of the measured spending would translate into a multiplier half way between Grahamstown‟s 0.18 (Antrobus *et al.*, 1997) and the Lake Fork Region‟s 0.28 (Chen *et al.*, 2003) for the Amathole District. This estimate yielded a multiplier of 0.23. The total economic impacts for the Divisional and Classic tournaments were thus estimated to be R16 762 and R89 863 respectively in 2012 prices.

Sensitivity analysis

The amounts under consideration are quite small, and so a more accurate way of calculating the multiplier would not have made much of a difference. Table 4.4 shows that the estimates of total economic impact which arise using multipliers which are more or less at the opposite extremes of the possibilities are fairly similar to one another (R1 362 difference between the two extremes for the Divisional Tournament and R7 307 for the Classic).

Table 4.4 Sensitivity analysis using different multipliers

Multiplier	Total Economic Impact – 2011 Divisional (2012 prices)	Total Economic Impact – 2012 Classic
0.18	R 16 081	R 86 209
0.23	R 16 762	R 89 863
0.28	R 17 443	R 93 516

4.2.3 Regular anglers and local expenditure

Detailed data on the number of anglers who regularly visit Wriggleswade were not available, but records showed that Wriggleswade received 350 visitors in addition to competitive

anglers in 2011. Ms Amanda Cohen, the manager of Stutterheim Aquatic Club, estimates that around 70 of these visitors were bass anglers, the rest being mainly carp anglers and sailors (Cohen, Pers Comm. 2012). By its strict definition, the economic impact of these anglers is not likely to be very large, given that many of them are probably locals. Nevertheless, this spending would need to be taken into account if one wanted to estimate the total economic impact of bass fishing at Wriggleswade in future, as well as the spending from the other tournaments held at this dam.

4.2.4 Conclusion

This study, using economic impact analysis, estimated the total economic impact of the Divisional Tournament to be substantially less than that of the Classic. This can be explained using three reasons. Firstly, the tournament was attended by 45 anglers as opposed to the 206 angler who participated in the Classic. Secondly, a greater proportion of these anglers originated from within the impact area as compared to the Classic, and their spending was thus not considered to be part of the direct economic impact. Lastly, a greater proportion of these anglers originated from within the Eastern Cape than did Classic participants. The summary statistics presented in Sub-section 4.1.4 showed that anglers participating in the Classic who originated from within the Eastern Cape spent significantly less to attend this tournament than did anglers from other provinces, and it is likely that this applies to other tournaments, such as the Divisional, as well.

The combined total economic impact of the two of the largest fishing tournaments held at Wriggleswade on the local economy of the Amatola Region to be R105 617 per year. The economic impact analysis did not consider the spending of locals, the rationale being that if the event in question had not taken place, it cannot be proven that the money would not have been spent in the impact region anyway (Crompton, 1995). However, data collected for the travel cost method (see Section 4.3) revealed that competitive bass anglers are willing to spend significant amounts on travelling to competitions. Thus, one could argue that if the Wriggleswade fishery did not exist, the combined direct spending of locals for the two tournaments (R96 699) may have been spent elsewhere. This figure would also undoubtedly be higher, considering that the locals would have had to travel longer distances to fish farther waters.

4.3 TRAVEL COST ANALYSIS

This section will present an application of the travel cost method to the 2012 Amatola Bass Classic with the intention of estimating the net benefit which accrued to anglers participating in this tournament. The analysis was carried out using Statacorp Stata, version 12.0.

4.3.1 Model specifications

As mentioned in Section 2.2.2, the Bowker *et al.* (1996) study used the product of the size of the travelling party and the number of trips taken in a given period as the dependent variable. The same method was used by Bhat (2003) and again by Martínez-Espiňeira and Amoako-Tuffour (2008). The research presented here utilised this approach.

The variables used to model demand for the *Amatola Classic* are listed in Table 4.5 and the questions used to obtain them can be found in the questionnaire used for the Classic (Appendix 2). The top two independent variables listed were not used in the same models, since both are variations on the dependent variable. TRIPCOST was calculated for each individual, using their reported expenditure added to their travel costs. Travel costs were computed by obtaining information on each respondent‟s vehicle and round trip distance travelled and using equations provided by the Automobile Association of South Africa (AA). Travel cost thus takes into account fuel costs, vehicle depreciation, insurance, maintenance costs, additional fuel costs attributed to the towing of trailers as well as a loading factor, given that the vehicles used were seen to be heavily laden. Travel costs thus took into account a number of factors which were calculated for each individual, reducing the number of assumptions that needed to be made. Two notable assumptions are firstly that respondents‟ vehicles were insured and secondly that respondents travelled between 25 001 and 30 000 km per annum. An approach this rigorous was not encountered in the literature reviewed and has undoubtedly contributed a robustness to the analysis.

Table 4.5 Descriptive statistics of the variables used in modelling fishing demand

Variable Name	Mean	Std. Dev	Min	Max	Description
Dependent variable					
TRIPS	12.4	10.83	0	55	Product of number of trips taken in past 14 years and party size
Independent variables					
TRIPCOST	2291.64	2329.09	236.57	11161.28	Cost of trip (ZAR)
OCTIME	2807.71	2927.84	630.03	11881.13	Cost of trip, including OC of time
INC_MID	0.40	0.49	0	1	=1 if R15 000 < income <R30 000
INC_UPP	0.17	0.38	0	1	=1 if R30 000 < income
EDUC	0.59	0.50	0	1	=1 if tertiary education obtained
AGE	40.08	10.89	15	72	Age in years
GEAR	27.95	22.00	0	144	No. times fishing gear used per year
AWARE	5.25	1.61	0	10	Environmental awareness score
TIME	7.98	9.42	0.67	33.3	Round trip travel time in hours
Y	4.34	1.18	1.62	7.79	Trips in previous 14 years x party size

OCTIME (trip cost including the opportunity cost of time) was calculated by taking TRIPCOST and adding to it an estimation of the opportunity cost of each respondent‟s time. This was calculated in accordance with Sohngen *et al.* (2000), Bin *et al.* (2005) and Martínez-Espiñeira (2008) by taking the mid-point of each respondent‟s reported income bracket. Two exceptions to this mid-point rule were applied. Firstly, R0 was used where respondents reportedly earned less than R10 000 per month, since many of these respondents were unemployed, as revealed by the notes of data collectors. Secondly, an income of R45 000 was used where respondents reported earning more than R45 000 per month, since there was no upper limit to use when calculating an average. This estimated income was then multiplied by 0.3 and divided by 90.

$$Opportunity\ Cost\ of\ One\ Hour\ = \frac{monthly\ income}{90\ hours} \times 0.3 \qquad (4.9)$$

Respondents‟ leisure time was thus assumed to be worth one third of their wage rate, and they were assumed to work 90 hours per month. This method provided an estimate for the opportunity cost of one hour of each respondent‟s time, which was then multiplied by the round trip time spent travelling.

INC_MID (middle income) and INC_UPP (upper income) were used to divide respondents into three income categories, the base category being lower income. Previous studied have

found this variable to vary both positively and negatively with the number of trips taken. In cases where a destination is particularly costly to get to one would expect lower income people to frequent the place less, but in the present study the costs do not involve plane tickets and so forth, as with Shrestha *et al.*"s (2002) study of fishing in the Brazilian Pantanal. Even du Preez and Hosking (2011) sampled a relatively high proportion of international visitors (just over 10% of the total sample) and it is likely that income would vary positively with this sub-section of the sample. As mentioned previously, Shrestha *et al.*., (2002) found that income varied inversely with the number of trips taken, despite the high costs involved in a trip to the Brazilian Pantanal. This could be due to the average length of trips, 6.26 days. Shorter trips probably make less sense, given the time taken to travel to this destination and higher income earners, having a higher opportunity cost of time, would presumably be less likely to trade off as many days in pursuit of leisure (Shrestha *et al*., 2002).

EDUC (education) was included as per convention, sometimes having been used as a proxy for social class. This is a dummy variable, equal to 1 if the respondent has obtained some form of tertiary education and zero if otherwise, AGE (age in years) was included to check to what extent some anglers have attended more *Amatola Classics* simply because they are older. GEAR is the number of times anglers use their fishing equipment in an average year and this was included as a proxy for experience. AWARE is an environmental awareness score, based on ten general knowledge questions to gauge respondents" knowledge about popular environmental issues and also their general concern for the environment. For each question that the respondent answered correctly, or answered in a manner affirming their interest in environmental matters, one point was allocated. The score was thus calculated as the number of points received out of the total of ten. Lastly TIME is the round trip time travelled, in hours, in order to attend the *2012 Amatola Classic*.

While substitute sites should usually be incorporated as explanatory variables in some way, this was not deemed necessary for the present study. All of the respondents interviewed were asked about the existence of substitutes and the question was met with ubiquitous confusion. The Amatola Bass Classic was the only conceivable activity required to occupy the weekend in question for 86 % of respondents.

Following the work of Du Preez and Hosking (2011), four models were tested. The standard Poisson model (SP), the zero truncated Poisson model adjusted for endogenous stratification

(ZTP), the standard negative binomial model (SNB) and lastly the zero truncated negative binomial model adjusted for endogenous stratification (ZTNB).

4.3.2 Findings

In addition to considering how well each of these models fits the data, time as an explanatory variable was used in different ways. Firstly, the performance of each of the models was considered without including time at all. Next, time was included as an additional explanatory variable. Lastly, time was incorporated in terms of its opportunity cost and this was then added to other trip costs.

Without time

The results of the four models are outlined in table 4.6. TRIPCOST is significant at 1% in the two Poisson models and only at 5% in the two negative binomial models. Furthermore, TRIPCOST is the only significant variable in the two negative binomial models, while INC_UPP, EDUC and GEAR are all significant at the 1% level in the Poisson models, AWARE being significant at 5%.

Both the χ^2 and Pseudo-R^2 measures of goodness-of-fit are much higher in the Poisson models, indicating that they fit the data better. This is a surprising result, given that Shrestha *et al.* (2002), Martínez-Espiñeira and Amoako-Tuffour (2008) and Du Preez and Hosking (2011) all found these models relatively similar in their goodness-of-fit measures. The best fitting model would at first appear to be the ZTP, which indicates that a bias caused by truncation of non-users and endogenous stratification was probably present in the standard Poisson model.

Table 4.6 2012 Amatola Bass Classic demand model results without time as a variable

Variable	SP	ZTP	SNB	TNB
TRIPCOST	-0.0001179***	-0.0001278***	-0.0001166**	-0.0001274**
INC_MID	0.00029	-0.00229	-0.02696	-0.03922
INC_UPP	0.30801***	0.32980***	0.25406	0.27165
EDUC	0.32112***	0.34392***	0.25277	0.25743
AGE	0.00145	0.00159	0.00250	0.00287
GEAR	-0.00536***	-0.00211***	0.00482	-0.00805
AWARE	0.05568**	0.60496**	0.51738	0.05806
Y	2.44205***	2.35217***	2.52136***	2.45046***
Statistics				
Log L"hood	-297.83	-309.93	-202.00	-201.23
χ^2	78.48***	84.70***	11.57	11.15
Pseudo-R^2	0.1164	0.1202	0.0278	0.0270
Per Trip Consumer Surplus Estimate (ZAR)				
	R8 482	R7 825	R8 576	R7 849

The weakness of the ZTP model is revealed in a likelihood ratio test on α, the overdispersion parameter measured by the Negative Binomial models. The likelihood ratio test tests the probability that α = 0. For the SNB model $\overline{\chi^2}$ (01) = 191.67 with Prob > = χ^2 = 0.000 and for the ZTNB model $\overline{\chi^2}$ (01) = 217.40 with Prob > = χ^2 = 0.000. Overdispersion, as mentioned in Section 1, is a form of bias caused by the restrictive assumptions of the Poisson model. In particular, the model"s distribution fails to match up with the actual distribution of the data, which is characterised by an overdispersion caused by the behaviour of respondents. Basically, many respondents take few trips, while a few respondents have taken many, and the Poisson models have been shown to be biased because they fail to take account of this.

That TRIPCOST is significant and positive confirms the *a priori* expected behaviour of quantity demanded with regards to price deduced from microeconomic theory. An interesting result here is that INC_MID is not significant, while INC_UPP is significant and positive. Thus, middle income earners do not seem to have taken more trips than lower income earners during the past 14 years, but upper income earners have. EDUC is positive and significant, showing that respondents with tertiary educations are likely to have taken 0.32 more trips than their less educated fellow anglers. AGE is insignificant, showing that age does not

appear to have any effect on the amount of times respondents have fished the *Amatola Classic*.

GEAR is significant and negative, which seems counterintuitive. This is perhaps the most difficult finding to explain, given that one would expect more experienced anglers to have fished more *Amatola Classics*. The result probably has something to do with the nature of the *Amatola Classic* in relation to other tournaments. The competition is well sponsored and there are many prizes to be won. The prize for the biggest fish (winning this prize has a greater element of chance to it than the bag prizes which require a more consistent ability to catch fish) is a boat and trailer worth around R300 000. This attracts a great variety of anglers compared to tournaments with smaller prizes and could explain why fishing experience does not necessarily play a significant role in whether or not an angler is likely to attend such a tournament.

Lastly, AWARE is positive and significant at the 5% level. In accordance with *a priori* expectations, anglers who scored higher in the environmental awareness test are those same anglers who have fished more *Amatola Classics*. In light of the previous discussion, however, anglers who have fished more *Amatola Classics* are not necessarily more frequent anglers. A Poisson regression was run using AWARE as the dependent variable to see which factors might influence this. All other explanatory variables used in the travel cost analysis were included and none were found to be significant.

With time as a separate parameter

Including travel time as a separate parameter allows for the estimation of the value of time to respondents (Loomis and Walsh, 1997). This can be achieved by considering two things revealed by the TGF, provided that it includes travel time and travel cost as separate explanatory variables. The first is the marginal change in trips brought about by an increase in travel time, *ceteris paribus*; and the second is the marginal change in trips brought about by an increase in travel cost, *ceteris paribus*. For example, du Preez and Lee (2011) found that a R1757.78 increase in travel cost would lead to a reduction of one trip, other variables held constant. Also, an 8.4 hour increase in travel time would result in one less trip, other variables remaining the same. If one trip is worth both 8.4 hours and R1 757.78 to the respondent, then it follows that one hour of the respondent‟s time is worth R209.26. Du Preez and Lee‟s (2011) work followed the example of Shrestha *et al.* (2002), who used the same

technique to estimate the value of an hour of time to anglers in the Brazilian Pantanal: US$37.06 in 2012 prices (R281.23[4]).

This technique is contentious, given the relatively high degree of correlation that typically exists between the travel time variable and the trip cost variable. In this study, the correlation coefficient between these variables was 0.74. This is why Martínez-Espiñeira and Amoako-Tuffour (2008), in their study, included TIME as part of the overall trip cost instead. The results of the same four models used previously are provided in Table 4.7, the only difference between Table 4.6 being the inclusion of TIME as an additional variable.

Table 4.7 2012 Amatola Bass Classic demand model results with time included as a separate parameter

Variable	SP	ZTP	NB	TNB
TRIPCOST	-0.0000889***	-0.0000961***	-0.0001014	-0.0001133
INC_MID	0.01221	-0.01681	-0.03247	-0.04482
INC_UPP	0.32263***	0.34528***	0.24984	0.26618
EDUC	0.31101***	0.33209***	0.25215	0.25697
AGE	0.00161	0.00178	0.00278	0.00318
GEAR	-0.00572***	-0.05928***	0.00670	-0.00791
AWARE	0.05431**	0.60496**	0.04792	0.05434
TIME	-0.01043**	-0.01131**	-0.00504	-0.00462
Y	2.47421***	2.38652***	2.53439***	2.46095***
Statistics				
Log L"hood	-295.70	-307.62	-201.93	-201.18
χ^2	82.74***	89.32***	11.71	11.25
Pseudo-R^2	0.1227	0.1268	0.0282	0.0272
Per Trip Consumer Surplus Estimate (ZAR)				
	R11 249	R10 406	R9 862	R8 826

The value of time was estimated using the ZTP model. While this model was shown to be unsuitable due to the overdispersed nature of the data, using it nonetheless proved interesting for theoretical reasons. Besides, the more appropriate Negative Binomial models did not indicate that time (or even trip cost in the present specification) was a significant determinant of the number of trips taken, *ceteris paribus*.

[4] Using the March 2012 USD-ZAR exchange rate of $1=R7.5885

According to the SP model, a R11 249 increase in trip costs would bring about a reduction of one trip, *ceteris paribus*. Also according to this model, an increase of 95.8 hours will lead to a reduction of one trip, other variables remaining equal. Thus, using the method pioneered by Loomis and Walsh (1997), the value of time to the average angler participating in the 2012 Classic can be estimated at R117.42. That the value is in the same order of magnitude as du Preez and Hoskings‟ (2011) is surprising, given that the amount of hours taken to reduce the number of trips by one are so different in the two studies: 8.4 hours in Du Preez and Hoskings‟ and 95.8 hours in this study. This difference may be due to the way that the dependent variable was set up in this study. While du Preez and Hosking (2011) simply used the number of trips taken by respondents in the past year, the present study used the number of trips taken by respondents in the last fourteen years multiplied by the number of people in the fishing party, following a similar route to Martínez-Espiňeira and Amoako-Tuffour (2008). The difference may also be due to the problem of overdispersion discussed earlier, which is why the value should be taken with caution.

With the opportunity cost of time incorporated into trip cost

Given the challenges of incorporating time as a separate parameter, it is appropriate to consider another technique, namely using model specifications that incorporate the opportunity cost of time into trip cost (Sohngen *et al.*, 2000; Bin *et al.*, 2005; Martínez-Espiňeira and Amoako-Tuffour, 2008). Across models, these specifications performed slightly better than the two discussed thus far. With the previous specifications, the best fitting model has been the zero truncated Poisson model corrected for endogenous stratification with time included as an explanatory variable. This model had a pseudo R^2 of 0.1268 and a χ^2 value of 89.32. The same model specification, however, with time included, achieved a pseudo R^2 of 0.1347 and a χ^2 value of 94.92. The other models were also more closely aligned with the data in this form, as can be seen in Table 4.8.

Table 4.8 2012 Amatola Bass Classic demand model results with the opportunity cost of time included as part of the trip cost

Variable	SP	ZTP	NB	TNB
OCTIME	-0.0001022***	-0.0001106***	-0.0000969***	-0.0001051***
INC_MID	0.22376	0.02067	-0.00361	-0.01500
INC_UPP	0.40352***	0.43142***	0.34812	0.37284
EDUC	0.29905***	0.31887***	0.23911	0.24191
AGE	0.00181	0.00199	0.00270	0.00312
GEAR	-0.00542***	-0.00600***	-0.00657	-0.00778
AWARE	0.06349**	0.06909***	0.55204	0.06174
Y	2.39197***	2.29829***	2.47575***	2.39971
Statistics				
Log L"hood	-293.07	-304.82	-201.47	-200.76
χ^2	87.99***	94.92***	12.62	12.10
Per Trip Consumer Surplus Estimate (ZAR)				
	R9 785	R9 042	R10 320	R9 515
Pseudo-R^2	0.1305	0.1347	0.0304	0.0293

Both of the Negative Binomial models reported trip cost as a significant determinant of the number of trips taken (Table 4.8). This suggests that it is possible that anglers take into account the opportunity cost of their time when deciding how many trips to take, and not necessarily the amount of time in absolute terms.

On theoretical grounds, the Negative Binomial model corrected for endogenous stratification and truncation of non-users (TNB) is the most suitable among the four discussed. The higher pseudo-R^2 values for all models led to the choice of the specification which includes time as an opportunity cost in the overall trip cost. The consumer surplus was thus estimated using the Negative Binomial model corrected for endogenous stratification, and with the opportunity cost of time included in trip cost. The value arrived at was R9 515 per angler per trip, indicating that the 2012 *Amatola Classic* generated a consumer surplus of R1 960 090.

It is interesting to compare the per day consumer surplus estimated by the chosen model to that obtained by Martínez-Espiñeira and Amoako-Tuffour (2008) through their study of recreation in Gros Morne National Park, and particularly to those estimated by Shrestha *et al.* (2002) and du Preez and Hosking (2011) in their studies of recreational angling in the Brazilian Pantanal and in the north Eastern Cape, respectively. But caution is necessary since

the direct comparison of these values would require that the types of anglers used be assumed homogenous in all respects which were not accounted for in all models being compared, ie. with regards to variables exogenous to the models. These comparisons are made in Chapter 8.

4.3.3 Conclusion

The travel cost analysis has revealed that the most appropriate way of dealing with time in this case was to incorporate the variable in terms of its opportunity cost. The analysis also showed that the Poisson models were not acceptable for use with the data considered as they were characterised by overdispersion. The Standard Negative Binomial was found to generate a higher pseudo-R^2 value than the Negative Binomial model which was corrected for endogenous stratification and truncation of non-users. The former was thus used to estimate the social welfare accruing to anglers who participated in the 2012 Amatola Bass Classic: R9 515 per angler per day, providing R1 960 090 for the tournament as a whole. The following part of the thesis will present the findings of a study which used a qualitative research method, the sustainable livelihoods framework, to explore the value of a recreational fishery surrounding the rural village of Cata.

PART C: THE FISHERY AT CATA

The purpose of this part of the thesis is to use a broad based method to explore the factors which determine the value of the recreational fishing industry in the rural village of Cata. In particular, the sustainable livelihoods framework will be used to structure a discussion which aims to isolate the variables which have been deemed important in determining the value of the fishery. As a backdrop to this discussion, Chapter 5 will explore Local Economic Development (LED) literature, particularly that which relates to community-based tourism, ecotourism and recreational angling‟s role in stimulating tourism. This is followed by Chapter 6 with a presentation of the study site and the research method, including an outline of the sustainable livelihoods framework. Lastly, Chapter 7 will provide an application of this framework to *Amatola Wild Trout*, a community run trout fishing business based in the village of Cata.

CHAPTER 5

LED THEORY AND CASE STUDIES

This chapter presents an overview of LED, followed by discussions on tourism-based LED, community-based LED, and ecotourism respectively. Lastly, South African policy in respect of tourism as a development strategy is reviewed.

5.1 LOCAL ECONOMIC DEVELOPMENT

LED is a process whereby a group of stakeholders identify and use local resources, skills and ideas to stimulate economic growth and development (RSA, 2000). Ideally, the process of LED should draw on a number of initiatives so as to encompass as many stakeholders as possible while efficiently utilising available resources. The resources used in LED initiatives can be any combination of natural, human, social, physical and financial capital. The aim of LED is to develop these various forms of capital with the intention of creating employment, alleviating poverty and redistributing resources in a manner which maximises welfare (Blakely, 1994; Nel *et al.*, 2001).

The International Labour Organisation stresses the need for LED initiatives to find and exploit their competitive advantage (ILO, 2008). The success of LED projects depends not only on the creative use of existing capital, but also the ability of planners to realise the regional, national and global context within which their projects are set (RSA, 2000). Failure to undertake market analysis and feasibility studies prior to the development of LED initiatives is a risky procedure (Ndlovu and Rogerson, 2003). An example is tourism development in Turkey. In the 1990s, the Turkish government set out to grow the domestic tourism industry by providing incentives to those engaged in the supply of tourism-related products and services. This was done without research into the existence and nature of markets. The result was an over-supply of tourism infrastructure and therefore an inefficient allocation of resources (Tosun and Timothy, 2001).

Binns and Nel (1999) point out that the reason why many communities in the South are in such dire need of development is that they still remain marginalised from the global economy. This is where government and non-government organisations find their role in LED: to facilitate the integration of economically isolated communities into the „global village". Nel *et al.* (2001) demonstrate the need for the harmonious integration of local, regional and national policy and point out the need for top-down approaches to complement their grass-roots counterparts. While outside participation can be an essential catalyst for growth, the success of LED ventures depends fundamentally on the role of communities which they are supposed to be uplifting. Projects with high levels of community control and ownership are more likely to provide greater benefits (Nel *et al.*, 2001; Rogerson, 2002; Holland *et al.*, 2003).

Rogerson (2011: 149) conducted a review of LED policy and practice in South Africa from 1994 to 2009 and concluded that LED projects throughout this period "have served to reinforce geographical inequalities in economic and social development across the country". This is because the success of urban based LED initiatives has been so much higher than that of rural ventures. Rural-based LED projects usually have far less human capital to work with and this is a common reason given for their limited success (Nel *et al.*, 2001; Gibb and Nel, 2007; Snowball and Courtney, 2010). Nel *et al.* (2001) have shown how NGOs can fill this gap, but question the degree to which it is sustainable to have them doing so indefinitely.

While rural LED projects face many challenges, the communities which they aim to uplift have little else to hang their hopes on. The agricultural livelihoods and state welfare upon

which so many of these communities currently rely is not sufficient to provide them with enough income to end the cycles of poverty within which they find themselves (Holland *et al.*, 2003). LED initiatives have the potential to provide communities with very tangible economic benefits in the form of employment generation, increased revenue to economically marginalised areas, the strengthening of human and social capital and the dignity which is essential for human wellbeing (Nel *et al.*, 2001; Ashley and Roe, 2002; Hill *et al.*, 2006). These successes, even where marginal, attest to the ability of LED as a strategy to support rural livelihoods.

5.2 TOURISM AS LOCAL ECONOMIC DEVELOPMENT

Utilising tourism to drive LED can be a reliable approach and there are many cases where it has led to job creation, poverty reduction and skills development (Binns and Nel, 2002; Hill *et al.*, 2006; Rogerson and Rogerson, 2010). One negative aspect of using tourism as a LED strategy is that it can often take many years to establish a tourist destination, given the varying geographical elasticity of tourism demand. This serves not only as a deterrent to potential investors, but can lead to a feeling of disillusionment and loss of momentum if all parties are not completely aware of and willing to make the sacrifices needed to achieve long-term goals (Visser and Rogerson, 2004; Snowball and Courtney, 2010). According to Allen and Brennan (2004), South African tourism initiatives have yet to prove that they are capable of driving radical improvements in livelihoods at the community level. Hill *et al.* (2006) point out the need for communities to develop a diverse range of LED projects, since there are limits to the number of jobs which can be created by any stand-alone tourism-based LED project.

Du Preez and Lee"s (2010) assessment of the contribution of trout fly fishing to the economy of Rhodes, in the north Eastern Cape, provides valuable insight into the nature of this industry and its potential to foster LED initiatives. The authors found that trout fly fishing is responsible for the annual injection of just over five million rand into the economy of Rhodes. Furthermore, tourism provides direct employment for 85 people in the town and the trout angling industry is believed to contribute 46 % of these jobs. Rhodes is a rural, isolated town with high levels of unemployment and so this economic impact is much needed. Du Preez and Lee (2010) conclude that the Rhodes trout fly fishing industry could form the foundation for a LED project, provided that the local government plays an active role in

supporting the local community through service provision and the promotion of micro-enterprises.

5.3 COMMUNITY-BASED TOURISM

The defining feature of community-based tourism projects is the extent to which local communities are involved in them. In particular, authors seem to agree that locals should have ownership, power and meaningful participation within enterprises if they are to be regarded as community-based (Ndlovu and Rogerson, 2004).

Sandbrook (2010) calculated the economic impact of tourism in Bwindi Impenetrable National Park, Uganda. The findings of this case study reveal that despite a 75-fold difference in the price of various types of accommodation, there was virtually no difference in the economic impact that they had on the local areas. This is because the cheaper accommodation was community-owned and thus a far greater proportion of money generated through low-cost accommodation stayed in the area as opposed to high-cost accommodation, where nonlocal ownership led to greater leakages.

One potential pitfall which faces community-based tourism ventures is that they risk becoming dependent on external sources of finance (Hill *et al.*, 2006; Snowball and Courtney, 2010). In this case a fundamental question must be asked: are the costs of financing projects which are unable to sustain themselves outweighed by the benefits generated by these projects? If the benefits were simply in the form of revenue and employment, this would be a relatively straightforward calculation. Benefits, however, can take a number of forms which can be more difficult to measure empirically, including skills development, empowerment, or even cultural preservation (Scheyvens, 2002; Snowball and Courtney, 2010). The intangible nature of these benefits should not prevent them from forming part of the consideration process when deciding on the efficiency of allocating resources to tourism based LED initiatives.

5.4 ECOTOURISM

The South African Department of Environmental Affairs and Tourism defines ecotourism as "environmentally and socially responsible travel to natural or near natural areas that promote conservation, have low visitor impact and provide for beneficially active socio-economic involvement of local people" (DEAT, 1996: 3) This is in line with the International Ecotourism Society"s definition (IES, 2012). Some authors, such as Weaver (2001) believe

that tourism can only be defined as ecotourism should it be strictly non-consumptive. Zwirn *et al.* (2005), however, point out that all forms of tourism involve some sort of consumption. Further, Zwirn *et al.* (2005) argue that ecotourism should be characterised by its outcomes rather than its intentions, given the risk that unsustainable projects could potentially operate beneath a „green washed" façade, with the purest of intentions and outcomes which are far from sustainable. According to Goodwin (1996), tourist ventures can be classified as operating under the principles of ecotourism either because they contribute directly towards conservation efforts through funding, or indirectly, by providing communities with revenue such that they become more aware of the value inherent in natural capital and thus take on the role of stewardship over their natural surrounds.

Literature regarding recreational angling as a form of ecotourism demonstrates the benefits which can accrue to communities who take this developmental line (Ditton and Stoll, 2003; Russell and Kuiper, 2003; Zwirn *et al.*, 2005). Given South Africa"s wealth of underutilised natural capital, tourism with a focus on utilising this capital in a sustainable manner makes sense. In this regard, developing infrastructure to provide tourists with access to rural areas seems like a logical way forward (DEAT, 1996). This is the general line of thinking upon which Spatial Development Initiatives are based. These aim to provide previously disadvantaged communities with benefits in the form of employment creation and income generation by linking them to the broader economy through tourism and other industries. An example is the Wild Coast Spatial Development Initiative, which is based in the former Transkei homeland. Taking the pro-poor approach advocated by authors such as Ashley and Roe (2002) might lead one to open the relatively pristine landscape of the Wild Coast to tourists through marketing and infrastructure development. The dilemma here is that no form of tourism is benign, and visitors to an area will always have some impact its ecology (Leopold, 1949). In some cases the interests of tourism will conflict with the interests of conservation (Moffet, 1995; Van Rooyen, 2002). Should the Wild Coast experience an influx of tourists this could destroy the very thing which it is famous for: Being an undisturbed part of the country (Moffet, 1995). This could be seen as an erosion of natural capital that would jeopardise the ability of the area to attract tourists in future, leading to a decline in the industry and a reversal of development that could leave communities worse off than they were in the first place. The trade-off between tourism development and conservation is thus a complex one that can involve negative feedbacks. According to Zwirn *et al.* (2005), the

negative externalities involved in tourism development can be minimised through collaboration and information sharing between stakeholders.

5.5 TOURISM POLICY IN SOUTH AFRICA

Tourism as a development strategy received little attention under South Africa‟s previous ruling party (Visser and Hoogendoorn, 2011). Following the 1994 transition to a democratic society, redressing the inequalities of past policies and fighting poverty became key goals for the African National Congress. In line with this agenda, the *Rural Development Strategy* was developed with the aim of creating full employment and eliminating poverty by 2020 (RSA, 1995). The following year saw the formulation of the *White Paper on the Development and Promotion of Tourism in South Africa* (DEAT, 1996). This white paper set out the task of developing the tourism sector in a sustainable manner as an industry that would provide benefits for all South Africans. The government pledged to support projects in rural communities in the hope of fostering a well-balanced industry. One such envisioned form of support would be the provision of infrastructure to improve the accessibility of rural areas. The idea was that government would form partnerships with entities engaged in rural tourism in order to help achieve an optimum allocation of tourism supply, given the untapped and previously neglected resources which many rural areas were perceived to hold. The potential drawbacks of this approach have been discussed previously. *The Responsible Tourism Handbook: A Guide to Good Practice for Tourism Operators* seems to have taken note of the prevailing support for bottom-up approaches within tourism based LED literature (Nel *et al.*, 2001; Rogerson, 2002; Holland *et al.*, 2003), and emphasises the need for partnerships between government, NGOs and communities in which communities have a significant portion of control (RSA, 2000).

CHAPTER 6

STUDY SITE AND RESEARCH METHOD

6.1 CATA VILLAGE

The second site is the rural village of Cata, where South Africa‟s first community owned and run fishing lodge, *Amatola Wild Trout*, has been established. Cata is located in the Keiskammahoek magisterial district of the former Ciskei homeland in the Eastern Cape Province, and was one of 375 rural villages in the Ciskei which experienced the brunt of former government‟s *Betterment Planning* policies[5] in the mid-1960s (BRC, 2007). Following the advent of constitutional democracy, the residents of Cata were the first in South Africa to receive *betterment restitution* (BRC, 2007). In 2000, the Department of Land Affairs (DLA) and representatives from the Cata community agreed that each family which had been forced to relocate in the 1960s would be given betterment restitution in the form of monetary compensation to the value of R31 697.50 ($5 179.33) per family. The DLA decided that half of this compensation would be given to the families in the form of a cheque, and half would be placed in a fund and used for development initiatives (De Wet and Mgujulwa, 2010). Local institutions, such as the Communal Property Association (CPA), have played an active role ever since in mobilising the community. The CPA, working with the Eastern Cape based NGO, the Border Rural Committee (BRC), used the betterment restitution to set up a Project Steering Committee (PSC). The PSC went on to start projects in agriculture and forestry and in doing so managed to secure further funding from various government departments which had been earmarked for rural development (BRC, 2007).

The development which has been made possible by betterment restitution and the strong network of organisations existing in Cata appears to have had a positive effect on the community. Without considering income received from state grants, such as the child support grant, 4 % of Cata‟s households had no income at all in 2007, a figure which was down from 43 % in 2001. The employment rate has also increased from 4% in 2001 to 26% in 2007, with

[5] Betterment planning was an attempt by South Africa‟s previous government to improve the layout of homeland areas with the intent of making them more productive agriculturally by reducing erosion. This was done by resettling people on a local scale. Ironically this erosion was the result of the government‟s larger scale resettlement policies which resulted in excessive population pressure being placed on certain areas (De Wet, 1989).

most of the growth being experienced by the agriculture, forestry and construction sectors (BRC, 2007).

One of the more recent initiatives of the PSC is a trout fishing lodge. *Amatola Wild Trout (*AWT*)* is the product of collaboration between the PSC, the BRC and the Rural Fisheries Programme, based at the Rhodes University Department of Ichthyology and Fisheries Science. The idea was to use an untapped natural resource, established populations of trout, to attract anglers who would provide an injection of money into the local economy. Chalets had previously been built at Cata to cater for hikers, mountain bikers and bird enthusiasts and this could potentially provide the accommodation needed for anglers.

The populations of trout found in the streams around Cata are small in comparison with those found in larger bodies of water. Some anglers prefer to catch fish which are part of established populations, as opposed to fish which are regularly stocked, even when they are smaller in size. Also, fishing within dense riverine forest provides additional challenges and the brand of fly-fishing offered by AWT is thus unique (Rouhani and Davies, 2009).

Figure 6.1 shows a map of Cata‟s streams and dams, drawn up for AWT‟s business plan. In the case that the business is successful, managers foresee building a lodge specifically for anglers (Rouhani *et al.*, 2010). Areas were also prioritised for alien invasive tree clearance, as shown on the map, to increase the flow of water in streams. Lastly, the river was delineated into *beats*, which are used as units when purchasing fishing time on the river.

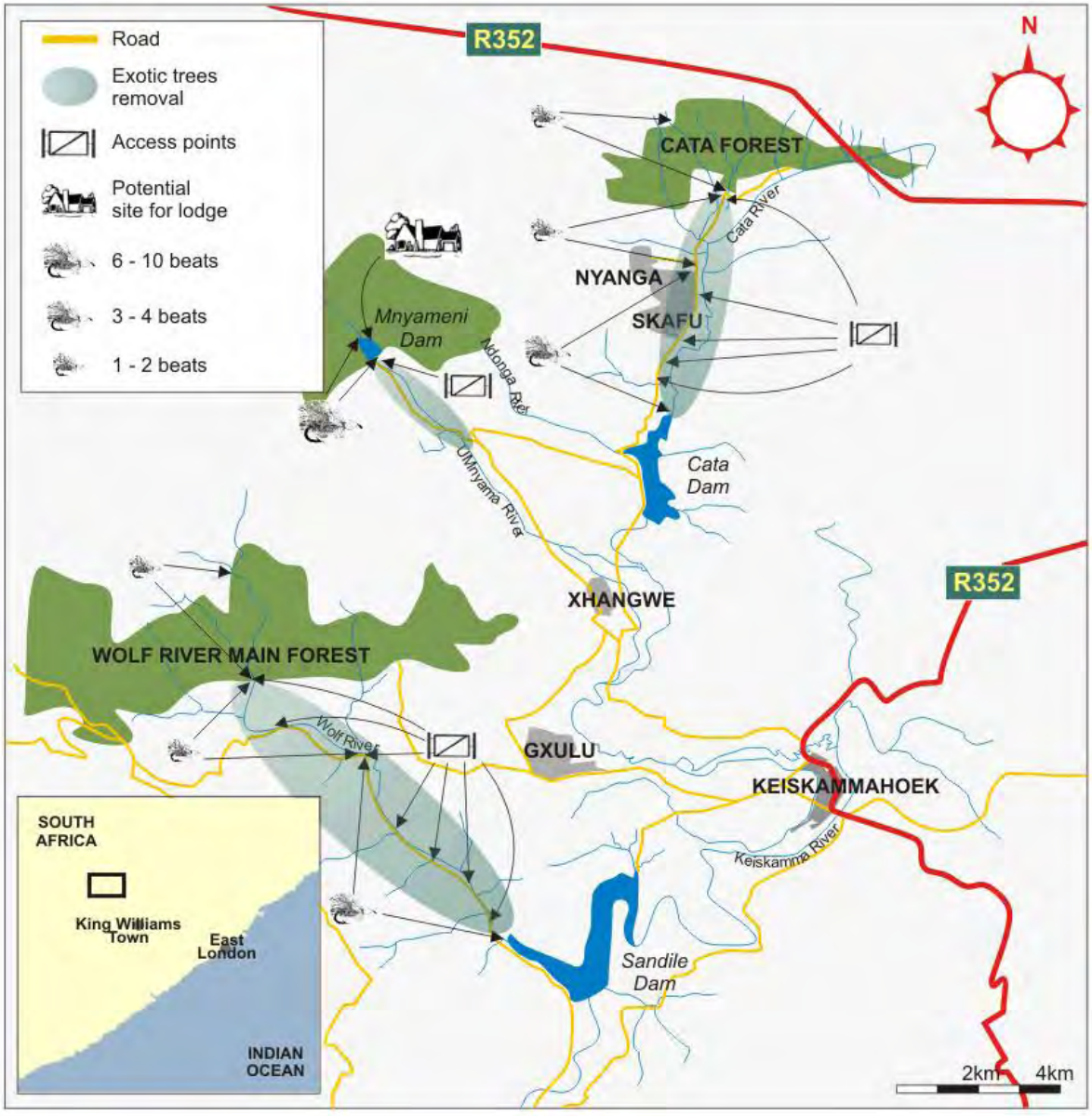


Figure 6.1 Proposed sites for recreational trout fishery development by *Amatola Wild Trout*, Cata Village, Eastern Cape

Source: Rouhani *et al.*, 2010

The aspects shown in Figure 6.1 will be discussed further in Chapter 7, which will present an application of the sustainable livelihoods framework to *Amatola Wild Trout*. It will be shown that a variety of factors determine what the value of this particular resource could potentially have to the local community, so limiting the usefulness of any one static consideration of the value of recreational angling in time. The remainder of this chapter serves to outline the method used to study the fishery at Cata.

6.2 RESEARCH METHOD

Sustainable livelihoods approaches were originally developed within research institutes, NGOs and donor organisations, all united by a common goal to better understand the drivers of poverty (Ashley and Carney, 1999). As with the quantitative methods employed in Part B, the approach can be defended on epistemological grounds using scientific realism (Maki, 2009) The fundamental difference between the sustainable livelihoods framework (SLF), employed in this part, and the quantitative methods employed in Part B, is that the SLF is methodologically collectivist (Ashley and Carney, 1999), while the way that the methods in Part B have been used to determine value based on individual choices places them in the methodologically individualistic category.

The SLF was used to analyse *Amatola Wild Trout* (AWT), the sole representative of the recreational fishing industry of Cata. Data were collected using document analysis as well as unstructured and semi-structured interviews with stakeholders and planners.

6.2.1 Document analysis

Document analysis allows researchers to construct contextual profiles for their case studies (Bowen, 2009). Although this is a form of data collection in itself, it is also useful in highlighting the areas which should be the focus of other data collecting techniques (Yin, 2009). Also, the data gathered using these other techniques can, in some cases, be verified using document analysis. Three documents were particularly useful for constructing a contextual profile for the village of Cata and AWT. The first was de Wet and Mgujulwa‟s (2010) *The ambiguities of using betterment restitution as a vehicle for development: An Eastern Cape case study*. This book chapter provided an in-depth discussion surrounding the development of the institutional foundations required for the formation of AWT. The *Report on the scoping study to develop a recreational fishery in and around Cata Dam* (Rouhani and Davies, 2009) and the *Report on the feasibility and business plan to develop a recreational fishery in and around Cata Dam* (Rouhani *et al.*, 2010) were both analysed to gain a better understanding of how the development of AWT was informed and guided by the Rural Fisheries Programme at Rhodes University. Document analysis allowed for the isolation of key actors in the study, provided basic information surrounding key dates and developments, and allowed for the construction of questions which would later guide semi-structured interviews.

6.2.2 Unstructured and semi-structured interviews

In contrast to the rigid, structured interviews required for the collection of reliable and valid quantitative data, the interviews used to collect qualitative are mostly unstructured or semi-structured. Semi-structured interviews are much more flexible than their structured alternatives, but still maintain a degree of order (Bryman, 2008). Those used to collect data for this study were conducted using a list of open ended questions and general themes for discussion. These questions were not always adhered to in any strict sense, but were used to facilitate a discussion in which the interviewee was encouraged to elaborate on certain points of interest. Semi-structured interviews were conducted with Qurban Rouhani (Technical advisor to the project, Rural Fisheries Development Programme, Department of Ichthyology and Fisheries Science, Rhodes University), Ashley Westaway (Former Managing Director, *Border Rural Committee*), Boniswa Tontsi (Administrator, *Amatola Wild Trout*), Luyolo Tete (Guide, *Amatola Wild Trout*) and Nina Rivers (Researcher, Environmental Learning Research Centre, Rhodes University).

Unstructured interviews go one step further in that there is very little order in terms of how the discussion proceeds. An unstructured interview is impossible to conceive of in any complete sense, since every interview must have some sort of aim (Sarantakos, 1998). The point is that unstructured interviews are very different from structured interviews. They do not require the interviewer to follow any sort of procedure, allowing the interviewer a freedom to pursue themes and topics at will (Bryman, 2008). For this study, the theme was simply the value of the fishery at Cata. The interview proceeded in the style of a conversation, being redirected toward the topic of interest where necessary. Unstructured interviews were conducted with Qurban Rouhani, Boniswa Tontsi and Luthando Mboso (Manager, *Amatola Wild Trout*). The data gathered in both semi-structured and unstructured interviews were rich and fairly comprehensive, as the aim was to exhaust the topic of the value of the fishery at Cata.

6.2.3 The sustainable livelihoods framework

A framework can be thought of as the most general form of theoretical analysis (Ostrom, 2011). Frameworks allow researchers to contextualise variables within processes, and so enable them to systematically consider the combined impacts of these variables on one another and on the unit of analysis. This then allows for the application of theories and, on a more technical level, partial analysis using models (Ostrom, 2011). The sustainable

livelihoods framework (SLF) uses the household as its core, and proceeds to outline the vulnerability context, assets, and transforming structures and processes which jointly determine the strategies through which the household can generate livelihood outcomes. The approach aims to provide an intricate description of the complex reality faced by households while at the same time simplifying this description into an abstract, manageable framework (Ashley and Carney, 1999). This framework can be seen in Figure 6.2.

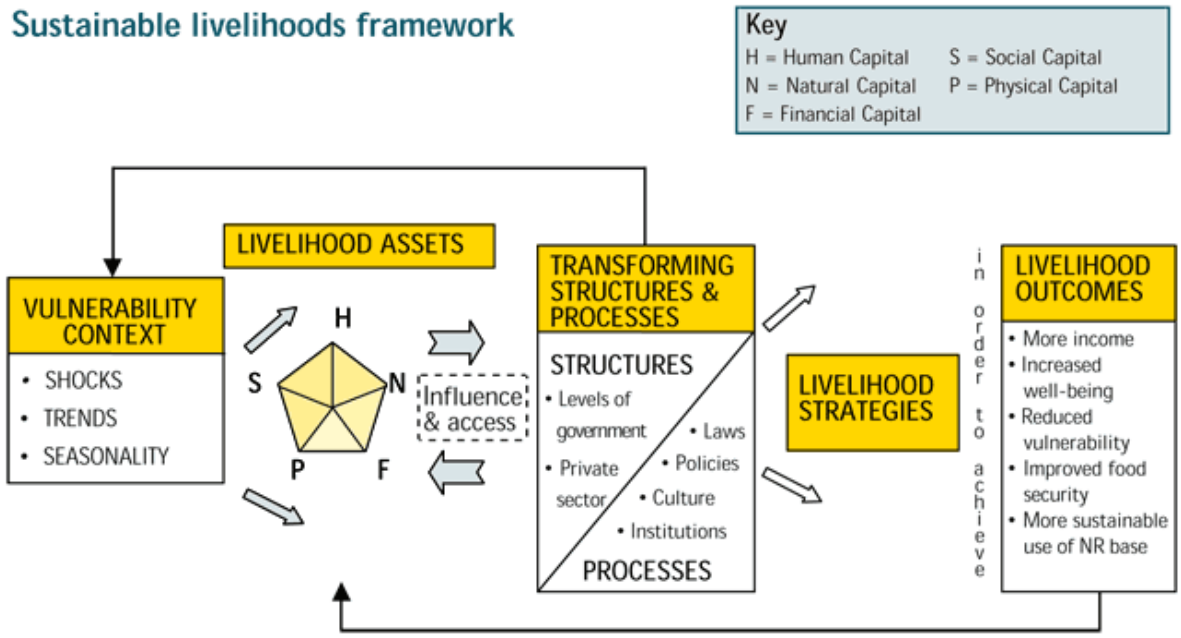


Figure 6.2 The sustainable livelihoods framework

Source: Practical Action, 2012

Simple definitions of the term „livelihood" define the noun as "(the way someone earns) the money people need to pay for food, a place to live, clothing, etc." (Cambridge, 2012) or "the way you earn money to live" (Longman, 2012). The more general definition offered by Merriam-Webster (2012) is: "means of support or subsistence". This definition is more in line with the way in which the term is used by the Food and Agriculture Organisation of the United Nations, encompassing the generation of money as well as other means of ensuring a continued existence, such as by improving food security, reducing vulnerability or using resources sustainably (Messer and Townsley, 2003; Carloni and Crowley, 2005).

Vulnerability context

The vulnerability context refers to all those factors which affect a household‟s ability to maintain a livelihood, but over which it has no control. This can include external shocks, such as a natural disasters; trends, such as the more long term changes in the demand for certain products or services; and seasonal changes, such as those which serve to limit the ability of households to access natural resources at certain times of the year (Messer and Townsley, 2003; Carloni and Crowley, 2005).

Livelihood assets

The assets which a household has at its disposal are commonly separated according to the type of capital which they can be classed under.

1. Human capital refers to the health and physical capability of people. It also includes all of the knowledge and skills which people have accrued over time, through experience, observation and education (Messer and Townsley, 2003; Carloni and Crowley, 2005).
2. Natural capital refers to resources derived from land and water, such as minerals, fertile soil, forests, fish, livestock, but also includes the land and water itself. Basically, these elements can be sold or combined with other forms of capital, as factors of production, in order to produce goods or services from which a livelihood can be created (Messer and Townsley, 2003; Carloni and Crowley, 2005).
3. Financial capital refers to liquid assets which have a value but do not have any practical use other than to be traded for goods, services or assets (Conjecture Corporation, 2012). Most commonly this term refers to money (Messer and Townsley, 2003; Carloni and Crowley, 2005).
4. Social capital refers to the relationships that exist between groups of people, particularly those which are beneficial and play a supportive role within communities. This form of capital is strongly determined by institutions, whether they are formal agreements such as the stokfel (a rotating credit association) or more casual loans which circulate between friends and family (Messer and Townsley, 2003; Carloni and Crowley, 2005). Social capital can reveal itself in many different forms. For example, a person watering her neighbours‟ vegetable garden, or even the advice which people are given by their peers, can be considered as forms of social capital.

5. Physical capital is similar to natural capital, except that it has been modified or processed by humans in some way. For example, the building where a firm is housed, as well as the tools used in producing goods and services, can be considered forms of physical capital (Messer and Townsley, 2003; Carloni and Crowley, 2005).

In depicting the assets available to households, researchers commonly use the pentagon shown in Figure 6.3. The shape of the pentagon is meant to represent by the quality and quantity of these assets according to their class. For example, Figure 6.3 portrays the various forms of capital available to a hypothetical household.

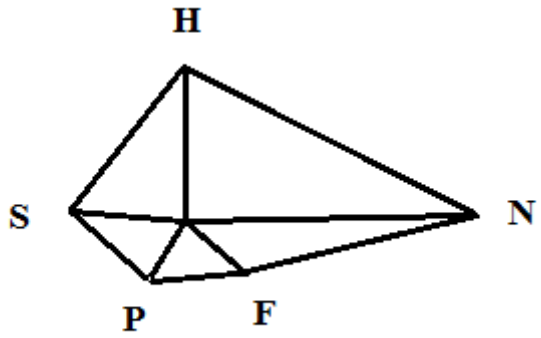


Figure 6.3 An example of a typical assets pentagon for a rural, marginalised household Source: Messer and Townsley, 2003

Figure 6.3 depicts a household with strong human and natural capital, and fairly strong social capital, but with very little in the way of physical or financial capital. This is typical of a rural, marginalised household with access to natural resources such as non-timber forest products and a good working knowledge of how to make use of them. Rural households typically have less access to credit and other forms of financial capital, and this is often linked to their lack of physical capital as embodied in advanced, expensive technology (Messer and Townsley, 2003).

Transforming structures and processes

Both the structure and the processes within which households operate are instrumental in determining the options available for households to choose from, and to an extent the choices themselves, in any given situation.

The sustainable livelihoods framework considers all agents influencing the choices faced by households to be part of that household‟s structure. This includes government, which usually

operates on more than one level, non-government organisations, as well as firms and individuals working from within the private sector (Messer and Townsley, 2003; Carloni and Crowley, 2005). The word process, as used here, is synonymous with the word institution. Institutions can be defined as "the rules of the game of society" (North, 1990: 3). They are norms, habits and expected behaviours determined by cultural and legal backdrops. Institutions can take the form of clearly defined laws and regulations, which are used in conjunction with policies to influence the choices available to households. But they are also comprised of informal norms and socially accepted patterns of behaviour, which are determined to a large extent by an ever changing cultural backdrop (Carloni and Crowley, 2005). One example of how processes can affect households is through the education system. A well-executed policy to improve the skills base of an economy could entail reforming the education system, and a policy like this has the potential to increase the human capital available for households to draw from.

Structures and processes impact not only households themselves, but also their vulnerability context (Messer and Townsley, 2003; Carloni and Crowley, 2005). For example, a particular policy to support commercial farmers might entail subsidising high tech farming equipment. In a competitive market, this policy would reduce the price charged by commercial farmers in order to make a profit from their produce, so leading to an overall reduction in the market price. For smaller scale farmers, unable to make use of the same equipment, profit margins would be reduced by this external force, which can be said to act through their vulnerability context; that is, as an exogenously controlled variable.

Livelihood strategies and livelihood outcomes

Together, the vulnerability context, livelihood assets, and transforming structures and processes determine the range of livelihood strategies available to households. And it is at this point within the process of building a theoretical framework that the researcher considers the agency of the household in its use of available livelihood strategies to achieve *livelihood outcomes* (Messer and Townsley, 2003; Carloni and Crowley, 2005). These outcomes can be thought of as the benefits, or the value of the livelihood strategy.

6.2.4 *Amatola Wild Trout* as the unit of analysis

A key distinction between the way that the SLF has traditionally been used and its application here concerns the unit of analysis. The SLF was designed to focus on households, while this study will have a firm, *Amatola Wild Trout*, at its centre. This was deemed theoretically

practicable, given the similarities that exist between a typical household and AWT. A household can be defined as "…a group of people who eat from a common pot, and share common stake in perpetuating and improving their socioeconomic status from one generation to the next." (Carloni and Crowley, 2005: 2). Likewise, a firm can be thought of as a group of people who have a common goal: to maximise profits, and in so doing derive as much value as possible from factors of production. In this way, the research presented here will consider the value of recreational fishing as the commodity which is sold by AWT. This will demonstrate to what extent the value of this commodity is determined by how well AWT is able to use it to stimulate local economic development.

CHAPTER 7

ANALYSIS

The following analysis will be set out in accordance with the SLF, first considering the vulnerability context within which AWT is situated. Secondly, the assets available to AWT are discussed as the various classes of capital defined by the SLF. This is followed by a consideration of the structures and processes surrounding AWT, as well as their effect on the vulnerability context and assets of the firm. Finally, the way in which AWT has used its assets within its surrounding context will be considered (livelihood strategies), as well as the resulting benefits (livelihood outcomes). While this structure is a useful guiding tool for the discussion which will follow, it should quickly become apparent that the interrelated nature of the factors being considered makes it impossible to adhere to the structure in any strict sense. However, the nature of the SLF framework allows for this sort of flexibility, and Figure 5.3 shows the different components of the framework feeding into one another. Figure 5.3 depicts a schematic representation of the SLF as applied to AWT in 2012, and can be seen as a highly simplified version of the discussion which is to follow.

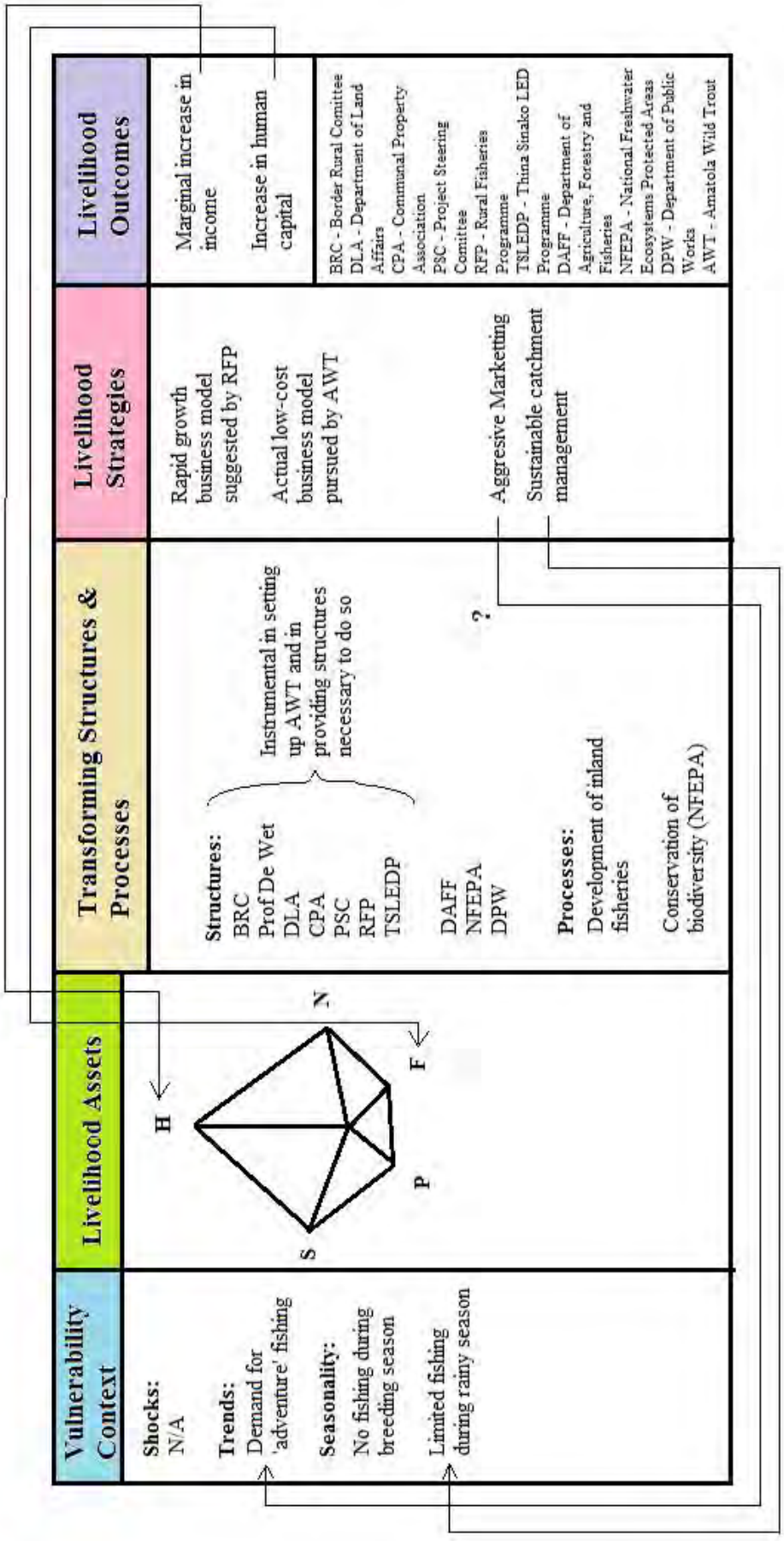


Figure 7.1 The sustainable livelihoods framework as applied to *Amatola Wild Trout*

Source: Adapted from Practical Action, 2012

7.1 VULNERABILITY CONTEXT

7.1.1 Shocks

The research conducted for this study did not uncover any exogenous shocks which affected AWT in the past. As AWT is a newly established enterprise it is likely that significant shocks would have come up during the interviews conducted with stakeholders.

7.1.2 Trends

The brand of trout fishing offered by AWT is unique for three reasons. Other popular fly fishing destinations, such as the village of Rhodes in the north Eastern Cape and Dullstroom in Mpumalanga, typically have relatively large rivers and dams, into which trout of desirable sizes, bred in hatcheries, are stocked on a regular basis (De Jager, 2010; Du Preez and Lee, 2010). This ensures a good chance that anglers will catch fish and also allows them the opportunity of keeping the fish if they so desire. Part of the appeal of AWT‟s unique brand of trout fishing is what the business plan refers to as „wild‟ populations of trout (Rouhani and Davies, 2009). That is, the populations are established and have sustained themselves since they were first introduced in the early 1900s. The idea is that some anglers might feel a sense of reverence for having caught a „wild‟ trout. Secondly, the streams surrounding the village of Cata are relatively small, and so the fish within these streams do not grow as large as those in the rivers surrounding Rhodes (Rouhani and Davies, 2009). Thirdly, the streams are situated within dense riverine forest. This makes casting into, as well as accessing the streams, difficult, so increasing the challenge of catching a fish here (Rouhani and Davies, 2009). This unique brand of fly fishing will be referred to hence forth as adventure fishing.

Very little is known about the market for adventure fishing, and so it is impossible to say how demand for this commodity might fluctuate in future. One needs look only as far as the local irrigation fed agricultural project in Cata to see how marketing problems might arise as the business develops. The irrigation scheme was initially started in the 1980s, and has subsequently been upgraded several times, most recently with restitution money and funding from the European Union, the Department of Agriculture, Forestry and Fisheries and the Department of Water Affairs. Although the project provides the community with a cheap food source, the idea was that it would be a self-sustaining business. Those currently involved in the project have tried for several years to secure a stable market for the scheme‟s produce, but it still operates at a loss (Rivers, Pers Comm., 2012).

It could be argued that AWT has the potential to undertake aggressive marketing campaigns and in doing so stimulate the demand for adventure fishing. If this were done, market forces would no longer be considered as part of the vulnerability context, but as a variable which could, to an extent, be endogenously controlled by the firm. The assumption made in constructing this framework, however, was that the demand for adventure fishing is determined predominantly from outside of AWT's control. This is in accordance with the rational actor model, which considers consumers‟ preferences to be established *a priori* (Hausman, 1994). While it would be interesting to study the extent to which AWT has affected change in the demand for adventure angling, this was outside of the scope of the present study.

7.1.3 Seasonality

Trout breed between the months of May and August. As their feeding habits change during this time, it is not practical to try and catch them (Mboso, Pers Comm., 2012). The fishing season therefore runs between September and April. Also, tourism demand in general changes in accordance with school holidays, and this is why peaks in the demand for adventure fishing are expected around the time of school holidays (Rouhani, Pers Comm., 2011).

During times of high rainfall, the rivers tend to have high levels of suspended sediment. As aquatic visibility is reduced under these conditions, and since trout fishing relies on the ability of trout to see the flies which are used as lures, it becomes much more difficult to catch trout at these times. This is where Mnyameni Dam can be seen as a significant advantage. The water in the dam will still remain relatively clear, even during seasons of high rainfall, and this means that anglers who happen to visit the area during these times will still be able to fish in the dam, even if the rivers are turbid (Rouhani and Davies, 2009; Rouhani *et al*., 2010).

Although rainfall is outside of the control of AWT, the extent to which it affects turbidity is not necessarily. Responsible catchment management practices can reduce the amount of soil which is washed into rivers during rainfall events. For example, if cattle are frequently taken to a particular point along a river‟s banks, then that piece of land is likely to become degraded. Degraded sections of river have less vegetation and this decreases the stability of the soil found there, allowing it to be washed into rivers during rainfall events and leading to increased turbidity. So it is in the interest of AWT to ensure that the catchment surrounding

Cata is managed responsibly, and ensuring this will serve to limit the negative impact which rainfall has on fishing conditions (Rouhani *et al.*, 2010).

7.2 LIVELIHOOD ASSETS

7.2.1 Human capital

The level of enthusiasm demonstrated by Boniswa Tontsi (Administrator, *Amatola Wild Trout*), and Luthando Mboso (Manager, *Amatola Wild Trout*) can be seen as significant assets to AWT. Both these people are confident that they have something unique and valuable to offer tourists through AWT (Mboso, Pers Comm, 2012; Tontsi, Pers Comm., 2012). Mr Mboso‟s official contract with the business expired in October 2011 and he no longer receives a monthly salary, but only gratuity from the fishing parties for which he acts as a guide. Despite this reduction in benefits received from the business, Mr Mboso continues to invite previous clients to visit the area again, sending them photographs as encouragement (Mboso, Pers Comm, 2012).

AWT first began investing in its own human capital in May, 2010. Mr Mboso had recently been hired by the firm and he was sent to the village of Rhodes, where he was mentored by Dave Walker for a month. Here Mr Mboso was taught some of the necessary skills to manage a fly fishing business, such as costing, fly-tying and bookkeeping. In September 2010, the business hired three more guides and they were subsequently trained in the art of fly-fishing and guiding by Bruce Elender and Jim McCafferty from Rhodes University. Finally, in December 2010 Tony Kietzman, of the Federation of Southern African Flyfishers, came to Cata to train Mr Mboso and the others further, improving their skills needed for guiding (Mboso, Pers Comm., 2012).

Boniswa Tontsi had been employed by the CPA since 2006, and the training that she had previously received can be thought of as existing human capital from which AWT has benefitted (Tontsi, Pers Comm., 2012).

Luyolo Tete (Guide, *Amatola Wild Trout*) was, at the time of writing, in his third year of a National Diploma in marketing at Walter Sisulu University. The knowledge which Mr Tete had gained from this degree can also be seen as contributing to AWT‟s pool of human capital, especially if one considers the importance of marketing in attracting visitors to this unique brand of trout fishing. However, Mr Tete became less and less involved with AWT since his contract expired in October 2011, and at the time that he was interviewed in June

2012 he did not foresee staying in Cata once he had completed his studies (Tete, Pers Comm., 2012).

The length of the Human Capital node in the asset pentagon depicted in Figure 7.1 demonstrates the judgement made here that human capital is currently AWT‟s most important asset.

7.2.2 Natural capital

The unique brand of trout fishing afforded by the established populations of fish in the streams surrounding Cata can be seen as a fairly significant asset. That the trout are self-sustaining and do not require constant stocking is an advantage, since fish do not need to be purchased from hatcheries on a regular basis to replenish stocks. The costs involved in running a fishery of this sort are thus lower than those required to run the type of fishery which requires constant restocking. However, this advantage comes with a cost. Since the fishery is not being constantly restocked, removing too many fish will likely have a detrimental effect on population sizes (Rouhani and Davies, 2009). Anglers fishing around Cata are thus prohibited from keeping their catches, and this has the potential to deter prospective visitors. The scoping report produced by Rouhani and Davies (2009) also recommended that local residents be prohibited from catching the fish for subsistence purposes. Although the residents have never used the resource in this way before (Westaway, Pers Comm., 2011), the decision has the potential to generate a conflict of interests in future if they ever decide that they would like to.

Cata is renowned for its scenic beauty. People are attracted by the forests and mountains in the area, which have been utilised by bird-watchers and hikers for many years (Tontsi, Pers Comm., 2012). These forests and mountains play a crucial role in attracting anglers to fish in the streams around Cata, and are thus a significant part of the area‟s natural capital.

7.2.3 Financial capital

The development of AWT would not have been possible without funding from the European Union‟s Thina Sinako Local Economic Development Programme (TSLEDP). This money was used to pay the salaries of employees until October 2011, to finance the training of these employees and to print brochures and set up a website. However, the business has since been limited in its options for expansion. For example, the initial business plan did not advise the immediate purchase of fly tying equipment, but suggested that this be purchased at a later

stage. But the plan forecasted a growth in revenue which has not been realised, and so the business is now unable to afford this equipment. Mr Mboso has the skills necessary to tie flies, but without the equipment he is unable to. According to Mr Mboso (Pers Comm, 2012), customers frequently enquire as to the availability of locally suited flies, and this can be seen as a missed opportunity to develop what the business plan describes as „downstream industries".

Since financial capital appears to be a limiting factor, it has been judged here as a limited asset and it"s node in Figure 7.1 is thus quite short.

7.2.4 Physical capital

The chalets which were previously built for tourists are an asset to AWT. Without them, anglers would not have the option of spending more than one day in Cata. This would likely reduce the number of people who would wish to fish here. Also, those who did still come would only spend one day in Cata, and this would limit their spending to a day"s worth. However, the chalets are around 20 kilometres from Mnyameni Dam and Mnyameni River, and anglers cannot be expected to walk there from the chalets. The initial business plan envisioned building a lodge specifically for anglers on the bank of Mnyameni Dam (Rouhani *et al.*, 2010). But until the business is able to raise enough financial capital to build such a lodge (in the region of R1 million), this will remain a plan (Rouhani *et al.*, 2010). The fly tying equipment discussed previously is another example of physical capital which the business is unable to acquire due to a lack of financial capital.

7.2.5 Social capital

It seems very likely that those employed by AWT have made use of their communal and family support structures in the past, and it could thus be argued that the business would not be where it is today if these structures had not existed. Also, the relationship between the community and Ashley Westaway (the former Managing Director of the Border Rural Committee) does not seem to be simply one of mutual benefit which usually defines professional affiliations (Westaway, Pers Comm., 2012). The same can be said of the community"s relationship with Prof. Chris De Wet, known locally as „Madala", isiXhosa for „Elder" (Rivers, Pers Comm., 2012). The role that Prof. de Wet played in catalysing the development process which eventually led to the conceptualisation of AWT, and the role of Mr Westaway in setting up the business will be discussed further in the next section. But their contribution as part of the community"s supporting structures, embedded in more intimate

relationships which have existed outside of the professional context, is outside of this study‟s scope. The role which social capital has played in allowing members of the community to transfer other forms of capital to one another will be discussed in Sub-section 7.5.2.

7.3 TRANSFORMING STRUCTURES AND PROCESSES

7.3.1 The development of *Amatola Wild Trout*

The existence of a network of structures was fundamental to the conceptualisation and development of AWT. Firstly, without the input of the Border Rural Committee (BRC), the Communal Property Association (CPA) and Prof Chris de Wet, the restitution money granted to Cata would probably never have been received (De Wet and Mgujulwa, 2010). This would have left the community limited in their options for development.

Professor Chris de Wet played a significant role is conducting the research needed for Cata to be developed in a responsible manner. Prof. de Wet is an anthropologist from Rhodes University. He has been conducting research in Cata since the time of the National Party‟s resettlement programmes. The Department of Land Affairs (DLA), to which the claim for restitution was made, saw the data produced by this research as ideal for providing baseline information which could be compared with post-restitution data (De Wet and Mgujulwa, 2010). Cata was thus deemed a suitable pilot project for judging the effectiveness of restitution in stimulating development thanks to the work of Prof. de Wet.

The BRC has been involved in the lives of Cata‟s people for many years (De Wet and Mgujulwa, 2010). This non-government organisation has played an active role in conducting research, as well as in disseminating the findings of this research to locals and to various government departments. Ashley Westaway, the former Managing Director of the BRC, was instrumental in securing funding from the TSLEDP. This was used to provide the necessary financial capital to start AWT (Mboso, Pers Comm., 2012).

The CPA provides plays a supporting role for all community run businesses, including AWT. The community of Cata is represented by the CPA in their dealings with government and non-government organisations. The CPA is comprised of an executive committee of seven members, all from the local community, and seems to have been effective in mobilising local people and providing a mediating role between them and the various organisations involved in the development process (De Wet and Mgujulwa, 2010).

So it can be seen that Prof. Chris de Wet, the BRC and the CPA all played their respective roles in securing restitution money. With the help of the BRC, the community formed the Project Steering Committee (PSC). The purpose of this organisation is to manage the community‟s various LED projects, allocating money where it is deemed necessary (De Wet and Mgujulwa, 2010). The PSC has the final say in the finances of AWT, and for this reason it can be considered a community run business.

Once a budget had been allocated to AWT, its existence allowed the BRC to motivate other applications for funding. Also, it was used bring the private sector on board. The Rural Fisheries Programme (RFP), based at the Rhodes University Department of Ichthyology and Fisheries Science (DIFS), was contacted by Ashley Westaway to produce two documents which would be used to steer the setup of the business. The first was the *Report on the scoping study to develop a recreational fishery in and around Cata Dam* (Rouhani and Davies, 2009), and the second the *Report on the feasibility and business plan to develop a recreational fishery in and around Cata Dam* (Rouhani *et al.*, 2010). The latter suggested a business model based on rapid growth. It was proposed that R150 000 would be spent on starting the business, including R78 500 on training, R2500 in legal expenses and the balance on physical capital. The business was forecasted to grow at 7.38 % per annum between 2009 and 2013, suggesting that by 2014 sales of over R350 000 would ensure an income for a business champion, an administrator and four guides.

7.3.2 The DAFF and its mandate to use inland fisheries for development

In 2009, with the restructuring of government, the mandate to govern fisheries fell to the Department of Agriculture, Forestry and Fisheries (DAFF). Weyl *et al.* (2007) point out that many of South Africa‟s inland fisheries are underutilised, and NEPAD (2005) has called for a greater focus on the ability of this resource to contribute to regional development. One of the DAFF‟s strategic goals is to “maximise the economic potential of the fisheries sector” (DAFF, 2010: 11). In terms of the framework developed here, the DAFF can be viewed as part of the structure within which AWT is operating, and its mandate to develop inland fisheries is a process which has the potential to support the growth of AWT. The DAFF does not yet have a policy on inland fisheries, however, and it could be some time before the department finds itself in a position to affect change in this regard.

7.3.3 Concerns regarding the impact of trout on native biota

The government‟s goal to develop inland fisheries is complicated by the fact that so many fisheries depend on non-native species, many of which have been shown to negatively impact native species (Gaigher, 1979; Hamman, 1986; Cambray, 2003; Lowe *et al.*, 2008; Ellender *et al.*, 2011). The streams surrounding Cata have recently been added to the National Freshwater Ecosystems Protected Areas (NFEPA), due to the presence of a unique composition of native flora and fauna (Nel *et al.*, 2011). With the authorisation of the provincial conservation department of the Western Cape, *Cape Nature*, it has recently demonstrated that the eradication of non-native fishes is feasible in small streams such as those surrounding Cata (Weyl *et al.*, in press). Because of the potential threat that these trout might pose to native species, this remains a distinct possibility.

As part of the broader SANPAD project to which this thesis will contribute, Bruce Ellender (PhD student, DIFS) will be investigating the likelihood that trout have had a negative impact on native fishes in the streams surrounding Cata, such as the critically endangered *Barbus trevelyani*. Also, Caroline Evans (MSc student, Rhodes University Department of Environmental Science) has investigated the role of these trout in supporting local livelihoods in ways other than their stimulation of the recreational angling industry. While Mr Ellender‟s findings reveal part of the biodiversity related costs associated with the presence of trout in these streams, this thesis, as well as that of Ms Evans, present part of the benefits which they have had in supporting rural livelihoods. These estimated costs and benefits will then be used to judge the desirability of removing trout from the streams surrounding Cata. This could spell the end of AWT, and so it can be said that the SANPAD research project currently being conducted in Cata, including this thesis, constitutes a process which feeds directly into AWT‟s vulnerability context.

7.3.4 Black wattle and the Expanded Public Works Programme

Some of the streams surrounding Cata have black wattle (*Acacia mearnsii*) growing on their banks. These invasive non-native plants suppress undergrowth and can reduce base flow in the streams where they are found (Le Maitre *et al.*, 2002). The Expanded Public Works Programme (EPWP) has been working to clear wattle in the catchment since 2010 (DPW, 2011; Tontsi, Pers Comm., 2012). If these efforts have indeed increased the base flow of the streams surrounding Cata then it can be argued that this government initiative, run by the

Department of Public Works (DPW), has led to an improvement in the state of the natural capital used by AWT.

7.4 LIVELIHOOD STRATEGIES

The rapid growth business model suggested by the RFP was not undertaken by AWT. Instead, one manager and three guides were employed for a period of 18months. Their contracts expired in October 2011 and they have since been employed on a piece-work basis, receiving gratuity from clients as their only form of payment. The firm doesn‟t have an administrator on its payroll. Instead Boniswa Tontsi, the administrator of the CPA, handles all of the bookings for AWT and allocates guides, including Luthando Mboso (the manager), to fishing parties on an *ad hoc* basis.

Very little research has been done into the market for this fishery and this has had less than desirable consequences for LED initiatives in the past (Nel *et al.*, 2001; Tosun and Timothy, 2001; Ndlovu and Rogerson, 2003; Hill *et al.*, 2006). The success of the fishery in this regard rests on two assumptions. Firstly, that recreational trout anglers are inherently explorative and always looking for new waters to fish (Rouhani, Pers Comm., 2011) and secondly, that the community of Cata, with its limited experience in dealing with tourists, will be able to accommodate the needs of its target market.

The other factor which will determine AWT‟s success lies outside of the business‟s control. The findings of the SANPAD project, to which this thesis is a contribution, will provide policy recommendations regarding the potential eradication of trout in the rivers surrounding Cata. If the costs of these trout to biodiversity are deemed greater than the benefits which they have provided, in particular those arising from the existence of AWT, then it is likely that they will be removed and AWT will have to be shut down.

7.5 LIVELIHOOD OUTCOMES

7.5.1 Income

Ascertaining the exact amount of revenue generated thus far by *Amatola Wild Trout* was not possible. Several attempts were made to access the firm‟s financial records, but they were stratified between different books, some held on site and some with the BRC, and apparently not available at the times of enquiry. According to the firm‟s administrator, Boniswa Tontsi, R2000 had been generated in rod fees between the time that business commenced in January 2011 and October 2012. This R2000 had been placed in an account, and no plans had been

made regarding the way that this money was to be used (Tontsi, Pers Comm., 2012). However, the records held on site show that R3000 had been generated in rod fees within the first year alone. Figure 7.2 shows the amount of money spent on fishing and accommodation by anglers in the year 2011 as revealed by the financial records which were available. The money spent on accommodation, R3 900 in 2011, went towards the salaries of two permanently employed staff members who run and maintain the chalets (Tontsi, Pers Comm., 2012).

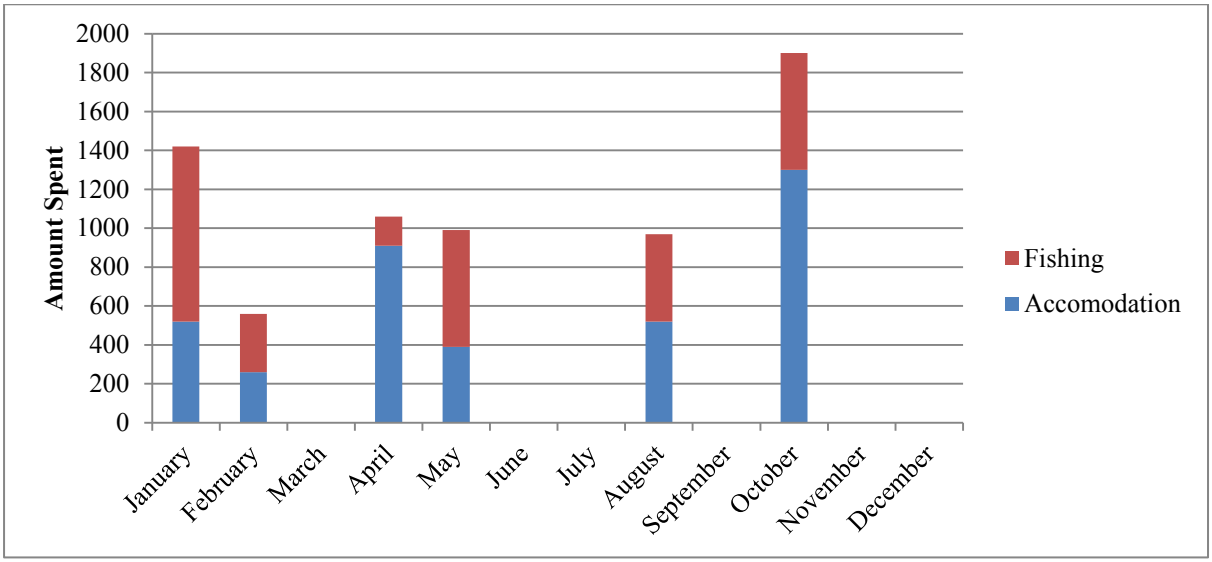


Figure 7.2 Spending recorded for *Amatola Wild Trout's* first year of business, 2011

It should be noted here that it is quite likely that a substantial amount of money has been injected into the local economy of Cata through researchers who frequent the village. The amounts shown in Figure 7.2 do not include this spending, mainly on accommodation at the chalets in the village, by those researching both the ecological and socio-economic aspects of the area.

7.5.2 Increased human capital

The skills gained by all those involved in AWT have contributed substantially to the pool of human capital from which other LED initiatives in Cata could potentially benefit. Furthermore, that there are more jobs available in Cata, even if they are only a few and part time, increases the attractiveness of the village to younger members of the community. With the commencement of any LED project, according to Luthando Mboso, younger people who previously would have seen the village as having nothing to offer them in terms of employment are now more likely to stay in the area after finishing school, rather than going

to an urban area to find work. Further, Mr Mboso says that some people who had gone to Cape Town to seek work have since returned in the hope of being employed in one of the local LED initiatives. This study will not attempt to ascertain the validity of this statement. It does, however, raise a potential focus for future research concerning the role of rural-based LED projects in retaining human capital which could feed into the on-going discussion surrounding geographical labour mobility in South Africa (See for example Bertrand *et al.*, 2003; Ardington *et al.*, 2009; Burns *et al.*, 2010).

Mr Mboso used part of the income which he initially earned from AWT to help finance his brother‟s Public Management Degree at Walter Sisulu University. This is an example of a positive knock on affect which AWT has had on the local community of Cata. Mr Mboso‟s brother has since finished his degree and is employed by Sustainable Rural Development in the Eastern Cape (SURUDEC), a joint initiative of the European Union and the Republic of South Africa. His current role is as part of an interim committee to set up the Association of Tourism in Cata (ATC), which will oversee guides, homestays, vendors, and other people who are locally employed by the tourism industry. Thus it can be seen that the development of one person‟s human capital can lead to an on-going process of growth whereby the human capital of others is fostered as well, even leading to a development of organisational capacity which has the potential to support the growth of a local tourism industry. It is impossible to say where this growth will end, demonstrating the difficulty of quantifying this sort of value and the likelihood that it could be overlooked by those interested in the less tangible benefits generated by LED.

7.6 CONCLUSION

While AWT has thus far generated only modest amounts of income, the business appears to have the potential to generate income for the community if it grows in future. It is not likely to generate anywhere near the five million rand per year which the Rhodes fly fishing industry does, given that the rivers are much smaller and that there is less room for the industry to grow. Du Preez and Lee (2010) found that the average per trip expenditure of trout anglers at Rhodes was R12 000. The higher-end market which AWT plans to target could pay off, assuming that the business can offer these anglers the quality of service that they have become accustomed to. Route tourism could be a viable option here, given that the Amatola region does offer other tourist attractions such as Hogsback, a popular hiking destination. In light of the existing tourism sector in Cata, networking with other tourist-

based economies in the area is certainly a viable option for the fishery and could lead to a stronger, all-encompassing brand of tourism.

The application of the sustainable livelihoods framework has brought out elements of value which are outside of the financial gains captured by methods such as economic impact analysis. In particular, the method has highlighted the improved human capital which has resulted from the development of AWT. Moreover, the method has provided a framework for analysing the importance of social capital in providing a means through which members of communities can channel financial capital towards others, so stimulating development in a process which extends beyond the initial gains of any given project. The knowledge gained by the guides of AWT, particularly that relating to the surrounding ecology of the area, has the potential to be utilised to ensure that the natural capital surrounding Cata is preserved and maintained as an asset which could support any number of livelihood strategies in future. These benefits are intangible and difficult to quantify, and so care should be taken to ensure that an appropriate weighting is applied to them when they are used to make decisions regarding environmental management.

PART D: CONCLUSIONS

This final part consists of one chapter, divided into three sections. The first will provide a summary of the findings presented throughout this thesis, relating them to those of other studies deemed relevant. The second section provides concluding remarks concerning the fisheries studies. The third section will consider the implications of these findings with regards to the management of non-native fishes. The fourth section will reflect on the three methods employed.

CHAPTER 8

SUMMARY, CONCLUDING REMARKS, AND MANAGEMENT RECCOMENDATIONS

8.1 SUMMARY

This thesis aimed to shed light on the value of inland recreational fisheries in South Africa by considering their economic contribution towards the regional economy of the Amathole District, towards the anglers involved in them, and towards rural livelihoods. This research was undertaken with the intention of providing insight into the human dimension inherent in fisheries systems, so that a holistic understanding of these systems might be gained. Such an understanding is required for the development of sound fisheries governance and management frameworks. The value of two recreational fisheries in the Amathole District were explored using economic impact analysis, the travel cost method, and the sustainable livelihoods framework.

Using economic impact analysis, it was estimated that the combined total economic contribution of two of the largest fishing tournaments held at Wriggleswade Dam to the regional economy of the Amathole District was R106 625 (USD 14 030[6]) (Table 8.1). If the spending of local residents is included in this estimation, the figure increases to R224 557 (USD 32 179). The travel cost method was used to estimate the net benefit accruing to anglers who participated in the largest fishing tournament held annually at Wriggleswade Dam, found to be R1 960 090 (USD 257 907) in 2012 (Table 8.1). A look at the financial

[6] Using the March 2012 USD-ZAR exchange rate of $1=R7.60

records of *Amatola Wild Trout* revealed that the fishery at Cata has generated R7000 (USD 921) of spending by visitors in its first 22 months of business. But an application of the sustainable livelihoods framework helped to reveal not only the human capital which has been injected into the local community through the fishery‟s development, but an improvement in the organisational capacity to support tourism locally which has resulted indirectly from the initial gains channelled through the fishery by donor funding.

Table 8.1 Summary of values uncovered

Location	Method	Value
Wriggleswade Dam	Economic impact analysis	Total economic impact of two of the largest tournaments held at the dam = R106 625
Wriggleswade Dam	Travel cost method	Net benefit accruing to anglers from participation in the 2012 Amatola Bass Classic = R1 960 090
Cata Village	Sustainable livelihoods framework	Revenue generated through the sale of rod fees and accommodation between January 2011 and October 2012 = R7000. Intangible improvements in human capital and organisational capacity.

8.1.1 Wriggleswade Dam

Economic impact

This thesis provides the first comprehensive economic impact analysis of a competitive fishing event in South Africa. Leibold and van Zyl (2008) conducted a very basic, data poor analysis concerning the economic impact of angling in South Africa and estimated the impact of bass fishing to be R 1.2 billion nationally in 2007. Brand *et al.* (2007) estimated the expenditure related to yellowfish angling in the Vaal River to be R 133 million per season.

Several bass fishing related economic impact analyses have been conducted in the United States of America, but they appear to have been conducted for much larger fisheries than the one considered here. Driscoll *et al.* (2010) found that tournament angling at Sam Rayburn Reservoir was responsible for 76 418 angling days, generating USD 39 million (about R299 million[7]) in output to the state of Texas between November 2007 and October 2008. Chen *et al.* (2003) estimate that 204 739 one-person, multiple day fishing trips were made to Lake Fork in Texas between June 1994 and May 1995, resulting in a total output of

[7] Using the 2008 USD-ZAR exchange rate of $1=R7.68

USD18 559 871 (about R68 million[8]) to the Lake Fork area. Despite not having been adjusted for inflation these figures are much larger than the R105 617 estimated for Wriggleswade in 2012, but the studies involved far greater numbers of anglers and were conducted over longer periods of time.

Angler welfare

While the economic impact of the fishery at Wriggleswade Dam is fairly modest, the value accruing to the anglers who make use of it, as revealed by an application of the travel cost method, appears to be substantial. The 2012 Amatola Bass Classic, attended by 206 anglers, generated R1 960 090 in social welfare. To put this figure in context, du Preez and Hosking (2011) found that the trout fishery at Rhodes generated a consumer surplus of R18 026 288 in 2007 (just under R23 million in 2012 prices), assuming a total population of 700 anglers. Shrestha *et al.* (2002) estimated a total annual social welfare of between USD 35 059 424 and USD 56 400 310 (about R341 million and R549 million[9] in 2012 prices) for the Brazilian Pantanal, fished by 46 000 anglers annually. The figures generated by Shrestha *et al.* (2002) and du Preez and Hosking (2011) report the annual consumer surplus generated for all anglers making use of the fisheries considered. It is important to keep in mind that this study only considered one of several competitions held annually at Wriggleswade Dam. The total number of competitions held annually at this location is difficult to estimate, since many of these tournaments have locations which vary from year to year.

8.1.2 Cata Village

The improvements in human capital which have resulted from the development of *Amatola Wild Trout* appear to have had a positive impact on the local community. Those involved in the business have received valuable training and an exposure to tourists. The sense of empowerment which has resulted from this training is also a positive impact worth considering. It is also possible that their recently acquired human capital will feed into future projects, making the village more attractive as a tourist destination.

The organisational capacity which has allowed for the development of the fishery also appears to have benefitted indirectly from the fishery in a positive feedback loop which will strengthen local structures capable of supporting future development initiatives. The existing

[8] Using the 1995 USD-ZAR exchange rate of $1=R3.69
[9] Using the 2002 USD-ZAR exchange rate of $1=R9.74

support structures in Cata, such as the BRC, the CPA, and the soon to be established ATC set the village apart as a place where development seems possible.

The training received by the guides of AWT could also prove valuable in promoting a greater understanding of the area"s ecology among members of the community. This could contribute towards an increased effort to conserve and actively maintain the natural capital which the area has to offer.

While the amount of revenue generated thus far by *Amatola Wild Trout* is small, if one considers that only 26% of the community of Cata were employed in 2007 it must be concluded that every contribution plays a significant part in developing livelihoods in this isolated village. LED research reveals that it can take up to 20 or even 30 years to establish a tourism destination which is capable of providing local communities with substantial economic benefits (Lourens, 2007). The success of tourism initiatives often depends on the ability of a community to keep things going during the initial, slow moving stages (Snowball and Courtney, 2010) If one assumes that the fishery at Cata does indeed play an integral part in the tourism appeal of the area, then the question becomes whether those involved in the business can hold out for the length of time necessary for its establishment.

8.2 CONCLUDING REMARKS

At present, Wriggleswade appears to generate larger benefits for the regional economy than does Cata. But the fishery at Cata had only been marketed for less than two years at the time of writing this thesis. If the downstream industries envisioned in the business plan drafted for *Amatola Wild Trout* by the Rural Fisheries Programme do materialise then these could contribute to a further diversification of local livelihoods through fly-tying and other craft related industries (Rouhani *et al.*, 2010). The institutional capacity to support these fledgling industries exists in the form of the CPA and the BRC, and is currently being developed further by an interim committee to establish the ATC. Furthermore, the enthusiasm of Boniswa Tontsi, the administrator, and of Luthando Mboso, the manager, bode well for the fishery. If this enthusiasm is channelled into an effective marketing of the fishery then Cata may one day bring in the millions generated by established fisheries such as the one at Rhodes, further north. However, Cata offers a very different brand of fishing to Rhodes, and so its possibilities for expansion are likely to be different as well. Nevertheless, as a development model, Cata appears to be one of significant, although uncertain, long term benefits.

While Wriggleswade generates modest amounts of value to the local economy compared to Rhodes, despite being as established, it is sustainable. As a development model, the fishery at Wriggleswade, characterised by several fairly large scale tournaments held each year and corporate backing, provides a modest but sustainable economic impact which is self-sufficient in that the anglers themselves form an effective, automated marketing platform. The fishery has evolved through the persistence of angling fraternities who, as shown in this thesis, derive significant welfare from their efforts. That the anglers themselves have provided the human capital necessary to drive the development of the fishery, including that needed to seek and attract corporate financing, demonstrates the bottom-up nature of this sort of development model. The bass angling culture in South Africa is both well established and well organised. Thus, developing this sort of fishery would require a great deal less outside support than developing a community-run fishery such as Cata.

8.3 MANAGEMENT RECCOMENDATIONS

The broader project, which this thesis forms part of, essentially asks whether the social and economic benefits of stocking Eastern Cape impoundments with invasive fish species are outweighed by the negative impacts which these introductions have had on indigenous biota and environments. This project essentially utilises the Ecosystem Approach to answer a question regarding a system which has both ecological and human dimensions, both equally important when making management decisions. Cape Nature recently demonstrated that it is possible to completely eradicate non-native fishes from small streams (Weyl *et al.*, in press), and given the mandate which provincial conservation departments have to conserve threatened and endangered species (NEM:BA, 2004), the question of whether the eradication of certain populations of non-native fishes is desirable from a societal perspective seems pertinent. The purpose of this section is to contextualise the findings of this thesis within this broader question, and to provide recommendations for fisheries and environmental management where possible.

8.3.1 Wriggleswade Dam

In the case of Wriggleswade Dam it can be concluded with a reasonable degree of certainty that if there were no bass in these waters, then the R105 617 - R224 557 in economic impact generated by the two tournaments considered would be spent elsewhere. Also, the value which accrues to anglers from the use of this resource would probably be obtained from fishing in other places. In any case, the removal of bass from a large water body such as

Wriggleswade Dam is probably unfeasible (Gozlan *et al.*, 2010; Van Rensburg *et al.*, 2011) and no research has been done to show that their presence in the dam itself has had negative effects on biodiversity. The management of this fishery can thus proceed, sound in the knowledge that bass are not currently under any threat from environmental conservation authorities.

The bass in Wriggleswade Dam should be managed in order to generate maximum societal benefit. One way of doing this is to ensure that anglers receive the greatest possible amount of utility from fishing in this Dam. In conducting interviews with anglers, four respondents commented that the bass in the dam were deemed to be undersized. These statements were of the anglers‟ own accord and it is likely that if a question had probed this topic specifically a significant portion of the respondents would have agreed that the bass were generally small relative to other South African dams. Research conducted by Taylor (2012) has confirmed that bass in Wriggleswade are generally smaller for their age than bass in other dams of a similar kind, and one of the resulting management recommendations of this research was that bass of a certain size class be removed from the dam when caught, which would reduce the competition amongst those size classes of fish, allowing those fish which weren‟t removed to grow larger and provide a more satisfying angling experience. This sort of management is likely to lead to an increase in the overall welfare generated by the fishery, and should be pursued.

8.3.2 Cata Village

If one wishes to weigh up the costs and benefits of having non-native fishes in indigenous waters then there is an important point to be made with regards to the fishery at Cata. The value which appears to have been channelled through the fishery thus far has not necessarily been generated by the fishery itself or by the fish which serve as its resource. It is thus tenuous to conclude that the fish themselves are responsible for this value. The business relied, until April 2012, on funding from the Thina Sinako LED Programme (TSLEDP). This funding allowed for the training of personnel, thus providing the improvements in human capital. It also financed the salaries of employees which made the business attractive to productive and competitive members of the community who contributed their expertise to making the business as successful as it has been. Thus, while the fishery is owned and managed by the local community, the benefits which it has provided thus far have been predominantly due to top-down funding and support from the BRC and the TSLEDP.

As discussed in the previous section, there is potential for the fishery at Cata to be developed further, but it is difficult to say what the chances are of the fishery ever providing a substantial financial benefit to local community. Thus, even providing an estimate of the future value of these trout is impossible. The SLF applied in the previous chapter has shown that the most significant benefits which have been channelled through the fishery thus far are intangible. Furthermore, the fishery has contributed to an improved understanding of ecology among members of the community, and it is possible that it will continue to foster this understanding in future, leading to a more responsible utilisation of natural resources in the area. Thus, while this thesis has demonstrated the value of the fishery to society, by considering the fishery in a holistic sense as dictated by the Ecosystem Approach, it becomes clear that the development of human capital has the potential to impact positively on the environment. And a well maintained environment provides the natural capital necessary to support livelihoods portfolios. These positive feedback loops must be considered when deciding the most efficient way to manage non-native species.

The economic cost of the threat which these trout pose to native biodiversity is perhaps even more difficult to ascertain, and so the choice of whether to eradicate trout from the streams surrounding Cata must be made under conditions of great uncertainty if it is to be made with the knowledge currently available. Further research into quantifying these costs is necessary if they are to be contrasted with the benefits outlined by this thesis, and while headway is being made with regards to developing the necessary frameworks for evaluating the economic costs of losing biodiversity, these frameworks are still in their early stages of development (Balmford *et al*., 2011). Gozlan *et al.* (2010) discuss the array of decision making frameworks available to those who wish to assess the risks which non-native species pose to biodiversity in any given context, but point out that these frameworks all have one thing in common: they do not consider the potentially positive impacts which non-native species can have in the areas where they have been, or could potentially be, introduced. The Ecosystem Approach offers a way of thinking about these systems holistically, but the operationalization of this approach will require the development of frameworks which will allow for the application of the principles therein. It is hoped that the values revealed in this thesis will contribute to the development of one such framework, allowing for an informed decision regarding the potential eradication of trout in Cata, and ultimately leading to a more refined, more holistic way of making environmental and fisheries management decisions.

8.4 A CONCLUDING NOTE ON THE METHODS EMPLOYED

Both the travel cost method and economic impact analysis yield estimates of pecuniary values. The advantage of these values is that they can be compared directly with those from other studies. These values also allow for a very practical approach towards policy development, and it would be straightforward to use them in a cost-benefit analysis. The disadvantage is that they fail to capture non-use values and do not account for those less tangible benefits which are not encompassed in people‟s spending patterns.

The sustainable livelihoods framework allows for a much broader consideration of value and thus helped to identify those intangible benefits which had accrued to a community through their use of a resource. The disadvantage of using such a highly descriptive method is that the results are difficult to generalise. While one can highlight insights gained in the analysis, applying these findings to a broader context or transferring them to other case studies requires a degree of speculation which could potentially compromise reliability, and which also calls for a greater effort on the part of the policy-makers or managers who wish to make use of the results generated by the method.

The choice between generalizable, predictive methods and their more descriptive counterparts represents an age-old discussion within economics. The use of highly descriptive models of reality was one of the defining features of evolutionary economics as encompassed in the work of Thorstein Veblen and John Commons in the 19th century (Dugger, 1979; Hausman, 1994; Groenewegen *et al.*, 2010). That the methods were perhaps too descriptive to be applicable to broader contexts was one of their less attractive features, and mainstream economics continues to be characterised by the use of methods which are capable of producing comparable, transferrable results.

8.5 SUGGESTIONS FOR FUTURE RESEARCH

The present research suggests ways in which a deeper understanding of the value of recreational angling in the Amathole could be gained through future research. One of the shortcomings of this thesis is that two different sets of methods have been applied to two different types of fisheries, making it difficult to compare directly either the fisheries or the methods themselves. Firstly, the quantitative methods used in this thesis have been applied exclusively to competitive angling. More quantitative research into the economic contribution of non-competitive angling is necessary to provide a holistic picture of the value of

recreational angling in the area considered. Secondly, the qualitative research presented in this thesis has been applied only to the fishery at Cata. It would be useful to apply the same method to a different sort of fishery, perhaps one which is dominated by competitive anglers, so that comparisons could be made.

It is possible that carp angling generates significant amounts of value, and people were seen fishing for carp at Wriggleswade Dam during data collection. No credible studies have been done thus far to determine the value of carp fishing anywhere in South Africa.

Lastly, the sustainable livelihoods framework has provided a very general overview of the factors affecting the fishery at Cata. A deeper institutional analysis would be the next logical step, and this would entail the creation of models, which are more technically detailed than frameworks (Ostrom, 2011). A historical analysis, concerning the evolution of the institutions which govern both the fishery at Cata and the fishery at Wriggleswade, could also provide valuable insights.

APPENDICES

APPENDIX 1 – DIVISIONAL QUESTIONNAIRE

Eastern Divisionals Tournament Research - 2011

Questionnaire Number: ……. *Do not ask but record*: Sex: ……

Interviewer: …… Race: ……

Date: ……

Hi, I'm _____ (*name*), from Rhodes University. We're conducting a survey regarding the economics of freshwater fishing in South Africa. Should you choose to participate, you may stop at any time and we will not be taking your name. You don't have to answer all of the questions if you don't want to. Would you be willing to spend 10 minutes answering some questions? *If yes* … Thank you

Expenses for Section 1 & 2 cover - ☐ **One individual**

☐ **Questionnaires ___ - ___**

Section 1 – Demographic and Geographical Information

1.1 How many are there in your fishing party? _____

1.2 Are there any people in your party who are not fishing? _____

1.3 Which city did you travel here from? _____

1.4 Do you normally live there? Yes ☐ No ☐

1.5 About how many kilometres did you travel to get here? _____

1.6 How many hours did you spend travelling here? _____

1.7 What kind of vehicle did you travel in?

1.8 Make _____ Model _____ Engine Size _____

1.9 Was a trailer towed by the vehicle? Yes ☐ No ☐

1.10 Is the main reason for your trip to participate in the divisionals?

Yes ☐ No ☐

1.11 *If no to 1.10*... What was your main reason for making this trip? _____

_____

1.12 If you hadn't come to this tournament, would you have gone fishing at another tournament instead?

Yes ☐ No ☐

1.13 *If yes to 1.12...* Where? _____

Section 2 – Details of Expenditure

2.1 Please indicate how much you spent, divided between the various categories and in addition to your normal spending, in order to come fishing here this weekend

Accommodation _____ Food and Drinks _____

Petrol _____ Entrance fee _____

Other (*please specify category and amount*) _____

2.2 How much do you spend on fishing tackle, equipment and clothing in a month or a year?

Per month _____ Per annum _____

2.3 Are you using your own boat for this tournament? Yes ☐ No ☐

2.4 *If yes to 2.3*… How much do you spend every year to licence and maintain your boat? _____

2.5 *If yes to 2.3...* How many fishing trips do you use your boat for in an average year? _____

Section 3 – Personal Information

This next section is about you. Please remember that, while the managers of this project fully support a non-discriminatory policy, certain demographic information is useful for understanding the results. Your name is not attached to any of the information you give.

3.1 Which year were you born in? _____

3.2 How many people live in your household? _____

3.3 What is your monthly individual income bracket after tax deductions (*show card*) _____

3.4 What is your monthly household income bracket after tax deductions (*show card*) _____

3.5 What is the highest level of education that you have obtained? (*show card*) _____

APPENDIX 2 – CLASSIC QUESTIONNAIRE

Amatola Bass Classic Research 2012

Questionnaire Number: ……. *Do not ask but record*: Sex: …….

Interviewer: …… Race: ……

Date: ……

Hi, I'm _____ (*name*), from Rhodes University. We're conducting a survey regarding the economics of freshwater fishing in South Africa. Should you choose to participate, you may stop at any time and we will not be taking your name. You don't have to answer all of the questions if you don't want to. Would you be willing to spend 10 minutes answering some questions? *If yes* … Thank you

Section 1 – Travel Information

1.1 How many times have you fished in the Amatola Bass Classic before, not including this one? ___

1.2 Did you travel here in your own vehicle? _____

If no to 1.2...skip to 1.12

1.3 How many people travelled in this vehicle? _____

1.4 Which city did you travel here from? _____

1.5 Do you normally live there? Yes ☐ No ☐

1.6 About how many kilometres did you travel to get here? _____

1.7 How many hours did you spend travelling here? _____

1.8 What kind of vehicle did you travel in?

Make _____ Model _____ Engine Size _____

Petrol ☐ or Diesel ☐

1.9 Was a trailer towed by the vehicle? Yes ☐ No ☐

1.10 If you hadn't come to this tournament, would you have gone fishing at another tournament instead?

Yes ☐ No ☐

1.11 *If yes to 1.10...* Where? _____

1.12 Is the main reason for your trip to fish the Amatola Bass Classic?

Yes ☐ No ☐

1.13 *If no to 1.12*... What was your main reason for making this trip? _____

_____

Section 2 – Details of Expenditure Directly Related to the Classic

2.1 If possible, I'd like to ask about the money which you've spent in order to participate in the Classic. Would it be easier for you to provide me with your personal expenditure, or are you sharing costs with others? ☐ ☐vidual As a group

2.2 *If 'as a group' to 2.1*... How many people are you sharing costs with? _____

2.3 Please indicate how much you spent, divided between the various categories and in addition to your normal spending, in order to come fishing here today

Category	Amount	Location
Accomodation		
Food and Drinks		
Petrol		
Entrance Fee		
Other: _____?		
_____?		

2.4 Are there any people with you this weekend who are not fishing? _____

2.5 *If yes to 2.4...* How many? _____

Section 3 – General Angling Related Expenditure

3.1 How much do you spend on fishing tackle, equipment and clothing in a month or a year?

Per month _____ Per annum _____

3.2 Are you using your own boat for this tournament? Yes ☐ No ☐

3.3 *If yes to 3.2*… How much do you spend every year to licence and maintain your boat? _____

3.4 *If yes to 3.2...* How many fishing trips do you use your boat for in an average year? _____

Section 4 – Personal Information

This next section is about you. Please remember that, while the managers of this project fully support a non-discriminatory policy, certain demographic information is useful for understanding the results. Your name is not attached to any of the information you give.

4.1 Which year were you born in? _____

4.2 How many people live in your household? _____

4.3 What is your monthly individual income category after tax deductions (*show card*) _____

4.4 What is your monthly household income category after tax deductions (*show card*) _____

4.5 What is the highest level of education that you have obtained? (*show card*) _____

Section 5 – Ecological Perceptions

I'd like to ask a few questions to get a sense of your interest in general environmental issues. There are no right or wrong answers.

5.1 Are bass indigenous to South African waters? Yes ☐ No ☐

5.2 Are you involved in any way with conservation or environmental bodies, such as clubs, societies or institutions? Yes ☐ No ☐

If yes to 5.2… Please provide details

_____

5.3 Do you subscribe to any magazines or newspapers about conservation or the environment?

Yes ☐ No ☐

If yes to 5.3… Please provide details

_____

5.4 Do you watch any environmental TV programmes, such as 50/50, or the kinds of environmental programmes seen on the discovery or national geographic channels?

Yes ☐ No ☐

If yes to 5.4… Please provide details

_____

5.5 Do you recycle? Yes ☐ No ☐

5.6 Does the environment ever play a role when you are making day-to-day decisions, like whether or not to conserve electricity or petrol? Yes ☐ No ☐

Section 6 – Contingent Valuation

6.1 Would you be willing to contribute to a catchment management programme, managed by the Wildlife and Environment Society of South Africa (WESSA) which would work towards maintaining healthy ecosystems in the catchment where you are currently fishing? The programme would not have a negative impact on your fishing experience and would include these kinds of activities:

- Management of alien invasive species
- Control of livestock stream access to prevent bank erosion
- Rehabilitation of river sections where threatened or endangered fishes occur

Yes ☐ No ☐

If yes to 6.1…

6.2 What is the maximum amount that you would be willing to contribute to this sort of catchment management programme? (*show card*) _____

6.3 Thank you very much for your help! Before we finish the interview, do you have any other comments about fishing at Wriggleswade or the environment in general? Yes ☐ No ☐

6.4 *If yes to 6.3*… Please feel free...

_____

_____

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