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**PEOPLE'S PERCEPTIONS OF FLOOD HAZARDS AND THEIR ATTITUDES  
TOWARDS RESETTLEMENT: A CASE STUDY OF THE COMMUNITY  
OF AZALEA IN THE GREATER EDENDALE COMPLEX,  
KWAZULU-NATAL, SOUTH AFRICA**

**by**

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## EXECUTIVE SUMMARY

The thesis addresses flooding as a natural disaster which has, on occasions, occurred in many parts of South Africa, especially in KwaZulu- Natal and Orange Free State. The prevailing impression is that the flood situation is worsening in KwaZulu-Natal. In the floods of 1987 which inundated a greater part of this province, more than three hundred and eighty people lost their lives. Recently, the flash flood that hit the Greater Edendale area near Pietermaritzburg on Christmas Day 1995 resulted in the death of approximately one hundred and sixty people. The latter figure is relatively high when considering the fact that only a small part of the province was affected.

Why do floods kill so many people and destroy their property? The answer is not because rainfall has increased but it lies in the development of floodplains for settlement. It has been estimated that at the beginning of 1993, between 50 000 and 100 000 people in South Africa have settled within flood lines. Now the Department of Water Affairs and Forestry estimates that 150 000 people are currently living at risk under the flood line. With this considerable number of people living at risk, there is an urgent need for an action. A concerted effort is required from the responsible authorities, the communities affected, and the people of South Africa as a whole in order to alleviate and if possible eradicate this problem (floodplain settlement and subsequent loss).

Resettlement of these people is an obvious solution to this problem. However, those people who live in flood prone areas (affected communities) should be engaged in any envisaged relocation strategy. That is one of the reasons why this study was undertaken. The aim of this study is to understand the affected communities' perceptions of flood hazards and their attitudes towards relocation. But why is it necessary to understand people's perceptions and attitudes? The reason is to get an understanding of how these people view the problem of flooding and solutions thereto so as to make informed recommendations that can be adopted by responsible authorities in endeavouring to combat the problem.

This study was undertaken in Azalea, a residential area in the Greater Edendale Complex (Pietermaritzburg). Azalea is an example of a community under threat from flooding. The method used in data gathering is called Participatory Rural Appraisal (PRA). PRA was preferred because it is community oriented. In order to accomplish the aim of this study, two hundred and fifty (250) people were interviewed. This figure is used as representative of the community of Azalea. For the purposes of this study, the interviewees were divided into flood victims and non- flood victims. The purpose of this division was to record the different perceptions of these two categories of people regarding floods.



It was discovered, among others, that people's perceptions tend to influence their attitudes towards relocation. Sixty eight percent of the people interviewed foresaw future flooding, twenty four percent did not while the remaining eight percent were not sure. Furthermore, it was discovered that seventy two percent were in favour of resettlement while the remaining twenty eight percent were not.

On the basis of these findings, recommendations such as resettlement of those living on the floodplains and education of the public about the dangers associated with floodplain settlement are made. Finally, it is important for the responsible authorities to note that in order to address the problems associated with current forms of floodplain development and land use, there is a need to adhere to the following fundamental principles: (a) Both the causes and consequences of the problem must be addressed, (b) If the fundamental causes- poverty, ignorance, landlessness, lack of commitment - are ignored, any attempts to address the consequences will fail, ( c ) If the consequences are ignored the risk to life and livelihoods will continue in the short term and the economy of the country will be compromised with every flood event.



# Plate 1. The 1995 Christmas Day floods aftermath



This photograph was taken by the Natal Witness on the 27th December 1995. It depicts Msunduzi floodplain immediately after the flash floods that devastated much of Edendale Valley. SANDF rescue operation team is seen here with some community members searching the debris for human bodies and lost property.



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The opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the Institute of Natural Resources, the Research and Development Fund or the School of Environment and Development.



## **PREFACE**

The field work constituting part of this dissertation was carried out in Azalea (Greater Edendale Complex) under the supervision of Duncan Hay. During this field study, my supervisor Professor Robert Fincham was constantly consulted.

This dissertation represents the original work of the author and has not otherwise been submitted in any form for any degree or diploma to any University.



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## LIST OF ABBREVIATIONS AND ACRONYMS

<b>ANC</b>	African National Congress
<b>CBO's</b>	Community Based Organisations
<b>CSD</b>	Centre for Science Development
<b>GNU</b>	Government of National Unity
<b>IDNR</b>	International Decade for Natural Disaster Reduction campaign
<b>IEM</b>	Integrated Environmental Management
<b>IFP</b>	Inkatha Freedom Party
<b>INR</b>	Institute of Natural Resources
<b>KFC</b>	KwaZulu Finance and Development Corporation
<b>MLL</b>	Minimum Living Level
<b>NCHE</b>	National Commission on Higher Education
<b>NGO's</b>	Non Governmental Organisations
<b>PMB-TLC</b>	Pietermaritzburg- Msunduzi Transitional Local Council
<b>PRA</b>	Participatory Rural Appraisal
<b>RDP</b>	Reconstruction and Development Programme
<b>S.A</b>	South Africa
<b>SANDEF</b>	South African National Defence Force
<b>SAPS</b>	South African Police Services
<b>T.B.V.C</b>	Transkei, Bophuthatswana, Venda and Ciskei (former homelands)
<b>UDF</b>	United Democratic Front



## CHAPTER ONE: INTRODUCTION

### 1.1 PREVIEW

The floods of Christmas Day 1995 in the Msunduzi catchment illustrated in a dramatic and decisive manner the risk inherent in settling on the floodplains. On the 25th December 1995 a combination of physical and human factors produced the worst flood disaster in recent South African history. It was this and other related disasters which prompted extensive research on the causes and consequences of floodplain settlement and the risk inherent in such settlement. As this study will show, it is difficult to prohibit or control settlement in such areas due to socio-economic and political pressures. An interim measure is required to alleviate further flood induced loss of life in the Msunduzi catchment.

This research is aimed at understanding the affected communities' perceptions of flood hazards and their attitudes towards resettlement, with specific reference to the Azalea community in the Greater Edendale Complex. Resettlement is an obvious solution to the problem and it is one of the long-term recommendation in terms of this study. It must be understood that in order to resolve the problem of flooding, it is inevitable that these people should be relocated. This is supported by Kader Asmal, the Minister of Water Affairs and Forestry, who, in his press statement a day after the floods, commented that local authorities must monitor informal settlements and caution informal settlers to evacuate or not to build on the floodplains (Natal Witness, 1995, December 28).

This thesis consists of seven chapters. This chapter (chapter one) sets the scene. It introduces the problem, aim and objectives of the study. It further outlines the contents of other chapters. Finally, it lists the limitations of the study. Chapter two defines the study area. It begins by outlining the geographical location and the physiography of the Greater Edendale Complex in which the study area (Azalea) is located. It further provides estimates of the population in the area. In addition, the chapter gives a brief history and the socio-economic characteristics of Azalea. Lastly, it deals with the area's physical characteristics and its vulnerability to floods.

Chapter three discusses research types and methods. It firstly deals with the general approaches to research and shows how this study falls into a research type referred to as 'participation based research'. This chapter has a section on research methods. In this section there is a brief overview of the qualitative and quantitative methods. Under qualitative methods a Participatory Rural Appraisal (PRA) approach and its relevance to the study is presented and discussed.



Chapter four is a literature review. The chapter is basically divided into three sections. The first section considers environmental hazards and disasters in general, their definitions, causes and classification. The second section deals with floods in particular. It covers their definition, classification and causes. The section further presents and discusses damages occasioned by floods and factors affecting them. Lastly, the third section entertains people's perceptions and their responses to flood hazards and/ or disasters. Chapter five contains the results of the study. It presents the views of the community of Azalea which were expressed during interviews. It broadly considers people's responses to the questions posed to them in the questionnaire (Appendix 1). The chapter discovers, among others, how socio-economic characteristics influence people's perceptions of flood hazards. It also covers people's personal flood experience, their feelings about the 1995 Christmas floods and the remedial measures or actions taken during and after the floods. Furthermore, reasons that compel people to stay in Azalea are set out. In addition, the chapter shows people's perceptions of future flooding and their attitudes towards resettlement. It also describes people's suggested solutions to the flood problem and flood related damages. Finally, it will be shown that superstitious and social beliefs play a very important role in determining people's perceptions regarding causes of floods.

Chapter six deals with the analysis of people's responses to the questions posed to them in terms of the questionnaire. It further discusses costs and benefits associated with floodplain settlement. In addition, the chapter illustrates that floodplain occupation is occasioned, among other things, by lack of choice. It will be shown in this chapter that lack of choice is a result of factors such as poverty, landlessness, unemployment and political violence. It is argued in this chapter that these factors are indicative of the socio-economic and political problems plaguing South Africa.

Chapter seven deals with conclusions and recommendations. The section on conclusions shows, *inter alia*, how the apartheid government policies contributed to the environmental degradation. It will be shown how this environmental degradation leads to, or aggravates flood problems. This section further shows that it is the responsibility of the present government to correct the mistakes of the previous government by alleviating the problem of environmental degradation. The second section discusses general recommendations to policy and decision makers on the flooding problem. It further deals with specific recommendations or suggested solutions to the flooding problem. Lastly it lists a number of recommendations which are directed to the University of Natal.

## **1.2 PROBLEM STATEMENT**

A combination of population growth, pressure for land, urbanization and the restrictive development policies of the past has compelled a large number of people to settle and erect both formal and informal



houses on the floodplains of the Msunduzi and its tributaries. Consequently, these people are at risk from episodic flooding. Their settlement on the floodplains and their activities have some negative impacts on the physical environment of those areas. It exacerbates environmental problems such as deforestation, increased soil erosion and river bank destabilisation, and reduced water quality downstream of the settlement. Those environmental problems combined with heavy rains accelerate the flooding problem which threatens human lives, especially of those who are residing in informal settlements on the floodplains of the above river and its tributaries.

Flooding a natural disaster which has, on occasions, occurred in many parts of South Africa. Pietermaritzburg is no exception and has experienced flooding on numerous occasions. Evidence suggests that the Greater Edendale Complex is one of the areas within the Pietermaritzburg Msunduzi Transitional Local Council that is most vulnerable to floods. For example, discussions with some of the senior citizens of Azalea revealed that in 1971, 1984, 1987/ 88 and early 1995 lives were lost and infrastructure damaged as a result of floods. However, the only recorded flood event prior to the 1995 flood is the 1987 flood event where significant damages took place. In January 1995 three people lost their lives as a result of flooding.

Recently, on Christmas Day 1995, the most severe flooding with attendant loss of life occurred in the Edendale valley where approximately 160 people died, 583 families left homeless and thousands of people displaced, some orphaned or widowed. As these floodplains and their adjacent catchments assume a more urban character and as the population grows, the pressure for land is bound to increase. Unfortunately these pressures cause environmental degradation and increased run-off, leading to a high possibility of future floods. It is absolutely certain that further flood events of this type may occur. Unless immediate action is directed towards addressing and altering patterns of land-use in the entire catchment, loss of life and damage to property as a result of floods will increase.

It was because of this urgent need to curb the flood related losses that the University of Natal's Institute of Natural Resources undertook an initiative aimed at suggesting measures to prevent further flood related damages on the Msunduzi catchment. This initiative was undertaken on behalf of the Pietermaritzburg-Msunduzi Transitional Local Council (PMB-TLC). The long-term goal of this initiative is to co-operate with local communities; local, provincial and national authorities and with specialists in achieving sustainable development in the Msunduzi River catchment. This research is just a small component of the bigger project of 'Regulating Settlements on Floodplain and promoting the Wise Use of Floodplain Resources' that has been initiated by the Institute.



① It is recommended that the best solution to the problem is nothing else but evacuation of those on flood prone areas. Pursuant to that, it is worth mentioning that communities affected by floods should not be forced to evacuate the area but should be willing or enthusiastic to do so. Willingness or enthusiasm to evacuate the area is dependent upon the affected people's perceptions of flooding and the situations in which they find themselves. It will therefore be shown in chapter seven that the emphasis today is on community driven development and community involvement in decision making. It is therefore important that prior to the resettlement of floodplain dwellers, research should be done about these people. The people's origin; the underlying forces that pull them into the floodplain and those that push them out of their places of origin; their sense of place; their perceptions of the flood hazards and their attitudes towards resettlement should be taken into consideration in that proposed research. This is the main reason why this study was undertaken. This study will help the decision makers to take an informed action in solving the problem of floodplain settlement and its subsequent loss.

### 1.3 AIM

It is submitted that there is merit in Smith and Tobin (1979)'s suggestion that in any study of floodplain behavioural patterns, perception of the hazard is of utmost importance. This statement is valid since it is very likely that, in any situation an individual will respond according to his or her beliefs rather than to the real situation. Indeed one's perceptions influence one's thoughts, feelings, behaviour and responses to certain stimuli.

The **aim** of this study therefore is to obtain an understanding of the Azalea community's perceptions of flood hazards and their attitudes towards resettlement.

Since human perception is influenced by factors which include, among others, past experiences; beliefs and attitudes, an understanding of people's perceptions of floods is therefore significant. This understanding will provide answers to what Kates refers to as "the perennial question asked to anyone who has studied flood problems", which is "but why people persist to live and work in areas subject to repeated floods?" (Kates; 1962, p135).

② With the belief that people's perceptions and attitudes shape human action and decisions to do something, understanding people's perceptions and their attitudes towards resettlement will help the decision or policy makers to understand the flooding problem at its roots. This will be an added advantage in making relevant policies for the regulation of settlement on the floodplains of the Msunduzi and its tributaries. By understanding the underlying forces that pull people into the floodplains and the conditions that push them out of their areas of origin into flood prone areas, the policy makers may be in a better position to



formulate policies that are economically viable, socially acceptable and environmentally sound for the sustainable use and/ or management of the floodplains.

## **1.4 OBJECTIVES**

In view of the aim and the motivations which inspired one to undertake this research, the following objectives were set:

- 1.4.1 The establishment of a general theoretical view or literature survey on people's perceptions of natural hazards (with specific reference to flood hazards) and their attitudes towards resettlement.
- 1.4.2 To generally understand the nature of communities that are living at risk on the floodplains.
- 1.4.3 To examine the study area (Azalea) and establish why it is vulnerable to floods.
- 1.4.4 To get an understanding of the reasons that compel people to stay on floodplains.
- 1.4.5 To explore possible measures which can help in alleviating flood related damages suffered by floodplain dwellers.
- 1.4.6 To make recommendations that can be used by responsible authorities or policy makers in combatting the flooding problem.
- 1.4.7 To consider resettlement as one of the suggested solutions to the problem of floodplain settlement and its consequences.
- 1.4.8 To recommend close working relations between the University of Natal and the surrounding communities.

## **1.5 LIMITATIONS OF THE STUDY**

This part of the study is aimed at outlining some of the problems encountered prior to and/ or during primary data gathering. Following below is a list of the problems experienced:

- There are many problems that led to the choice of Azalea as the study area. Azalea was chosen after failing to secure the initially preferred study area (KwaPata township). The change of study area was due to the lack of both interest and co-operation exhibited by the KwaPata authorities. Appointments and meetings were not honoured. Messages were not replied to and calls never returned. It was difficult to get hold of any official from this community. This situation continued for four weeks before Azalea was discovered to be an equally relevant alternative.
- Late-coming and poor attendance at meetings and forum groups were some of the common problems experienced. It was difficult to get the same group of people more than once for a meeting or workshop. Most people leave for work early in the morning and come home late at night. It was therefore very difficult to get hold of them.



- Working with poverty stricken and unemployed communities complicates data gathering. People want concrete promises and/or bribes. For example, one person agreed to talk on condition that he was promised a job or a housing subsidy. One official asked for something in return if research was going to be conducted in 'his community'.
- This research was strongly opposed by some local officials. The opposition was due to their previous experiences with other researchers who studied their communities and failed to provide them with any feed-back. One official plainly announced that he "is sick and tired of people who come to our communities to conduct research for their own benefit whereas the community being studied does not benefit anything".
- Another problem was the way the researcher was perceived and treated by people. This was due to misinformation and false perceptions. Some were allegedly told and thought that the researcher was a government official or was from the Private Housing Board who came to give assistance to their housing needs. Some thought that the researcher was a social worker, while others thought that she was a community lawyer employed by the government to help them in their dispute with KwaZulu Finance and Development Corporation (KFC). Their expectations and false perceptions influenced their willingness to be interviewed.
- After the Christmas floods, flood victims were settled in different community halls around Edendale and Imbali area. This made it difficult to get hold of all of them at the same time.
- Most people were still traumatized and mentally haunted by their experiences of the December flood and, as a result, some were not willing to talk about their experiences and feelings about flood hazards. It was therefore a stressful experience to work with such people.
- Age and gender of the researcher, being a young female, also turned out to be a problem. The researcher was plainly told by one male official that he does "not listen to anything that a woman of your age can tell me, because there is nothing productive or beneficial I can get from a woman".
- People's negative attitudes towards the University of Natal were also evident. Some people do not see the University as sensitive, responsive and helpful to social needs. They feel they are being used by academics for their own personal ends. Most people complained that interviews and reports conducted by the university do not help them since all they need is financial support.



Questions such as "what can you do for us after we have told you about our feelings of floods?", "what am I going to benefit from this research?", and "what help can the university give?", were common.

Lastly, the inadequacy of documented secondary data about the study area and its people compelled one to rely more on primary or verbal information.



## CHAPTER TWO: THE STUDY AREA DEFINED

### 2.1 INTRODUCTION

This chapter aims to give a clear definition and description of the study area (Azalea) in relation to the Greater Pietermaritzburg Metropolitan area. The chapter is divided into two parts. Firstly, it gives a general description of the location and physiography of the study area. Secondly, a specific discussion of the study area in which the research was done is presented.

### 2.2 GEOGRAPHICAL LOCATION

Azalea is one of the small sections of the Greater Edendale Complex and cannot be defined in isolation from it. The complex is situated within the Pietermaritzburg Metropolitan Region, being immediately to the west of the Pietermaritzburg Municipal area, but east of the KwaZulu district of Vulindlela. It is approximately 8 600 hectares in extent (Metroplan, 1993).

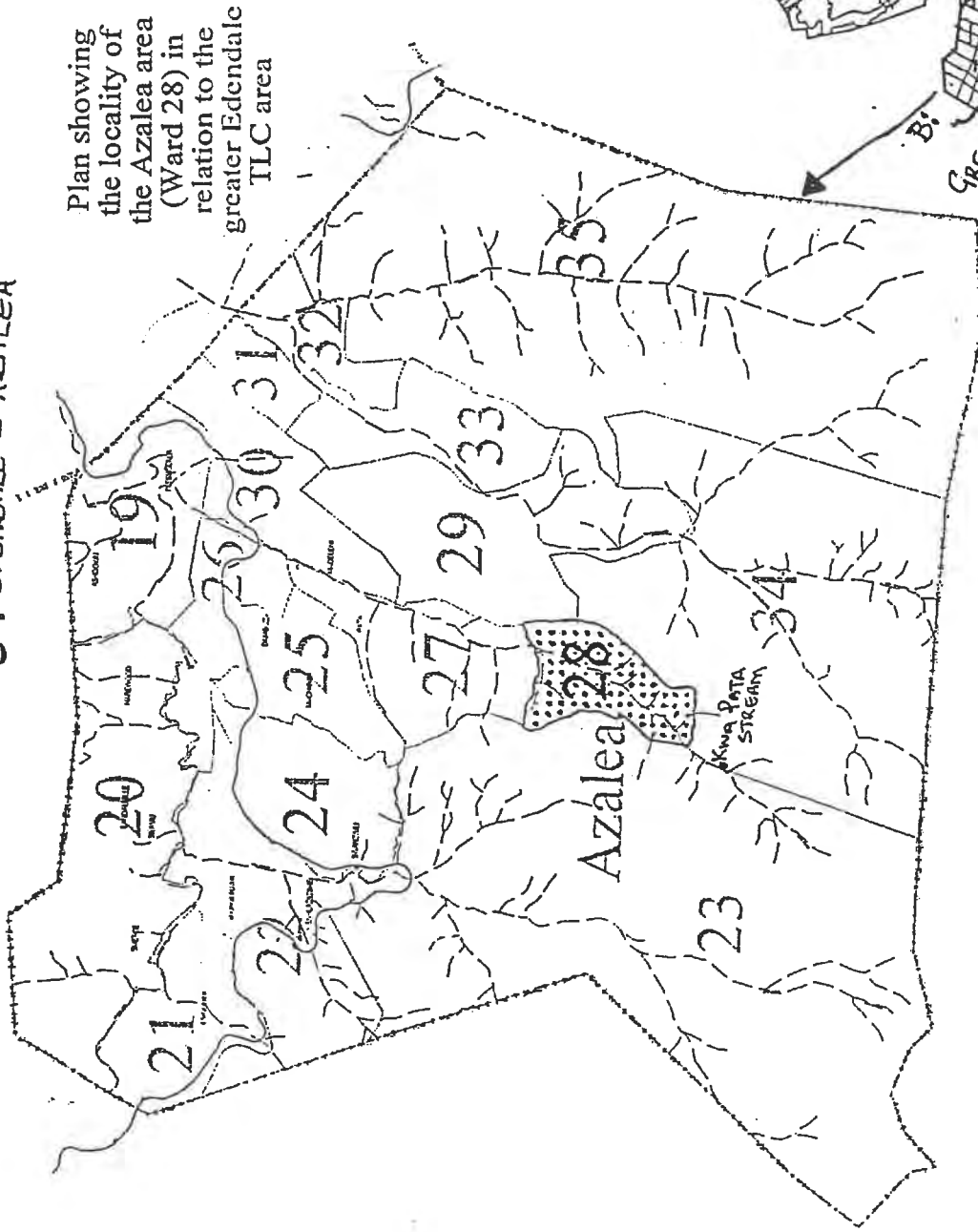
Edendale is a Black township, lying approximately 10 kilometres south west of the city of Pietermaritzburg, within the catchment of the Msunduzi River and its tributaries. It is predominantly residential in character with relatively few formal sector jobs. The majority of the residents are competing for these few jobs and many of them commute daily between Edendale and the city of Pietermaritzburg and its surrounding industries. The main road linking the complex with the city is Edendale Road (M70). The complex comprises of a number of sub-areas, such as Ashdown, Plessislaer, Imbali, Slangspruit, Edendale East/ Azalea, Old Edendale or Edendale Proper, Shenstone and Ambleton.

### 2.3 PHYSIOGRAPHY

The Greater Edendale area is located within the Greytown-Pietermaritzburg-Richmond Benchland physiographic region (Metroplan; 1993). The most common features of the region are relatively steep sloping areas. However, the region is also characterised by flat river valleys. The principal feature of the area is the Msunduzi River Valley. This valley is bisected by four steep sided valleys formed by the tributaries of the Msunduzi River. These valleys are formed by the Sinathingzi, KwaPata, Wilgefontein and Slangspruit streams (figure 2.1). The confluences of the latter two streams with the Msunduzi are situated to the east of the Edendale area. A substantial proportion of the area is made up of these steep sided valleys, placing some severe restrictions on the use of the area for urban development (Ibid).



# C : EDENDALE - AZALEA



Locality Plan Showing the PMB-Umsunduzi TLC Area (not to scale)

A: PMB-UMSUNDUZI TLC AREA

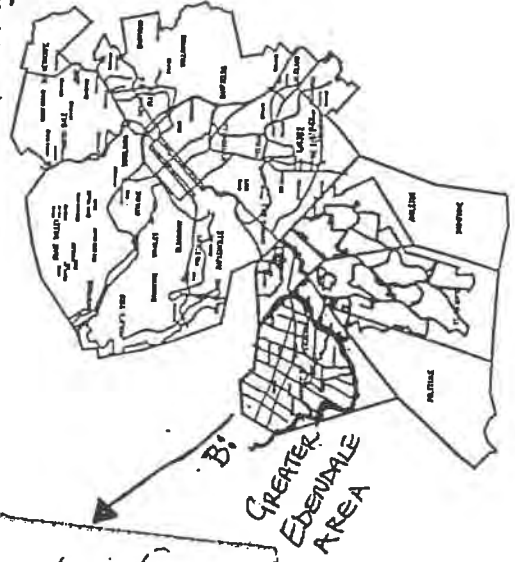


Figure 2.1: Plan showing the locality of Azalea (Ward 28) in relation to the Greater Edendale TLC area



## 2.4 THE POPULATION OF THE EDENDALE COMPLEX

Accurate determination of the existing population of the Edendale complex is not possible. Consequent to a detailed count of habitable structures in Edendale undertaken using high resolution 1:4000 aerial photography in 1993, the following information was obtained:

- Counts for existing habitable structures or dwellings within Greater Edendale in 1993 varied between 25677 and 20903 (Metroplan, 1994).
- There is an estimated population of approximately 140 700 people in Greater Edendale. This figure is based on the estimation of an average household size of approximately 6 or 7 persons. This is despite the fact that, in all likelihood, only main dwelling structures were counted. Since household sizes tend to vary between formal and the more informal structures, best possible estimation would be of the order of 149 500 persons (Metroplan, 1994).

## 2.5 AZALEA

Azalea is the specific area of focus, as it lies on the catchment of the KwaPata stream. It is located within Edendale 'Unit S' or the so-called Ward 28 (figure 2.1). Unit S lies approximately 8 kms south west of Pietermaritzburg. The area is estimated to be approximately 420 ha in extent (Metroplan, 1994). The township was built in early 1987, and most people started moving in by late 1987.

### 2.5.1 Brief history

Due to the inadequate documented data about the study area, the following information was mostly elicited from interaction with the community members and direct observations during field visits. Between 1950 and 1970 the whole area was a commercial farmland owned by white farmers. Some of these farmers allegedly sold their plots to Indian farmers who then planted wattle trees. There were many plots of farms owned by different farmers who practised different farming activities. Sheep and cattle breeding, milk production, forestry and vegetable gardening were the commonly practised farming activities before some farms were sold to the Indian farmers (Ex-farm worker).

When the farmers left the area in the early 1970's it reverted to the ownership of the government. The farmers allegedly left the area because it was degraded and therefore agriculturally unsuitable. Farm workers who allegedly inherited the area from the farm owners were reportedly evicted from these farms under the Forced Removal legislation of the apartheid government. Their houses were allegedly demolished without prior notification, and no compensation was awarded to them. Because of the Group Areas Act and the anti-urbanization policies of the apartheid regime, 'Black people' evicted from the farms were not allowed to move to the cities. They had to move to the already overcrowded homelands and townships (Senior residents of Azalea).



The land remained vacant until the mid 1980's. It is alleged that from this time farm workers, who during the forced removals resisted and stayed not too far from the farms, started moving onto the vacant land. In addition, some people, because of the political instability that was at the time ravaging the whole of KwaZulu-Natal, moved away from violent and unlawful conditions to Azalea (Ibid).

The land was then reportedly sold to a finance group known as the KwaZulu Finance and Investment Corporation (KFC) in the mid 1980's. The KFC bought the area with the aim of changing the land use practice from farming to residential and promised to provide low cost housing. This promise was, according to the people interviewed, never fulfilled. When the area was sold to these developers the original inhabitants were then forcibly removed. They were allegedly promised an alternative land as compensation. As with previous promises, this one was also not fulfilled. Because of the unfulfilled promises people are now flooding into the area to reclaim their land, which is why there is an increase in the number of informal dwellings, especially on the floodplains of the KwaPata river (Community leader).

The name Azalea was adopted from an Urban Foundation utility company known as AZALEA that was contracted by KFC to build formal houses. It is said that the houses were initially built for people who were victims of violence, so, during the housing allocation first preference was given to such people. Most of these people (60%) were victims of the political conflict between Inkatha and the United Democratic Front (UDF), and later African National Congress (ANC), in Sweetwaters and Vulindlela (Ibid).

### 2.5.2 Socio-economic characteristics

Land use is mostly residential with a bit of subsistence agriculture. The area is characterised by both formal and informal houses. The formal houses range from two to six rooms. The area is poorly serviced. It lacks proper water and sanitation. Most households use pit latrines and a very few have phungulutho toilets (VIPs). The residents do not have potable water in their houses, they only have one or two taps at the end of each row of houses in the street. A majority of the households do not have electricity and depend on wood and paraffin for fuel.

In as far as the infrastructure is concerned, roads are, for example, in a very poor condition. Even though most of the roads are tarred more especially within the developed or formal house section, several of these roads are up steep gradients and their surface has broken up. In the informal settlement section most of the roads have been eroded by water draining from the developed area. The area lacks educational, social, health and business centres such as schools (there is only one primary school and a crèche), parks, clinics/



hospitals, shops, training centres, halls and churches. Both the informal and formal houses are not in a satisfactory condition. The majority of the formal houses built under the authority of KFC are reportedly leaking, have cracks and their roofs are said to shake when there are strong winds. The common material used for the informal houses (shacks) is mud bricks.

### 2.5.3 Community

Most of the residents of Azalea were affected by some form of violence due to the prevailing political tensions between the Inkhatha and UDF (and later ANC) as mentioned earlier. However, some of the inhabitants are the evicted ex-farm workers who decided to come back when they realized that the land was being developed for residential purposes. Most of these ex-farm workers are living in informal houses. The majority of people are illiterate, unemployed and poor. Some depend on low productivity subsistence farming for food. Based on the number of existing structures in Unit S, counted from 1993 orthophotos at a scale of 1:2000, there was an estimated population of approximately 18 474 people in 1993 (Metroplan, 1994). There are about 600 formal houses in Azalea. Seventy five of these are in areas of flood risk. Furthermore, there are approximately thirty three informal houses which are situated on the floodplains (INR unpublished data).

### 2.5.4 Vegetation

*"Before AZALEA came to build the township, the whole area was covered with long grass and trees. We did not live in close settlements. Each family had enough land to build their huts and fields to plant their crops, there was enough grazing land. But as more and more people came in, they removed more trees to erect their houses. During the construction of Azalea more trees were bull-dozed"* (Community member).

The above quotation from a senior citizen of Azalea says it all. Azalea was originally an open woodland. The hills were covered by trees and bushes. Common indigenous trees were willow, acacia especially camel-thorn acacia, syringa and fig. None or few of these trees exist on the slopes of the hills today, except for the very few scattered wattle trees which are not indigenous and some patches of shallow rooted short grass. The area is partly denuded of its vegetation and is now degraded. The slopes are subject to extensive run-off and erosion. This is evidenced by the countless dongas (erosion gullies).

Direct causes of this unsatisfactory state of affairs have been identified as poor farming methods (including overstocking, overgrazing as well as ploughing of marginal land unsuitable for cultivation); population growth and new developments. Poverty is also a root cause of this vast change in the vegetation of the area. For instance, due to the demand for food, shelter and fuel the poor community



members were forced to cut trees and plough the already degraded soils to meet those needs. Erosion, deforestation and loss of vegetation lessen the soil's ability to absorb water, which makes it unstable. The area is extremely dry in winter and extremely damp during rainy seasons. This makes it vulnerable to floods. The problem of soil erosion and the deteriorated environmental conditions is not peculiar to Azalea, but as Ramphela and Mc Dowell (1991, p30) argues, is "the most serious of the many problems facing South Africa".

### 2.5.5 Topography

Azalea is located in a valley which is drained by the perennial KwaPata stream, a tributary of the Msunduzi River (figure 2.1). The area like the whole of Edendale Complex is characterised by relatively steep sloping hilly topography, but fairly flat on the river valley. The most visible features of these slopes are dongas, cracks and dry eroded soils.

### 2.5.6 Geological composition

The geological composition of the area is mostly shale and silt stone of the Eccu Group or of the Pietermaritzburg formation intruded by dolerite dykes and sills as portrayed in the Geological Map of Pietermaritzburg and its Environs (Geological Map, 1948). Soils associated with this formation in this region tend to be shallow (Thomas; 1995, p6). This makes it difficult for vegetation to re-establish itself. As McGee (1988,p6) notes "soils derived from dolerite are usually clayey". The soils in Azalea are clayey and chocolate or red in colour. They are subject to wetting and drying depending on seasonal change. They are alleged to expand when they are wet and contract when they are dry. The quotation from a community member below substantiates this:

*It is difficult to understand this area, when it rains the whole area will be damp. In summer you can see water welling from the ground, but in winter the soil is so hard that you can hardly dig it (ex-farm worker).*

These clayey, dark, chocolate coloured soils are mostly on the steep hills of Azalea and a lot of alluvial soils are found on the floodplain of the KwaPata River, which is the stream that crosses through and divides Azalea into two. The soils on the hills are very sensitive, cracking when they are dry and becoming sticky when they are wet. In contrast, the topsoil along the banks of the river is light grey brown. Soils of this nature, according to McGee (1988), are derived from shale. These soils have a loamy texture. It is because of these characteristics that one agrees with some community members when saying "the soils on the flood plains are rich", meaning fertile. This statement is substantiated by McGee (1988, p13) when stating that "soils along river banks are fertile and easily irrigated".



### 2.5.7 Drainage pattern

A study of the relief map of the Edendale Valley, as observed by Plan Associates (1972), clearly shows three major water courses which run parallel to each other and bisect the area in a north-south direction. These are Sinathing, KwaPata and Willowfontein streams. These streams, together with the Slangspruit, flow into the west to east flowing Msunduzi river situated in the north (Stiff, 1991). But Azalea is drained only by KwaPata and Wilgefontein the tributaries (Thomas, 1995).

The soils become very damp during rainy seasons causing wells and springs in some parts of the area. This implies that the ground water table is also affected, rising during wet seasons and declining in dry seasons. Finally, due to the poor soil structure on the hill sides, a very small amount of rainwater gets absorbed. This exacerbates run off during heavy rains, making the area susceptible to floods.

### 2.5.8 Climate

In the Reconnaissance Engineering Geological Investigation for Township Development Report, Stiff (1991) states that the area experiences an average annual rainfall of approximately 821 mm per annum. Rainfall drains off the slopes into gullies which then feed the above mentioned rivers. Due to the inadequate vegetation cover and soil erosion which make the absorption and retention of water difficult, the temperature of the area is also affected. For example, the area is said to be extremely hot in summer and extremely cold and windy in winter.

### 2.5.9 Flood vulnerability

Greater Pietermaritzburg and its surroundings have a long history of floods. Though there are no sufficient available records to prove that, it can be argued that flood events date back from (if not before) the early 20th century. For example, McGee states that "...other violent storms were recorded in October 1917, March 1939, and 1947" (McGee; 1988, p15). William Bizley's statement (quoted in McGee; 1988, p15) on flooding in the Pietermaritzburg area states that "in the 1920's and 30's flooding took place with almost every rainstorm". This statement illustrates the point that flooding is one of the common natural disasters experienced by the whole of Pietermaritzburg and its surroundings. In addition to the above quoted statements, some senior citizens of Azalea alleged that flooding in the area occurs regularly. For example, they reportedly experienced floods in 1971, 1984, 1987/ 88 and twice in 1995. All these statements make it evident that the 1995 Christmas Day floods were not the first to hit the area and will not be the last to occur. Finally, these experiences can be used to draw conclusions that most parts of Pietermaritzburg area are highly vulnerable to flooding.



## 2.6 CONCLUSION

This chapter gave a picture of the background in which the study area is located. It covered the geographical location, physiography and the population of the Greater Edendale Complex in which the study area is located. The chapter then focused on Azalea and some of its important characteristics. It was shown that the settlement on the floodplains of Azalea began a long time ago (although this settlement was informal prior to 1987). It was further demonstrated that inadequate inspection by the township developers led to the place being formally developed for settlement. The development of Azalea for settlement was irrespective of the fact that some parts of it is situated on the floodplains.

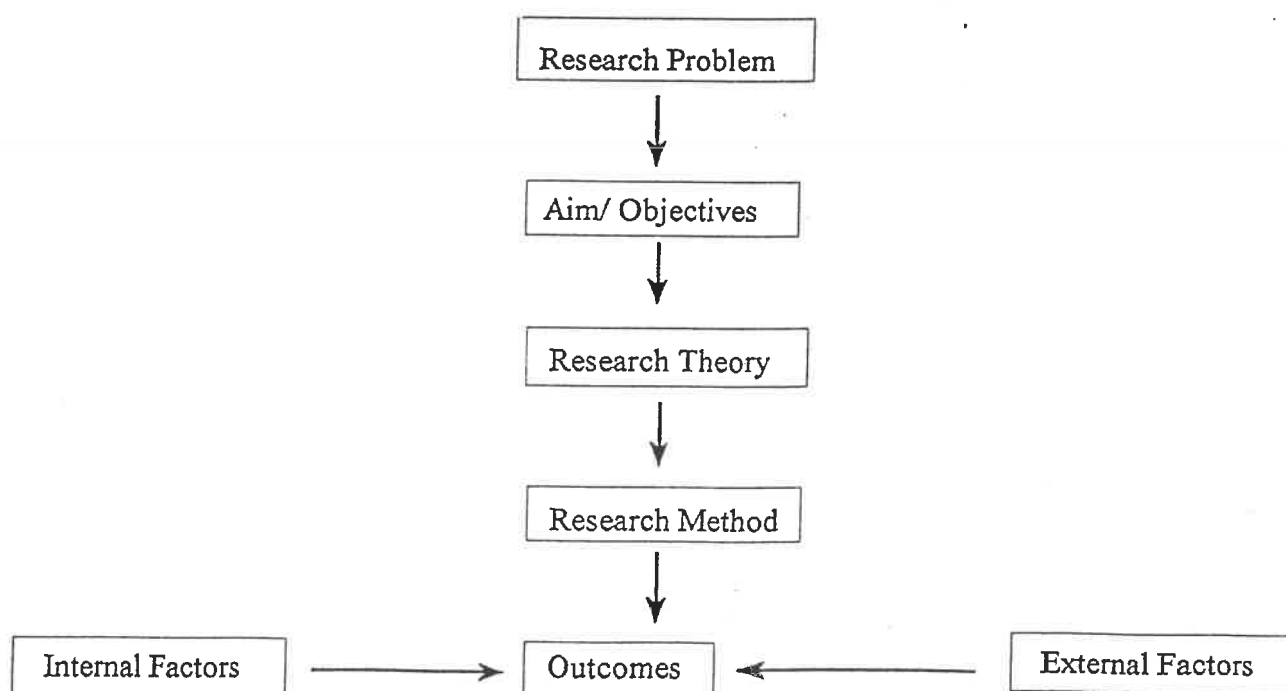
Furthermore, it was demonstrated that occupation of this place was occasioned largely because of the place's proximity to the city of Pietermaritzburg. A discussion on how some of the characteristics of Azalea such as topography, geological composition, drainage pattern and climate make it vulnerable to floods was presented. Lastly it was illustrated that the place experienced floods on a number of occasions.



## CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

### 3.1 INTRODUCTION

The choice of research methods employed in collecting and analysing data is mostly dependant upon a research mode, which is a function of the research problem. In other words, the research problem is the controlling factor since it determines aims and objectives, which in turn determine the research theory and research mode. Consequently, the choice of a method has a strong influence on the outcomes. The choice of method is also influenced by other factors (internal or external). These factors include the type of data required-primary or secondary; available time and resources for that particular research. Figure 3.1 outlines the relationship between these research components.



*Figure 3.1 Determinant components of the choice of research methodology*

Having outlined the components of the research methodology process, it is therefore important to briefly discuss types of research and methodologies. This chapter is divided into three sections: Firstly, the different research types, their characteristics and their relevance are briefly discussed. Secondly, there is a discussion of various research methodologies. Thirdly, an outline of Participatory Rural Appraisal (PRA) and its relevance to this study is presented.



### 3.2 RESEARCH TYPES

There are four common types of research noted by Bawa (1995). After considering these types of research and their principles, it was discovered that only one type (participation based) satisfies the needs of this research. This section is aimed at showing how this research falls under the participation based research type. The purpose of this section is not to discuss at length various types of research but to show why the participation based research type is preferred to others. It is important to briefly outline the research types and indicate why others are not particularly relevant. The four research types below (adapted from Bawa, 1995) are considered.

**3.2.1 The traditional or pure scientific** - This research type is purely scientific and discipline specific. According to Bawa (1995) this is driven by the assumption that knowledge is testable and objective. It is because of the transdisciplinary nature of the problem tackled by this study that this research type is not preferred. This study places more emphasis on socio-economic rather than purely scientific issues. The results of this study are neither testable nor objective and as a result the use of this method is unnecessary.

**3.2.2 Applied research or applications driven** - This type of research follows a particular set of assumptions which influence the outcomes. Experts and academics are central and decisive. It is because of its failure to involve all affected and interested parties in problem solving that this research type was not considered relevant. Furthermore there is no set of assumptions that must be adhered to in this study.

**3.2.3 Strategic** - This is, according to Bawa (1995), mostly used to meet specific identified needs. This is considered irrelevant due to the fact there are no specific identified needs to be met by this survey since socio-economic needs are not specific but diverse.

**3.2.4 Participation based** - The key distinguishing element of this type is its transdisciplinarity and its recognition that the determination, construction and solution of problems require more than one discipline and / or institution to be involved (Bawa, 1995). It also recognises that solutions to problems require both empirical and theoretical inputs. It further encourages interaction between various modes of research and establishes networks of communication. It is because of these reasons that this research type fulfills the requirements of this study. These requirements include, among others, community involvement, development of networks of communication between different institutions and the use of various methods in data gathering and analysis.



### **3.3 RESEARCH METHODOLOGIES**

There are various methods for carrying out an enquiry. The most common ones are quantitative and qualitative. By quantitative one refers to that method which places an emphasis on numbers and precise measurements. Qualitative method on the other hand is based on "... descriptive information that cannot be expressed in numerical form" (Barrat & Cole, 1991. p91).

This research is multidisciplinary, this contention can be substantiated by the fact that the study required a grasp of social, economic and political conditions in the communities in which the work was conducted. Furthermore, an appreciation of the environmental context in which the affected floodplain dwellers lived, was also essential to answering the questions posed in this work. Therefore, because of the multidisciplinary nature of this research, both quantitative and qualitative methods were used in data gathering and analysis. For instance interviewees are quantified and categorized according to variables such as age and gender. For variables such as people's attitudes, behaviour, feelings and perceptions, the qualitative method was used since these factors cannot be quantified.

Participatory Rural Appraisal (PRA), which is part of qualitative method, was adopted as the best tool for this kind of research since it is more applicable when community-based interventions are proposed (Chambers, 1992). PRA is premised upon the principle that communities and other stake-holders' inputs are important in any proposed programme. Following below is the assessment of PRA and its relevance to the study.

### **3.4 PARTICIPATORY RURAL APPRAISAL (PRA)**

#### **3.4.1 Definition**

PRA refers to a growing family of approaches and methods which serve to enable local people to share, enhance and analyse their knowledge of life and conditions- in short, to plan and act (Chambers, 1992). In PRA, information is owned and shared by local people. Researchers merely act as facilitators. Their task is to introduce the problem and leave it to the people themselves to explore their own solutions. Following below are some of the principles and methods of PRA as noted in Chambers (1992).

#### **3.4.2 Principles of PRA**

There are many principles of PRA that can be used when a research is undertaken. The two principles that were adopted in this research are what Chambers (1992) refers to as 'triangulating and diversity seeking'.

In this research a range of methods were used and different types of information gathered in order to crosscheck information already obtained. This process is referred to as triangulating. In this study results



are not only analysed statistically. Diversity of opinions was obtained from a variety of people in order to investigate contradictions and anomalies or distinctiveness of their perceptions of flood hazards and attitudes towards relocation. This activity is known as diversity seeking.

### **3.4.3 Methods of PRA**

PRA methods are many, broad and diverse. From the long list of such methods, those which follow were selected for this study.

**3.4.3.1 Short simple questionnaires and semi-structured interviews-** The key here is to keep the questions 'short and simple' and only to collect necessary information with as much accuracy as possible. A questionnaire (see appendix 1) was used to collect data from flood victims and non flood victims in Azalea. The questionnaire was loosely structured and consisted of open and close-ended questions. Emphasis was placed on probing and understanding the respondent's answers rather than the uniform administration of interview schedules. This helped in encouraging the interviewees to openly reveal their perceptions of flood hazards.

**3.4.3.2 Group interviews or discussions, workshops and brainstorming -** Under this method, different groups in the community are gathered for open-ended discussions on key issues. Group interviews can be held with specific kinds of people, for example, specialists, key informants and laypeople. During the research process group interviews were conducted, discussions and workshops held with flood victims and non flood victims in order to enable them to brainstorm about the flooding problem and solutions thereto.

**3.4.3.3 Transect walks with key informants -** This method involves walking with key informants through an area asking, observing, listening, discussing, identifying different zones, identifying problems and seeking solutions. During field work physical characteristics of the area were observed and people talked to about flood related issues.

**3.4.3.4 Stories and time lines -** Investigation into the community's history, chronologies of events and listing of major remembered events with approximate dates was also conducted. Time lines were used to come up with the historical events of the area, its community and its vulnerability to floods.

**3.4.3.5 Secondary sources -** Materials such as reports, maps, aerial photographs, books and newspapers were used in data gathering.



### 3.5 CONCLUSION

It has been shown in this chapter how a research problem determines the aims and objectives of research. An illustration on how a research type determines the choice of research method and how this in turn influences the findings was presented. This chapter further demonstrated how a 'participation based' type of research accurately meets the demands of this study. It has been shown that this research is based upon a premise that the determination and solution of problems require more than one discipline and/or institution. Of importance in this section is the demonstration of the inappropriate nature of scientific, strategic and applied research.

The importance of qualitative as well as a quantitative methods was illustrated. It was shown that in order to get a clear picture of the people's views or perceptions, it is necessary to quantify them according to their characteristics which include age and gender. Furthermore, it was indicated that for information that cannot be expressed in numerical form, qualitative methodologies can be used. Finally, it has been shown that the PRA method is the most important and the more applicable when community based interventions are proposed. It was further realised that PRA is premised upon the principle that it is important to understand the community before recommending any strategy aimed at assisting them. The PRA also recommends the use of short and simple questionnaires, informal or unconventional interviews and stories and time lines. This illustrates the respect PRA accords to the community.



## CHAPTER FOUR: LITERATURE REVIEW

### 4.1 INTRODUCTION

This chapter aims to give a theoretical background of the way people think about natural hazards and disasters, floods in particular. Environmental disasters are increasing and putting more and more lives at risk. What is the reason for the increase in numbers and intensity of disasters? Is it because people in their interaction with the environment make their area more and more vulnerable? An attempt to answer these and other related questions is made in this chapter. It will also be shown that environmental hazards and disasters are perceived differently by different people. Many people perceive them as genuine natural phenomena. Therefore, natural disasters are commonly perceived as unalterable acts of God (Domeisen, 1996). In contrast, some people view them as a function of human production.

The chapter is divided into three sections. The first section focuses on environmental hazards generally, their definition, causes and influence to mankind. Secondly, there is a discussion of floods, their causes, types and damages caused to human beings. Lastly, the chapter considers people's perceptions of natural hazards (especially floods), their responses, adjustment and adaptation.

### 4.2 ENVIRONMENTAL OR NATURAL DISASTERS AND HAZARDS

#### 4.2.1 Definitions of natural hazards and disasters

An environmental hazard refers to a potential natural risk which threatens human life. As Whittow (1980, p19) puts it, an environmental hazard is "a perceived natural event which threatens both life and property". This definition denotes a possible event which, if it does not have the potential of affecting any person, is not a hazard. Therefore, according to this definition, a hazard involves both people and nature. If the floods, for example, occur in an unoccupied area, no person would be affected and as a result the possibility of that event (floods) occurring is not a hazard. This is so irrespective of how likely that possibility could be. By itself, extra water present during a flood does not cause a threat. But for this water to be classified as a hazard, there must be some danger or pending harm to people and their property.

A situation when people are adversely affected or suffer as a result of the occurrence of a hazard is called a disaster. A disaster is basically the realization of a hazard. In other words, a disaster is the manifestation of the negative consequences associated with a particular event (Handmer, 1995). This is best illustrated by the following examples. People who occupy floodplains are living in a hazardous situation, that is, floods are a disastrous possibility. When the flood occurs, its consequence of killing people and destroying property is called a disaster. Furthermore, living in a desert only constitutes a hazard but drought and consequent starvation associated with desert life constitute a disaster.



Hazards are therefore termed disasters only when they strike those areas where people have chosen to settle, their properties and life. As Tufty (1969,p183) argues, a "natural cataclysm becomes a natural disaster when it inflicts destruction upon human life and property". Wijkman and Timberlake (1984) give a good example of this when articulating that, a strong earthquake in an unoccupied desert area where no one is affected is hardly a disaster but a mild earthquake in a shanty town of mud- brick houses on the side of a steep riverine area may well prove a disaster in terms of human suffering.

## 4.2.2 Causes

### 4.2.2.1 Introduction

It is generally believed that environmental disasters occur naturally. However, some disasters are created by people during their interaction with their environment or in an attempt to offset existing natural hazards. For instance, 'man's' construction of a dam in an effort to combat drought can trigger off earthquakes in certain critical seismic zones, a good example of which is the "Vaiont Dam landslide" (Whittow; 1980,p22). This example proves that though most environmental hazards can be of natural origin, human beings play a very important role in exacerbating the events associated with those hazards. Therefore, it can cogently be argued that environmental hazards occur as a result of people's careless exploitation of the environment. Developing floodplains for residential purposes like in the Greater Edendale Complex, is an example of such careless exploitation of the environment.

#### 4.2.2.2 Environmental disasters- human or natural act?

Environmental disasters, though triggered by natural processes, are increasingly 'man' made. Some disasters (flood, drought and famine) are caused more by environmental and resource mismanagement than by too much or too little rainfall. Though reduced rainfall may trigger a drought, lack of rain is not the sole cause of drought but because deforested and overused tropical soils erode easily and therefore retain insufficient water, drought can occur as a consequence (Wijkman and Timberlake,1984). It can thus be argued that human activities on the land are the primary causes of what is commonly referred to as environmental or natural hazard or disaster. Domeisen supports this statement by aptly stating that "the real culprit is man" (Domesein; 1996,p22).

Although much of human activity that leads to environmental deterioration are inevitable, some of today's disasters are direct consequences of people's carelessness in managing the environment. It is the everyday activities of people (farming; cutting wood for fuel; building homes and choosing sites for housing) that makes their land more or less vulnerable to environmental disasters. For instance, Tufty (1969) argues that, for many centuries disasters such as floods came and went merely as part of the many vast cycles of nature on earth and there was little destruction caused by excess water in terms of human life and loss



of property. The reason why these floods caused no or minimal loss was, among others, that there was little in terms of modernization and development on flood prone areas. As civilization and modernization started, people began to build their centres of living near great river systems. And as these centres developed into towns and cities, people began to experience devastation from the periodically rising waters. On this basis it is befitting to argue that it takes extensive human intervention before most of these geological and climatic events become disastrous.

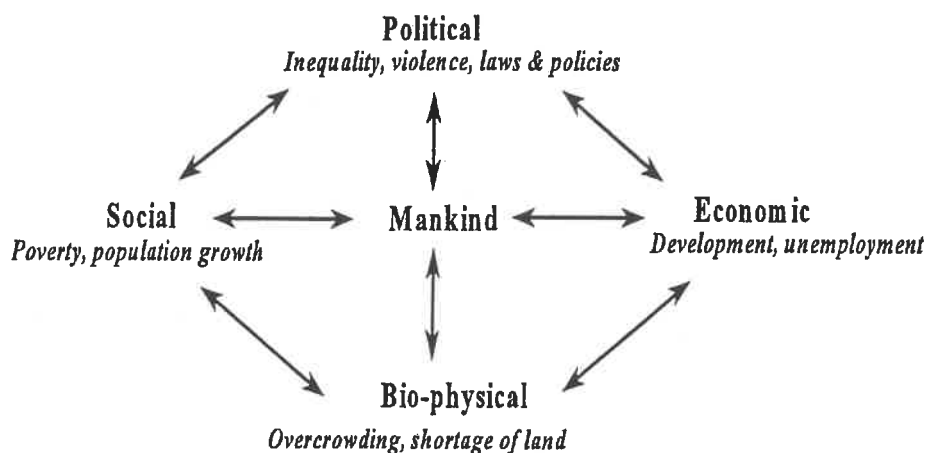
However, in stressing the ways in which people make their land more vulnerable to disasters and thus increase their misery, one does not mean that unpredictable natural processes do not play a key role in triggering these disasters. It is strongly believed that people may increase or decrease environmental hazards but they are not the sole causes. Floods can be used as an example in this regard. Tufty argues that, "long before man first began to tamper with the earth's surface and rivers, violent floods were inundating the land with as much violence as they do today" (Tufty; 1969,p185). It is submitted on the basis of this argument that although people contribute in aggravating disasters, they may still do not cause them. Natural disasters are the manifestations of the earth's physical or natural processes that were existent at the beginning of the universe. These natural disasters are therefore arguably far beyond human control for them to be said they are 'man made'. Indeed it is indisputable that people play a key role in aggravating disasters but it can equally be argued that they do not and will never cause them.

#### **4.2.2.3 If humanity is not the sole cause -then what else?**

It is important to consider the following questions when discussing the manner in which human actions and behaviour contribute to the escalating environmental disasters and consequent death toll: (i) Why are natural disasters becoming frequent, more deadly and more destructive? (ii) Is it because people are changing their environment to make it more prone to some disasters or are they behaving so as to make themselves more vulnerable to those disasters? (iii) Are disasters more a result of natural processes or of the fact that people are living in dangerous areas?

The causal link between humanity and 'natural disasters' is not cut and dried. It is as diverse as the concept of 'environment' itself and as complicated as the relationship between people and their environment. If the environment means everything from socio-economic through to socio-political, biological and physical, likewise, the disaster issue is transdisciplinary. The way human beings interact with and within their environment is therefore important in understanding environmental problems. As stated earlier, environmental disasters, though not directly caused by people are aggravated by them. Figure 4.1 below shows the interdependence and effectual relationship between mankind and the environment:





**Figure 4.1** *The interdependence relationship between mankind and the environment*

In their interaction with and within the environment, people alter their environment positively or negatively. Following from the above figure, it is apparent that people contribute in exacerbating environmental hazards, which in turn endanger them. Mankind, by being in the centre in terms of this figure, does not mean that he/ she is the sole cause of disasters but a role player and a victim of all disastrous and hazardous circumstances. As stated earlier, environmental hazards cannot be discussed in isolation from people and the impacts they have on them. This is so because natural events only fall in the category of disasters once they negatively impinge human life. From the figure above, it is clear that people interfere with the biological and physical environment in a variety of ways. For instance, people can interfere through policy making (political); development practices (economical) and social interactions (social).

It is argued that it is not only changes in the earth's climate that lead to an increase in disasters but the concentration of people's socio-economic and political activities in disaster prone areas. These activities directly or indirectly increase the number and frequency of deadly environmental disasters. Through these activities, people degrade their environment to make it more prone to certain disasters, mainly drought and floods. Domesein (1996, p22) comments that "increased vulnerability to disasters stems largely from environmental degradation and uncontrolled urban growth, exacerbated by demographic pressure and political and institutional gaps". It is equally important to note that, even though people aggravate environmental disasters, these disasters are also natural. For instance, flooding would occur even if people were not living on the floodplains. However, because of floodplain settlement, this flooding is exacerbated and becomes disastrous.

There are further indirect factors which cause or contribute to environmental hazards or disasters.

These are called push and pull factors. It is important to note that it is these factors that influence a human being to act unwisely in his or her interaction with the environment. For instance, occupation of disaster prone areas and consequent environmental degradation would be minimal or non existent if socio-



economic factors such as poverty and landlessness were not affecting people. The effects of these push and pull factors are outlined below.

#### 4.2.2.4 Pull and push factors

Pull factors are those that attract people into an area whereas push factors are those that compel people to leave an area for another. These factors can be divided into four categories: political; social, economic and bio-physical (as shown in figure 4.1). Firstly, under political, pull factors can be peace and democracy while push factors can be inequality, violence and poor development policies. Secondly, employment opportunities and land fertility are pull factors under economic category while push factors can be underdevelopment and unemployment. Thirdly, family ties and sense of place are pull factors under social aspect whereas poverty, crime, population growth, overcrowding and shortage of basic infrastructure are push factors. Finally, shortage of land can be a bio-physical push factor whereas availability of land can be a pull factor (Bergman,1995). On the basis of this, it can be argued that causes of environmental disasters are socio-economic and political in nature. For instance, as population increases, land in both rural and urban areas become scarce and people are then forced to reside in flood prone areas and/ or in earthquake prone cities.

Inequality and the political failure of governments to develop new economic systems and to allocate resources equitably, lead to a situation where low income earners are forced to settle in areas that are vulnerable to natural disasters (Tufty,1969). In developing countries such as South Africa the poor are forced to over-use their land and live on dangerous areas because of socio-economic and political factors. That is why environmental disasters are increasing and it is mostly the poor that are most vulnerable and worst affected. It can therefore be cogently argued that, in developing countries, disasters are an integral part of poverty cycle. Poverty causes disasters and disasters aggravate poverty. As Cross has observed, there are "over 3 000 deaths per disaster in low income countries compared with 500 in high income countries" (Cross, 1988). Domeisen (1996) contrasted Japan (a rich developed country) to Peru (a poor country). She found that Japan averages 63 deaths per year from natural disasters while Peru, with similar natural hazards and only one sixth of the population of Japan, averages 2 900 deaths per year. It is worth noting that in all these disasters, floods took a lead in terms of loss of life and destruction of property (Cross,1988).

### 4.3 FLOODS

#### 4.3.1 Introduction

Floods are an integral part of world history. According to Biswas (in Ward, 1978), the first recorded floods occurred in China on the Hwang Ho in 2297 BC. Other major disastrous flood events have been taking



place as early as the late nineteenth century. As reported by Ward (1978), extensive flooding occurred in Hwang Ho in 1887 and on the Yangtze Kiang in 1911. Both these flood events claimed 900 000 and 100 000 lives respectively. The Lynmouth floods of August 1953 in Britain caused immense damage and deeply "impressed the public conscience" (Ward; 1978,p1). In South Africa, especially in Kwa Zulu-Natal, flash floods and violent storms were, according to McGee(1988), recorded in October 1917, March 1939 and 1947.

The prevalent impression is that the flood situation is getting worse. According to Domeisen(1996), damages inflicted by disasters (of which floods take the lead) kill more than one million people each decade and leave millions more homeless. In addition, financial damages from natural disasters were estimated to be \$120 billion in the 1980's as opposed to \$40 billion in the 1960's (Domeisen, 1996).

#### **4.3.2 Definition**

Most definitions of floods relate to river floods. For example, Chow defines it as "a relatively high flow which overtaxes the natural channel provided for the run-off" (Chow;1956,p36). In fact, so many stream channels have been artificially improved that the definition by Rostvedt and others (1968) is probably more appropriate. They define a flood as "any high stream-flow which overtops natural or artificial banks of a stream" (Rostvedt *et al*;1968,p62). Such high flows are normally caused by either intense or prolonged rainfall. In short, floods may be defined as a discharge which exceeds the channel capacity of a river and then proceeds to inundate the adjacent floodplain.

#### **4.3.3 Flood description and classification**

Floods may be classified into a land and a channel phase. During the land phase water flows over the land when the intensity of the rainfall exceeds the infiltration capacity of the soil. Whenever more rain falls or snow melts than the soil can absorb or retain, a flood begins and streams become incapable of returning excess water to the sea. The first physical evidence of a flood is usually in the form of water flowing into the stream channels. The surface or direct run-off makes up the initial or land phase of the flood. It is during the land phase that rain, rejected by the soil, becomes run-off and generates the flood (Hoyt & Langbein, 1955).

When speaking of floods, reference is given to the channel (second) phase, since this phase is the most spectacular and on the whole, the most destructive. During the channel phase the water rejected from the land becomes extremely powerful and destructive, causing immense damage along its route. Depending on the flow from tributaries, the flood waters of the main channel gradually rise, overflow onto the

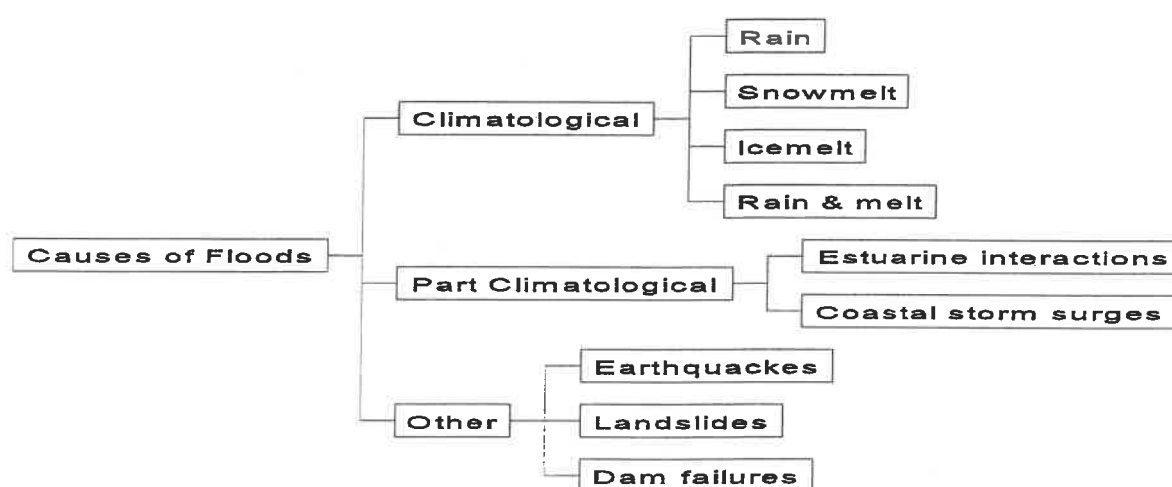


floodplains, inundate and deposit debris. Also depending on “velocities, these waters wash away homes, factories, railroads and highways” (Hoyt and Langbein; 1955,p7).

#### 4.3.4 Causes

##### 4.3.4.1 Introduction

Floods result from a number of basic causes (see figure 4.2 below) of which the most frequent are climatological in nature. Excessively heavy or prolonged rainfall is the most common universal cause of floods. In cold-winter areas where snowfall accumulates on the surface, substantial flooding frequently occurs during hot seasons. Other rather infrequent causes of flooding are tsunamis produced by earthquakes and landslides (Smith *et al*; 1981).Figure 4.2. illustrates some of the causes.



**Figure 4.2 Flood causing factors ( adapted from Ward, 1978)**

In addition, the increase in floodplain occupancy is certainly one of the really significant causes of the general rise in flood damage. This trend has gradually placed more and more people and property at risk. For example, Burton *et al* (quoted in Ward, 1978), estimated that there were over 2000 towns and cities in the USA situated on floodplains, 200 of which had populations of over 1000 people. In Canada a further 1000 towns were in such locations. In South Africa, estimates done by the Department of Water Affairs and Forestry, put the figure of people occupying the floodplains at 150 000 (Asmal;1996a).

##### 4.3.4.2 Types of floods

There are two common types of floods. These are rainstorm generated, river or tidal floods and snow melt floods. The most commonly experienced floods are those which fall into the category of rainstorm-river floods. Snow melt floods occur when heavy snow thaws or melts. The two types of floods mentioned above are the "most sensational flood disasters in the world" (Whittow; 1980,p269). Other common causes

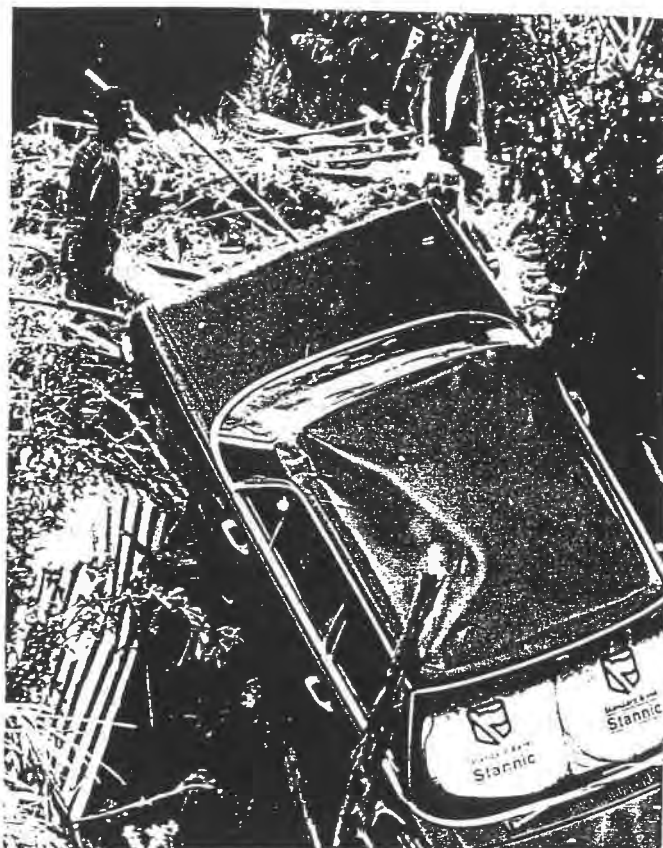


include dam or levee failure. These are largely attributable to human error. A good examples of this is the 1928 St. Francis Dam failure in California when five hundred people died (Ibid).

## 4.4 DAMAGE FROM FLOODS

### 4.4.1 Definition

Flood damages may be defined as "the destruction or impairment, partial or complete, of the value of goods or services, or of health, resulting from the action of flood waters and the silt and debris they carry" (Hoyt & Langbein; 1955,p77). It is easy to define flood damages but difficult to assess them in monetary terms. The main reason being that, these losses are as diverse as the "economic interests of modern society" (Ibid). The immediate consequences of destruction of property are easily seen and quickly evaluated. For example, a house overturned or a car washed away (as shown in plate 2) are simple facts, readily computed in rands. But how does one compute human life in rands and cents?



***Plate 2** This picture shows that floods cause extensive damages. This car has been washed by the 1995 Christmas Day floods within the Msunduzi catchment in the Greater Edendale valley (Natal Witness, 1995 December 27, p3)*

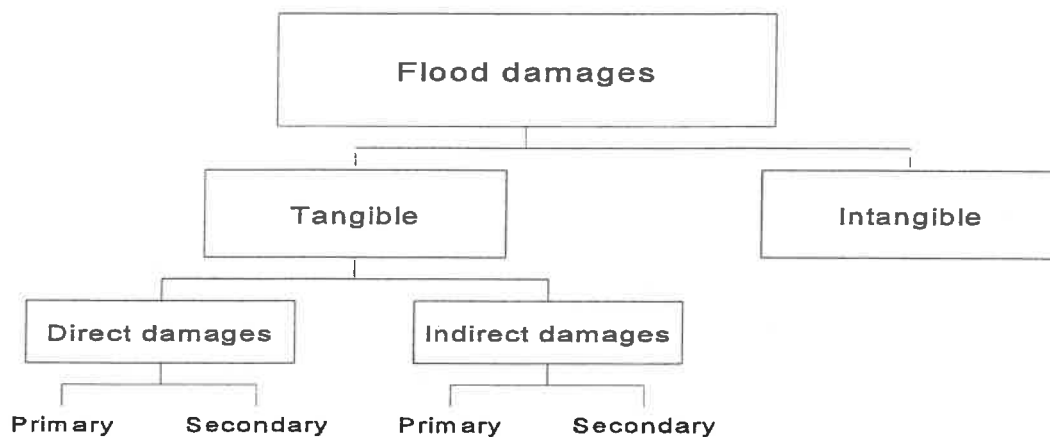
### 4.4.2 Description and classification

Flood damages can be classified as tangible (material) and intangible losses suffered by people on account of a flood. Tangible losses refer to "damages which can be determined in monetary terms whereas



intangible damages denote that portion of losses that cannot be computed in this way" (Ward;1978,p173). Examples of tangible damages include, the destruction of a bridge or house. Intangible damages on the other hand, include fear, anxiety, annoyance, distress, insecurity, ill health and loss of life.

Tangible losses are divided into direct and indirect damages, which are further divided into primary and secondary losses (See Figure 4.2 below). Damages are said to be direct when the damaged entity or thing has made physical contact with the flood water and indirect when no such physical contact was made (Ward, 1978). Examples of direct losses are, as Smith *et al* (1981) substantiate, losses to municipal property and public lands; residential and other buildings in urban areas; agricultural land; crops and harvests; livestock and other animals. Indirect damages are "losses resulting from the breakdown of certain physical or economic linkages in the economy" (Ward;1978,p175). Examples include, loss of production, loss of income and business and delays in transportation of goods and people. Direct damages are the actual and immediate damages while secondary are the after effects of those damages. It must be emphasized that, it does not matter whether damages are tangible or intangible, direct or indirect, primary or secondary, they all have disastrous effects on human life and property and are therefore undesirable.



**Figure 4.2 Flood caused and flood related damages (adapted from Parker and Penning-Rowse,1972)**

#### **4.4.3 Factors affecting flood damages**

The variability of flood damage in both space and time reflects a large number of influencing factors. According to Parker and Penning-Rowse (1972), the most important are the types of land use and characteristics of the floodwaters (including depth, velocity, wave action, duration and solids load). The interaction between people and their environment is also an important factor affecting flood damages. Having seen how flood related damages adversely affect people, it is important to have an insight into



some of their perceptions of flood hazards. People's perceptions are important in understanding the kind of measures that they can take when confronted with floods. Following below is a discussion and analysis of people's perceptions of flood hazards and their responses thereto. People's attitudes towards relocation are also discussed and analysed.

## 4.5 PEOPLE'S PERCEPTIONS OF FLOOD HAZARDS AND THEIR RESPONSES

### 4.5.1 Perceptions and attitudes

[People have varying opinions and perceptions regarding natural hazards and the possibility of their recurrence. What is believed to be a hazard by one person or community may not be regarded as such by another. People possess diametrically different opinions or perception about the same event even if they are in the same situation.] Studies done by several researchers have shown these varying perceptions. For example, James (1974) and Ramachandran and Thakur (1974) found that more than 85% of floodplain dwellers in Atlanta (USA) and on the Ganga floodplain (India) expected future flooding. In contrast, Smith and Tobin (1979) and Eriksen (1971), found that more than 50% of floodplain residents in Shrewsbury (UK) and 30% of those in the Oritiki floodplain (New Zealand) did not expect floods to recur in the future. De Villiers (1994) discovered that 54% of the respondents in the Mdloti river floodplain (KwaZulu-Natal) expected floods to occur again within the next ten years.

[People's perceptions of the environment around them influence the way they think about and behave towards the environment. Therefore, perception is of utmost importance in understanding people's behaviour, since it is likely that people will respond according to their beliefs rather than according to the real situations. Thus, more often than not, what they perceive is what they see and believe to be real. In addition, people's attitudes towards and responses to flood hazards are not only determined by the nature of the hazard] as argued by Ward (1978). But mostly by the perception of that particular hazard, which is a result of the joint interaction between physical and socio-economic processes. Perception is also a result of the characteristics of the individual decision maker. It is dependent on whether he or she is an individual floodplain occupant or a farmer, government official, industrial production manager, employed or unemployed.

Characteristics such as, socio-economic status, past experiences and awareness of flood hazards, degree of fear of flood hazards, security of tenure; education level; type and purpose of one's building; period or length of time spent on a floodplain; values and preferences, play a very important role in the way people perceive and think about flood hazards. For example, rich people are more likely to have different perceptions of flood hazards from those of the poor.



In addition, past experience and awareness of the place's vulnerability to floods are closely related, though not in a particularly simple manner to the way people perceive and react to floods hazards. Smith and Tobin (1979) found that there is a significant relationship between the perception variable and personal flood experience. In their survey (which was undertaken in the communities at risk in Carlisle and Appleby on people's perceptions and attitudes to floods) they discovered that a majority of respondents with personal flood experience perceived future flooding. In contrast, a majority of those without such experience did not perceive future flooding. De Villers (1994), in a similar study, observed that people's personal experience of floods does not appear to influence their perceptions of future flooding. He discovered that only 14 (23%) out of 60 respondents had experienced a flood previously, but the majority 54 (90%) stated that the area would flood again within the next ten years. And just over a half of the respondents (32) expected another flood within five years whilst 22 held the view that floods would recur within the next six to ten years.

The degree of fear of flood hazards also has an influence on people's perception and responses. Smith and Tobin (1979) discovered that, because of fear of flood and its consequences, a considerable number of people are concerned about future flooding. Those who have no fear of flooding are not concerned about it. Therefore, those who have no fear would tend not to perceive the possibility of future flooding. In addition, the degree of fear of flooding is regarded to be closely related to the frequency and the extent or severity of flooding itself. According to Smith and Tobin (1979) the fear of flooding develops or increases with the severity of each flood experienced. The frequency of the flood events might also tend to influence one's degree of fear of flooding.

In as far as tenure of household is concerned, Smith and Tobin (1979) discovered that tenure has a very important role to play in influencing one's perception of future flooding. According to them a large percentage of owners as compared to a small percentage of tenants perceived future floods. This is because, as Smith and Tobin argue, house owners have more at risk than tenants.

Other important factors influencing people's perceptions of flooding are ignorance or lack of knowledge and false impression. For example, Smith and Tobin (1974) discovered that most people tend to ignore or deny the existence of flood hazards. Furthermore, in certain circumstances even those people who are aware of the possibility of future flooding tend to create a false impression or deceive themselves with regard to the reality of such a possibility. This self deceit is occasioned by the reluctance of such people to admit the nature of the consequences effected by flooding.



It is worth mentioning that another factor which influences people's perceptions of future flooding and attitudes towards resettlement is the provision and the availability of aid and relief funds. In their studies, Ward (1978), White (1974) and Sewell (1969) found that the provision of financial assistance may substantially increase the potential of flood damage rather than reducing it. This is due to the possibility that a provision of this nature can encourage new development in flood prone areas, further adding to the problem. Some people might be encouraged not to relocate in a belief that any losses will not be borne by them or that they would yield benefits (because of their continued occupation of the floodplains).

Awareness of the place's vulnerability to floods, like experience and previous knowledge, plays a major role in understanding floodplain settlers' behavioural patterns. De Villiers (1994) indicated that nearly 50% of the respondents lived in a flood prone area but were completely unaware of the flood hazard. This lack of awareness is also highlighted in a British survey in 1971 in Shrewsbury, in which more than 50% of the residents interviewed were unaware that they were in a flood hazard zone (Smith and Tobin, 1979).

However, De Villiers (1994) observed that there is no apparent relationship between awareness of the flood hazard and expectation of future floods. The majority of the respondents (30) who were aware of the hazard expected a flood to occur within the next ten years. And twenty four of the respondents who were unaware of the flood hazard also expected a flood within the next ten years. This suggests that awareness of the flood hazard is not an indispensable factor influencing one's perception of future flooding.

#### **4.5.2 People's responses to flood hazards**

People's responses to floods actually refer to some of the measures floodplain dwellers take during or after flooding in order to abate or control flood related damages. Their responses depend on their perceptions. For instance, if a person does not perceive the possibility of future flooding, he or she might not consider relocation as a viable mechanism to the problem of flooding.

Responses to flood hazards range from measures aimed at controlling flood damages to those that are aimed at completely avoiding them. This is not different from what Ward refers to as "moderating human activities in flood prone areas and moderating the floods themselves..." (Ward; 1978, p116). In other words, the choice is between "adjustment and abatement or protection" (Ibid). The threefold terminology of adjustment, abatement and protection is pursued by Ward with the understanding that adjustment implies "man control" while abatement and protection imply "flood control" (Ibid).

With regard to adjustment there are, among others, two possible measures that are adopted by floodplain dwellers. These are firstly, 'no adjustment', which entails the failure or reluctance to take any measures



in alleviating or avoiding flood damages. Under this measure, people are either prepared to suffer or bear the losses when they occur or are too poor or ignorant to take any measures (Ward, 1978). Secondly, some people would prefer to evacuate the floodplains rather than suffer periodic damages effected by floods.

Flood abatement and flood control entail factors used to reduce flood magnitude. Such factors include the introduction of vegetation cover for the reduction of precipitation entering the soil and the planting of shrubs or bushes to bind the soil. Flood protection refers to the attempts taken to minimize flood damages by means of structural measures in a way which is economically feasible (Ward, 1978). Examples of this include, among others, diversion schemes and reservoirs. There are two types of diversion schemes that are commonly adopted by people in their struggle to control or prevent flood hazards, these being (as quoted in Ward;1978,p151): (i). temporary diversion in which the normal channel is supplemented or duplicated by a flood relief channel, by-pass channel or floodway which is brought into operation for only a limited period of time, (ii). permanent diversion in which an alternative, intercepting or cut-off channel is built to replace the existing channel. Reservoirs, on the other hand, are structures built for the temporary storage of flood waters and waste water which could have caused damage during the floods. They are commonly adopted because, as Ward (1978) argues, they are mostly economically feasible or affordable.

#### 4.6 CONCLUSION

In this chapter three sections were discussed. The first section dealt with environmental hazards. In this section the definitions of hazards and disasters were highlighted. It was shown that the common description of hazard is that it is a negative or undesirable side of some event, action or situation where harm (to human life and/ or property) is a possibility. On the other hand, a disaster is the realization of the hazard.

The chapter further revitalized an ancient debate regarding the causes of environmental disasters. The question of whether the causes of environmental disasters are natural or human was considered. Factors that pull or push people into the flood prone areas were also considered. It was realised that many of these push and pull factors are the root causes of environmental disasters. The second section dealt with floods and flood related damages. A variety of flood damages were considered and it was shown how these damages adversely affect people. Lastly, people's perceptions of flood hazards were also considered. Lastly, this chapter outlined certain measures that floodplain settlers take, before or after the floods.



## **CHAPTER FIVE: RESULTS**

### **5.1 INTRODUCTION**

This chapter is aimed at showing the interviewees' responses to the questions posed to them in terms of the questionnaire (appendix 1). It will be shown that people of the same community can possess diametrically different views on the same subject matter. This chapter is divided into two broad sections. The first section deals with quantitative results while the second covers qualitative results. The first section is further divided into two sub-sections, namely, socio-economic characteristics of the community of Azalea and the people's extent of flood experience. The former is sub-divided into two categories; structural as well as personal factors. The section on qualitative results discusses factors such as people's feelings and attitudes towards the 1995 Christmas Day floods, their sense of place, reasons that compel them to settle and those that make them to continue to settle in Azalea. It further covers people's perceptions of the possibility of future flooding, their attitudes towards resettlement and their suggested solutions to the flooding problem.

In this chapter, the respondents are divided into flood victims and non-flood victims. Flood victims refer to those people who suffered extensive damages to their property (furniture, livestock, houses and clothing) and those who lost relatives and/ or loved ones as a result of the aforementioned floods. Non-flood victims refer to those people who suffered no or minimal damages, such as experiencing floodwaters of approximately ten to twenty centimetres during the Christmas floods.

Information was collected from almost all interested and affected parties of Azalea, these being key informants - councillors and other authorities; church leaders; ordinary community members; members of committees such as the Development Committee, Vukuzakhe, Youth and Women's Leagues; shebeen queens; tuckshop owners and sangomas. All these people, whether key informants or ordinary people include, for the purposes of this study, flood victims and non-flood victims.

### **5.2 QUANTITATIVE RESULTS**

#### **5.2.1 Socio-economic characteristics**

In this subsection the total number of the interviewees (victims and non-victims) is presented. Furthermore, respondents are quantified according to their socio-economic characteristics such as gender, tenure, age and occupation. The main aim of acquiring information on people's socio-economic characteristics was to show how these characteristics affected their responses to questions posed to them and, therefore their perceptions. Table 5.1 categorises people in terms of their socio-economic characteristics. In terms of this table, the total number of the people surveyed is shown. Every category of people surveyed is divided into



victims and non-victims. The sole purpose of dividing people into victims and non- victims was to discover the difference of opinion between these two categories of people in relation to floods and how this difference affects their attitudes towards resettlement.

**Table 5.1 Socio-economic characteristics of the people surveyed**

CHARACTERISTICS OF PEOPLE SURVEYED	CATEGORIES OF PEOPLE SURVEYED		NUMBER OF PEOPLE SURVEYED	% OF PEOPLE SURVEYED
INTERVIEWEES	<b>Individuals</b>		<b>250</b>	<b>100%</b>
		victims	145	58%
		non-victims	105	42%
TENURE	<b>Owners</b>		<b>170</b>	<b>68%</b>
		victims	110	44%
		non-victims	60	24%
	<b>Tenants</b>		<b>80</b>	<b>32%</b>
		victims	35	14%
		non-victims	45	18%
TYPE OF HOUSING	<b>Formal</b>		<b>160</b>	<b>64%</b>
		victims	60	24%
	<b>Informal</b>	non-victims	100	40%
			<b>90</b>	<b>36%</b>
		victims	85	34%
		non-victims	5	2%
KNOWLEDGE OF FLOODS	<b>Prior know- ledge</b>		<b>110</b>	<b>44%</b>
		victims	60	24%
	<b>No prior knowledge</b>	non-victims	50	20%
			<b>140</b>	<b>56%</b>
		victims	85	34%
		non-victims	55	22%
CHOICE OF PLACE	<b>Choice</b>		<b>40</b>	<b>16%</b>
		victims	25	10%
	<b>No choice</b>	non-victims	15	6%
			<b>210</b>	<b>84%</b>
		victims	120	48%
		non-victims	90	36%
ATTITUDES TOWARDS RELOCATION	<b>Positive</b>		<b>180</b>	<b>72%</b>
		victims	130	52%
	<b>Negative</b>	non-victims	50	20%
			<b>70</b>	<b>28%</b>
		victims	15	6%
		non-victims	55	22%



### 5.2.1.1 Structural factors

The total number of people interviewed was two hundred and fifty (250). This sample is, for the purposes of this study, representative of the community of Azalea. In this sub-section more emphasis is placed on the types of houses in which the interviewees resided. Common buildings (formal or informal houses for example) and other available physical structures are believed to be of importance in determining people's perceptions and feelings about floods. These structures are also important in providing protection from flood related damages. In view of this, one can predict that a person who lives in a well constructed cement house (which may offer protection during flooding) is bound to have a different view of the floods than the one who suffered extensive damages because he/ she was living in a shack.

These structural factors were assessed by obtaining information on both the location and types of dwellings involved. The methods used in obtaining this information included field visits, transect walks and direct observations. From these, it was discovered that (as shown in table 5.1) out of the two hundred and fifty people interviewed, one hundred and sixty (64%) lived in formal houses. Out of the one hundred and sixty people who lived in formal houses, sixty (24%) were victims whereas one hundred (40%) were non-victims. Ninety interviewees (36%) lived in informal houses built out of mud bricks. In contrast, eighty (34%) of the people who lived in informal houses were flood victims. Only five (2%) were non-victims. This is indicative of the fact mentioned earlier that formal houses are relatively protective during floods as opposed to informal houses. In as far as other infrastructure such as roads and water, is concerned, it was discovered that water supply was very poor. There was one or two taps for about fifteen households (approximately ninety family members). Roads were in a very poor condition and were extremely narrow.

### 5.2.1.2 Personal factors

Since certain social characteristics could significantly influence individual perceptions and behavioural patterns (as stated earlier), information was collected on such factors as gender, tenure, age distribution, occupation, flood awareness or prior knowledge of floods.

#### (a) Gender

As figure 5.1 portrays, the majority of people interviewed were females, with seventy six percent (190) being females while only twenty four percent (60) were males. One hundred (40%) of the females were flood victims whereas the remaining ninety (36%) were non-flood victims. Forty five (18%) of the sixty males were flood victims, while only fifteen (36%) were non-flood victims.

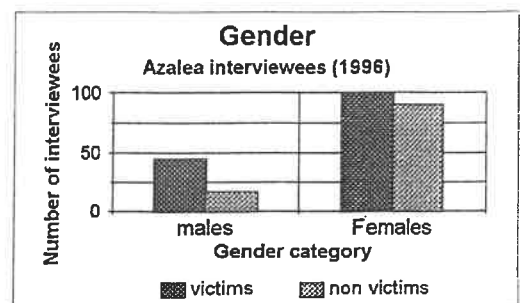


Figure 5.1



### (b) Tenure

One hundred and seventy (68%) of those interviewed were house owners (houses include formal and informal). One hundred and ten (44%) of these house owners were flood victims whereas the remaining sixty (24%) were non-victims. Eighty of the interviewees (32%) had no houses of their own and were therefore tenants. Of this eighty, thirty five (14%) were victims while the remaining forty five (18%) were non victims (Table 5.1).

### (c) Age distribution

The age distribution of the interviewees is shown in Figure 5.2. One hundred and thirty eight (55%) of them were of middle age or working group - between thirty and fifty years of age. This Figure consists of eighty (32%) victims and fifty eight (23.2%) non-victims. Furthermore, sixty two people (25%) interviewed were pensioners (of fifty years and above). In this Figure, there were fifty seven (22.8%) victims and five (2%) non victims. Twenty percent (50) of the people surveyed consisted of youth (between the ages of fifteen and thirty). Eight members of the youth group (3.2%) were victims while an overwhelming number of forty two (16.8%) consisted of non-victims.

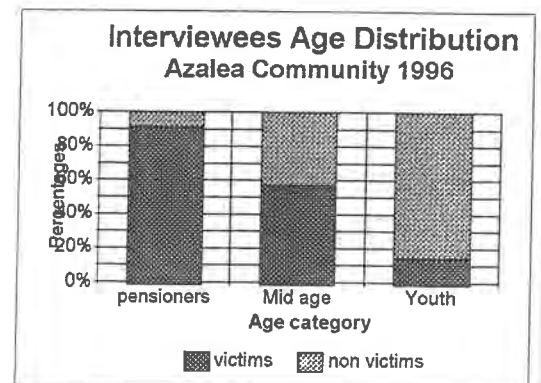


Figure 5.2

### (d) Occupation

Unemployment also has an influence on the way people perceive flooding and the importance of relocation. Unemployed people may feel that resettlement would have financial implications and therefore out of their reach and as a result unnecessary. On the other hand employed people may feel that they could afford resettlement provided a place to where they would be located is near their work places. Furthermore, unemployed people may tend to be lulled into a false impression that floods were an accident while employed people may see flooding as a potential hazard. In as far as the interviewees were concerned, one hundred and twenty (48%) were employed. Seventy (28%) were victims and fifty (20%) were non victims. One hundred and thirty (52%) interviewees were unemployed. The unemployed consisted of seventy five (30%) victims and fifty five (22%) non victims (figure 5.3).

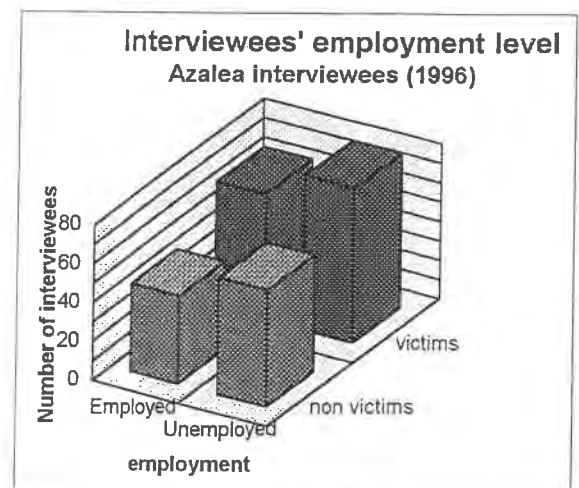


Figure 5.3



### **(e) Prior knowledge of the place's vulnerability to floods**

Information was also obtained on the people's prior knowledge of the place's vulnerability to floods. The aim of requiring this information was to discover reasons that compel people to continue staying in Azalea notwithstanding the place's vulnerability to floods. If people did not have prior knowledge, then their occupation of the area would be justifiable. In contrast, if they had prior knowledge then they probably had no choice or they deceived themselves that things would change for better.

In as far as prior knowledge (Table 5.1) was concerned, one hundred and ten interviewees (44%) were aware of the danger associated with settling on the place. This figure includes sixty victims and fifty non victims. Those who had no prior knowledge constituted fifty six percent (140) of the interviewees; thirty four percent victims and twenty two percent non victims.

### **(f) Choice of place**

As already mentioned, some people continued and still continue to stay in Azalea probably because they have no choice. Lack of choice may be occasioned by a number of factors such as poverty and landlessness. It is worth mentioning that it is this lack of choice that places a lot of people's lives and their property in danger and subjects them to perpetual poverty.

Among all interviewees, the number of people who had a choice to leave or continue staying in Azalea was a mere forty (16%). In this number, twenty five is made up of victims while fifteen consists of non- victims. An overwhelming two hundred and ten (84%) interviewees considered that they had no choice. One hundred and twenty (48%) of those were victims while ninety were non victims.

It is not surprising that such a large number of interviewees had no choice. This is indicative of the socio-economic problems plaguing this country. It is therefore evident that lack of choice is at the root of the mushrooming number of floodplain settlements.

### **(g) People's attitudes towards relocation**

Information was also obtained on the floodplain dwellers' attitudes towards relocation. In Azalea, one hundred and eighty (72%) interviewees indicated their willingness to relocate. Out of this, one hundred and thirty (52%) were victims whereas fifty (20%) were non-victims. On the other hand, seventy (28%) interviewees were opposed to relocation. Fifteen (6%) of these were victims while fifty five (22%) were non victims (Table 5.1).



### (h) People's perceptions of future flooding

People's perceptions of future flooding are important in determining their willingness to relocate. If a person believes or is convinced that there is a possibility of future flooding, then it is predictable that, that person would be inclined to relocate and vice versa. It was therefore befitting to obtain information relating to people's views on the possibility of future flooding in the area (Azalea). A majority (one hundred and seventy or

68%) of the interviewees foresaw future flooding. This figure comprises one hundred and fifteen victims and fifty five non victims. Sixty interviewees expressed that they did not foresee the possibility of floods recurring in the future. Of this number, fifteen were victims and forty five were non victims. In addition, twenty interviewees were not sure about the possibility of flooding in the future. This number consists of five victims and fifteen non victims (as shown in percentages in Figure 5.4).

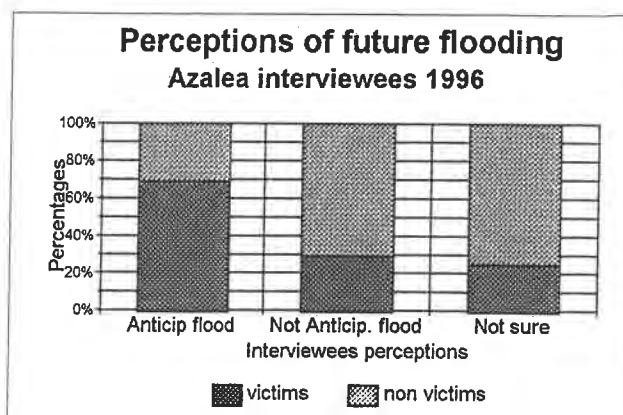


Figure 5.4

### 5.2.2 Extent of flood experience

This part of the interview was designed to provide information on the degree of flood experience among the respondents. It basically covers the following factors: number of flood events experienced; flood losses suffered; remedial actions taken by the residents during and after the Christmas floods and people's feelings about the 1995 Christmas Day floods. The table below (Table 5.2) clearly illustrates the above factors with corresponding categories of people surveyed and their numbers.

Table 5.2 People's extent of flood experience

EXTENT OF FLOOD EXPERIENCE	CATEGORIES OF PEOPLE		NO. OF PEOPLE SURVEYED	PERCENTAGES OF PEOPLE SURVEYED
NUMBER OF FLOODS EXPERIENCED	1st time victims		105	42%
	2nd time & more victims		40	16%
	non victims		105	42%
FLOOD LOSES	victims	relatives	10	6.6%
		furniture	35	24.1%
		livestock	25	17.2%
		house	15	10%
		clothing	60	41%



### 5.2.2.1 Number of floods experienced

The number of floods experienced by a person is believed to be very influential in determining his/ her views on the floods and protective measures that he/she might adopt. One hundred and five respondents (42%) experienced flooding for the first time during the December 1995 floods. Forty interviewees experienced floods on two or more occasions in the area (Azalea). The remaining one hundred and five had never experienced flooding in the area.

### 5.2.2.2 Flood losses suffered

It can cogently be argued that flood related damages can induce the sufferer to have a negative view of the area in which the damage occurred. The sufferer may also consider relocation as the best alternative to the problem. These are the reasons why information was obtained on flood related losses or damages suffered by the people of Azalea. During the survey, it was discovered that out of one hundred and forty five flood victims, ten lost their relatives or loved ones as a result of the 1995 Christmas Day floods. Thirty five lost furniture in flood related damages during this flood event. Fifteen interviewees' houses were washed away. The remaining sixty lost their clothing, bedding and cooking utensils (Plate 3 depicts some of the immense flood related losses suffered by the people of Edendale).



***Plate 3** Flood related losses. A corpse of one of the approximately 160 people killed during the flood of 25 December 1995 is being taken out of the debris by members of SAPS (Natal Witness, 1995, December 29th, p2)*



### **5.2.2.3 Remedial measures adopted**

Remedial measures taken are essential in determining people's perceptions of the floods. This depends on the success of a particular remedial measure adopted and the relative ease or difficulty with which it was accomplished. For example, if one's house, which had been destroyed as a result of floods could be immediately restored after the floods without any negative financial implications on one's side then one may view flooding as an ordinary occurrence and not as a serious threat. In this instance, the flooding will also be viewed as a benefit rather than a loss. There are three types of remedial measures adopted in Azalea after the floods; these are compensatory measures, personal and communal remedial measures.

#### **(a) Compensation**

After the flood, victims were provided with emergency aid such as food and blankets by the government and non governmental organizations such as the PMB TLC, The Red Cross and Islamic Society. Some families were allegedly awarded a sum of about R4000 each as compensation. It is regrettable that even some of the non-flood victims unscrupulously benefited from these benevolent organisations. It can be convincingly argued that some of the families who received more than they lost in terms of the floods may view flooding as beneficial and then develop a negative view towards relocation. In Azalea, one hundred and ten victims received some form of compensation. Ten non-flood victims received compensation as well.

#### **(b) Personal remedial measures**

Individual remedial actions took a variety of forms. For example, temporary measures such as sand bagging of doors and openings and removal of valuables to higher levels or to neighbours and relatives in safer places were adopted by about eighteen percent of the flood victims. Permanent measures such as building of parapet walls, better roofing and concrete paving were adopted by some people (about 2% of the 18%), especially by those who could afford it. Some made permanent alterations to their houses and other properties after the floods, presumably as a token of their unwillingness to relocate. Twenty percent dug trenches to allow free flow of water during heavy rains. It is reiterated that if these measures could be accomplished with relative ease, people's perceptions of the floods could be affected in that they could, for example, be opposed to relocation.

#### **(c) Communal measures**

During and after flooding some of the community members accommodated some flood victims. Other flood victims were provided with food and blankets by their neighbours. Some of the flood victims were rescued by the SAPS rescue team. In all, six percent of the flood victims indicated that they received some assistance (financially, or otherwise) from community members. It is worth mentioning that during the survey, people who favoured relocation were mostly those who went through trying conditions after the floods.



### 5.3 QUALITATIVE RESULTS

#### 5.3.1 People's feelings about the 1995 Christmas Day floods

The majority of the interviewees (145 victims and 80 non victims) indicated that they felt bad about the floods. Predictably, none of the interviewees (victims or non victims) felt good about the event. However, twenty five of the non victims were neutral in their responses concerning their feelings of the floods, (see Figure 5.5)

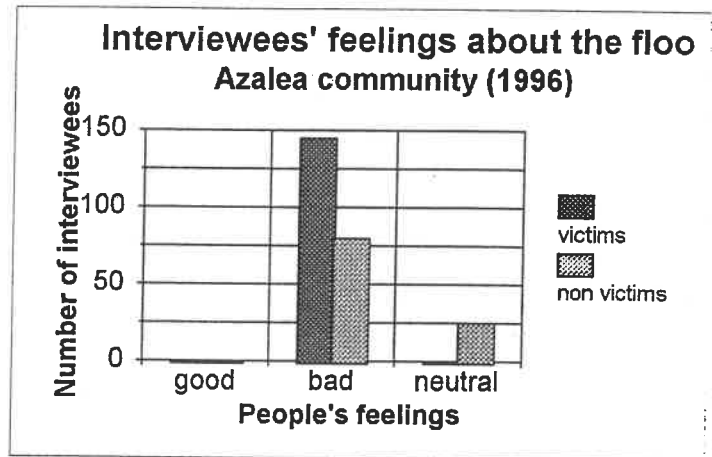


Figure 5.5

Different people had different feelings and attitudes about the 1995 Christmas Day floods. Some people felt guilty, sorrowful or anxious. This section seeks to highlight some of the feelings people have or had about the floods. It is worth noting that twenty five respondents (10%) failed for one reason or the other, to express their feeling about the 1995 Christmas flood. Some of the feelings expressed were as follows:

**5.3.1.1 Guilt** - Some flood victims felt guilty about the deaths of relatives, friends and loved ones who died without them being able to offer any help to save their lives. Even if they had attempted to help, they still felt that they should have done something more. About six percent felt responsible for the death of those people close to them. Four percent of those were females while three percent comprised of the middle aged or a working group.

**5.3.1.2 Anger** - Among some of the victims (5%), there were some feelings of anger and resentment about the flooding event. Three percent of them were young, and mostly male, interviewees. These people felt this way allegedly because they had been questioned several times about their experiences of flooding and its consequences. They felt that they had been over-studied and therefore used but nothing was given to them in return. These people claimed that many of them submitted their names to a number of researchers who failed to provide them with any feedback. They felt that the government should be responsible for resolving the flooding problem.

**5.3.1.3 Sorrowful** - feelings of grief and mourning were highly prevalent especially among females of all ages. About sixteen percent (forty in number) of the respondents were still psychologically tormented or mentally haunted by the 1995 Christmas Day floods.



**5.3.1.4 Hopelessness and helplessness** - some people had a pessimistic view about the future. Thirty two percent of these people felt useless, irresponsible and unproductive. They felt that there was nothing they could do to resolve the flooding problem. They were of the opinion that if God wished to annihilate them, there was nothing they could possibly do to stop Him. This was mostly common among the youths who were neither working nor schooling, a majority of whom (20%) were males.

**5.3.1.5 Neglect** - One hundred and ninety interviewees (especially flood victims) felt neglected. It is inherent in human nature for one to shift the blame to the authorities in times of disaster or misfortune. These people strongly felt that the government, NGO's, CBO's and other authorities, donors and neighbouring communities were irresponsible. Seventy percent of those had been victims of violence in the past and they therefore felt unfortunate and unrecognised.

**5.3.1.6 Suicidal** - some flood victims, though a very small number (1.4%), expressed some suicidal thinking or feelings. They felt that life was unfair to them and that death could be the best possible solution to their problems.

**5.3.1.7 Anxiety** - some respondents were still traumatized by the flood related damages. They felt unsafe and insecure. Some had nightmares. For example, when interviewed, one person said " I can't be anywhere by myself because when I'm alone, I still see the picture of my daughter drowning in flood waters". Most people (68%) were anxious about their future, that is, future flooding and the sustainability of the area. Sixty percent of those were youthful and mostly female.

**5.3.1.8 Panic** - One hundred and seventy people, especially women, claimed that they panic whenever they see black or grey clouds covering the sky. Most of these people seemed to be uneasy with the approach of the summer season.

## **5.3.2 Reasons for settling on the floodplains**

### **5.3.2.1 Why do people settle in flood plains or flood prone areas (in particular, Azalea)**

There are numerous and varying reasons why people decide to settle in any area. Different people have different motives in deciding to settle in a particular area. These motives are mostly socio-economic and political in nature.

It was shown in chapter one that there are about 150 000 people currently residing on the floodplains. With this large number of people living under such great risk, there must definitely be very compelling reasons of why they continue to stay in these floodplains.



In developing countries like South Africa, the primary pressure influencing the perceptions and hence the actions of people is poverty. Poverty generates a number of secondary pressures including hunger and malnutrition, diminished health, social dislocation, violence, overcrowding, landlessness, lack of opportunities and choice, and lack of education and/ or skills training. People of Azalea were asked why they stayed or preferred flood prone areas like the one on which some of them were staying. The majority of the respondents (about two hundred), victims and non flood victims cited one or more of the following reasons for their occupation of the area:

- ▶ Political instability in their areas of origin. This political instability, more often than not, culminated in violence. Most interviewees (about one hundred and fifty) left their areas of origin to settle in Azalea because of political instability. Political instability in KwaZulu-Natal is, in most cases engendered by the continued friction between ANC and IFP members and supporters. These frictions usually culminate into a series of socio-economic and political problems like social dislocation and landlessness. A large number of people in this area were victims of this friction.
- ▶ Poverty and unemployment. The search for job opportunities and improved quality of life was also cited by about one hundred and sixty respondents as a cause for their settlement in Azalea. Azalea was seen as an attraction offering all those advantages, mainly because it is near the city of Pietermaritzburg and the surrounding industries and factories. This place is therefore nearer to most people's work places. There are some benefits associated with staying near one's working place. These include reduced transport or travelling costs and increased productivity which can be attained, *inter alia*, by working longer hours.
- ▶ Population growth and increased pressure on land. Population growth has assumed unprecedented proportions mainly in developing countries and is fast approaching a situation where competition for limited resources would reach considerable and unhealthy dimensions. These limited resources include land. A serious lack of residential land induced the people of Azalea to occupy this potentially dangerous land which was vacant, relatively flat, fertile, inexpensive and resourced with the necessities like transport and water. An added advantage is that some of these people (especially informal settlement dwellers) are not expected or forced to pay for rates. A high percentage of the residents are unemployed. They stay in this area because they cannot afford to pay for services in formal housing. About thirty respondents articulated that they were forced to leave their areas of origin because there were many people in their families.



- ▶ Some people (especially ex-farm workers) stayed there because they had no where else to go and this was the only place available to them. This is covered at length in the section on quantitative results.
- ▶ The search for land ownership and security of tenure. Some respondents (about one hundred and twenty) came to this area because they were searching for land they could call their own. Azalea was being developed for residential purposes, so, the people saw this as an opportunity. Property ownership is regarded as one of the most important values in a modern state.
- ▶ Ignorance engendered by lack of communication. Some of the community members (about sixty) cited lack of knowledge as one of the reasons that led to them staying in this area. They claimed that they were never informed of the danger associated with staying in this area and they therefore thought that the area was safe.
- ▶ Illiteracy or lack of education. Even though there could have been any publication of information regarding the danger of establishing a settlement in areas such as Azalea, most of the people would not have known about it because of illiteracy. Over fifty interviewees could neither write nor read.
- ▶ “Misinformation”- false perceptions and unfulfilled promises. Many people stayed in this area and failed to move to other relatively safe places because of the promises allegedly made by candidate councillors. These councilors reportedly promised to relocate people to safe and developed residential areas in a near future.
- ▶ Thirty interviewees claimed that lack of laws and policies on developmental issues also contribute to people moving into this and other similar areas. There is merit in this statement since the Pietermaritzburg Town Planning Ordinance No 27 of 1948 which prohibits the erection of any buildings on flood prone areas only exists on paper and is rarely applied in practice.
- ▶ Family ties and a sense of place. Some community members (about ninety) stated that they moved into this place in order to be with their relatives and loved ones.

#### **5.3.2.2 But why do these people persist to stay in this area (Azalea) even after having experienced such a disastrous flooding event?**

Most of the reasons cited by the community members for their continued occupation of the area are the same or are inextricably related to those given for their original settlement in this area. Immediately after



the December 1995 flood some people were temporarily settled in community halls and some in tents provided by donors and sympathisers. However, it was not long before these people started moving out of these centres to their original flood prone areas. Others went to stay with their relatives and/or neighbours. Why do these people go back to these dangerous places? Is it either because they forgot about the floods and its consequences or that they have nowhere else to go? It is apparent that these questions suggest answers in themselves. Different people gave different reasons for their persistent occupation of the area, for instance:

- Some people (24%) claimed that Azalea is not dangerous in as far as flooding is concerned. This view existed either because these people might have experienced flooding only on one occasion and therefore viewed it as an accident or because, as they claimed, the river is too narrow and shallow to burst its banks during floods. Secondly, they claimed that floods do not occur regularly in the area. These people expected no flooding in the near future because flood is not a regular event in the area.
- Community members about fifty (forty five victims and five non flood victims) claimed that authorities promised that the river would be canalized, roads and houses renovated and bridges extended and were further told that this would help in curbing flood damages. They were therefore relying on these promises and believed that they would be fulfilled in a near future, that is, before the next floods.
- As already mentioned some people did not want to leave the area solely because they did not want to part with their relatives, friends and neighbours. Some found it difficult to abandon their property without being compensated.
- Some (12%) continued to stay in the area because they wanted to capture the attention of the government and other donors. They saw it as the government's responsibility to help them find an alternative viable settlement area, which means that they saw it as within their rights to be assisted by the government. They articulated that they wanted the government to deliver the goods as it promised.
- Some (25%) people claimed that the benefits associated with settling on these flood prone areas outweigh the losses associated with such an activity. These benefits include security of tenure, no rates and services payable and proximity of the place to their work places.



### 5.3.3 Why do some consider relocation as an option?

From the study it was discovered that some people (one hundred and eighty or 72%) were willing to relocate. This figure consists of hundred and thirty victims and fifty non victims. Some of the reasons put forward for their willingness to relocate were:

- A majority of people (68%), victims and non victims were concerned about the possibility of flooding in the future.
- Eighty of the respondents (32%) were clamouring for land ownership and security of tenure. This concern was raised mostly by tenants. These people comprised of forty five victims and thirty five non victims.
- The view was also voiced that the tents in which most of the flood victims were temporarily housed were not safe. When it was windy these tents were blown over with relative ease, which means that the situation could worsen during heavy rains.
- Those people who were informed that the government would build them houses should they consider resettling, said they could move provided they were given land on which to build their houses and financial assistance by the government.
- Those who experienced floods on numerous occasions, wanted move to safer places. They regarded the area as environmentally unsuitable for residential purposes.

### 5.3.4 People's perceptions of the flood and/ or future flooding

#### 5.3.4.1 Causes

In as far as flood causes are concerned, people came up with different responses. The majority (60%) of the people agreed that the Christmas floods were caused, if not exacerbated by the degraded environmental conditions of the area. The figure consists of forty five percent victims and fifteen percent non victims. Characteristics such as lack of vegetation cover, erosion and bad soil structure, among others, were pointed out as primary causes or contributory factors for the increased run-off. The secondary causes were alluded as poor roads, lack or shortage of drainage structures and storm water storage reservoirs or dams, poor bridges and pavements, and poor housing conditions.

People's beliefs and values have an impact on their thinking. Superstitious beliefs play a major role among the communities not only of Azalea but also of the whole Edendale Imbali complex. Different people had different beliefs about the flood and its causes. Some of the common non scientific beliefs include:



- The Christmas Day 1995 floods occurred because somebody killed a mermaid, which, according to this belief, must not die alone but with hundreds of people. This, according to them, is the reason why hundreds of people have been killed as a result of the flood.
- Some believed that God was very angry about the lives of His children that were lost as a result of political battles between the ANC and the IFP.
- The disaster was believed to be the first of its magnitude in the province. These people believed that this disaster started in Edendale because of the political violence (that God is said to be angry about) which allegedly started in this part of the province and eventually inflamed the whole province then the whole country. The flood therefore, like violence, allegedly started in Pietermaritzburg. It would then continue to other areas before recurring in Pietermaritzburg.
- Some believed that people in those neighbourhoods that were worst affected by the floods, might have killed a monster (makhandakhanda / inkanyamba), a huge mythical snake (with seven heads) which allegedly lives in deep waters. This mythical snake, when provoked, allegedly leaves the water and flies across the land and causes damage along its route.

#### **5.3.4.2 General hazard perception**

It was discovered that the perception of environmental problems and hazards is closely related to the frequency or the constant occurrence and magnitude of such an event. For instance, some respondents (30%) did not perceive any disastrous future flooding within the next five years or so because the last flood of this nature (the 1995 December flood) was experienced or occurred in 1987. Twenty four percent (6% victims and 18% non victims) of these people expressed no expectation of flooding nor feelings of fear whatsoever.

Fourteen percent of the people who did not foresee any possibility of flooding in the future, believed that the river plays no role in exacerbating flood damages in their area. They argued that most houses were swept away by water from roads, mountains and dongas. All of these people were non victims.

### **5.4 PEOPLE'S SUGGESTED SOLUTIONS**

Following below are some of the foreseen possible solutions to the flooding problem. Some of these suggested solutions could be adopted and implemented by the policy makers in formulating sound policies for sustainable floodplain/ catchment management. All numbers stated in this sub-section consist of victims and non-victims.



- Sixty percent of the respondents suggested that, if the area could be flattened, river canalized, bridges and houses renovated, mud houses demolished and prohibited the damages caused by floods during heavy rains could be reduced.
- Some people (twenty percent) claimed that free land should be made available to people staying in the floodplains as an incentive to resettlement. They further suggested that the land given to these people should be proportional to the population to which it is allocated.
- Some (ten percent) suggested that the area (Azalea) still requires inspection. They maintained that inspectors should be consulted to do a feasibility study in order to determine whether the area is suitable for residential purposes or if not, whether there is any possibility of making it such.
- It was suggested by some people (twenty percent) that, in the event of the authorities deciding to relocate people staying along the flood lines, it would be necessary to fence those evacuated areas and to place warning signs around them.
- Some suggestions were that people should be educated about the dangers associated with settling on flood prone areas.
- Finally, twenty two percent suggested that constant communication between the weather bureau and the media should be maintained so as to timeously notify people on floodplains about the possibility of a flood event.

## 5.5 CONCLUSION

This chapter is pivotal to this research in that it disclosed the affected communities' perceptions on flood hazards and their attitudes towards resettlement. The chapter further elicited, among other things, that experience of floods does not always influence people's perceptions of future flooding. It further discovered that a majority of people in Azalea claimed that they were not aware that they are situated in a flood prone area. Most importantly, the chapter established that about sixty eight percent of the people interviewed expected flood in the next five years. Twenty four percent of them did not expect flood in the near future. The remaining eight percent expressed their uncertainty about future flooding. It was further shown that seventy two percent considered resettlement as the solution to the problem. Even though the number of the people who would like to be resettled is relatively high, very few of them did evacuate the area. This situation epitomizes the difficulties associated with resettlement.



It was also illustrated that factors such as poverty, landlessness, political violence and a search for employment opportunities feature most among reasons for settlement in Azalea. It was further shown that these factors are so strong that people would consider staying in such a flood prone area rather than resettle. This chapter highlighted some of the reasons why some people considered relocation as a solution to the problem of flooding. Furthermore, it was shown how superstitions and social beliefs play a very important role in influencing people's perceptions of flood causes. Lastly, people's suggested solutions were also listed.



## CHAPTER SIX: ANALYSIS

### 6.1. INTRODUCTION

This chapter aims to show that people's perception are influenced by a number of factors. In this chapter factors such as flood experience, awareness of flood danger and fear of relocation to undesirable places will be explored in as far as they influence people's perceptions of future flooding and their attitudes to resettlement.

This chapter attempts to show that settlement on the floodplains is basically influenced by a number of interrelated factors that should be seriously considered by the policy makers and responsible authorities. These factors, as it will be shown, include: political instability, which was prevalent in KwaZulu-Natal, urbanization and a need for security of tenure. It is argued that most of these factors are socio- economic in nature.

Furthermore the apparent lack of commitment on the part of the responsible authorities which led to the uncontrollable invasion of the floodplains. It will be examined that maladministration and the reluctance to enforce existing legislation further contribute to the problem of floodplain settlement and consequent flooding. Finally, the role of population growth and migration play a fundamental role in influencing people's perceptions will be considered.

### 6.2 EVALUATION OF PEOPLE'S PERCEPTIONS

As it was presented in the previous chapter, there are different and sometimes opposing perceptions that people have on environmental hazards. This is prevalent even within the community of Azalea where, for instance, some people perceived the 1995 Christmas Day floods to be a hazard in respect of loss of life and property while others saw it as a benefit. Indeed what is believed to be a disadvantage to one person, may be an advantage to another. Farmers, for example, benefitted from the silt deposited on the floodplains by the flood waters which helped with regard to soil fertilization while, on the other hand, some people lost their lives and property.

During the study, it was discovered that people's perceptions of the flood were influenced, among other factors, by their perception of the benefits and costs of settling on the floodplains. The advantages and disadvantages are clearly summarised in the table (6.1) below. It is argued in this study that it is these costs and benefits that influence people's attitudes towards relocation.



that the purchase of property is not feasible. Floodplains then offer an available attractive option as a place to live. The need and the 'availability' leads to settlement. Whether settlement takes place with a full appreciation or in ignorance of the risks is largely immaterial because these people have no choice. It happens simply because there is no where else to settle. Most people who settle on the floodplains regard it as a temporary expediency whilst they get established and do not consider the risk significant. When the risk materialises, they wish to forget it easily and deceive themselves that there is no possibility of recurrence.

In terms of the findings, a clear relationship between risk awareness and expectation of future flooding was discovered. This relationship shows that awareness may be taken as an important factor influencing people's perceptions of hazards and their attitudes towards relocation. Although some of the people who were quite aware of the flood hazard and have experienced flooding several times in the area expected floods to occur within a year, others denied the possibility of future flooding. A majority of the residents were unaware of the flood hazard but many of them expected the recurrence of floods while few did not foresee such a possibility.

Lack of awareness can be used as a pretext by floodplain residents. This purported lack of awareness can be used (by them) in trying to justify their persistent occupation of these areas and also in order to avoid the possibility of their removal to places where they might not have access to resources or be affected by political violence. It was discovered by many researchers such as Smith and Tobin (1978) that, though people can be aware of the flood hazard, they either ignore or deny its existence and the possibility of it recurring and continue staying in the known dangerous areas. In addition, during his visits to a regularly flooded Vereeniging residential area, Clark (1996) discovered that residents were still prepared to stay in their houses even if the river was slowly rising. Some of the respondents in Azalea like the Ganga floodplain residents in India, as observed by Ramachandran and Takur (1974), were fully aware of the flood hazard but continued and still continue building their houses on the very same spots where their previous ones were flooded. It can therefore be argued that their persistent occupation of these areas is occasioned, *inter alia*, by a combination of a number of socio-economic factors like those mentioned earlier (in Table 6.1). Furthermore, their continued occupation might be because 'the benefits associated with floodplain settlement outweigh the losses associated with flooding'.

The development of floodplains for settlement is largely a function of ignorance of the consequences, a lack of commitment to enforce existing legislation/ regulation on the part of authorities, and/or ignorance on the part of the developers. In a similar fashion to the impoverished 'settler', the developer has identified flat land that is easy to build on; that is unoccupied; that is not privately owned; that contains resources;



and that is adjacent to transport links. Amongst all players, there is general ignorance of the general functioning of river and floodplain systems. Alexander (1993, p9) aptly observes that a "potential loss of life due to floods has continued to increase because of the increased occupation and development of flood prone areas for residential purposes"

The study also wanted to discover whether previous flood experience had an influence on people's perceptions. Here, the assumption is that people with previous flood experience would naturally expect future flooding while those without such experience would not. However, in Azalea some of the people who never had any flooding experience also perceived future flooding. These findings are, however, different from Smith and Tobin's (1979), who found that most of the people with or without personal flood experience were not expecting any future flooding. Based on these findings, it is befitting to argue that personal experience of floods is not an indispensable factor in influencing people's perceptions of future flooding.

Ownership and security of tenure are important factors in assessing people's perceptions, decision making and behaviour. In this study it was revealed that owners and tenants had different perceptions regarding future flooding. A majority of house owners seemed to be ignoring future flooding. They did not want to admit the possibility of floods occurring in the future. This is because in the event of flooding, house owners are more likely to undertake protective measures to prevent damage to their properties while tenants are less likely to do so. For example, some home owners in Azalea built parapet walls, paved their yards and put better roofing while tenants did nothing to prevent flood damages. The reason might have been the cost factor associated with such an activity and/ or the fact that the latter did not own the property. Furthermore, it is undeniable that home owners in these floodplains (who often reside in safer places) may not admit the possibility of future flooding since if they do, tenants would be inclined to move to safer places. This would consequently lead to loss of revenue by these home owners.

Economic pressures such as affordability and (un)employment are important in understanding people's perception and their desire to relocate or remain in the same area after the flood. Some people would remain in the area because they are economically dependant on it. For example, if their sources of income or work places are in or not too far from Azalea. For these people staying in the area is beneficial in the sense that, it reduces their transport or travelling costs to and from work. It is apparent that people would prefer to ignore the possibility of floods occurring in the future because of employment reasons and financial losses associated with relocation. If the costs associated with relocation are higher than the losses experienced when a flood occurs, then it could be argued that, under normal circumstances people would prefer to stay in these floodplains and bear the costs. Furthermore, it must be remembered that all these



relate back to the root cause of settlement in these areas - poverty. A majority of people in Azalea are, as stated earlier, unemployed and therefore financially unstable, which makes it difficult or too costly for them to relocate. Some people preferred to stay in Azalea because they had no choice. Some stated reasons such as availability of aid and relief funds as the cause of their continued stay in the area. In such a situation, it can be argued that the provision of relief to floodplain occupants may, to a greater extent, reduce people's concern about and/ or fear of flood hazard. Provision of aid and relief may well increase the potential for loss occasioned by these flood disasters. In their studies, Ward (1978), White (1974) and Sewell (1969) found that the provision of financial aid to floodplain dwellers after a flood may substantially increase the potential of flood damage, since people would continue to stay in these areas in expectation of such assistance. They all agree that the provision of aid will encourage new developments and settlements in flood prone areas and further aggravate the problem. It seems apparent therefore, that there is general agreement that the provision of relief and other financial assistance contribute to the continued settlement on the floodplains. Though flood relief funds appear to be necessary on humanitarian basis, they may generate a poor or negative response to the flood hazard, in the sense that people will view relocation as a loss in as far as cost benefit analysis is concerned. However this argument must not be construed as suggesting that people must not be supported or compensated by benevolent organisations and individuals in times of disasters and need.

Some of the reasons people gave about their reluctance to relocate have some political dimensions or connotations. For instance, some people said they wanted to remain in the flood prone areas of Azalea because they wanted to attract the government's attention. These people commented that they wanted the government to speed up the Reconstruction and Development Programme (RDP) process of relocating and building houses for them. In this regard, most people articulated that they were only willing to relocate if they would get financial assistance from the government. It is worth mentioning that these reasons are a manifestation of the way people perceive the Government of National Unity (GNU), its role and responsibilities. This perception seems to be more prevalent within the communities that were historically suppressed and discriminated against by the past government. They seem to perceive the GNU as more of a delivery process than a government.

In as far as fear of the flood hazard is concerned, it was observed that age and gender play a major role in influencing the way people think and in triggering people's memories of the last flood. For example, in Azalea, males expressed significantly less fear of flooding than females. Furthermore, males seemed to be more ignorant of the hazard than females. The youth, on the one hand expressed their fear of future flooding whilst older residents on the other hand tended to express the most intense fear. Males, especially the youth, expressed high tolerance in as far as flood losses are concerned whilst females (mostly elderly)



seemed to be intolerant of any flood related damage. It could be argued that this is to some extent a manifestation of the social system which, among others, perpetuates gender inequality by providing that males should not easily exhibit remorse and must tolerate all mishaps as opposed to women.

People's love of the area or sense of place also plays a vital role in influencing the way people view flood hazards and the environment around them. Some people expressed that they were so used to the area that they found it difficult to leave it for another. It is submitted that, this is a true reflection of human nature and the sense of oneness or belonging which is inherent in human beings. Most people voiced out that they were so attached to the area that they did not see a more peaceful area around Pietermaritzburg than Azalea. As stated earlier, the majority of the people in Azalea have a long and harsh history of being victims of political violence, torture and victimisation. To these people, a safe place is a politically stable area like Azalea where there is relatively no violence.

Social status also affects the way people think about resettlement and the possibility of future flooding. People who are in authority (mainly in political positions) are less likely to admit the possibility of future flooding and are reluctant to leave the floodplains since abandoning the area might result in them losing their positions. This is so because their relocation might cost them their constituencies. This is one of the reasons why these political leaders end up deceiving themselves and others regarding the possibility of future flooding. Since these political leaders are more influential, they tend to use that opportunity to persuade people to have some false sense of security regarding the safety of the floodplains. For instance, in Azalea most people expressed that before the local elections (that took place in May, 1996), they were allegedly promised by the campaigning councillors that the government or a person they would vote for as their local councillor would build them better houses if they did not relocate. The residents found it difficult to leave the area notwithstanding the fact that they might be aware of the danger associated with the area. This is mainly because they did not want to miss the opportunity of being provided with better housing. In this regard, one could argue that these political leaders' behaviour cannot be justified since there is no value that can be attached to human life. Based on this, it may be justifiable to contend that political office should not be used in such a manner that it would make other people's lives miserable. If these allegations could be found to be true, future losses occasioned by continued settlement along the flood lines may justifiably be attributable to those few individuals who claim to be fighting for the people whereas they ruin their (people's) lives.

Maladministration and/ or unequal distribution of resources affects people's attitudes and perceptions of environmental problems. This is a recurring problem inherited from the past government and its homeland system. Notwithstanding an enormous number of people whose lives are at stake due to their continued



settlement on the floodplains, these settlements continue to be developed, especially the townships. Their continued development is largely attributable to maladministration on the side of the authorities. The development of these areas means that the government or certain government officials, generate a lot of money from the developers which money is taken from unsuspecting prospective homeowners. These government officials disregard the existing legislation which prohibits construction of buildings along the flood lines. The relevant legislation include certain provisions of the (National) Water Act 54 of 1956 (Section 169 A); National Building Regulations and Standard Act 103 of 1977; and the Pietermaritzburg Town Planning Ordinance 27 of 1949. There is a possibility that these government officials, especially in the past, allotted these areas for development because of ulterior or personal motives. The ease with which this maladministration continue unabated can be blamed on the foundation that was laid down by apartheid laws, and in particular the Group Areas Act.

Furthermore, some officials exploit flood victims by using relief funds allocated to these people by the government and other sympathetic donors. This behaviour has the effect of freezing any attempts to encourage the flood victims to evacuate flood prone areas (because this funds could be used by flood victims to relocate to a safer place). For instance, in Azalea, though it was claimed that flood victims obtained financial assistance in the amount of about R4000 per household, most people denied having received such or any related financial assistance. The problem arose when it was discovered that some of the genuine flood victims recovered nothing from the government's financial aid whereas some non flood victims received some compensation at the expense of actual victims. If the flood relief funds were well managed a situation like this would have been prevented.

Population growth, migration and the stigma associated with it (like been shunned by the new community in which one finds oneself) are also influential factors in people's perception of the hazard and attitudes to relocation. This is so because population growth leads to shortage of residential areas, shortage of land and employment opportunities and socio-political instability. Since most people came to Azalea because they had no where else to go, they therefore found it impossible to move to any place. This influenced them to ignore the possibility of future floods. They deceived themselves that the December 1995 flood was the last to occur in the area. The stigma associated with migration or relocation makes people reluctant to consider resettlement as an option. Political tensions between the ANC and IFP in this province, particularly Pietermaritzburg and its surroundings, play a major role in shaping people's views and feelings about moving from one area to another. In KwaZulu- Natal, a place of residence is either an IFP or ANC stronghold. This is to some extent epitomized by political intolerance exhibited by residents of one area against those of another. In a place like this where people have been greatly affected by violence, trust is far removed from their list of considerations.



### 6.3 CONCLUSION

In this chapter, arguments were presented that people's perceptions are influenced by a number of factors. This chapter demonstrated that social factors such as age, gender, social status and personal experience play a very important role in this regard. Most importantly, it illustrated how people's perceptions can further be influenced by the perceived benefits associated with floodplain settlement. Some of these benefits include; security of tenure, social and political security, proximity of the place to the city and factories (employment opportunities), access to necessities like water and transport and the escape from poverty stricken rural areas. It is against this backdrop that it is argued that the attitudes of some people towards resettlement is bound to be negative. It is befitting to argue that, among the people who are opposed to resettlement, a majority of them are only afraid of losing these benefits. This chapter illustrated that some people may be afraid of removal from Azalea which could imply an end to the enjoyment of the benefits. Most of the responses given by the people to the questions posed to them were largely influenced by a consideration of these benefits. Finally, it was shown that it is extremely difficult, if not impossible, to get the accurate views of the people on the issue as sensitive as the one on the possibility of future flooding and resettlement.



## CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

### 7.1. INTRODUCTION

This chapter is divided into two broad categories. It firstly deals with conclusions and secondly, it discusses recommendations. The section on recommendations is further divided into three subsections. The first subsection considers general recommendations directed to all levels of government in the country. The second covers specific recommendations to the local authorities (Pietermaritzburg- Msunduzi TLC) and the third subsection presents recommendations to the University of Natal.

The first section on conclusions begins by showing the socio-economic and political dimensions of the flooding problem. In this section it will be discovered how the problem of floodplain settlement is inextricably linked to the socio-economic and political problems afflicting the country as a whole. It will then illustrate how the policies of the previous apartheid government greatly contributed to the deterioration of the environment. It is the degradation of the environment that aggravates the flooding problem. The section further illustrates that the problem of floodplain settlement should not be considered in isolation from the socio-economic and political factors such as population growth and unemployment.

In a section on recommendations, a number of general recommendations are discussed. These general recommendations include: the responsibilities of the present policy makers; a need to balance environmental and developmental issues; general education on environmental issues; good governance and a need for a holistic and more integrated people centred participatory approach in solving the flooding problem.

The sub-section dealing with specific recommendations is divided into short, medium and long term recommendations. Under short term there are recommendations such as general education; the integration of administrative and management structures and flood proofing measures. Under medium term, the following recommendations are made: identification and demarcation of the land intended for resettlement; flood abatement and flood control mechanisms. Long term recommendations include the following: resettlement of floodplain settlers; development controls and agricultural practices.

As already illustrated in chapter one, some people and communities, not only of Azalea have a negative attitudes towards the University of Natal. This is because of a conventional view of the University which is prevalent among both the community members and the University and its community. In the past, an institution of higher learning such as a university was portrayed and seen as the prerogative of the academics, with less interest in the issues affecting the communities around it. Universities did not play a



role they should have played in developing and trying to alleviate the problems afflicting neighbouring communities. Recommendations in the final sub-section show that if the University and the neighbouring communities, especially in the Greater Edendale, could work together the problem of flooding might be alleviated, if not solved. It will be shown that the University can be a platform or a medium through which problems, such as flooding, affecting the communities could be communicated to the authorities and therefore taken seriously. The University will in turn be enriched by the experience that could be imparted by some of the community members. It is worth mentioning that this subsection was not part of the recommendations which were initially envisaged in terms of this research. However, during the process of data gathering, it was realized that these recommendations are worth making in this study.

## 7.2 CONCLUSIONS:

### 7.2.1 Socio- economic and political dimension of the problem

The flooding event that occurred on the Christmas day of December 1995 was a natural phenomenon that would have occurred no matter whether people were staying there or not. It is arguable that the problem that leads to flood related disasters is socio-economic and political in nature. This can be substantiated by Ramphela and Mc Dowell's statement which goes "... for in South Africa environmental issues are deeply and fundamentally political" (Ramphela and Mc Dowell; 1991, p15). The December flood disaster was therefore, just a manifestation of the socio-economic and political problems that the country as a whole is experiencing. Most of these socio-economic and political problems are as a result of the policies of the ~~past governments~~. It is submitted that policies of the past governments did not only fail to prevent disasters but also contributed to the severity of the disasters in many ways. For example, the majority of the people who were affected by the floods are residents of the townships (which were created by the apartheid government).

As already stated above, the flood itself was not a problem. The real problem can be discovered by answering the question- why do floods become disastrous? An answer to that would be floodplain occupancy. Smith and Tobin also support this statement when they argue that, "the increase in floodplain occupancy is certainly one of the main significant causes of the general rise in flood damages, since this trend has gradually placed more and more lives and property at risk" (Smith and Tobin; 1979, p2). If occupancy and the land-use practises in those floodplains are the causes of these disasters, the main problem will therefore be found by understanding and answering the question- why do people settle on dangerous places like flood prone areas? There are pressures that compel people to settle on the floodplains. These pressures, as it is shown in table 7.1, are socio- economic and political in nature. Most of these pressures have already been exhausted in chapters five and six.



**Table 7.1 The pressures that cause floodplain settlement, their causes and solutions.**

PRESSURES	CAUSES	SOLUTIONS
POVERTY	Weak economy Depleted resources Overpopulation	Improve economy Sustainable use of resources Family planning
VIOLENCE	Political instability Poor quality of life	Political stability Equal distribution of wealth Improved environmental quality
LANDLESSNESS	Overcrowding Inappropriate urban planning	Decentralization
MALADMINISTRATION	Inequitable and ineffective service Inappropriate laws and policies	Enhance commitment to service Build capacity to serve through training
LACK OF CHOICE	Dis-empowerment Lack of choices	Development of democratic community structures Community participation in planning and development Provide choices

Indeed occupancy of the floodplains is the problem but, as the table 7.1 shows, it is immersed in a morass of other problems which have to do with the distribution of power and resources. In South Africa, floodplain occupation is rooted, *inter alia*, in the socio-economic inequalities of the past government with its policies of apartheid. During the apartheid era people of different racial groups were treated differently for unjustifiable reasons. Resources were not equally distributed among the different racial groups. Black people were treated unjustly and lacked access to resources. For example, as Ramphela and Mc Dowell (1991) note, in 1960 whites, who constituted less than one-sixth of the whole population earned almost two-thirds of the total income of South Africa. In the same year, 50% of the total South African population was found to be living below the Minimum Living Level (MLL). Within the African population throughout the country, the proportion living below the MLL was estimated to be nearly 66%, while in the "homelands" it was 81% (Ramphela and Mc Dowell; 1991, p1).



World Bank studies show that in 1978 and 1986 South Africa had the highest level of inequality of all countries for which statistics had been kept (in Ramphele and Mc Dowell, 1991). For example, as a result of the Land Acts of 1913 and 1936 Africans who formed the majority of the country's population, were allocated only 13% of the land. It is these Africans (occupying 13% of the land) who are worst affected by disasters. Azalea is a good example of the effects of these legislations.

It must be emphasized that the problems occasioned by the apartheid government must inevitably be inherited by the present government. It is submitted that there are other problems (probably not caused by the apartheid government) which aggravate the problem of floodplain settlement. These problems include population growth and immigration. Immigration is becoming increasingly problematic in for South Africa. Immigrants from neighbouring countries illegally cross into South Africa in search of 'greener pastures'. These immigrants are content with any residential place since they fear repatriation. They then end up settling on the floodplains. This then aggravates the problem of floodplain settlement and ensuing consequences.

#### **7.2.1.1 How did Apartheid policies contribute to environmental degradation?**

According to Asmal "a 150 000 people currently live below the 1 in 50 year flood line because apartheid planning, poverty... have put them there" (Asmal;1996b, p30). The Land Acts of 1913 and 1936 increased the pressure on the 13% of the land reserved for use by African people, with disastrous ecological consequences. Under the Nationalist government's policy of apartheid, massive removals of communities from productive to unproductive land increased the pace and extent of environmental destruction. As a result of the fact that the land set aside for Africans was barren and unproductive, its occupants were so poor that they ploughed this marginal land while trying to make a living under desperate circumstances. This greatly contributed to the degradation of the environment.

Furthermore, Black people were forcibly removed, in accordance with the Group Areas Act of 1950 and other legislation, from environmentally suitable and economically viable places (from areas near their places of employment) to far-off locations reserved for black occupation, that is, the environmentally degraded homelands. For example, until 1986 the main movement of the African population was to the overcrowded homelands. Since those areas were not environmentally sustainable, the people's occupation exacerbated environmental problems.

However, with the repeal of the influx regulations and pass laws in 1986, the gates of African urbanization were metaphorically opened. Since then Black people started moving into urban areas. It is estimated that "between 1980 and 1985 about 100,000 people moved into the urban areas, that equals 20,000 per year"



(Urban Foundation estimates, quoted in Ramphele and Mc Dowell; 1991, p5). The more people move into an area the greater the shortage of land and/ or residential areas. This is one of the reasons why people end up finding themselves in dangerous places such as the flood prone areas of the Edendale valley.

Apartheid policies and legislation in operation since 1948 added a new and profoundly destructive dimension to the deterioration of the country's natural resources, mainly soil and vegetation, particularly on those very homelands which have been the cornerstones of apartheid. And, just as apartheid permeated through every aspect of life in South Africa, there is no doubt that it is at the centre of environmental degradation. The widespread overgrazing, desertification, deforestation, soil erosion and serious land degradation in the so-called 'homelands' constitute the unavoidable destructive consequences of apartheid. Furthermore, according to Asmal (1996b, p30), the previous government's "fantasy of self reliance" had also encouraged unwise agricultural cultivation, and repeated government assistance in crises "abetted the continuation of unsustainable agriculture in areas where extreme events such as drought and floods should have been treated as regular and predictable factors". Based on this statement, it is befitting to argue that the root cause of people's suffering because of flooding is, *inter alia*, a result of apartheid policies.

Furthermore, the narrow environmental thinking, insensitive and environmentally unsound policies which disregarded what may be termed 'black survival needs', contributed to the degradation of the environment. These policies and practices alienated many of the Black communities from environmental concerns. As a result of that, most black people developed a negative view of environmental issues. This was mainly because, "often the establishment of game reserves has meant the expulsion of local people from their homes, loss of arable and grazing land and considerable distress" (Ramphele and Mc Dowell, 1991, p13). Following from this, it can cogently be argued that the negative environmental perceptions and attitudes of many black people are attributable to apartheid policies.

#### **7.2.1.2 Environmental degradation and flooding**

How does environmental degradation link with flooding? As it is already mentioned, population growth is the most common and significant factor that leads to acute environmental pressures experienced by most parts of the country, especially the townships and rural areas. Poverty is also one of the root causes of environmental degradation, constituting a vicious circle of inability to care for the environment that becomes extensively degraded and exploited for survival. Because of the high demand for shelter, food and fuel, these areas are denuded of their original vegetation. Trees are cut for firewood and the fragile soils are ploughed. The absence of vegetation cover leaves the soil bare and exposed which in turn makes it more prone to erosion when strong winds and heavy rains come. Floods also yield disastrous effects as a result of this situation. Where there is no vegetation cover the soil's ability to absorb water is lessened.



When rain falls, the water fails to easily soak into the soil but instead runs off, taking precious top soil along. Trees also play a very important role, they bind and enrich the soil, making it relatively "indestructible", by enabling it to attract or easily absorb rain water. The absence of trees make the soil more vulnerable to floods.

## 7.3 RECOMMENDATIONS

### 7.3.1 General recommendations

It is suggested that South Africa should lead the Southern African region in trying to control natural disasters. Failing to address the problem of natural disasters now may have significant consequences on the economy of this country and of the region as a whole in the future. All responsible authorities in this country should indicate their willingness to solve the problem of natural disasters. By so doing, they would be in step with the International Decade for Natural Disaster Reduction (IDNR) 1990- 2000, a UN-led campaign to reduce the impact of natural disasters. Political commitment is very important if this campaign is to succeed.

It must be emphasized that radical solution to the problem of floodplain settlement may not be emphasized in the short term. Even though it is strongly suggested that people should evacuate the flood prone areas, it is important for the authorities to note that all factors- social, economic and political- which compel people to settle in flood prone areas should be taken into consideration when attempting to relocate these people. In order to address the problems associated with current forms of floodplain development and land use, there is a need to adhere to the following fundamental principles:

- ▶ Both the causes and the consequences of the problems must be addressed.
- ▶ If the fundamental causes- poverty, <sup>equitable protection</sup> ignorance, landlessness, lack of commitment - are ignored attempts to address the consequences will fail.
- ▶ If the consequences are ignored the risk to life and livelihoods will continue in the short term.

It must be noted that most of the negative impacts of floodplain settlement can be mitigated through the adoption of non- structural flood control measures and regulation of floodplain use. Furthermore, non-structural control measures aim to prohibit or regulate development on the floodplain and catchment areas or flood proof existing structures, to reduce the potential for loss from flooding. These measures are less costly than structural measures to install. These recommendations are now discussed in turn.

#### 7.3.1.1 Implications to Policy Makers

There are compelling reasons to support Ramphela and Mc Dowell's argument that "a vigorous approach and/ or alternatives to past policies and practices will be needed to repair the damage of the past and great



care must be exercised to avoid further undue strain on both the environment and the people" (Ramphela and Mc Dowell; 1991, p6). Since the apartheid system is abolished, it is crucial to repair the damage it created on the environment and its resources. This is essential in alleviating institutional environmental damage such as that caused by the 'homeland system'. This may be successfully effected through the institution and adoption of strict, sensitive and sound environmental and developmental policies. At the same time there is a need to ensure that the needs of the majority of the people are met. Such policies should involve what may be called 'a balancing process'. This process would require the policy and decision makers to ensure that limited resources are fairly and equitably distributed between the citizens of this country while at the same time taking great care not to degrade the environment. Failing which, environmental hazards such as flooding may be aggravated. The effectiveness of policies is rooted in the fact that a sustainable reversal of environmental destruction needs to be accompanied by the force of law.

It is submitted that policy makers in this country should take environmental issues seriously. In his speech on disaster management, Asmal commented that flood and disaster management in general are issues of strong debate and contention (Asmal; 1996b). He further articulated that, it lies at the door of government, in partnership with civil society, to create a situation where these tragedies (natural disasters) can be avoided to the best of human ability.

The present government is now entrusted with the responsibility of ensuring that floodplain management policies are established and implemented. There should, for example, be legislation that compel floodplain dwellers to manage their floodplains. "Any floodplain can be zoned into strips, parallel to the river, according to flood risk" (Smith; 1996, p10). This would help in saving their lives and property in times of floods. The government should ensure that unoccupied floodplains are not sold and developed for residential purposes, something which was common in the past.

Responsible authorities and policy makers in this country should guard against repeating the mistakes of the previous governments. A clear example of the previous government mistakes is the Ladysmith saga. Smith and Guastella (1996, p8) note that Ladysmith is an example of a place where "urban development was allowed within stipulated flood line and so the chances of flooding are now greater than 5%". Furthermore, the high death toll caused by the 1995 Christmas Day Umsunduzi River flooding could have been avoided if informal settlement had not been allowed so close to the river. Finally, it is argued that there is a direct and symbiotic relationship between human poverty and ecological destruction. If poverty can be understood as a form of grave imbalance of the wider ecological system, then policy makers are bound to formulate environmental policies which take into consideration the socio-economic circumstances of the majority of South Africans.

*There are most vulnerable people (p8); 16 protection of lives*



### 7.3.1.2 Balance between environmental and developmental issues

There is a need to balance environmental and developmental issues, that is, a need to balance environmental planning and the provision of basic needs. This can be done through the integration of development planning and disaster management since there is an interactive relationship between disasters and development (disasters impact negatively on development). Disaster management need to be proactive rather than reactive. In the past, attention had been focussed only on the post disaster recovery phase rather than being preventative. It is imperative that any disaster management strategies should address the root causes of the disasters concerned rather than treat the symptoms. This is in accordance with the maxim 'prevention is better than cure'. For any sustainable development strategy to be successful, disaster mitigation should be taken into consideration. If this is disregarded, disasters can seriously degrade the country's long term potential for sustained development. It is in this understanding that some funding be diverted from the Reconstruction and Development Programme (RDP) in order to not only rehabilitate flood stricken communities but also to be invested into flood prevention programmes.

### 7.3.1.3 Education

It is also necessary to educate or conscientize people (especially Africans) whose previous involvement in environmental issues was limited during the apartheid era. This was due to the fact that, black people have been so often taken up with the struggle to survive that they had little time or energy left to think about environmental concerns. The public needs to be made aware of the 'annihilation' of the environment that is taking place as a consequence of the extensive use of wood for fuel. Furthermore, these people must be made aware of the dangers associated with their settlement on the floodplains.

### 7.3.1.4 A holistic and integrated participatory approach

It is further recommended that a holistic and more integrated, people centred, participatory approach to environmental issues should be used as a vital tool in trying to solve or alleviate these problems. It must be realized that the narrow, authoritarian, top- down approach of the past governments failed to foster in people the love of the environment. This approach was premised upon a belief that saving the environment was equivalent to saving wild animals. The survivors of floods and other people who are staying in flood prone areas must be the primary role players in any envisaged development project that is to take place in their area. Without their involvement, willingness and enthusiasm to relocate, any resettlement endeavours could be a failure. If the people are aware of the costs associated with their settlement on the flood prone areas, they will be in a better position to make sound judgements and decisions.



### 7.3.1.5 Good governance

It is clear that, in this country most of the politicians and other authorities are so immersed in crisis management at local, regional and national level that there is little scope for considering the environment around them. A shift from 'conventional conservation', (for instance the establishment of game reserves) which is often at the expense of people's welfare, to what Ramphele and Mc Dowell (1991,p15) refers to as "green politics", is essential. Green politics regard people and the environment as intimately connected and "links the struggle against poverty and social injustice with the struggle against abuse of the environment" (Ibid).

It is a commonly known fact that previous governments used to make decisions unilaterally without taking into consideration the needs and views of the local communities. Community consultation and involvement was not known in this country. However, there is no or little doubt that days are gone when authorities could independently and arbitrarily make decisions on issues of fundamental importance to the welfare of communities. People empowerment and people participation in environmental and developmental issues is of vital importance for a democratic country, healthy environment and sustainable development. That is why it is strongly recommended that any development should be characterised by community involvement and acceptability. There is a multitude of reasons why an interactive approach is sound, such as: Firstly, it is the members of the community that have a very good understanding of the local area and its needs. Secondly, any developmental proposal needs the support of the target community if it is to succeed. And the only way to ensure this is to involve the community in decision making as well as in the planning process, because, it is only when people actively take part in solving their own problems that lasting development eventuates.

### 7.3.2 Specific recommendations

As it has already been reiterated, the complexity of the problems must be acknowledged since they are rooted in the fundamental socio-economic and political character of the country. It must be borne in mind that there is no 'quick fix' of the problems described. It must also be remembered that causes and consequences are inextricably intertwined and the dichotomy between them is often blurred. Consequences are often the cause of further consequences [for example, the consequence of political disempowerment is poverty which leads to floodplain settlement, which in turn is the cause of reduced health which causes a declining productivity which in turn impacts on national economic performance, ultimately national economic performance impacts on political (dis)empowerment].

Furthermore, in order to come up with lasting solutions, it is important to divide these recommendations into short, medium and long-term. The ultimate goal, as already mentioned, must be the resettlement of



the communities situated on the floodplains. However, it is important to note that the cost, financial or otherwise, associated with such an activity is so immense that the process will be a protracted one. For example, if the Pietermaritzburg- Msunduzi Transitional Local Council were to relocate all people currently living in areas of risk, the immediate financial cost to the TLC is estimated to be between R45 million and R80 million. These figures, however do not include the losses incurred by those being resettled, nor do they include the cost of relocating those who will settle in the future. If relocation is to be adopted by the TLC, a cost-effective relocation strategy is of utmost importance. Therefore the cost associated with this activity does not necessarily mean that nothing should be done in the interim. According to Asmal (1996b), there are two directions from which to approach the reduction of disaster potential: the conventional, technological approach and the reduction of vulnerability. On the technological side, "smaller floods can be controlled by structural means such as raising river banks and providing for flood attenuation capacity in dams. Land use controls, flood forecasting and warning, and emergency preparedness could also be employed, according to Asmal (1996b). The minister further commented that communities should be made less vulnerable (Ibid). Better living conditions, better health and nutrition, improved infrastructure, increased literacy and educational standards, and improved income will all reduce the vulnerability of communities.

### **7.3.2.1 Short Term Recommendations**

#### **(a) General Education**

There is general agreement among specialists that education is at the core of any strategy that may be initiated in order to alleviate, if not to eradicate, flood related losses. It is suggested that efforts should be made to educate the general public about the dangers and costs associated with settling on the floodplains. This must be done with a view to making the public to understand and appreciate the need to relocate. It is suggested that funds should be made available for the training of educators who would be responsible for the implementation of the education policy designated for general public regarding resettlement. This can, among others, be effected through the utilisation of pilot projects. Alternatively, if the cost associated with was astronomical that it would greatly affect any contemplated relocation plan, the education of the public about the dangers associated with settlement on the flood plains should be integrated in the present formal education system.

#### **(b) Provision of adequate flood forecasting and warning to those living at risk**

It is suggested that, since the TLC has a moral (and probably legal) obligation to protect its residents, adequate warning should be implemented. According to Alexander (1993) engineering solutions such as the construction of flood control dams, flood levees and river canalisation are costly and do not reduce the risk in the long term. Therefore, according to him, "the only viable option to reduce the risk of life is



to operate efficient flood warning systems" (Alexander, 1993, p9). Improved satellite communications and computer analyses have increased the ability to predict extreme weather events. It is important therefore for the TLC to develop and implement technical and human capacity to provide warning. Among other ways in which this can be effected, the appointment of official flood wardens would be a great benefit to the floodplain residents. These wardens could be a source of information to those residents or act as liaison persons between the weather bureau and the communities concerned.

The wardens can also play a major role in the dissemination of the warning message, when acting as initial receivers of the information alerting the people about flood dangers. As Smith and Tobin argue "most floodplain dwellers are likely to respond favourably to a warning from an authoritative source" (Smith and Tobin, 1979, p116). This procedure could enhance the credibility of the warning message. Preparedness occasioned by forewarning is the most important factor in saving life and property threatened by flood waters. It is commonly known that when faced with a flood and the possible loss of life and property, human beings cannot be expected to act in an entirely rational manner. In such a situation emotion dominates reason. "But foreknowledge and forethought can prevent utter chaos" (Hoyt and Langbein, 1955, p104). Hoyt and Langbein's statement that "a community flooded without warning is like a crowd trapped in a burning theatre" is fully supported. Furthermore, the use of sirens, rainfall stream flow and soil moisture content monitoring and associate telemetry is recommended.

### **(c) The integration of administrative and management structures**

It appears that, although the PMB-Msunduzi TLC now has the responsibility of administering the Greater Edendale Complex, little integration of the 'old' administrative structures has taken place. This has led to considerable duplication, confusion and general inefficiency. It is therefore difficult if not impossible for the TLC to embark on any strategy if it is not directly responsible for the day- to- day administration and management of the area. Since institutional co-ordination and integration is critical it is recommended that the TLC put considerable effort into promoting interdepartmental co- ordination and co-operation; developing informed and effective leadership structures; establishing forums for co-ordination at a regional and catchment level and build the capacity to effectively support community structures and initiatives. All government departments and organisations involved should be drawn together so that integrated environmental and developmental planning and pro-active action take place.

### **7.3.2.2 Medium Term Recommendations**

#### **(a) Identification and Demarcation of land intended for resettlement**

It is evident that before any resettlement can be effected, areas where people can be relocated should be clearly identified and demarcated. It is suggested that in so doing, care should be taken not to disregard



people's socio-economic needs. Furthermore, it needs to be ascertained that areas demarcated for such resettlement are not flood prone.

### **(b) Flood abatement and Flood control**

As stated earlier, it is acknowledged that relocation will take time and may encounter resistance. Many studies conducted on floodplain behaviour have proved that absolute human control in flood prone areas is impossible due to numerous and often conflicting political, social and economic pressures associated with the development of such areas. The failure to control human behaviour in flood prone areas led to the development of strategies and mechanisms to control the flood itself. As a result, mechanisms such as flood control and flood abatement are usually adopted. (Usually, when a floodplain is developed for settlement, flood protection must be afforded.) Therefore, protection in the form of risk reduction and not elimination is afforded through structural measures, (the most common of which are river channel modifications.) Flood abatement is one of the two approaches that help in controlling flood damage. This approach is, according to Ward (1978, p132), "a land-use modification or some after action taken with the catchment area upstream of a given flood hazard location to reduce the severity of flood consequences". This is sometimes referred to as watershed (or catchment) management. The second approach called flood protection refers to the physical controls constructed in the river channel or along the coast to reduce either the peak discharge, the area of inundation or the depth of floodwater (Ibid). The two approaches are discussed below.

#### **(i) Flood abatement**

The consideration of the physical factors that can contribute in reducing flood magnitude is deemed necessary for some parts of the country. Such factors include the introduction of vegetation cover having either "high interception capacities, which reduce the amount of precipitation entering the soil moisture store, or higher contraception rates, which increase the available water storage capacity in the soil profile" (Ward,1978.133). This method is of great necessity in a denuded area like ~~Azalea~~ which has little vegetation cover and no form of plantations. In an area like Azalea it is strongly suggested that trees be planted and parks developed, more especially along the river banks to prevent further flood related damages.

#### **(ii) Flood control or Flood protection**

Flood protection or control refers to "the attempts to minimise or mitigate flood damages by means of structural measures in a way which is economically feasible" (Ward, 1978.145). This approach involves the utilization of physical structures such as (1). The construction of embankments (sometimes referred to as dykes or levees) and flood walls to confine the floodwater ; (2). The improvement of river or flood



channels to enlarge their discharge capacity, for example, by straightening, widening or deepening; (3). The construction of bypass and diversion channels to carry some of the excess floodwater away from the area to be protected; and (4). The construction of reservoirs for the temporary storage of floodwater. Each of the four approaches listed above has its merits and demerits. However, a need for further research concerning the efficiency of these mechanisms is necessary in order to attain lasting results.

### **7.3.2.3 Long- Term Recommendations**

The immediate consequence of floodplain settlement is that there are people living on the floodplain. Such people are at risk of loosing both their lives and property. With risk comes cost and as the risk increases so does the cost. When the risk turns to disaster, the socio-economic costs of loss of life, livelihoods, production, production potential and natural sources is considerable. What value does one put on one hundred and sixty lives and five hundred and eighty six displaced families? The purely financial costs of replacing infrastructure damaged by the 1995 Christmas day floods was approximately R20 million. This money might have been put to far better use and so the opportunity cost is also extremely high. During flood disasters certain loss of life and damage to infrastructure is unavoidable but the scale at which it is currently happening is unacceptable in any terms. In view of these flood related damages, it is very important, if not indispensable, to recommend the following measures:

#### **(a) Resettlement of floodplain dwellers**

The indiscriminate development and settlement on floodplains constitutes a policy of doubtful wisdom or creativity. For example, Hoyt and Langbein (1955, p92) pose a question "is it sound economics to let (such) property be damaged year after year (plate 4), to rescue and take care of the occupants, to spend millions for their local protection, when a slight shift of location would assure safety?" A direct consequence of the increasing intrusion upon river banks and river valleys by, among others, residential areas may be found in the mounting figures of flood related losses. Resettling these people elsewhere is the obvious solution. Although this measure will involve high financial and emotional cost, it is definitely inevitable. This mechanism must take place as soon as is reasonably possible before a further large number of floodplain settlements develop. For this process to be undertaken with full success, the affected communities should be fully involved.





***Plate 4** It is indispensable that people should relocate. The damages caused by the 1995 Christmas Day floods in Edendale (as shown in this picture) depict the need for such relocation (Natal Witness, 1996, January 5).*

Upon the completion, if possible, of the process of relocation, certain measures must be undertaken in order to prevent further settlements on the flood prone areas and therefore the recurrence of the problem. These measures include mechanisms stated below.

#### **(b) Development controls**

There is a serious need for the responsible decision and policy makers in land-use planning to institute more rational floodplain development. For example, as Smith and Tobin (1979,p116) point out "armed with better hydrological data, it should be possible to attempt more explicit floodplain zoning policies, with land-use controls and grant-aided flood proofing measures as necessary". As rapid urbanisation and population growth occurs so are the number of dwellings on the floodplains likely to increase. It is therefore important that new and existing legislation should be implemented and enforced. Among the existing legislation (stated in the Analysis chapter) the most specific one is the Pietermaritzburg Town Planning Ordinance 27 of 1949. This ordinance provides that the Council may prohibit the erection of any buildings on the land which is or is likely to be subjected to flooding.

It is regrettable that the above ordinance and other related legislation, are seldom or rarely applied. It is therefore very difficult to enforce them since many floodplains have already been developed for settlement. However, in terms of the new constitution of the Republic of South Africa, citizens' rights to safety and



security are entrenched. In view of this constitutional provision, the resulting legislation is likely to place the onus (legal duty) of ensuring the safety and security of people living in flood risk areas firmly in the hands of the local authority. It is therefore suggested that the TLC should consider responding to this now rather than later. Furthermore, it is strongly suggested that Integrated Environmental Management (IEM) processes are of utmost importance in South Africa. In terms of IEM, due respect and caution is given to both economic growth and environmental issues.

### **( c ) Land-use regulation**

The aims of land-use regulation are, as stated by Murphy (1958), to prevent encroachment on the flooding cross-section (the channel and those adjacent parts of the floodplain necessary for the conveyance of a selected flood discharge); to prevent carelessness in the maintenance of channels; to prevent the installation of structures which if they become buoyant in flood conditions, could cause damage to bridges and other property; to restrict uses which would constitute hazards to health and welfare; to prevent land owners from being victimised and to restrict uses which could result in undue claims upon the public purse. In general terms then the purpose of land use regulation is to maintain an adequate floodway and to regulate development practices alongside the channel.

*no over crowding of buildings*

There are two suggested methods of land-use regulation. These are, as note by Ward (1979): firstly, purchase of land by government agencies to reduce flood damages. Here, land may be purchased for public uses, often recreational, which are flood tolerant. Secondly, the establishment of lines or limits on the floodplain beyond which further encroachment is prohibited. Following from this, it is suggested that land-use in the floodplains should be mainly restricted to, *inter alia*, agriculture, recreation and parks, or to the construction of structures not subject to damage by inundation.

### **(d) Agricultural practices**

Contour ploughing and contour terracing are the most economically viable and feasible agricultural practices that can be adopted by any country where agriculture is a priority and run-off is a problem. For instance these practices reduce overland flow by impeding the down slope movement of water. In a sloppy area like Azalea, these methods are the most relevant especially if agricultural practices are to be reconsidered for the floodplains. Similarly, as Ward (1978) argues, basin listing, which refers to a variety of methods used to score the land surface along the contour, increases depression storage and infiltration and reduces overland flow. Strip cropping takes advantage of contour cultivation by using alternate strips of contrasting vegetation to break up the water flow path and to provide some areas of high infiltration throughout the year. Deep subsoiling is used to break up hard pans and thereby promote more rapid percolation and infiltration. These agricultural methods may be considered by the authorities, as well as



the farming community, after the evacuation of flood prone areas like Azalea. These methods, beside saving lives that might be lost as a result of floods, could also help in alleviating the socio-economic problems of the surrounding communities.

### **7.3.3 Recommendations to the University of Natal**

It is regrettable that most people in South Africa still view a university as an institution which exists in isolation. These people feel that the university is a prerogative of the academics. To them, the university cannot and should not interfere in the affairs of the community. In short, they feel that there is nothing the university can do for the communities and vice versa. This was the case even with the people interviewed in Azalea. In the light of these limitations or problems, the following recommendations are made:

- A University- community liaison committee can be formed. This committee can serve as a backbone to any researcher from the university who intends to conduct a research that is community based. It must be a duty of the committee to devise a strategy for the payment of community guides/ facilitators.
- The stigma attached to the University by local communities can be removed if the University can prove to the communities in which a research is intended, that the people are also going to benefit from it. Researchers should be obliged to feed-back to the community studied.
- Local people like to take responsibility of their own situations and issues that affect them. Therefore a more participatory research mode should be adopted by the University. Communities should be involved in a research process rather than being 'studied' and research findings should be made available and accessible to that particular community.
- Because of the change in paradigm regarding research activities and emphasis, it is suggested that the University consider research that will provide findings that are useful and applicable. Research that is relevant for this country is that which caters for environmental and developmental needs. Participatory research is seen as the ideal type.
- The local communities should be made aware of the assistance that can be provided or offered by the University. This can be done through provision of education to the local communities, for instance. This may be successfully implemented since the University has relevant schools and departments such as the School of Rural Development, School of Environment and Development, the Institute of Natural Resources and the department of Geography and Environmental Sciences.



- The University should strive to meet the needs of society and in turn the community must see the University as part of them (the community). The University is obliged by the social demands to change from only understanding social needs to providing for those needs. This is vital for the University's attempts to bridge the gap that exists between the it (the University) and the local communities.

## 7.4 CONCLUSION

It has been shown that there are no readily available solutions to the flooding problem. It was further shown that even though there could be solutions to this problem, the cost associated with their implementation could be so immense that it would be very difficult to apply them within a short period of time. It is against this background that it is recommended that an investigation into the accurate costs involved in the implementation of these recommendations should be conducted.

While it is understood that long term recommendations might help in eradicating flood related disasters, their implementation require ample time and funds. In the meantime, responsible authorities should do something to alleviate flood related damages as recommended in this document. It must be borne in mind that it could happen that while resettlement of floodplain settlers could be underway, some more people could invade other unoccupied floodplains. It is therefore important that responsible authorities must ensure that a majority, if not all, unoccupied floodplains are proclaimed in order to prevent people from occupying them. It must be emphasized that these recommendations need serious attention since there are approximately more than 100 000 lives at risk from flooding.

Finally, common negative perceptions that people on the grassroots have about universities is evident from the local authorities and their communities. It is therefore recommended that the University of Natal looks at this issue as one of the critical and urgent problems to be solved.



## Appendix 1

### QUESTIONNAIRE

1. People's origin, reasons for settling on the flood prone area of Azalea (Upper Kwa-Pata River flood plains) & their socio- economic status

- When did you come to Azalea?
- Where were staying before coming here?
- How long have you been staying here?
- How many members are there in your family?
- Was it your own choice to stay here, if so why?
- Is there anyone or anything that compelled you to stay here?
- Are you employed, if not what is your source of income?
- Are you the owner or the tenant of the house in which you're staying?

2. People's sense of place and attitudes towards resettlement

- How do you feel about Azalea?
- Do you see this place as dangerous in as far as flooding or other natural disasters are concerned?  
Give reasons for your answer?
- How do you feel about the community in which you find yourself?
- Do you have any relatives or friends in this place, if so how do you relate with them?
- Do you have any thoughts or plans of leaving this area for another, if so why and if not motivate?
- If your answer to the preceding question is yes, What type of place would you like to move to?
- What would you consider important if you were to move to another place and why?

3. Personal experiences of and attitudes towards the Christmas day (1995) floods

- Do you have any personal experiences of flooding, if so how many times did you experience flooding?
- Were you affected by the Christmas day flood?
- If the answer to the preceding question is in the affirmative, to what extent were you affected by this flood?
- If you were affected by the above mentioned flooding event, how did you survive it?
- ? What do you think make the flood to cause such disasters it causes, is it an act of people or God?
- Are there any other specific measures you took in trying to avoid any damage to yourself during and after the flood?
- Are there any family members who survived the flood, if yes, what measures did they take to survive it?



- If there are family member(s) who did not survive the flood, how do you feel about it?

#### 4. People's level of awareness regarding the susceptibility of their place to flooding

- Were you aware that the area is susceptible to flooding, if so why did you choose or continue to stay here? *Awareness*
- Did you expect the area to be flooded on the 25th December 1995, or any other day during that period?
- How did or do you feel about the 25th December floods and its consequences?

#### 5. People's perceptions of future flooding *Agree/dis*

- Do you foresee any possibility of future flooding? *FF*
- What are your feelings or thoughts about the possibility of future flooding? *Ag/dis*
- Are you convinced that there is a possibility of future flooding in this area?
- Who <sup>you</sup> do feel is responsible for the damages caused by floods, why? *I am res. why? local govt. why?*
- What do you think can be done to reduce the damages done or caused by the flood?

*What to do to reduce damages*



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