

## EXTRACT FROM THE REPORT:

Exploring human wellbeing in the Phongolo River and Floodplain, with emphasis on the use of fish as an ecosystem resource in the Ndumo Community”, Ch 8 in N Smit et al on **WRC Project K-5-2185, *Ecosystem functioning, Sustainable Utilization and Management of aquatic resources of the Lower Phongolo River and Floodplain***, Feb 2015.

Phongolo Project

## CHAPTER EIGHT

### **SOCIO-ECONOMIC, SOCIO-ECOLOGICAL AND CULTURAL IMPLICATIONS ASSOCIATED WITH THE USE OF FISH AS AN ECOSYSTEM SERVICE IN THE PHONGOLO RIVER AND FLOODPLAIN<sup>1</sup>**

When the Human and Social Sciences Cluster (HSSC) undertook the task of undertaking research to broadly assess the socio-economic implications associated with the use of fish as an ecosystem service in the Phongolo River and Floodplain, a few objectives as possible achievements, were listed. Amongst others the social, cultural and economic life around fishing habits (including management, health, wellbeing status and perhaps tourism opportunities) were regarded as objectives to focus on. People's impressions about the socio-economic value of the flood plain fishery (subsistence versus commercial) for the community and community's associations with the environment and thinking about environment were equally considered. Whether any threats from a community perspective on cultural fishing events existed, inclusive of threats related to fishing habits and associated with the level of fish consumption, became part of the broader aim of searching for the socio-economic, socio-ecological and cultural implications associated with the use of fish as an ecosystem service in the Phongolo River and Floodplain. The HSSC-research eventually followed the standard protocol of an extensive combined and integrative effort of literature research amongst four (not necessarily related) disciplines (namely Sociology, Psychology, History and Zoology). Afterwards close-up fieldwork followed which resulted in three phases of exploring the availability of information at the Jozini Local Municipality and engaging in fieldwork as well as in structured interviews with members of especially the Ndumo community. A lack of published research and reports on the general wellbeing of communities and their fishing practises in the northern part of the Phongolo River and Floodplain (namely the Ndumo area), allowed for an opportunity to fill a historical gap in scientific information. It's constructive value to the broader project and the necessity to help understand the fishing practises of this self-perceived “forgotten” rural community also

---

<sup>1</sup> Acknowledgement: The authors wish to thank the Water Research Commission (WRC) of South Africa who provided financial support for this part of the study (Project K5-2185 NJ Smit, PI, 2012-2014). Views expressed are those of the authors and not those of the WRC or broader research team.

created an opportunity for the research team to exploit refreshing ways of integrating their expertise to the benefit of the project focus. The two main sections to follow is a response to the afore-mentioned research objectives. In section 8.1 some observations of the Ndumo community about their livelihood, their appreciation of environment and the utilising of natural sources are explored in Section 8.1. In Section 8.2 a more specific research focus on human-fish interactions follows.

## 8.1 A reflection on the psycho-social wellbeing of a “forgotten” South African community: The case of Ndumo, KwaZulu-Natal

### 8.1.1 Introduction

This study investigated the psycho-social wellbeing of the Ndumo community in South Africa, using a sequential explanatory mixed-methods design. Data were collected via the Satisfaction with Life Scale and Mental Health Continuum during the quantitative phase of the research (n = 521, 52.2% male). During the qualitative phase, semi-structured interviews were conducted with 20 purposively selected participants to explain the quantitative findings. Findings revealed that, despite challenges such as poverty, unemployment, and lack of basic services, Ndumo residents exhibit above average levels of psycho-social wellbeing. Main reasons were that residents are able to live off the land, feel safe, have hope for a better future, and receive instrumental support from external agents, and internal social support through local churches.

Ndumo, a geographically isolated deep rural community in northern KwaZulu-Natal of South Africa, is a highly traditional, predominantly isiZulu speaking community with a population of 6779 people (1505 households), the majority of which is under the age of 19. Politically the Ndumo region, which is mostly governed by traditional authority, falls within the Jozini local municipality in the Umkhanyakude District that is situated approximately 650 km east of Pretoria, and 400 km north of Durban (Jozini Local Municipality, 2013-2014; Khumalo, 2014; Statistics South Africa, 2011) (see Figure 8.1). Based on this isolated position, residents refer to themselves as the “forgotten community” (Ogilvie, 2014).

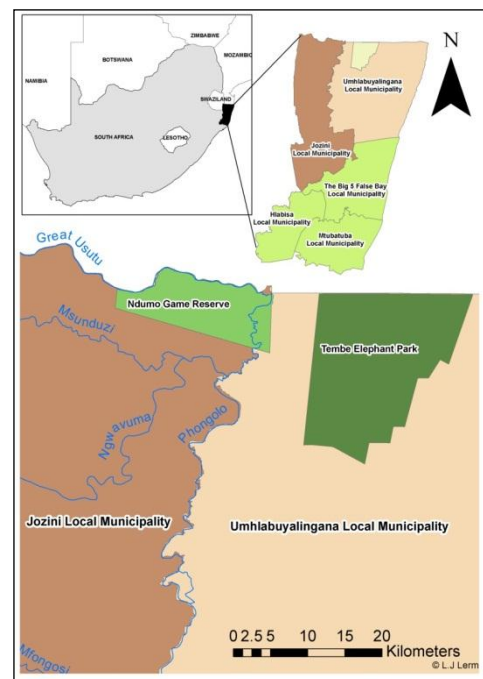


Figure 8.1. Location of the Ndumo community, Kwazulu-Natal (Adapted from Mavundza et al., 2011).

### **Challenges faced by the community and responses to challenges**

The Ndumo area is characterized as underdeveloped, with below average income levels. By 2010 the poverty rate in the Jozini municipal area was estimated as 75.66% (PRESPA, 2009; Jozini Local Municipality, 2013-2014), resulting in a financially dependent community that greatly relies on social grants. By 2013 the broader Jozini Local Municipal area (inclusive of Ndumo) utilized over 44% of their annual budget for issuing social grants (mostly in the form of pension and childcare) in the community (South African Department of Agriculture, 2009-2010). This resulted in a dependency ratio of 82.4% among people in the broader Umkhanyakude district (Statistics South Africa, 2011). To survive, in addition to relying on government grants, most households depend on subsistence agriculture and the sale of locally harvested natural resources (Jones, 2006; Jozini Local Municipality, 2013-2014).

The high poverty levels that characterise the Ndumo region are also reflected in the lack of infrastructure and municipal services in the area. At present, access to electricity is either absent or severely limited. There is also a shortage of sources of safe drinking water, which are currently inadequate and restricted to a few municipal-installed communal taps (Ogilvie, 2014; South African Cooperative Governance & Traditional Affairs, 2010). To compound the challenges already faced by this community, the prevalence of HIV/AIDS throughout the region was estimated by 2003 to be among the highest in the country (Hlongwe, 2003), and was still found to be endemic by 2014 (Jozini Local Municipality, 2013-2014).

However, significant developments with regard to schools and sporting facilities have taken place during the last two to three years. Nine primary schools and six secondary schools are functional within the Ndumo boundaries. Additionally, a number of support mechanisms exist, mainly in the form of medical care provided by several fixed and mobile clinics (Ogilvie, 2014; Khumalo, 2014; Jozini Local Municipality, 2007-2008). Furthermore, Ndumo has been earmarked by the Provincial government of KwaZulu-Natal for significant development over the next few years, with one billion ZAR being allocated to the construction of a new clinic, a public library, sports field, a large community centre, and new roads in the region (Jozini Local Municipality, 2013-2014).

### **Psycho-social wellbeing and the Ndumo community**

Although some research has been done on socio-economic (Hlongwe, 2003; PRESPA, 2009), socio-ecological (Jones, 2006), health (Jones, 2006) and poverty alleviation (Peters, 2005) aspects in the Ndumo area, very little evidence of the psycho-social wellbeing within

the community is available. Increasingly, it is recognized that studies of the objective wellbeing of communities do not provide a complete picture of how a given community is faring. In addition to evaluating objective aspects of quality of life, such as housing, basic services, and the socio-economic condition of communities, it is also necessary to examine a community's subjective and psycho-social wellbeing (Moller, 2012). Such evaluations are particularly important in ensuring the success and sustainability of community development initiatives (Coetzee, 2001). As a construct, subjective wellbeing refers to the extent to which individuals experience the presence of positive emotions, the absence of negative emotions, and the presence of satisfaction with their lives. Whereas the first two components, collectively referred to as affect balance, focus on the affective or emotional dimension of wellbeing, the latter component focuses on the cognitive aspects thereof (Diener, 2009).

Psycho-social wellbeing is an even broader concept, which includes not just subjective (or emotional) wellbeing (EWB), but also encompasses social and psychological wellbeing (Ryff & Keyes, 1995). As conceptualised by these authors, psychological wellbeing (PWB) comprises six dimensions, which include self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy. Social wellbeing (SWB) is a concept that reflects whether and to what extent individuals are functioning well in their social lives, and comprises social integration, social contribution, social coherence, social actualization, and social acceptance. The most significant distinction between PWB and SWB is that the former reflects how persons view themselves functioning as an 'I' or a 'me' whereas SWB reflects how individuals see themselves functioning as 'we' and 'us' (Ryff & Keyes, 1995; Keyes et al., 2008).

Very little research appears to have been conducted on the PWB and SWB dimensions of community wellbeing in the greater Ndumo area (Ogilvie, 2012), and as such, it is unclear how this community is faring in terms of overall psycho-social wellbeing. Furthermore, no research could be located which provide an inside perspective of factors that support as well as detract from Ndumo residents' psycho-social wellbeing. Such an understanding is critical in light of the future developments for which Ndumo has been earmarked (Jozini Local Municipality, 2013-2014), in order to ensure that such developments are contextually sensitive and apt. Sentiments on the value of understanding the overall psycho-social wellbeing of communities are echoed by Coetzee (2001) who states that: "development must be firmly based on human wellbeing, and... any development programme will have to focus on ways to uncover people's own definitions of human wellbeing". In light of these research gaps, the following research questions were formulated: What is the psycho-social wellbeing

of members of the Ndumo community? Do levels of wellbeing differ across age, gender, and marital groups? What are the factors that most significantly support and/or detract from residents' levels of psycho-social wellbeing?

### 8.1.2 Method

An explanatory mixed-methods design was adopted as basis for the study. During this process, an initial quantitative phase of data collection and analysis is followed by a second phase during which qualitative data are collected and analysed. The purpose of such a design is to use the findings of the qualitative study to explain, refine, or extend the findings that emerge from the initial quantitative data (Plano-Clark & Creswell, 2007). This approach was deemed to be appropriate within the context of the present study as it would enable contextually sensitive interpretation and explanation of the findings derived via the initial quantitative phase of the project.

### Participants

A total of 521 participants took part in the quantitative phase of the study. The characteristics of the participant group are set out in Table 8.1:

Table 8.1 Characteristics of the participants ( $n = 521$ )

Item		Frequency	%
Gender	Male	247	47.8
	Female	270	52.2
Marital status	Married	55	10.9
	Single (never married)	413	81.8
	Divorced	11	2.2
	Widowed	26	5.1
Race	African (Zulu and Tsonga)	521	100

These participants all reside within the Ndumo area, which forms part of the lower Phongolo River and floodplain. The average age of the participants was 37.28 years ( $SD = 13.12$ ), with ages ranging from 18 to 98. On average, participants had been living in the area for 28.18 years ( $SD = 16.244$ ).

Twenty participants, all purposively selected on the basis of their experience with and knowledge of the Ndumo community, were interviewed during the qualitative phase of the study. These participants firstly included a focus group consisting of 10 local residents (6

male), aged between 20 and 30 years, and 4 local female residents studying at TUT and residing in the Ndumo area, aged 21, 22, 25 and 31 years respectively. The sample also included a tourism officer at the Ndumo Game Reserve, who is also a local resident, the Ndumo Project Manager who has been actively working in Ndumo and adjacent communities for more than a decade, the Ndumo Game Reserve Manager, an individual who has been doing community based work in the Ndumo community for the past 13 years, and 3 local residents (2 female) working as staff members in the Ndumo Game Reserve.

### **Data collection**

During the quantitative phase, data were gathered by means of a structured questionnaire that was administered by trained fieldworkers. The first section of the questionnaire was aimed at gathering biographical data in relation to participants' age, gender, and the length of time they had been living in the Ndumo area. To investigate possible correlates of wellbeing, participants' levels of self-reported health and religiosity were also measured. Self-reported health was measured by a single item ('how would you rate your own health?') that was assessed on a 5-point scale ranging from 'poor' to 'good'. Religiosity was likewise measured with a single item ('how religious do you consider yourself to be?') that was rated on a 5-point scale ranging from 'not at all' to 'very much'. This type of question is commonly utilised to assess religiosity, and has been found to be highly reliable as a single-item measure (Chang et al., 2013).

To measure wellbeing, two scales were used. First, the Satisfaction With Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985) was employed to measure residents' life satisfaction. The SWLS consists of 5 items, each measured on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Responses are summed to obtain an overall score that can range from 5 to 35, with higher scores being indicative of higher levels of life satisfaction. The items in this scale have been found to exhibit good internal consistency, as reflected in a Cronbach Alpha level of 0.87, and excellent test-retest reliability, with correlations as high as 0.82 over a two-month period (Diener et al., 1985). This scale has been used extensively in a South African context and has been found to exhibit robust psychometric properties (Wissing et al., 1999).

Second, the short form of the Mental Health Continuum (MHC-SF) (Keyes, 2008) was used to investigate residents' psycho-social wellbeing. The MHC-SF consists of 14 items that are measured on a 6-point frequency scale ranging from 0 (never) to 5 (every day). In turn, these items fall into three subscales which measure emotional, social, and psychological

wellbeing. An algorithm has been devised by Keyes et al. (2008) which enables respondents to be classified as falling in one of three categories ranging from languishing, to moderately mentally healthy, to flourishing; with each successive category reflecting higher levels of mental health and wellbeing. This questionnaire has been validated within the context of a large group of Setswana speaking adults in the North-West Province of South Africa and was found to be valid and reliable within this context (Keyes et al., 2008).

During the qualitative phase of the study, data were collected by means of two main strategies. First, a focus group interview was conducted with a group of 10 fieldworkers from the quantitative phase of the research. This method seemed appropriate for verifying quantitative findings as the socially oriented research environment of focus groups is helpful for participants to discuss perceptions, ideas, opinions, and thoughts (Krueger & Casey, 2000), and the interactions that occur among the participants can yield important data (Morgan, 1988).

Following this, a series of semi-structured individual interviews were conducted with 10 additional participants who were purposively selected on the basis of their expertise in relation to the main research questions guiding the study (as discussed in the next section). Both the focus group interview and the individual interviews consisted of the following questions, which were based on the main aims of the study, as well as on the findings of the quantitative phase of the study: *What makes people/you happy in this community? What makes people/you unhappy/dissatisfied in this community? Why do people want to stay here? What is it that they like/dislike this area? Why? How important is religion to you/the people? In what ways is it important?* Residents who left Ndumo for educational or other reasons, but who chose to return, were asked: *"Why do you come back to this area after being exposed to city life/other opportunities?"*

## **Procedure**

During the first phase of the study, entry into the communities was negotiated through a local ward councillor. He also assisted the researchers in sourcing a pool of candidates from which 16 fieldworkers were selected and subsequently trained in administering the survey. The researchers were assisted in this process by an academic assistant who spoke Zulu fluently and was able to translate and explain all concepts to the fieldworkers in their native language.

Fieldworkers were then taken to various locations within the five sub-wards of the Ndumo area, each equipped with multiple copies of the questionnaire, which they administered to local community members during the course of the day. The researchers travelled to the locations where the fieldworkers were deployed and collected the completed questionnaires the following morning, and assessed them for completeness. This process was repeated over the following three days until data collection was complete.

During the second, qualitative phase of the study which took part 4 months later, fieldworkers were invited by the ward councillor of Ndumo to meet with the researchers and project leader. Ten of the original 16 fieldworkers accepted the invitation, and provided their consent to participate in a focus group discussion.

For all other individuals who were interviewed, a meeting time was either formally arranged, or an informal discussion took place spontaneously with individuals who were available and willing to voluntarily participate during the second research visit to the study area. Prior to all interviews, consent was obtained from each participant to voluntarily participate in the interview. Notes were taken during all interviews, member checks were done throughout, and transcriptions were summarised and analysed afterwards.

### **Ethical considerations**

In light of the economically disadvantaged reality that characterizes the Ndumo area where the research was conducted, utmost care was taken to ensure ethical conduct during all phases of the study. During the quantitative phase, data collection was done by local community members who have been volunteered to take part in this process. These fieldworkers were thoroughly trained to ensure that data quality would be of a high level, and were reimbursed financially for their services. Furthermore, fieldworkers were specifically trained in explaining the purpose of the research project to potential participants, as well as explaining that participation was entirely voluntary, and that participants could choose to cease their participation at any time, without penalty. All participants who agreed to take part in the study were requested to sign a written consent form after these matters were explained to them.

During the qualitative phase of the study, in addition to following the similar procedures to those outlined above, credibility and trustworthiness of the data were ensured by applying the strategies as described by Shenton (2004) and Leech and Onwuegbuzie (2007), which involved collecting data from different types of participants, and by means of different



methods. Furthermore, where possible, member checks were done after interviews to ensure that conversations were captured accurately (Roberts, Priest, & Traynor, 2006). A thorough description was provided of the research context, in order to allow other researchers to contextualize the findings and to enable decisions to be made on the transferability of the findings to similar contexts.

### **Data analysis**

Data from the questionnaires were analysed in the Statistical Program for the Social Sciences, version 21 (SPSS 21). Descriptive statistics, principal component analysis, bivariate correlations, independent t-tests and analyses of variance (ANOVA) were employed to analyse the data (Field, 2013).

During the second phase of the study, qualitative data obtained via the focus group and individual interviews were analysed by means of thematic content analysis, following the procedure as outlined in Corbin and Strauss (2008). During the initial phase of open coding, data were segmented into units of meaning, which were subsequently given a code label by the researcher. During the next, axial coding phase, codes were examined for similarities and differences via a process of constant comparison, and related codes were grouped together into categories.

Categories were then examined for interrelationships, and integrated into overarching themes. Within the context of an explanatory mixed-methods design, these findings were then used to explain, refine, and expand upon the findings derived from the initial quantitative phase (Plano-Clark & Creswell, 2007).

### **Results: Quantitative Phase**

Table 8.2 provides descriptive statistics, Cronbach alpha coefficients, and Pearson correlations for the items, scales, and subscales that were assessed via the structured questionnaire:

Table 8.2 Descriptive statistics, reliabilities and correlations between religiosity, life satisfaction, emotional, social, and psychological wellbeing, and self-reported health

Scale	N	Mean	SD	$\alpha$	Relig	Swl	Ewb	Swb	Pwb
Relig	511	2.19	1.15	-					
Swl	499	23.47	6.85	.88	.06				
Ewb	490	3.30	1.27	.83	.05	.68**			
Swb	463	3.18	1.09	.82	.04	.66**	.65**		
Pwb	456	3.50	0.96	.86	.06	.60**	.58**	.69**	
Health	511	3.74	1.05	-	-.16**	.20**	.01	.08	.03

Note: Relig = religiosity; Swl = satisfaction with life; Ewb = emotional wellbeing; Swb = social wellbeing; Pwb = psychological wellbeing; Health = self-reported health.

\*  $p < 0.05$ , \*\*,  $p < .01$ ; Relig scale ranged from 0 to 4; Swl scale ranged from 5 to 35; Ewb, Swb and Pwb scales ranged from 0 to 5, Health scale ranged from 1 to 5.

As is evident from Table 8.2 all scales and subscales had Cronbach alpha coefficients that are well above the cut-off point of 0.7 that is customarily proposed for social science research (Field, 2013), indicating that the inter-item reliabilities of these scales are acceptably high within the context of this study population.

Principal component analysis was conducted on the SWLS and the MHC-SF to investigate their psychometric properties. This analysis confirmed that all items in the SWLS loaded onto a single factor (all loadings  $> .62$ ) with an eigenvalue larger than one, and which accounted for 67.34% of the variance in item scores. In relation to the MHC-SF, two factors with an eigenvalue greater than 1 were found, with a third factor just failing to reach this threshold (0.97). Based on an evaluation of the scree plot, however, this factor was retained, and, along with the first two factors, explained 65.3% of the variance in the scale. The rotated solution, using the direct oblimin method, revealed that the items measuring EWB and PWB loaded strongly (all  $> .66$ ) onto their respective factors, but that items from the SWB subscale, while loading onto a third factor, also exhibited cross loadings with the PWB factor in the case of items 6, 7 and 8. In the interest of the overall psychometric structure of the scale, these items were retained, but as a consequence, results pertaining to the SWB subscale should be interpreted with caution, and regarded as subject to future confirmation. Results of the SWLS revealed that participants' level of life satisfaction was slightly above average (Mean = 23.47, SD = 6.85). Similar findings are reflected in the MHC-SF subscale scores, which are all significantly above average. In particular, psychological wellbeing scores were the highest, followed by emotional, and then social wellbeing scores.

The MHC-SF allows researchers to classify participants into a threefold scheme of increasing levels of psychological wellbeing respectively referred to as languishing, moderately mentally healthy, and flourishing, using a special algorithm (Keyes et al., 2008). As reflected in Table 8.2 42.2% of the participants were flourishing, 54.7% were moderately mentally healthy, and 3.1% were languishing.

In order to identify community level factors that might account for variations in levels of psycho-social wellbeing, and to contextualize the findings from the wellbeing scales, participants' marital status, gender, religiosity, self-reported health, age, and the number of years they have lived in the Ndumo area were measured and assessed in terms of how these factors related to the psycho-social wellbeing of community members.

### **Socio-demographic correlates of psycho-social wellbeing**

In relation to marital status, findings revealed that only 10.9% of the participants were married, whereas 81.8% were single, 5.1% widowed, and 2.2% were divorced. Given that the average age of the participant group was 37.28 years ( $SD = 13.12$ ), the low marriage rate was unexpected. Furthermore, in a demographically comparable sample in the North-West province, only 64% of participants were found to be single, with 22% still married, and the remaining 14% of the sample consisting of the divorced and widowed (Khumalo, Temane & Wissing, 2012). Levels of psycho-social wellbeing were assessed comparatively according to marital status to determine if any between-group differences occurred. Life satisfaction was found to be significantly lower ( $t = 2.19$ ,  $df = 77$ ,  $p < .00$ , two tailed, mean difference = 3.19, 95% CI: 0.29 to 6.09) for those who were widowed (Mean = 21.88,  $SD = 6.95$ ) than for those who were married (Mean = 25.08,  $SD = 5.62$ ).

No statistically significant differences were found between male and female participants on any of the wellbeing related scales, suggesting that gender does not significantly account for variations in psycho-social wellbeing.

As far as religiosity is concerned, 13.1% of the participants indicated that they were not religious at all, 10.2% considered themselves to be 'slightly' religious, 29.7% were moderately religious, 38.2% described themselves as 'very' religious, and 8.8% indicated that they are extremely religious. As such, 76.7% of participants in this community regard religion as being of moderate to above moderate levels of importance, suggesting that religion likely plays a significant role in the lives of those living in the Ndumo community.

However, self-reported religiosity had virtually no bearing on any aspect of wellbeing that was measured, with the exception that those who were more religious were more likely to report lower levels of physical health ( $r = -.16, p < .001$ ).

In relation to self-reported health, the majority of participants perceived themselves to be in average to above average levels of health. Specifically, 2.2% of participants regarded their health as “poor”, 3.5% as “below average”, 48.1% as “average”, 10.6% as “above average”, and 35.6% regarded their health as “good”. Whereas a small to moderate correlation was found between self-reported health and life satisfaction ( $r = .20, p = .00$ ), the three MHC subscales exhibited no significant correlation with self-reported health, indicating that this variable is unlikely to significantly affect psycho-social wellbeing (as measured by the MHC-SF) in this particular community.

The age of the participants had a small positive relationship to psychological wellbeing overall ( $r = .01, p = 0.04$ ). Closer scrutiny revealed that this relationship only occurred among female participants ( $r = .13, p = .047$ ), and that it did not do so among males ( $r = .05, p = .48$ ).

Finally, no significant correlation existed between psycho-social wellbeing and the length of time that participants had been living in the Ndumo area.

### **8.1.3 Findings: Qualitative Phase**

The aims of the qualitative phase of the study were to explain, refine, modify and extend the results that were obtained during the first phase, and to explore the factors that most significantly support and/or detract from residents’ levels of psycho-social wellbeing.

Findings largely confirmed those made during the initial phase of the study, with the majority of participants reporting that they consider themselves and their fellow community members to be fairly happy. Six main themes emerged from the data which provided an explanation for Ndumo residents’ comparatively high levels of psycho-social wellbeing. However, despite reporting slightly above average levels of wellbeing, most participants also pointed to the existence of a number of factors in their communities that detracted from their sense of wellbeing. Table 8.3 provides an outline of these themes as a prelude to the discussion that follows.

Table 8.3 Themes emerging from the qualitative phase of the study

Theme	Subtheme	Verbatim quote
<b>Themes related to factors that support and enhance psycho-social wellbeing</b>		
Finding happiness in the land	Being able to live off the land	<i>We are happy here... the soil is good for planting and animals have good grazing</i>
	A good climate	<i>We like the warmth...the weather is good</i>
Safety and security related to respect for traditional cultural authority	Safe environment	<i>We don't mind walking alone...we feel safe</i>
	Trusting others	<i>People don't take each other's things...water cans...firewood...we know it belongs to someone who will come and get it</i>
Support from external sources	Educational	<i>The children and the teachers benefit from educational workshops and additional programs developed for the specific area...</i>
	Financial	<i>'The grants help me to buy food for the children...'</i>
	Medical	<i>The mobile clinics help...otherwise there would not be anything</i>
	Nutritional	<i>The e-pap makes a huge difference in the children's lives...only meal they have in a day</i>
Hope for a better future		<i>We will never live elsewhere...we love this place...we won't give up, we hope and believe that one day it will be better here for everyone... better services, better living</i>
Religion and the church	Church and faith	<i>We go to church to read the Bible and strengthen our faith...the people in the church support each other, especially when someone dies or suffers</i>
	Traditional beliefs	<i>The sangoma will speak to the ancestors and ask for direction...some of us believe in the sangoma...</i>
<b>Themes related to factors that detract from psycho-social wellbeing</b>		
Economic challenges	Poverty	<i>The people here don't have much...they don't have money to buy things...they are poor</i>
	Unemployment	<i>We don't have jobs...government does not provide for jobs or much development in this area</i>
Lack of basic municipal services	No electricity	<i>We have no electricity, only lamps or candles or fire...for heat and cooking and light...the children study with lamps</i>
	Insufficient access to water	<i>We walk to the river...in winter... no water at the taps...we wait a long time in queues for the water</i>

Problems with education		<i>I don't think the teachers are good...they sometimes don't even come to school</i>
Limited and inadequate health care		<i>The mobile clinic is only here for few hours...we wait a long time and did not get any help. The clinic is very far...</i>
Always being 'last in the row'		<i>We are always last in the row when they give services</i>

### **Factors that support and enhance psycho-social wellbeing**

#### *Finding happiness in the ability to live off the land and in a good climate*

Participants firstly indicated that they are happy because they are able to live off the land, as the area provides good grazing for livestock, and fertile soil in which to plant crops such as maize, pumpkin, sugar cane, potato and sweet potato, and also provides natural resources for them to build, find, grow or catch whatever they require for their survival. These sentiments are well illustrated in the words of the following participants: “*We are happy here... the soil is good for planting and animals have good grazing*” and “*We plant maize, lots of maize...and pumpkin and potato...the soil is good for potato*”.

Second, several participants cited the warm, temperate climate as reason for being happy in this area, as is reflected in the following excerpt from an interview with a local resident: “*We like the warmth...the weather is good*”.

#### *Safety and security related to respect for traditional cultural authority*

A third major factor that contributed to participants’ psycho-social wellbeing in this otherwise impoverished community was the sense of security they felt in relation to their persons and their material possessions. Participants, among whom some were young women, widely reported that they felt totally safe when walking alone in remote areas. In addition to feeling a sense of personal safety, most participants reported that they trusted other residents and had very little fear that their possessions would be stolen by others. For example, many residents left personal belongings such as firewood and water cans in public areas without concerns that these would be taken. As one participant stated: “*We can leave our water cans at the tap. When we get back there tomorrow, it will still be there. We don't take other people's cans. Also like firewood...you can leave it next to the road*”. Asked why the crime levels were perceived to be so low, the dominant theme that emerged was that this was as a result of the respect residents had for the *Induna* system (the traditional cultural tribal authority system of the Zulu, (compare Haddad & Maluccio, 2003)). Another consequence of the respect that local residents were reported to have for the *Induna* system was that it resulted in order and discipline in these communities, which also significantly contributed to the satisfaction of many participants.

### *Support from external sources*

Fourth, the psycho-social wellbeing of residents of the Ndumo community is to some extent supported by the provision of financial, medical, educational, and nutritional support from a variety of institutions and individual benefactors. These include government grants distributed by the local municipality, the provision of mobile health clinics, and educational and nutritional initiatives from The Tshwane University of Technology (TUT) that have established a feeding programme at most schools in Ndumo in 2002. The project has also initiated vegetable gardens at eight schools and in addition, food parcels in the form of “ePap” are supplied to orphans at certain schools (Ogilvie, 2012). Quotes from participants in this regard include: *“The grants help me to buy food for the children...”* and *“The ePap...it makes us very happy. It keeps us healthy and alive. It keeps me going...it is my brain food”*.

### *Hope for a better future*

Participants were asked why they still like and want to stay in the Ndumo area despite challenges such as the perceived educational drawbacks and limited job opportunities in this rural community that rely mainly on subsistence agriculture for survival. A central (and fifth) theme that emerged from their responses was that of hope. Specifically, participants stated that they firmly believed and hoped that the poverty that characterizes the area would eventually be eradicated, and that living conditions would improve. In the words of one resident: *‘We will never live elsewhere...we love this place...we won’t give up, we hope and believe that one day it will be better here for everyone...better services, better living. We want to give back to our community...’*

### *Religion*

Sixth, community wellbeing appears to be supported in a variety of direct and indirect ways by religion and religious institutions. Whilst a large variety of denominations were mentioned by the participants, Christianity was reported to be the main religion in the area. However, elements of traditional African belief systems, which include beliefs in traditional healers (*sangomas*) and ancestral spirits, were reported to co-exist with Christian beliefs.

Overall, findings echoed those that emerged from the quantitative phase, indicating that religion is important to the majority of participants in the community. This was the case specifically as religion (both in terms of Christianity and indigenous religious belief systems) enabled them to cope with the vicissitudes of life, and as it provided moral support, and represented sources of guidance and direction. On a more practical level, the Church and church members were also seen as a source of social and everyday practical support,

providing for community members in need. As one participant said: *'The people at the church support each other when we suffer...when someone dies or is sick...we talk to each other and take food to the sick because we are from the church'*. As such, whilst the findings of the quantitative phase of the study revealed no significant relationship between religiosity and psycho-social wellbeing, the themes emerging from the qualitative phase suggest that such a relationship probably indeed exists, but that it might be mediated by factors such as social support and generativity.

### **Factors that detract from psycho-social wellbeing**

As discussed in the next section, participants also mentioned several challenges that detract from their happiness and wellbeing.

#### *Poverty and unemployment*

The first and most dominant theme that emerged centred on the widely reported view that the community is economically underdeveloped and plagued by high rates of unemployment, resulting in pervasive and widespread poverty in the region: as is the case in many other urban areas in South Africa.

#### *Lack of basic municipal services*

Second, participants frequently cited inadequate basic municipal services such as a total lack of electricity and limited access to water in most areas as being a primary concern that significantly detracts from their wellbeing. Residents reported that municipal taps are often very far from homesteads (requiring people to walk great distances carrying heavy water cans in order to simply procure water for domestic purposes), and that these taps are reported to often be dry (especially in winter) or to produce virtually no water due to insufficient water pressure, forcing residents to collect water from local rivers.

#### *Inadequate education*

Third, participants also expressed their concern at what they perceived to be the inadequate standard of education that residents were able to obtain in this area. They indicated that teachers appear to be ill-equipped for their tasks, and generally delivered a poor service. Participants also complained that students receive inadequate instruction in English, which they felt hampered these students' chances of obtaining work outside of the community. Stated in the participants' own words: *"We don't learn English at all...I learned English when I came to university"* and *"Children cannot speak English...they get training in Zulu and maybe only later in school they start with English, but then also the teachers themselves*



*cannot speak English well*". Some participants also felt that it was not only a lack of skill that hampered effective teaching, but also teacher absence at schools: "*I don't think the teachers are good...they sometimes don't even come to school*". In an interview with a participant who had been doing community-based work in the Ndumo community for 13 years, it was reported that most of the teachers in the area are either unqualified or still in training. Most teachers are reported to be placed in the Ndumo area against their will and in meagre accommodation facilities, are poorly paid, and consequently lack motivation. Many teachers, and especially principals, are reported to own and operate their own private businesses, which are said to take up much of the teachers' time and often cause them to not come to work, which frequently leaves pupils without any adequate instruction and supervision.

#### *Limited and inadequate health care*

Fourth, these problems were compounded by what the participants perceived as limited health assistance. Specifically, participants indicated that whilst certain facilities such as mobile clinics were available, the service at these places were often very limited, and residents frequently had to return home after a long waiting period without having received the necessary medication or assistance.

#### *Always being last in the row*

Fifth, although the Ndumo area benefits from sponsors, grants, food parcels and other initiatives from institutions and individuals, participants in the community still regard themselves as "forgotten" because they are, as one participant stated: "*always last in the row*". Most who were interviewed felt that whatever is being done in the province by government or local government, and whenever benefits concerning water supply, education or housing are considered, Ndumo would be last to receive anything.

### **8.1.4 Discussion**

The main aim of this study was to investigate the psycho-social wellbeing of participants in the Ndumo community as so-called "forgotten community". To do so, an explanatory mixed methods design was used which consisted of an initial, quantitative phase, which was followed by a qualitative exploration in order to obtain data that would explain the findings emerging from the initial phase.

#### **Quantitative phase**

Results from the quantitative phase indicated that Ndumo residents generally have above average levels of psycho-social wellbeing. The relatively high PWB and EWB scores which were found suggest that participants are likely functioning reasonably well psychologically, and that they are moderately happy. Whilst social wellbeing scores were also significantly above average, it represented the lowest score of all the subscales, suggesting that social conditions might in some cases detract from participants' overall levels of wellbeing.

However, in a study which investigated the psycho-social wellbeing of a Setswana speaking community ( $n = 459$ ) in the North-West province by using the same scale, far lower levels of especially emotional and social wellbeing were found. Specifically, whilst PWB was found to be relatively high (3.69 compared to 3.50 in the present study), SWB and EWB scores were low (1.98 and 1.58 respectively, compared to 3.18 and 3.30 in the present study) (Khumalo, Temane & Wissing, 2012). Similarly, in a study by Keyes et al. (2008) involving a sample of 1050 Setswana speaking adults in the North-West province, EWB was found to be 2.6, SWB was 2.4, and PWB was 3.3. Additionally, Keyes et al. (2008) found that 12.2% of participants in their study were languishing, 67.8% were moderately mentally healthy, and 20.0% were flourishing, compared to the present study in which 42.2% of the participants were flourishing, 54.7% were moderately mentally healthy, and 3.1% were languishing. These findings suggest that the social and emotional wellbeing of participants in the Ndumo area significantly exceed those of members of at least some comparable communities elsewhere, and point to the possible existence of a variety of wellbeing enhancing factors extant in the Ndumo community.

Correlational analyses of wellbeing in relation to demographic variables suggested that psycho-social wellbeing was unrelated to gender and the length of time participants resided in Ndumo. In their study, Khumalo et al. (2012) similarly found gender to be uncorrelated with psycho-social wellbeing. Furthermore, despite the fact that 76.7% of participants regarded religion as being of moderate to above moderate levels of importance, religiosity did not exhibit significant correlations with any of the subscales of the MHC or with the SWLS. Taken together, these findings suggest that gender and religiosity are unlikely to substantively impact the wellbeing of residents in these communities, at least as far as these constructs have been conceptualised and measured in these studies.

However, some aspects of psycho-social wellbeing were found to be related to self-reported health, age, and marital status. Specifically, a mild to moderate positive association was found between life satisfaction and health among participants. Whilst the age of the

participants had no overall relationship to psycho-social wellbeing, a small positive correlation between these variables was found among female participants. In their study, Khumalo et al. (2012), found age to be unrelated to wellbeing.

Marital status was found to be associated with psycho-social wellbeing in that those who were married had higher levels of life satisfaction than those who were single or widowed. Khumalo et al. (2012) similarly found that married participants reported higher levels of wellbeing than never-married, divorced and widowed participants. However, in the present study, only about one in ten participants reported being formally married, suggesting that the beneficial effects of marriage would likely be limited to a proportionally small section of the community.

### **Qualitative phase**

The qualitative phase of the study was aimed at explaining and extending the results obtained during the initial quantitative phase of the study, and to identify factors which both support and detract from the community's levels of psycho-social wellbeing. In relation to factors that support wellbeing, the main theme that emerged was that the natural environment enabled participants to make a living in a self-sustaining way (through the provision of rich soil to plant crops, firewood to cook food, good grazing for livestock, and building materials to construct houses) and therefore to survive in spite of the abject poverty that otherwise characterizes the region. It appears likely that these options would not exist to the same degree for members of poor urban communities, where lack of access to land, water, and wildlife would in all probability prohibit the likelihood of living off the land in a self-sustaining way.

A second environmental-related theme that emerged was that the good climate of the area was also viewed as a factor that positively impacted residents' wellbeing. It would appear that mild winters, abundant rain, and warm temperatures increase the habitability of the region, which might not be the case for communities residing in less temperate climates. A third theme was that crime levels were reported to be low, and that residents in the Ndumo community consequently felt safe and secure, which enhanced their psycho-social wellbeing. This situation appears to exist as a result of respect for the *Induna* system and its associated administration of social justice and the discipline of the people in relation to traditional customs.

Fourth, financial, educational, nutritional and medical support from external sources, institutions, and individuals in the form of grants, food parcels, and community upliftment projects, educational initiatives and mobile clinics were found to enhance community wellbeing. However, the fact that the Jozini Local Municipality (2013-2014) used 53% of its budget for social grants raises concerns as to the sustainability of at least some of these support mechanisms.

Hope for a better future was identified as fifth theme. Such hope helped to sustain a degree of wellbeing and resilience among participants in spite of challenging conditions such as poverty coupled with high rates of unemployment. Additionally, participants were buoyed up by expectations of continued agricultural self-sustainable opportunities for maintaining their livelihoods.

Sixth, participants also reported that religion and support from the churches contributed significantly to their wellbeing. It was found that participants' religious beliefs represented an amalgam of Christianity and indigenous African religious belief systems. Previous studies confirm the continued existence and relevance of traditional religious belief systems, in particular in relation to the healing powers of the *sangomas* (Hall, 2009; Peltzer, Preez, Ramlagan & Fomundam, 2008). When considered in relation to the finding that high levels of discipline and order existed in these communities as a result of respect of the *Induna* system, these findings point to the important role of cultural and religious factors in sustaining the wellbeing of members of these communities. It appears that a strong, intact, and homogenous cultural identity and a pervasive Christian religious orientation serves to unify community members around a central set of beliefs and cultural systems (such as the *Induna* system), and that it regulates the behaviour of community members in functional ways (such as by reducing the incidence of crime), which in turn, support residents' wellbeing in these communities.

However, despite the higher than average levels of psychosocial wellbeing that were found in Ndumo, the results of the study also reveal that participants in this community face significant challenges that detract from their wellbeing. In particular, poverty, unemployment, and a lack of basic municipal services such as electricity and access to water in many areas seem to reduce psycho-social wellbeing of at least some community members. These findings echo those made in previous studies (PRESPA, 2009; South African Cooperative Governance & Traditional Affairs, 2010). Limited and poor quality health-care further

compounds the challenging living conditions faced by most participants residing in the area. Finally, concerns about inadequate primary education, teacher competence and motivation, and the absence of any higher education institutions in the region appear to significantly detract from community wellbeing. As such, it would appear that despite educational initiatives that have recently been undertaken (Jozini Local Municipality, 2007-2008), serious shortcomings still exist which require additional investigation and remediation.

#### **8.1.5 Implications of the study**

The results of this study point to the importance of various forms of social and other capital, such as a sense of safety, religious communal support, access to social grants, abundant natural resources, and hope in sustaining and supporting the psycho-social wellbeing of residents in otherwise impoverished rural communities. However, with this community being located in a highly ecologically sensitive area near the Ndumo Game Reserve, and with the Jozini Local Municipality spending 44% of its budget on social grants, these factors also need to be evaluated in terms of their sustainability over time.

Furthermore, in spite of recent initiatives aimed at improving access to education in the region (Jozini Local Municipality, 2007-2008), these findings highlight an urgent need for strategies to improve the quality of education, with a specific emphasis on English language education. At present, it appears that a vicious cycle exists, in which what is perceived to be inadequate education and underdevelopment in the Ndumo community results in unemployment and widespread poverty, and a resultant inability to pay for basic municipal services, which hamper community development.

The findings suggest that psycho-social wellbeing in these communities could be substantively enhanced by promoting access to tertiary education or other types of training that will enhance employability of especially the youth in the area, as well as by creating employment opportunities in the region that will benefit the community. With increased income, the provision of basic municipal services such as electricity and access to running water would then become more viable. Given the agricultural basis of the Ndumo community, as well as residents' appreciation for the land on which they live, interventions focusing on the establishment of agricultural initiatives, and on equipping local residents with the necessary skills to succeed in small to medium scale farming enterprises could be explored as potentially viable, contextually sensitive, and relevant strategies for improving quality of life in the region.

The findings of this study also raise the issue of the impact of communities being primarily governed by traditional, rather than local government authority. Future research could investigate the specific ways in which psycho-social wellbeing differs across such communities.

#### **8.1.6 Limitations of the study**

As the study was based on a cross-sectional design, no causal inferences can be made about the relationship between variables that have been quantitatively investigated. It is therefore quite possible that the associations that have been found between various aspects of wellbeing and the living conditions and demographic characteristics of residents could be explained by extraneous variables that have not been accounted for in this study. Furthermore, as some of the items purported to measure social wellbeing in the MHC-SF have been found to cross load onto other factors, all findings related to this specific subscale should be treated with caution, and regarded as subject to confirmation in future studies.

#### **8.1.7 Conclusion**

This study set out to investigate the psycho-social wellbeing of the Ndumo community in northern Maputaland in the Kwa-Zulu Natal province of South Africa, using a cross-sectional sequential explanatory mixed-methods design. Overall, the findings revealed that, despite significant challenges such as poverty, poor infrastructure, concerns about education, and inadequate provision of basic municipal services, members of this community do not only exhibit above average levels of psycho-social wellbeing generally, but appear to fare significantly better in this regard than demographically comparable rural communities elsewhere. The main reasons for this were that community members were able to make a living off the land and liked the climate of the region, that they felt safe and secure in their communities due to low crime levels, that they received financial and instrumental support from external sources, and that they were sustained by hope for a better future. Finally, it was concluded that a strong, intact, and homogenous cultural identity and a pervasive Christian religious orientation serves to unify community members around a central set of beliefs and cultural systems (such as the *Induna* system), which in turn regulates the behaviour of community members in functional ways, thereby supporting the wellbeing of residents living in these communities.

Particular research on the level of human-fish interactions as a means to record and understand how community members of Ndumo are able to make a living through the practising of fishing and the availability of this natural source as economic commodity followed.

## **8.2 Human-Fish-Interactions in Ndumo, KwaZulu-Natal, South Africa**

### **8.2.1 Introduction**

Ndumo, which forms part of the lower-Phongolo River and its floodplain system, is an important reservoir for a number of fish species. This study set out to gain an understanding of the potential impact Ndumo's communities could have on the local fish population by investigating the interactions between local residents and fish. The study followed a sequential, exploratory, mixed-methods design comprising a qualitative phase where interviews, observations and a document study resulted in the development of a questionnaire based on emerging themes, which was followed by a quantitative phase during which results from Phase 1 were verified and quantified by a survey. The results of this study suggest that human-fish-interactions in the Ndumo community are significant, and play an important role in supporting the livelihood of members of this community, both by serving as an important form of sustenance, and by constituting an important economic resource (Nell, De Crom, Van Eeden & Coetzee 2013). However, given the ecological sensitivity of the Floodplain, it was also deemed necessary to assess the impact that these interactions might have on the fish populations in the region.

The Ndumo Game Reserve is of critical importance for the conservation of fish in the lower-Phongolo River and its floodplain system since this Reserve acts as an important reservoir for species such as the tiger fish *Hydrocynus vittatus*, which is a protected species in South Africa (Smit et al., 2013). This species, as well as a number of other fish species, are regularly caught and consumed by residents of the Ndumo community. However, this phenomenon is neither new nor unique to Ndumo. Human-fish-interactions are as old as humanity's history on earth (Bogue, 2001; Jacobsen et al., 2004; Knox, 1954; Whitelaw, 2009). Throughout southern Africa, wetlands in particular are important sources of fish because they support numerous small-scale fisheries, especially in rural communities (Turpie et al., 1999). These multi-species fisheries are generally highly productive and constitute a major contributor to the livelihoods of many local communities (Baker 2008; Neiland 2006; ACWR, PLAAS & UWC, 2012), especially in the large lake systems in central and eastern Africa (Hauck 2010). As early as 1994, Ribbink reported that fish caught from Lake Malawi provide as much as 75% of the animal protein consumed in the entire country,

which is a finding also supported by more recent studies (Hauck, 2010). The relative importance of fish as food and as a source of livelihood for local communities can therefore not be ignored or denied.

In South Africa, however, the relative scarcity of large floodplain wetlands means that wetland fisheries are not experienced as generating high levels of fishery productivity, with the exception of some of the larger systems such as the Phongolo Floodplain (Acreman & Hollis, 1996; Merron & Weldrick, 1995; Ross & Ross, 2012). The ecological value of the Phongolo River Floodplain, and particularly the varying natural and anthropogenic impacts on the system, has already been recognised in both public and scholarly circles decades ago. For example, Coke and Phélines (1970), and later Coke and Nicol (1973), pointed to the effects water management and floods have on the system, while Heeg and Breen (1982) in turn highlighted the impact humans may have on the Floodplain.

Recently, a few additional studies were conducted on human activity in this region, and the various ways in which such activities affect the ecosystem of the Phongolo Floodplain (Chhotray, 2010; Ellender et al. 2010; Lankford et al., 2013; PRESPA Report 2009). The importance of fish in particular was highlighted, as it was found to play an important role in the livelihood of local communities in the area, inclusive of fishing practises close to storage dams such as Pongola Dam (ACWR, PLAAS & UWC, 2012). This finding was further supported by the results of Ross and Ross (2012), who asserted that fish was the main protein source in the floodplain area. However, whilst there seemed to be general consensus about the importance of fishing in the context of communities located in the region of the Floodplain, far less is known about factors such as the types of species most commonly consumed, seasonal variations in fishing and fish consumption, and the nature and extent of local trade in fish. In a current WRC-study (ACWR, PLAAS & UWC, 2012) fishing practices in storage dams in selected areas of South Africa are investigated which includes the Pongolapoort dam. This study did not investigate fishing practices further north towards Ndumo.

Given the ecological sensitivity of the Phongolo Floodplain, especially around the Ndumo area, and the possible pressures that human-fish-interactions might exert on the Ndumo Game Reserve (and specifically on local fish populations inside the park), it was deemed important to assess these interactions in the Ndumo community.

### **8.2.2 Method**



A sequential, exploratory, mixed-methods design (Plano-Clark & Creswell, 2007) was adopted as basis for the study. It consisted of three phases: (1) a qualitative phase to explore people’s interactions with natural resources, particularly fish, (2) the development of a questionnaire on the basis of the qualitative findings, and (3) a quantitative phase to verify and quantify the results. This design is commonly used in cases where contextual sensitivity is required and where limited empirical knowledge exists (Plano-Clark & Creswell, 2007). Two additional benefits of this approach are that it reduces bias and increases credibility, because the investigators only work with what emerges during interactions with the participants and these views are confirmed and tested against the views of a more representative sample.

### Participants

Two groups took part in the study. The first group, which participated in the qualitative phase of the study, consisted of nine key informants in the form of local traditional and political leaders (eight males and one female) between the ages of 47 and 62. These participants were purposively selected (Creswell, 2007), based on their knowledge and experience of their communities’ interactions with fish.

During the quantitative phase of the study, 521 participants were surveyed. Their average age was 37.28 years (SD = 13.12), and participants had been living in the Ndumo area for a mean 28.18 years (SD = 16.24). As shown in Table 8.4, the participant group consisted of an almost equal number of males and females were mostly single (i.e. not formally married) and isiZulu and/or Tsonga speaking. Of the total group, 88.90% viewed themselves as consumers of fish, 28.98% as local fishermen or fisherwomen, and 38.69% as fish vendors.

Table 8.4: Characteristics of participants (n = 521)

Item	Category	Frequency	Percentage (%)
Gender	Male	247	47.8
	Female	270	52.2
Marital status	Married	55	10.9
	Single (never married)	413	81.8
	Divorced	11	2.2
	Widowed	26	5.1
Race	African (mostly isiZulu and Tsonga)	521	100
Participant category	Consumers of fish	463	88.90*

Fishermen/fisherwomen	151	28.98*
Fish vendors	203	38.96*

*\*As several participants fell into more than one category, percentages do not add up to 100.*

### **Procedure**

Entry into the Ndumo community (i.e. various villages) was negotiated on behalf of the research team by an experienced research assistant who carefully explained to the various leaders who he (as a representative of the research team) was, what the team planned on doing in the area, and what their involvement would entail if they agreed to participate. Semi-structured interviews were then conducted with those participants who provided their informed consent.

This work was followed up with a second visit to the area during which the questionnaire that was developed was used to quantify and verify the initial results. A group of 16 fieldworkers was sourced from the various local villages and trained to recruit participants, obtain informed consent, and administer the questionnaire by means of structured face-to-face interviews.

All quantitative data was collected over a five-day period, with fieldworkers receiving a set of questionnaires in the morning, which they administered during the course of the day. Questionnaires were collected at the end of each day and examined for completeness.

During the entire process of data collection, care was taken to do so in as ethical a manner as possible. Full, informed and signed consent was obtained from all participants, and it was explained to respondents that their responses would be treated confidentially and that they had the right to withdraw from the research at any time without penalty.

### **Data collection**

Qualitative data was gathered by means of interviews, observations, and a document study. Non-participant observations were made during both visits to the study area and documented. This data was later used as contextual information. A document study, as performed by one of the members of the research team, was used as background information and a knowledge base against which the results of this study were compared and contextualised.

Semi-structured interviews were used to collect data, as outlined in Creswell (2007). The interviews consisted of six open-ended questions aimed at eliciting the participants' views on

various aspects pertaining to the utilisation of natural resources in the area, followed by more direct questions relating to participants' interactions with fish. Where necessary, follow-up questions deemed were asked to explore or clarify participants' responses. Questions included:

- *What does the floodplain mean to you/the community? (How so?)*
- *What forms/kinds of natural resources do people in your community utilise from the floodplain (on a regular basis/only at times)?*
- *How does your community use/utilise these natural resources economically/politically and culturally/religiously?*
- *How important are these natural resources for each family's survival or coping with life?*
- *What do the people from your community say about the environment?*
- *How do they treat it? (Why?)*
- *Can you please tell me more about the fish industry in your area?*

The participants' responses were digitally recorded and transcribed to ensure accuracy.

Quantitative data was collected by means of a structured questionnaire, which was developed on the basis of the themes that emerged from the analysis of the qualitative data. It consisted of 40 questions that were divided into four sections:

- Section A consisted of four basic demographic questions aimed at determining the age and gender of the participants, followed by questions to establish where the participants resided and how long they have been living in the area.
- Section B was specifically aimed at consumers of fish products and included a question on the proportional use of various types of proteins in their diet, followed by more fish-use-related questions such as how many times per week and per day participants ate fish, why they ate fish and whether their diets changed at different times of the year and, finally, questions such as how and where they obtained the fish, which species of fish they consumed, and whether fish and fishing had any cultural or social significance to them (participants were given the local names of each fish species, and were shown full-colour photographs and sketches of each species to assist with identification of these).
- Section C of the questionnaire, which was aimed at local fishermen and women, included questions relating to the number of years these participants had been fishing in the area, where they caught most of their fish, the number of locations at which they fished, the availability of fish, how they selected the sites where they fished, why they fished, the methods they used to catch the fish, whether they had experienced any recent changes in the availability of the type and size of fish, the type of species they caught, whether they had ever noticed any large-scale deaths of

fish, whether fish played an important social or cultural role in their lives, and concluded with a question on aspects that made it more difficult for them to fish.

- The final section of the questionnaire was directed at fish traders and/or people who sold fish but who were not themselves fishermen or fisherwomen. The first question in this section was used to determine how many years they had been selling fish, followed by items inquiring about the availability of fish, the form in which the fish was sold, where participants obtained the fish from, the types of species they sold, and whether they had experienced any changes regarding the availability of certain species.

### **Data analysis and interpretation**

Qualitative data was analysed by means of thematic content analysis (Creswell, 2007). To begin with, the data was subjected to a process of open coding during which descriptive codes were assigned to fragments of text. Following this, codes were inductively grouped together into categories based on conceptual similarities as part of a selective coding procedure. Finally, each category and each theme were studied in detail again to make sure that the original data truly supported these categories. In turn, these categories were used as a basis for the development of the questionnaire used in the quantitative phase of the study.

Data from the quantitative questionnaires was analysed in the Statistical Package for the Social Sciences, version 21 (SPSS 21). Basic descriptive statistics were calculated for all items in the questionnaire. Wherever relevant, findings were compared across demographic groups, using independent t-tests to verify the statistical significance of any differences that emerged, while bivariate correlations were used to examine relationships between variables (Field, 2013).

Given that the qualitative phase was mostly exploratory, that the findings from this phase were incorporated into the quantitative survey, and that the main aim of the study was to obtain representative and generalizable findings, only quantitative results are reported in this chapter.

### **8.2.3 Findings**

The results pertaining to the consumers of fish are reported first, followed by those of local fishermen and fisherwomen and, finally, those of fish vendors.

## Consumers of fish

As can be observed in Table 8.5, which outlines participants' dietary preferences in relation to sources of protein, fish was found to be the third most frequently consumed protein by males and females alike. Among those who consumed fish, which included 88.9% of the participant group, fish was eaten on average twice a week. On days when fish was eaten, participants ate fish on average 1.4 times per day (SD = 0.59). Most participants relied on chicken and, to a slightly lesser extent, on beef as main protein sources. Goat meat, venison (referred to as "bush meat") and mutton were also consumed, but relatively infrequently and far less often than fish. To enable identification of additional protein sources, a category of "other" was included. A qualitative analysis of findings relating to the latter revealed that respondents occasionally utilised rabbit as a protein source.

Table 8.5: Frequency of the consumption of various protein sources by residents of the Ndumo area

Protein source	Mean	SD
Chicken	3.91	1.10
Beef	3.11	1.13
Fish	2.70	1.10
Goat	1.98	0.79
Venison (bush meat)	1.66	0.98
Mutton	1.65	0.95
Other (mainly indicated as rabbit)	1.78	1.18

*\*Consumption was measured on a five-point scale ranging from "never or almost never" (1) to "almost daily" (5) in response to the question: "How often do you eat each of the following?"*

Overall, these findings suggest that whilst fish did not constitute the primary protein source in these communities, it is nonetheless consumed quite frequently and in significant quantities by the majority of participants. As such, fish plays an important role in the overall diet of residents in the Ndumo community.

Additionally, participants were also asked which species of fish they ate and how frequently they did so. Table 8.6 provides a summary of these findings:

Table 8.6: Percentage of participants who consumed the species as listed and mean number of fish/crayfish consumed per week

Species	Percentage of participants	Mean number consumed	SD
---------	----------------------------	----------------------	----

	who consumed species	per week	
<i>T. rendali</i>	89.1%	4.17	3.16
<i>O. mossambicus</i>	77.4%	4.28	2.92
<i>S. zambezensis</i>	64.0%	3.15	3.30
<i>C. gariepinus</i>	54.8%	3.81	3.98
<i>S. intermedius</i>	54.8%	2.85	2.64
<i>H. vittatus</i>	46.9%	2.59	2.65
<i>C. quadricarinatus</i>	20.9%	2.27	2.10

Overall, it was found that all species of fish (listed in Table 8.6) were consumed in significant numbers by a substantial portion of the participant group, with the exception of the recently introduced alien freshwater crayfish *C. quadricarinatus* (see Du Preez and Smit, 2013 for a report on this alien). Reasons for the low levels of utilisation of this (invader) species are still unclear and should be examined more closely in future studies. The two Tilapia species that occur in the region were the most preferred species of fish, with *T. rendali* being significantly more popular than *O. mossambicus*. Unsurprisingly, these species were also the most frequently consumed species of fish. However, while *C. gariepinus* was consumed by only 54.8% of the participants, it was eaten the third most often of all species. A possible reason for this trend may be that *C. gariepinus* is a successful aquatic invader. It is large, omnivorous (taking a variety of bait), long-lived and fast-growing, and attains sexual maturity within two years. It also has the ability to breathe air directly from the atmosphere (Booth et al. 2010). These attributes allow *C. gariepinus* to survive in most adverse conditions and could, therefore, explain its abundance. Differences such as that males ate more *S. intermedius* (mean difference = 0.54) and *Cherax quadricarinatus* (Red claw crayfish) (mean difference = 0.47) than females were not statistically significant ( $t = 1.51$   $df = 213.90$   $p = .13$ . two-tailed equality of variances not assumed; 95% CI: -0.17 to 1.24 and  $t = 0.89$   $df = 62.42$   $p = .38$ . two-tailed equality of variances not assumed; 95% CI: -0.59 to 1.53, respectively).

Bivariate correlations were used to examine the relationships between age, the number of years that participants resided in the Ndumo area and their consumption of fish, both generally and in relation to specific species. Age was uncorrelated with general fish consumption, but a small negative correlation ( $r = -.13$   $p = .006$ ) was found between the number of years participants lived in the area and the number of fish they consumed per day. However, when specific species were considered, it was found that the longer participants lived in the Ndumo area, the more likely they were to eat *T. rendali* ( $r = .12$   $p = .02$ ), *S. zambezensis* ( $r = .15$   $p = .02$ ), *O. mossambicus* ( $r = .13$   $p = .02$ ), and, especially *H.*

*vittatus* ( $r = .24$   $p = .00$ ), suggesting that those living in this region develop an acquired taste for these species. A positive correlation ( $r = .17$   $p = .00$ ) occurred between self-reported health and fish consumption, suggesting that eating more fish was associated with elevated levels of self-reported health.

All participants who indicated that they did consume fish were asked what their primary reasons were for doing so. In descending order of importance, 57% of participants asserted that they ate fish as they regarded it as healthy; 41.1% said they consumed fish because they like the taste thereof; 21.9% stated that they preferred it as it was fairly cheap and affordable; 15.5% thought it was easily available, while 10.6% felt it was quick and easy to prepare. Only 9.4% of participants (of which the majority (75%) were males) indicated that they ate fish because they could catch it for free. The above-mentioned figures strongly suggest that the appeal of fish does not necessarily lie in the fact that it is relatively freely accessible in the surrounding environment, but rather in its taste and perceived health benefits.

Asked how they obtained the fish they consumed, 46.1% of participants (54.4% of females and 37.3% of males) indicated that they bought it from a vendor; 37.8% (similar for both genders) obtained it from family and/or friends, whereas 16.1% (25.5% of males and 7.2% of females) caught it themselves. A Chi-square test with cross-tabulation confirmed that the association between gender and where participants obtained fish from was significant ( $\chi^2(2, N = 457) = 31.18, p = .000$ ), and of moderate strength ( $\phi = .26$ ). Among those who indicated that they bought fish, 58% indicated that they purchased fish from a vendor in the Ndumo area's local village, whereas 19.5% typically obtained fish from a vendor in a nearby town, and 14.1% bought fish from vendors who sold their merchandise close to main roads (but not within any designated town or village between Jozini and Ndumo). A small number (8.4%) of the respondents bought fish from other unidentified sources.

Participants were also asked whether they had experienced any significant changes in the price of fish over the past 10 years. A virtually unanimous response to this question was that prices had increased slightly.

In an attempt to obtain a thorough understanding of the possible cultural role pertaining to fish and fishing among the Ndumo communities, participants were also asked whether they were aware of any social or cultural activities or rituals in which fish or fishing plays an important role. Overall, 85.8% of participants stated that they were not aware of fish-related

cultural activities, implying that fish and fishing predominantly served economic-related instrumental, rather than cultural ends.

### **Local fishermen and fisherwomen**

A total of 149 local fishermen and fisherwomen were surveyed as part of the study. Of these, 89 (59.7%) were men and 60 (40.3%) were women. Each of these participants on average spent a mean 9.25 years (SD = 7.78) fishing in the Pongola Floodplain in the general vicinity of the Ndumo area. Participants indicated that they commonly fished in an average of 4.32 (SD = 5.07) different locations. However, the majority of participants (70.48%) only fished in one to three locations. Among these sites, 81.02% of fish was caught in rivers and streams; 13.60% in pans, and 1.9% in other (unspecified) locations, suggesting that fishing was mostly focused around the river system and that pans were not highly exploited for fishing. The main reason for this seems to be that the majority of the pans in the Ndumo region falls within the confines of the Ndumo Game Reserve and, as such, are protected. Utilisation of fish in unprotected pans further south should be more thoroughly investigated in future studies.

Participants were asked why they preferred the aforementioned (unspecified) fishing locations to other possible locations. The most commonly cited reason, acclaimed by 33.59% of the participants, was that the frequent availability of fish in a given location was the most decisive factor in their choice of fishing spot. The second most common reason, cited by 31.35% of participants, was the ease with which they could fish in a given location, based on factors such as a lack of obstacles and the likelihood that fishing lines could become ensnared. Participants also indicated that the physical safety of the fishing spot (22.19%), and its proximity and accessibility (12.83%) were significant considerations in their choice.

Along a somewhat similar vein, participants were asked about factors that made it more difficult for them to catch fish. In descending order of importance, they indicated that the most significant challenges were that the pans and the rivers sometimes dried up (77.5%), that there were too many other fishermen (74.0%), that there had been fewer fish in the pan and river recently (64.0%), that the release of water from the Pongolapoort Dam interfered with fishing (48%), and that it became difficult to fish when it rained a lot (45.5%).

In order to ascertain whether seasonal variations in the abundance of fish were experienced, participants were asked whether they caught more fish at some times during the year rather



than at other times. The majority (63.7%) stated that they caught fish mostly in summer, whereas 22.6% indicated that they caught fish mostly in winter. Around 5.5% of participants specified that there were no seasonal changes, and thus no particular choice of season to be preferred, while 8.2% said that they caught more fish at certain times than at others but that this was not seasonally related.

Participants indicated that the bulk of fish that was caught were intended to be sold (54.73%) and that 44.28% of fish caught was for personal consumption. One percent of participants indicated that fish was caught for other, unspecified uses. It was also found that males more than twice as likely catch fish for personal consumption than females, whereas females were a third more likely to catch fish for commercial reasons.

A variety of methods was used to catch fish. Most commonly employed were hand lines (26.77%), traditional baskets (25.81%), and drag nets (22.26%), followed by gill nets (17.10%), and to a much lesser extent, fishing rods (8.19%). The species of fish participants usually caught and the average number of fish per species that was caught are summarised in Table 8.7:

**Table 8.7:** Summary of type of species caught and number of each species caught in an average week

Species	Percentage of participants who indicated that they actively caught this species	Mean number of each species caught in a typical week	SD
<i>T. rendali</i>	97.1%	23.86	33.83
<i>C. gariepinus</i>	85.5%	14.71	16.62
<i>O. mossambicus</i>	78.9%	19.22	27.19
<i>S. zambezensis</i>	73.7%	16.51	25.21
<i>S. intermedius</i>	72.9%	12.24	15.31
<i>H. vittatus</i>	59.0%	11.11	14.93
<i>C. quadricarinatus</i>	31.8%	6.92	8.70

*T. rendali* and to a lesser degree *O. mossambicus* again emerged as the most caught species of fish in the region. Whilst the vast majority of participants indicated that they actively sought to catch *C. gariepinus*, a significantly lower number of these fish was caught. However, as can be seen from the large standard deviations associated with the number of fish caught, great variability exists in this regard, with some fishermen and fisherwomen

catching one or two fish per week and one individual reporting catching as many as 200 fish of the *Tilapia* species per week. These differences could possibly be attributed to the fact that some fishermen fished for personal consumption and, therefore, only needed a relatively small number of fish, whereas others did so for commercial purposes and, therefore, made far larger catches. No statistically significant gender differences were found in relation to the types or numbers of fish species caught.

The only notable gender difference that occurred in relation to the type of species that was caught was that males reported catching more *H. vittatus* than females (mean difference = 7.3 fish per week). However, this difference failed to reach statistical significance ( $t = -1.71$   $df = 58$   $p = .09$  two-tailed; 95% CI: -16.04 to 1.28).

In order to determine whether any changes or trends pertaining to the fish population had been observed by local fishermen, participants were asked whether they had noticed any changes in the number and size of fish over the past 10 years. Responses were measured on a five-point scale ranging from “decreased a lot” (1) to “increased a lot” (5). A score of 3 indicated that there was no observed change. Participants’ mean score was 2.91 (SD = 1.22), suggesting that they observed very little change. The same was true for the average sizes of the fish, which were viewed as only decreasing fractionally (M = 2.89; SD = 1.25).

### **Fish traders**

Lastly, data was also collected from participants who sold (but did not themselves catch) fish. Of the 203 traders surveyed, 52.2% were female and 47.8% were male. The average trader indicated that he or she had been selling fish in the area for 7.50 years (SD = 5.87) and that they obtained 85% of the fish from local fishermen and 15% from other undisclosed suppliers.

Congruent with what was reported by fishermen, the majority (62.6%) of fish traders also reported that there was significantly more fish available in summer than in winter, although 20.6% of traders believed the opposite to be the case. A further 12.1% of participants indicated that the availability of fish fluctuated according to other undisclosed factors not related to the seasons. Finally, a small number of traders (4.7%) stated that the availability of fish remained more or less the same all year round.

Asked whether they had experienced any changes in the availability of fish over the past 10 years, participants indicated that virtually no such change had been noticed by them (mean

score on five-point scale ranging from “big decrease (1)” to “big increase (5)” was 3.20 [SD = 1.31]).

Traders indicated that they mostly sold their fish in nearby towns (40.7%) (regularly Ndumo but occasionally Jozini, approximately 75 km further south) and in their own villages (30.7%); also to a lesser extent in other villages (where they did not reside) (15.9%), or “next to the road” (referring to areas outside towns or villages) (11.1%).

The format in which fish was sold was predominantly fresh (50.20%) or deep-fried (33.47%) and, to a lesser extent, dried (15.54%). Female fish traders were slightly more inclined to sell fish fried than were males, and male traders were slightly more inclined to sell their fish fresh.

Table 8.8 indicates the number of fish that was sold by traders during the course of a typical week, and mean and modal prices per average sized specimen for each species:

Table 8.8: Number of fish sold during a typical week and mean and modal prices per average-sized specimen for each species

Species	Mean number sold per week	Mean price per fish	Modal price per fish
<i>O. mossambicus</i>	29.02	20.30	10
<i>T. rendali</i>	28.87	18.75	10
<i>C. gariepinus</i>	20.05	23.88	20
<i>H. vittatus</i>	18.02	13.85	10
<i>S. zambezensis</i>	17.84	13.87	10
<i>S. intermedius</i>	15.64	14.03	10
<i>C. quadricarinatus</i>	13.92	16.76	15

The findings reported in Table 8.8 suggest that the two species of Tilapia and *C. gariepinus* were both the most frequently sold and were also the most expensive of all the fish species that were exploited in the area. However, when the modal (as opposed to mean) prices for all species of fish were considered, it would appear that fish of all species was most

commonly sold for ZAR 10 (with the exception of *C. gariepinus*, which was sold for a modal amount of ZAR 20, and the Red claw crayfish, which was sold for a modal amount of ZAR 15). As such, these species likely play a significant role in the context of the local economy within the Ndumo and the greater Phongolo River Floodplain region.

#### **8.2.4 Discussion**

This study was conducted to obtain an informed understanding of human-fish-interactions in the Ndumo area of KwaZulu-Natal. Quite a number of relevant findings emerged that could help to clarify the way in which people from this area interact with fish and the potential impact their interactions – be they consumers, fishermen/women or traders – could have on local fish populations. First, it was found that fish only constitutes the third most regularly eaten meat (after beef and chicken). This contradicts earlier findings by Ross and Ross (2012), who stated that fish was the main protein source in the floodplain area. The results of this study suggest that fish is mainly used as a supplementary meat, given the quantity and frequency of fish consumption that were reported by participants.

Participants indicated that fish was fairly affordable (typically around ZAR10 per average-sized fish) and also indicated fairly unanimously that fish prices had increased only slightly over the past 10 years. It was also found that consumers have not experienced any significant changes in the number and availability of fish. In addition, the participants identified a previously unrecorded source of protein: rabbit – indicating that they are willing to adapt their dietary preferences to what is locally available. Furthermore, participants indicated that fish is mostly consumed for its perceived health-related benefits and its taste, rather than because it is a freely available resource. It could well be that local people are more aware of the health benefits of fish as a result of education and nutritional campaigns being stepped up (Ogilvie, 2014).

Most consumers also indicated that they bought their fish from vendors in their own villages or in a nearby town (but usually in Ndumo) or obtained fish from friends and family members who had personally caught the fish. This suggests that the local fishing industry, though limited in opportunities, contributes directly and significantly to the economy of the Ndumo area, in which income-generating opportunities are very scarce (Ogilvie, 2014). These findings correspond with those made by Andrew et al. (2010) in relation to communities in the Fish River Valley, Eastern Cape Province. The latter found that, given the catches maintained during the time of their study (2010), fishing activities had the potential to generate an estimated profit of over R50 000 per annum for an area with few other economic

opportunities. Preliminary findings in a recent study which investigated fishing practices in seven South African provinces in storage dams, it was found that small scale commercial fishers earn between R500 and R2500 per day (ACWR, PLAAS & UWC, 2012).

It was also found that the most preferred fish species as observed from the study were the *T. rendali* (Red-breasted tilapia) and *O. mossambicus* (Mozambique tilapia), followed by *S. zambezensis* (Brown squeaker), *C. gariepinus* (Sharp tooth catfish) and, to a far lesser extent, *H. vittatus* (Tiger fish) and *C. quadricarinatus* (Red claw crayfish). None of these species are regarded as threatened or endangered, with the exception of *H. vittatus*, which is a protected species in South Africa. However, even though residents tend to increase their consumption of this species the longer they reside in the Ndumo area, this species is eaten fairly infrequently, and does not appear to be specifically targeted as much as being incidentally caught. *C. quadricarinatus* is an invasive species, and catching this species for personal or commercial use is currently not classified as illegal, although they have the potential to have a large impact on the local fish population (Smit et al., 2013).

In the case of consumers, it was also found that fish plays a predominantly instrumental (as a source of either food or income) rather than cultural role in their daily lives. This finding stands in contradiction to findings from a previous study in the Pongola Floodplain which indicates that there are certain cultural practices around fishing habits if fish stocks are sufficient (PRESPA Report 2009). Additional research would be required to clarify these contradictory findings and investigate the possible cultural significance of fishing in the Pongola Floodplain region.

Fishing in the Floodplain region, which was slightly more likely to be done by men than women, primarily took place in the Phongolo River, and to a much lesser extent in the more ecologically sensitive pans. This suggests that local communities might not have a large impact on the pans in the Ndumo area. However, as most of the pans in the Ndumo area fall inside the boundaries of the Ndumo Game Reserve and, as such, are protected, and as participants might not have disclosed any illegal fishing activities, additional research is required to investigate the extent to which these, and other unprotected pans in other parts along the Pongola River's boundaries are exploited for fishing.

Significantly, too, those who fish tend to focus on more than one site (an average of 4.3 sites), and selected these sites predominantly on the basis of the location's fish abundance and the ease of fishing there. It also appears as if there is a peak during summer months

and that fishing activities decrease during the colder months. This could potentially allow fish stock to recover at given sites and are likely to decrease the impact on a given site.

A variety of methods was used to catch fish, which included (in decreasing order of prevalence) hand lines, traditional methods (using baskets), drag nets and, to a lesser extent, gill nets. Fishing rods were used least often. Thus, non-commercial techniques were used, and no evidence of large-scale was uncovered – indicating that local communities in the area (especially then the male population) fish for personal subsistence rather than for commercial reasons. More specifically, slightly less than half the number of fish caught was used for personal consumption and the remainder was sold for subsistence purposes. The recent preliminary finding of the ACWR, PLAAS & UWC (2012) also revealed that traditional and modern methods of fishing were found to co-exist, and that fishing in rural areas were done both for survival and small scale subsistence purposes.

Furthermore, given the number of fishing methods available, hand lines are by far the least destructive method, and is a low-impact and selective way of fishing.

Asked about the most significant challenges experienced in fishing, participants mentioned that, owing to pans and rivers drying up, they had to compete with many other fishermen and fisherwomen, and that there was a gradual tendency for fewer fish to be found in the rivers and pans. However, in response to another question, most participants indicated that they had noticed only a very slight decrease in both the number and the average size of fish in the rivers and pans over the past 10 years.

A more or less equal number of male and female fish traders did not generally fish personally but mostly obtained fish from other local fishermen and fisherwomen in Ndumo or neighbouring villages in the area. Most traders sold their wares either in a nearby town or, somewhat less often, in their own villages. Fish was either sold fresh or deep fried and, occasionally, in dried form. The most commonly sold fish and those also fetching the highest prices were *T. rendali*, *O. mossambicus* and *C. gariepinus*. Where fish vendors differed from the other two role-players was that they reported selling slightly more *O. mossambicus* (Mozambique Tilapia) compared to other species. *This could probably be attributed to misidentification, since O. mossambicus and T. rendali have very similar appearances when they are not in breeding colours, especially after being caught, which causes the natural coloration of the fish to fade.*

Assessing the impact of human activities on fish populations in the Ndumo area is hampered by the fact that very little research has been conducted to determine the size and reproductive rate of the fish population in this ecologically sensitive region (Smit, 2014).

This study has a few limitations. Given the cross-sectional design of the study, no inferences can be made in relation to causality between variables. Furthermore, it is possible that some degree of response bias might have occurred in some instances in relation to the disclosure of the extent to which illegal activities such as hunting and fishing in protected areas were practiced.

### **8.2.5 Conclusion**

The results of this study suggest that human-fish-interactions in the Ndumo community are significant, and play an important role in supporting the livelihood of members of this community, both by serving as an important form of sustenance, and by constituting an important economic resource. However, given the ecological sensitivity of the Floodplain, it is also necessary to assess the impact that these interactions might have on the fish populations in the region. It is hoped that the findings of this study will provide the necessary information on fish consumption so that the impact of fishing on fish reserves in the Ndumo area can be assessed once fish population studies have been conducted. The value of extended research in human-fish interactions in the southern parts of the Pongola Floodplain region, to fully understand human habits regards fish consumption and other fish reserves in the broader peripheries of the Floodplain, should be seriously considered. Given the sensitivity of the Floodplain ecosystem, continuous monitoring of this situation is important to ensure that human-fish-interactions in the region remain sustainable.

### **8.2.6 Summarising remarks**

In this study the life of the Ndumo community (general wellbeing and particularly fishing habits in the context of social, cultural and economic aspects) were explored: Especially community's impressions about the worthiness of the flood plain fishery (subsistence versus commercial). From the outcome it appears that the community currently don't pose any threat to the fishing reserves in the Floodplain. Though fish is readily consumed, it does not necessarily come from the Ndumo pans and dams in the area, but from fishing practises further south to the Pongola Dam. Cultural fishing practises, as generally expected from an indigenous knowledge system perspective, appear to be lower than was anticipated. This further means that cultural fishing practises also poses no immediate threat to the Ndumo area. Thus, regards the conservation implications for the area it can be said that given the

sensitivity of the Floodplain ecosystem, additional research on fish reserves and continuous monitoring of this situation is important to assess and ensure the sustainability of human-fish-interactions in the region.

The findings further revealed that, despite significant challenges such as poverty, poor infrastructure, concerns about education, and an inadequately perceived provision of basic municipal services, members of the Ndumo community exceeded above average levels of psycho-social wellbeing generally. The rural nature of the community, which allows for agricultural practises, probably is the main reason for this status. Inclusive to this standing is a tendency to maintain and respect traditional moral values which allows for people to feel secure and safe. Other trademarks of value that enhanced wellbeing was the Ndumo community's homogenous cultural identity and general Christian religious orientation. The findings of this study also raise the issue of the impact of communities being primarily governed by traditional, rather than local government authority. Future research could investigate the specific ways in which psycho-social wellbeing differs across such communities.

As such, it is hoped that the outcomes of the present study would provide the necessary data on fish consumption in the region so that the ecological impact on local fish populations can be assessed once future studies on fish populations in the area are completed.

### **8.3 References**

ACREMAN MC and HOLLIS GE (1996) *Water Management and Wetlands in sub-Saharan Africa*. Glad: IUCN.

AFRICAN CENTRE FOR WATER RESEARCH (ACWR), POVERTY LAND and AGRARIAN STUDIES (PLAAS) and UNIVERSITY OF THE WESTERN CAPE (UWC) (2012) [Thapela, B] Preliminary research findings on WRC K5 1957//4, Characterisation of indigenous knowledge and practice and current subsistence, commercial and recreational techniques and practices for using fish in storage dams in selected rural areas of South Africa. Water Research Commission, Stakeholder Consultation meeting Workshop Report, Value of Ecosystems to Society, University of Zululand, 18 October.



ANDREW TG, ROUHANI QA and SETI SJ (2000) Can small-scale fisheries contribute to poverty alleviation in traditionally non-fishing communities in South Africa? *Southern African Journal of Aquatic Sciences* 25(1): 49-55.

BAKER CF (2008) Seasonal floodplain wetlands as fish habitat in Oregon and Washington. *Ph.D. Thesis, ProQuest LLC, UMI no 3321083.*

BOOTH AJ, TRAAS GRL and WEYL OLF (2010) Adult African sharptooth catfish, *Clarias gariepinus*, population dynamics in a small invaded warm-temperate impoundment. *African Zoology*, 45(2), 299-308.

BOUGUE MB (2001) *Fishing the Great Lakes: An environmental history, 1783-1933*. University of Wisconsin Press: UK & USA.

CHANG EC, KAHLE ER, YU EA, LEE JY, KUPFERMANN Y and HIRSCH JK (2013) Relations of religiosity and spirituality with depressive symptoms in primary care adults: Evidence for hope agency and pathway as mediators. *The Journal of Positive Psychology*, 8(4), 314–321.

CHHOTRAY V (2010) The impacts of the ecosystem service and environmental governance on human wellbeing in the Pongola region, South Africa. Working paper, UEA, Norwich and Institute for Natural Resources, Pietermaritzburg. <https://ueaeprints.uea.ac.uk/37820/>.

COETZEE JK (2001) A micro foundation for development thinking, Coetzee JK, Graaff, J, Hendricks F and Wood G (eds), *Development: Theory, policy, and practice*. New York: Oxford; 119-138.

COKE M and NICOL SM (1973) Bathymetric studies on the Pongola River Floodplain, Breen CM, Furness HD, Heeg, J and Kok, J (eds). *Journal of the Limnological Society of Southern Africa*, 4(2), 95-100.

CORBIN J and STRAUSS A (2008) *Basics of qualitative research*. CA Sage: Los Angeles.

CRESWELL JW (2007) *Qualitative Inquiry and Research Design: Choosing among five traditions*. CA Sage: Thousand Oaks.

DIENER E, EMMONS RA, LARSEN RJ and GRIFFIN S (1985) The Satisfaction with Life Scale. *Journal of Personality Assessment* 49: 71–75.

DIENER E (2009) Subjective wellbeing Diener E (ed.) *The science of wellbeing: The collected works of Ed Diener*. Springer: New York; 11-58.

DU PREEZ LH and SMIT NJ (2013) Double blow: Alien crayfish infected with invasive temnocephalan in South African waters. *South African Journal of Science* 109(9/10): 1-4.

ELLENDER BR, WEYL OLF, WINKLER, H, STELZHAMMER, H and TRAAS, GRL (2010) Estimating angling effort and participation in a multi-user, inland fishery in South Africa. *Fisheries Management and Ecology* 17:19-27.

FIELD A (2013) *Discovering Statistics using IBM SPSS Statistics* (4<sup>th</sup> ed). Sage: London.

HADDAD L and MALUCCIO JA (2003) Trust, membership in groups and household welfare: Evidence from KwaZulu-Natal, South Africa. *Economic Development and Cultural Change* 51(3): 573-601.

HALL J (2009) *Sangoma: My odyssey into the spirit world of Africa*. Sterling Publishing Company Inc: London.

HECK S, BÉNÉ C and REYES-GASKIN R (2007) Investing in African fisheries: Building links to the millennium development goals. *Fish and Fisheries* 8(3): 211-226.

HEEG J and BREEN CM (1982) Man and the Pongola Floodplain. Report no 56 of the Committee for Inland Water Ecosystems, National Programme for Environmental Sciences, South Africa.

HLONGWE M (2003) *Umkhanyakude Local Economic Development Initiative*. Haley Sharpe Southern Africa (Pty) Ltd.: Durban.

JACOBSEN L, BERG A and SKOV C (2004) Management of lake fish populations and lake fisheries in Denmark: History and current status. *Fisheries Management and Ecology* 11: 219-224.

JONES, JL (2006) *Dynamics of conservation and society: the case of Maputaland, South Africa*. Ph.D. Thesis, University of Pretoria, South Africa.

JOZINI LOCAL MUNICIPALITY (2007-2008) *IDP document, 2007-2008*. Retrieved from [http:// devplan.kzntl.gov.za/idp\\_reviewed\\_2007\\_8/IDPS/KZ272/Adopted/~WRL0713.tmp.pdf](http://devplan.kzntl.gov.za/idp_reviewed_2007_8/IDPS/KZ272/Adopted/~WRL0713.tmp.pdf)

JOZINI LOCAL MUNICIPALITY (2013-2014) *Jozini Local Municipality Integrated Development Plan 2013/14 Review*. Retrieved from [http://devplan.kzntl.gov.za/idp\\_reviewed\\_2013\\_14/IDPS/KZ272/Draft/2013-14%20JOZINI%20IDP%20REVIEW%20draft%20final.pdf](http://devplan.kzntl.gov.za/idp_reviewed_2013_14/IDPS/KZ272/Draft/2013-14%20JOZINI%20IDP%20REVIEW%20draft%20final.pdf)

KEYES CLM (2008) The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behaviour* 43(2): 207–222.

KEYES CLM, WISSING MP, POTGIETER JP, TEMANE QM, KRUGER A and VAN ROOY S (2008) Evaluation of the mental health continuum-short form (MHC-SF) in Setswana-speaking South Africans. *Clinical Psychology and Psychotherapy* 15: 181-192.

KHUMALO IP, TEMANE QM and WISSING MP (2012) Socio-demographic variables, general psychological wellbeing and the mental health continuum in an African context. *Social Indicators Research* 105: 419-442.

KHUMALO B (2014) NWU-WRC Pongola Floodplain Research, HSSC-research data. Personal interview, B Khumalo/ES van Eeden, 7 January.

KNOX R (1954) *Fish and fishing in the Lone Glens of Scotland: With a history of the propagation, growth and metamorphosea of the Salmon*. Routledge: London.

KRUEGER RA and CASEY MA (2000) *Focus groups: A practical guide for applied researchers* (3rd ed.). CA Sage: Thousand Oaks.

LANKFORD B, PRINGLE C, DICKENS C, CHHOTRAY V, MANDER M, GOULDEN M, QUALE L (2013), The impacts of ecosystem services and environmental governance on human wellbeing in the Pongola region, South Africa. <http://www.espa.ac.uk/projects/ne-g008213-1>.

LEECH NL and ONWUEGBUZIE AJ (2007) An array of qualitative data analysis tools: A call for qualitative data analysis triangulation. *School Psychology Quarterly* 22: 557-584.

LEWIS D (1997) Rethinking aquaculture for resource-poor farmers: Perspectives from Bangladesh. *Food Policy* 22(6): 533-546.

MAVUNDZA EJ, MAHARAJ R, FINNIE JF, KABERA G and VAN STADEN J (2011) An ethnobotanical survey of mosquito repellent plants in uMkhanyakude district, KwaZulu-Natal Province, South Africa. *Journal of Ethnopharmacology* 137(3): 1516-1520.

MERRON GS and WELDRICK SK (1995) Fisheries management of the Pongola River Floodplain. Investigational Report 51, JLB Smith Institute of Ichthyology, Grahamstown.

MOLLER V (2012) South African quality of life trends over three decades, 1980–2010. *Social Indicators Research* 113: 915-940.

MORGAN DL (1988) *Focus groups as qualitative research*. CA Sage: Newbury Park.

NEILAND E and BÉNÉ C (2006) *Tropical River Fisheries Valuation: A global synthesis and critical review*. International Water Management Institute: Sri Lanka.

NELL W, DE CROM EP, VAN EEDEN ES AND COETZEE H (2013) A qualitative exploration of natural resources and livelihoods in the Pongola floodplain: An Integrative Multidisciplinary perspective. Symposium of Contemporary Conservation Practice, 4-8 November Howick KwaZulu-Natal.

NXELE Z and QUAYLE L (2013) The impacts of ecosystem services and environmental governance on human wellbeing in the Pongola region, South Africa.  
<http://www.espa.ac.uk/projects/ne-g008213-1>.

OGILVIE CL (2012) *The socio-economic and biophysical factors affecting a rural community, Ndumo Game Reserve, KwaZulu Natal*. Paper presented at the 5th Best of Both Worlds International Conference: Environmental Education and Education for Sustainable Development, Bela Bela.

OGILVIE CL (2014) NWU-WRC Pongola Floodplain Research, HSSC-research data. Personal interview, C Ogilvy/ES van Eeden, 8 January.

PELTZER K, PREEZ NF, RAMLAGAN S and FOMUNDAM H (2008) Use of traditional complementary and alternative medicine for HIV patients in KwaZulu-Natal, South Africa. *BMC Public Health* 8(1): 1-14.

PETERS, O (2005) Poverty alleviation and sustainable development in Manqakulane, Northern Kwazulu-Natal, South Africa: a systematic approach using retrospective remote sensing and GIS. *MA Dissertation, Vrije Universiteit Brussel, Brussel, Belgium.*

PHÉLINES RF, COKE M and NICOL SM (1973) Some biological consequences of the damming of the Pongola River. Proceedings of the International Conference on Large Dams, Madrid.

PLANO CLARK VL and CRESWELL JW (2007), *Designing and Conducting Mixed-methods Research*. Sage: Thousand Oaks.

PRESPA (2009) Livelihoods and poverty linkages to the ecosystem services provided by the Pongola Floodplain. Project Brief No 3. [http://www.uea.ac.uk/polopoly\\_fs/1.140758!Livelihoods%20project%20brief%20PRESPA%20Dec%202009](http://www.uea.ac.uk/polopoly_fs/1.140758!Livelihoods%20project%20brief%20PRESPA%20Dec%202009).

RIBBINK AJ (1994) Alternative perspectives on some controversial aspects of cichlid fish speciation. *Advances in Limnology* 44: 101-125.

ROSS M and ROSS T (2012) Umkhanyakude District Municipality. Environmental management framework report. Status quo report: Rivers & Wetlands.

ROBERTS P, PRIEST H and TRAYNOR M (2006) Reliability and validity in research, *Nursing Standard* 20(44): 41-45.

RYFF CD and KEYES CLM (1995) The structure of psychological wellbeing revisited. *Journal of Personality and Social Psychology* 69(4): 719-727.

SHENTON AK (2004) Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information* 22: 63-75.

SMIT NJ, WEPNER V, VLOK W, WAGENAAR GM & VAN VUUREN JHJ (2013) Conservation of tigerfish, *Hydrocynus vittatus*, in the Kruger National Park with the emphasis on establishing the suitability of the water quantity and quality requirements for the Olifants and Luvuvhu rivers. *WRC Report No. 1922/1/12*, Water Research Commission, Pretoria.

SOUTH AFRICA, COOPERATIVE GOVERNANCE & TRADITIONAL AFFAIRS (2010) *Umkhanyakude district municipality profile*. Retrieved from <http://www.google.co.za/url?url=http://www.nda.agric.za/doaDev/22SMS/docs/PROFILES%25202011%2520UMKHANYAKUDE%2520AUG.docx&rct=j&frm=1&q=&esrc=s&sa=U&ei=p5zbU7n2I4OQ7Ab5rYGwBg&ved=0CDcQFjAG&usg=AFQjCNFinzYuLSJ4ZUWNRCxixh8oahJ2vw>.

SOUTH AFRICA, DEPARTMENT OF AGRICULTURE (2009-2010) *Fighting Hunger. Food Insecurity and Vulnerability Information Management System*. <http://www.nda.agric.za/doaDev/22SMS/Posters/Poster%20umkhanyakude.pdf>

STATISTICS SOUTH AFRICA (2011) Jozini. [http://beta2.statssa.gov.za/?page\\_id=993&id=jozini-municipality](http://beta2.statssa.gov.za/?page_id=993&id=jozini-municipality).

TURPIE J, SMITH B, EMERTON L and & BARNES J (1999) Economic value of the Zambezi Basin Wetlands. Zambezi Basin Wetlands Conservation and Resource Utilization Project. IUCN Regional Office for Southern Africa.

WHITELAW G (2009) An Iron Age fishing tale. *Southern African Humanities* 21: 95-212.

WISSING MP, THEKISO S, STAPELBERG R, VAN QUICKELBERGE L, CHOABI P, MOROENG C and NIENABER A (1999) *The psychometric properties of scales measuring psychological wellbeing in an African group: The THUSA study*. Paper presented at the International Africa Psychology Congress, Durban, South Africa.