MAPPING SPATIAL BEHAVIOURAL RISK PATTERNS IN THE PORT CAMPBELL NATIONAL PARK

A thesis submitted in fulfilment of the requirements for the degree of

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(Land Information)

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DECLARATION

This Thesis contains no material that has been accepted for the award of any other higher degree or graduate diploma in any tertiary institution. This Thesis contains work of mine alone and to the best of my knowledge and belief contains no material that has been published previously or documented by another person, except where due references are made in the text. Furthermore, the work presented has been carried out since the official starting date of the programme.

Dave, Naishadh Rushikeshbhai

March, 2009

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LIST OF ACRONYMS

AIO = Attitude Interest and Opinion

CA = Cluster Analysis

DFA = Discriminant Function Analysis

GIS = Geographic Information System

GPS= Global Positioning System

LAG= Loch Ard Gorge

LBS= Location-Based Services

NP= National Park

PCA= Principle Component Analysis

PCNP= Port Campbell National Park

PDA = Personal Digital Assistance

PV= Parks Victoria

SPSS= Statistical Package for Social Sciences

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ABSTRACT

Humans are inherently drawn to places of scenic beauty found in many nature based tourist destinations worldwide. Alone in Australia's national parks; the demand on these locations is increasing partly due to increased population, but also due to increasing regional domestic travel. With this increase come the associated dangers of over-crowding and environmental degradation, subsequently diminishing the visitor experiences. It is becoming increasingly important to understand how tourists are utilising nature-based tourism resources to ensure that tourist attractions, and facilities and services provided in parks are not exposed to loss events such as being over-used, becoming over-crowded, and therefore diminishing the tourist experience. Such losses, when combined with their likelihood of occurrence, will constitute risk. Furthermore, new forms of recreation activities such as mountain biking, rock climbing, horse riding and hang gliding has further worsened the risk as these activities have their own stringent environmental requirements.

Heavy use of relatively more popular sites in particular times of the year, often beyond the carrying capacity, may result an irreparable environmental loss. Besides, human risks in terms of becoming lost in the wilderness or from falling down from the cliff are significant factors that park managers are considering. It is becoming utmost important to investigate how these visitors are interacting with the natural environment, in what ways and at highly vunerable sites. These issues were not previously delt as serious concerns by park managers and that further escalates the potential chance of risk on visitors themselves.

Park managers are now required to understand the needs, demands, preferences and motivation for visitors to their parks. With an increasing

demand of tourism resources in natural areas, a proactive planning for managing potential risk particularly in relatively more fragile and vulnerable environments are needed.

This research thesis documents a study of visitors to Loch Ard Gorge Site within the Port Campbell National Park, Victoria. Visitors were monitored for their spatial behaviour i.e. movement patterns using the GPS. Tourists' attitude, interests, opinions and motives to travel to the LAG and the PCNP is surveyed using onsite self-administrated questionnaire. A total 102 individuals were given the questionnaire in order to determine their preferences and to obtain their socio-demographical profiles.Those were then latter on coupled to their GPS movements in order to derive their elicited spatial behaviour.

It is well established fact that visitors' elicited attitude, preferences and socio-demographical profiles is an important factor for their risk taking spatial behaviour. Hence, this research project underpins the exhibited spatial behaviour of tourist to deliver their associated spatial behavioural risk typologies. Statistical classification of visitors, based on 102 survey responses was categorised using K-means Cluster Analysis technique. As a result six different tourist types were obtained.They are:

- Mid-Allocentics possibly Risk Takers;
- Allocentrics and confirmed Risk Takers;
- Mid-Psychocentrics and Risk Averters;
- Allocentrics and Dependent Risk Takers;
- Psychocentrics and confirming Risk Averters;
- Psychocentrics and Risk Averters Mass Tourists.

These newly developed typologies reflect tourists' attitudinal and socio demographical parameters. The mean values of all clusters (group means or cluster centroids) are interpreted to understand tourist's risk taking and/or risk averting preferences.

Visitors' actual spatial behavioural were monitored using spatial analysis of movement pattern maps using ESRI GIS suite. The derived six types than were verified using Discriminant Function Analysis and in this process tests of equality of group means (Significance of F-test), ANOVA classification are discussed. The final part of Discriminant Function Analysis is to determine the linear regression equations for prediction of group membership of data points in future using classification Function Matrix or Fisher's Linear Disceriminant Function.

The study has extended the traditional notion of risk in parks and protected areas by integrating attitudinal and spatial behaviour of visitors to develop a better understanding of recreational use of our national park. It is anticipated that this approach may help park managers to control and regulate risk by taking proactive measures prior to the occurrence of any environmental damages. The developed tourist typologies may help park managers to regulate and mitigate human risk prior to its occurrence by understanding the visitors personality and preferences and their risk taking probabilities.

Key Words: Risks, nature-based tourist destinations, attitude, recreation planning and tourist spatial behaviour.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The rapid growth of tourist markets across the globe and the increase in the special needs of tourists means that various challenges need to be addressed to ensure tourist satisfaction. In order to deal with the increase in demand in any industry, the identification of the special needs of consumers is of the utmost importance. With regard to visitor's satisfaction the tourism industry is no exception and numerous efforts have been made to make it a high priority. In today's highly competitive market with a global economy, a consideration of tourists' attitudes and behaviour are becoming the corner stone for the development of new opportunities for the tourism industry. With the development of new on-site attractions and new marketing strategies essential safety measures are required to be addressed by park managers and researchers. In selecting, purchasing and/or consuming tourism/travel services and products the consumer uses a variety of psychological and social influences and their own personal and environmental awareness. Park Managers and researchers need to look at these.

This research project aims to ascertain the differential behavioural risks to visitors due to their attitudes and preferences while visiting natural tourist attractions. In this process a statistical approach will be used and Geographic Information System will be employed to map the spatial behaviour using Port Campbell National Park (PCNP) as a case study. This new GIS based behavioural risk model could be used for other locations to maintain the sustainability of natural tourist destinations. Hence, In this research the measuring and managing of the ecological impact by bio-physical activities of

tourists has been monitored to ensure natural environmental conservation at National Parks, In order to determine tourist typology based on their attitudes, preferences and socio-demographical characteristics GIS and statistical analysis will be used as the key tools.

In addition to model the risk, the risk factors of different behaviour and their associated potential impacts on a park will be closely examined. The risk in this thesis has been considered on visitors' spatial behaviour using their attitudinal and perceptual attributes. For example, behaviour can be deemed to carry greater risk to environment and other visitors if a visitor exhibits or undertake high risk activities such as horse riding, hiking, skiing etc. or holding attitudes those are not sensitive to environmental sustainable principles or on other hand demonstrate certain unpleasant behaviour to other tourists in group. In this consideration visitor's behaviour can invite to risk to one own self, other visitors and environment.

Besides this an attempt will be made to identify whether or not existing tourist attractions are sustainable and managed to meet tourists' needs. The notions of nature-based tourism, environmental conservation in national parks and bio-physical activities of visitors will be analysed carefully in order to accomplish the different tourist typologies.

1.2 Background

Before tourism evolved into an industry people travelled to attain basic needs such as food, shelter and clothing and this lifestyle still exists in several nomadic communities. Gradually when the idea of travelling for pleasure or

recreational purposes emerged it was seen to be dependent on so many factors such as the distance from the recreational area, the cost involved and, the availability of transportation etc.

Currently this industry is one of the more promising industries seen to be able to generate revenue in capital markets for almost all nations. Now, the tourism industry is not only centred on sight seeing and recreation but encompasses so many other activities, services and trades which create the 'travel event'. These include the transport industry, accommodation sector, food service sectors, entertainment sectors, entertainment businesses, activity facilities and other hospitality services provided for individuals or groups travelling away from home. Hence the tourist industry is a set of multiple sub-industry types.

The World Tourism Organization (WTO) claims that tourism is currently the world's largest industry with annual revenues of over $3 trillion dollars. In the United States of America tourism provides over six million jobs, making it the country's largest employer (McLaren 1998; Honey 1999). In addition the tourism sector is globally one of the largest employers and accounts for almost ten percent of jobs. Mowforth and Munt (1998) documented many advantages of a tourist industry such as economic growth, the generation of foreign exchange for host countries and the creation of employment opportunities, transportation and infrastructure development.

Over the last two decades the Australian tourism industry has been growing significantly. Tourism Australia (2007) reported the significance of tourism impacts on the overall country's economy. In 2005-2006, tourism consumption

in Australia amounted to nearly $81 billion – it also employed 4.6 % of the Australian workforce and contributed to over 11 % of Australia's exports.

1.3 Objectives of the study

This research project underpins visitors' spatial behavioural risk patterns in PCNP due to their attitude, preferences and socio-demographical background. In this process the research project also aims to map their spatial behavioural risk patterns (typologies) in order to minimise the risk to the sustainability of the tourist attraction and to visitors themselves.

The objective raises a number of research questions and these are:

1. What is the range of activities available for tourists in national parks?
2. Does the range of different activities in a national park depend on certain attitudes and preferences of visitors? If yes what are they?
3. What is risk?
4. What are high risk areas, activities and behaviour?
5. Are there any tourist activities which might lead to risk for tourists themselves?
6. If the answer of the above research question is yes, then are the tourist activities and associated risk similar for all tourists, or do they vary?.If they vary then what could be the basis for that?
7. Do the socio-demography of visitors and their explicit attitude lead to specific spatial behaviour in the study area?
8. How can the attitude, preferences and behaviour of people in the study area be modelled?

This research project hopes to deliver the following benefits to the research community, tourist and travel authorities and to whoever may be interested.

1. Park management will benefit by knowing the risk to natural resources which are due to tourist activities and thereby they can formulate an action plan to mitigate the risk based on the control impact study.
2. The study of tourist's motivations can indicate the type of park activities required and in which direction activities should be focussed in the future.
3. Revenue generation of a park would be benefited by providing a healthy environment which in turn would be good for the eco-psychology of visitors. This would lead to an increase in tourist numbers and revenue generation.
4. The said research will also be useful in creating a platform for further research in environmental psychology.
5. The final GIS based mapping will give a spatial aspect to biophysical activities and the exploitation of natural resources to assist planers in taking a further course of action.

1.4 Rationale of the research

Tourism is a composite of various sub-industries and service sectors such as hospitality, travel-trade sector, transportation and logistics, food-service etc. They all collectively deliver visitation experiences, impact on tourists' behaviour and attitudes and provide a large scope for the development of marketing strategies.

Nature-based tourism is a fast growing branch of mainstream tourism and gives a good opportunity for monetary benefits for a nation in terms of foreign currency. It also provides opportunities for the local population to provide services and sell their locally made and produced products. According to Guidelines for community-based ecotourism development, WWF, 2001 community based eco-tourist is generally visiting with the idea of environment conservation and tend to buy natural domestic products from the local vendors when on tour (Denman 2001). Therefore this form of tourism provides a source for income for the local community particularly in rural areas where agricultural employment may be irregular or insufficient.

Nature-based tourist destinations are subject to a range of natural and anthropogenic forces. Some of these forces, particularly those directed toward recreation are potentially deleterious to the fragile ecosystem of parks. Our parks are undergoing an unprecedented growth in the number of tourists and in tourism pursuits within the parks. This rapid increase in number is partly due to increasing opportunities because of mobility and accessibility to transport. This enables tourists to visit many places in a short time which can be geographically located far from each other. Due to this, the pressure on fragile ecosystems is also bound to increase in the near future. In addition, the recreational pursuits that people seek in parks are not only increasing but also becoming diversified and specialised. For example an area that in the past offered one recreation activity such as hiking, is now being used for several different activities like rock climbing, horse riding and mountain biking (Arrowsmith and Inbakaran, 2001). Such unfettered tourism could be seen as a threat to the sustainable use of our parks and protected areas. (Chhetri and Arrowsmith, 2003) This is generally

because the carrying capacity of the environment is compromised over profits generated from tourism. This unregulated influx of tourists when confined to a relatively small area and in a particular season, leads inevitably, to some disturbance or damage to the visited sites. Visual alteration of natural landscapes, trampling of plants, soil compaction, animal disturbance and waste production are some of the consequences of these visitations. Ziener (2000) argued that the adverse impacts on our parks have not resulted from tourist utilisation per se, but from the amount of utilisation, its distribution within a region, seasonal use and leisure time activities. On the other hand Cubit and McArtheur (1995) argue that poorly managed visitors' activity is the real problem which is nearly neglected over the emphasis on the management of tracks. (Cubit and McArthur, 1995) This clearly indicates the need of managing tourist activities and tracks simultaneously.

This research project develops a theoretical framework of behavioural risk underpinning our nature-based tourist destinations. The idea behind this thesis is to investigate whether people visiting nature-based tourist destinations exhibit high-risk or low risk behaviour. The risk behaviour pattern has emerged as the component that characterises risk associated with each segment of tourist behaviour. This study has extended the traditional notion of risk in parks and protected areas by identifying components of risk that are generally ignored or not being given enough importance. Data was collected via a questionnaire using Port Campbell National Park as a case study. This segmentation-based behavioural approach may help park managers to control and regulate risk by taking proactive measures prior to the occurrence of any human loss or environmental damage.

Besides the economic benefits of tourism it is essential to contribute towards natural resource conservation and management action plans for tourist attraction such as Port Campbell National Park.

1.5 Research Methodology

1.5.1 Study Location

To model the different impacts of visitors in national parks the selection of study location is a very important as the location should be rich in environmental beauty with high amount of tourist influx.

Port Campbell National Park has been selected as the study area to undertake this research project because of following reasons:

1. In PCNP the Loch Ard Gorge site is heavily used due to its spectacular scenery.
2. Numerous geographical and geological phenomena for instance spectecular coastal beauty, naturally erroded features are significant factors in why this site is used heavily in holiday periods.
3. A complex series of walking tracks at Loch Ard Gorge offers access to a range of tourist attractions.
4. A wide range of environmental and cultural features is a key component of why tourists find this site attractive.
5. This site is extremely popular during holiday periods.

Visitors can range from locals to international tourists. They can stay for a few hours or come for a 3-4 day trip. They visit the place for various motives

including bird watching, cycling, hiking, beach activities, swimming, surfing ,bush walking and sight seeing etc.

As PCNP provides a range of tourist activities, the site is heavily used during the peak tourist periods which tend to enforce over-crowding and pressure on the natural environment of the park.

Since due to over crowding, some people tend to go off-track that further creates a risk to the park environment as well as to them.

Over the years, the regulating authority, Parks Victoria has shown an interest in building up the model which ascertains spatial behavioural risk in natural tourist destinations.

PCNP offers all the significant parameters and a range of tourists with different preferences and attitudes, behaviour, differing lengths of visits to the park and varied demographic background of tourists. The main aim of this research project is to build a typological model to ascertain the spatial behavioural risk at this site. If proper survey techniques are used and accurate statistical analysis are implimented the good model can be developed at the Loch Ard Gorge site in PCNP as the study area gets heavily crowded in certain season of the year with range of tourists from different socio-demographic background and motives, behaviour with diversified atitudes towards environment conservation and risk.

1.5.2 Survey design

The survey conducted via a self administered questionnaire at Loch Ard George in the Port Campbell National Park. The format of the questionnaire was conducted by preference statements which were incorporated into a self-completing questionnaire. Due to the quantitative nature of the research and the ease of computer processing closed–ended questions were used. This was measured on a seven point Likert scale, where 1 represents ' strongly agree' and 7 strongly disagree'.

The study has used on-site intercept methodological procedures. Whereby people visiting the park or in a part thereof, were approached before entering Loch Ard Gorge sites. An ad hoc method has been used in the study wherein each person travelling to the study area has been asked to participate in the survey. This has amounted to a total of 150 completed surveys.

1.5.3 Data collection

Kuppam, A., Pendyala R., Rehman S (1999) have identified two potential problems in using attitudes in traditional data in tourism research (Kuppam, A., Pendyala R., Rehman S 1999 pp.68-76) It is difficult to collect detailed data regarding tourist attitudes in the traditional household travel survey and attitudinal variables cannot be easily predicted. Hence, for the collection of attitudes and visitors' preferences, their socio-demographical characteristics were also considered.

Socio-demographical characteristics, attitudes and motives or preference for visiting natural tourist destinations can lead to certain spatial behaviours exhibited by visitors in the area.

The spatial data collection was done with Garmin E-trax handheld GPS receivers and the attitude and socio-demographical data was collected using an administrative questionnaire.

1.6 Thesis Structure

The thesis has been written for this research endeavour describing the different phases of whole project. It gives a clear understanding of the flow of the whole work in series of systematic chapters. It contains 6 chapters in total.

This chapter outlined the research concepts, ideas, research questions, methodology and thesis outline.

Chapter 2 reviews the relevant literature associated with the different terms and definitions of tourism, sustainability and various forms of tourism. It describes tourism types, impacts of carrying capacity, visitor impact monitoring, and the various methods used in monitoring. Further the component of risk is evaluated with the associated spatial behaviour of visitors. The term behaviour is explained along with social anatomy of behavioural risk. The various techniques used in monitoring the spatial behaviour of visitors is reviewed. Chapter 2 is also aims to put the research into perspective by reviewing literature on recreational activities in national parks and the risk associated with these activities in natural tourist destinations.

Chapter 3 explores the case study Port Campbell National Park and in this process the significance of study area Loch Ard Gorge site is highlighted with respect to tourist attractions and various tourist activities.

Chapter 4 explains the type of data collected and adopted methodology for Data Collection in the study area and how the framework has been designed for the final development of an approach. In the efforts of inventory development, this chapter discusses the spatial data collection within the GIS environment. The attitudinal, preference statements of visitors and their socio-demographical profile was also discussed in detail in the chapter 4.

Chapter 5 explains the statistical techniques used for data analysis of the collected data. The pattern or typology of spatial behavioural risks of visitors obtained from the data analysis is examined. For this, the segmentation based approach has been used and cluster analysis technique was used for the building of typologies. The collected results from cluster analysis were analysed with Discriminant Function Analysis to determine the discriminating function for each segmented cluster.

Chapter 6: Conclusion and further scope for research is discussed. The objective outlined in section 1.3 will be revised to see whether all the objectives were met.

1.7 Summary

This chapter has set out the main aims and objectives of this research project. These are to investigate and develop a model for the differential behavioural risks to visitors in national parks which are due to their attitudes and

preferences. In the future this will assist in minimising the risk to the sustainability of the national parks and other nature-based tourist attractions. In addition to identifying and outlining the main objectives of the study, the methodology and scope of the project is explained. The rationale of the project and the main research questions raised during the literature review are also outlined.

The organisation of the six chapters of this thesis on a chapter by chapter basis was also explained in this chapter.

The following chapter will focus on a literature review of sustainability and different types of tourism, carrying capacity of a national park, and risk as an independent entity and the components of risk in total.

CHAPTER 2

UNDERSTANDING THE PURSUITS OF SUSTAINABLE TOURISM AND SPATIAL BEHAVIOURAL RISK

2.1 Introduction

This chapter of the thesis will discuss the concepts of tourism and the inter-relationship of tourism with our natural environment. This chapter also underpins the discussion of the maintaining the health of our tourist attractions. Hence, in this section an attempt has been made to link the similarities and discrepancies between the various forms of tourism. Furthermore this chapter of the thesis also highlights the concept of sustainable development. This critical term is commonly misunderstood and mismanagement of the natural environment occurs whether it be intentional or unintentionally because of this misunderstanding. This is described in detail in section 2.2.

The concept of sustainable development is essential when considering humans as a main component of the environment. In the context of tourism the visitor and the local community are indispensable when considering maintenance of the sustainable development of natural ecosystems at tourist destinations. This research project uses visitors' attitudes and preferences and their risk taking behaviour, for the purpose of understanding the spatial behavioural risk. It is worthwhile to be aware of the interconnectivity of what is to be sustained and what's to be developed in the natural environment. The intention of this research is to further the wellbeing of tourists who go to the Port Campbell National Park along with minimal deterioration of park environment.

Several authors have suggested that studies which incorporate attitudes towards the environment and tourism go a long way in understanding the "hidden nature" of visitor travel behavior (Jackson 1986; 1987; Kiiskilä 2001; Uysal and Jurowski 1994). This study incorporated a set of descriptive terms

regarding tourists and environmental attributes to measure the perceptions and motivations of visitors.

For that reason section 2.3 examines the terms tourism, travel, leisure and recreational activities, as these terms are often used interchangeably without proper understanding. As all the terms have their own significance and posses distinct characteristics, their proper expression and the context in which they are used should be considered to avoid the misinformation and confusion. However, different writers have used these terms in different ways. For instance some consider travel and tourism as just a process of recreational activity whereas others evaluate recreational activities as one feature of leisure activity and tourism. Indisputably in any case the tourism and travel industry comprises countless services and trades ranging from local vendors to international tour and travel operators, government and non government organizations and many other enterprises.

Section 2.4 explains management frameworks such as the concepts of carrying capacity, limits of acceptable change and visitor impact.

Section 2.6 will reveal the generic meaning of risk and will further broaden the paradigm of risk in natural settings. In this section, the notions of different risk components will be discussed. In any natural tourist environment, risk has two different types. The first is the risk to the environment and the second is risk to people. In this thesis the consequences of human risk in a natural tourist destination have been highlighted. With respect to visitor's attitudes and preferences risk generally leads to certain precarious spatial behaviours in

tourist attractions. Rugged attitude and destructive perception may drive a person to behave objectionably for other tourists from which other tourists may receive unpleasant experience. This unpleasant behaviour also implies risk to natural environment of park. For example eroding or writing on historical monuments no only gives unpleasant experience to other tourists but also decrease the intrinsic natural beauty of monument. The study will further extend the meaning of spatial behavioural risk in natural tourist destinations.

Undeniably to formulate the spatial behavioural risk model associated with any tourism site a clear understanding of the terms and definitions related to tourism is essential.

2.2 Significance of Sustainable Development and Sustainability

Since the declaration of the Brundtland Report 1987 (Hardi P. Zdan T., 1997:27), more commonly known as *Our Common Future*, blew a siren of alarm to the world to make progress toward economic development that could be sustained without diminishing the natural resources or altering the natural environment. This report in simpler words put forward the idea of natural resources conservation in harmony with economic growth, which is sustainable development. Sustainable development can be defined as, "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Kates, Parris, and Leiserowitz, 2005, 2:14).

After the declaration of *Our Common Future* in 1987 the term sustainable development and sustainability became open to ambiguity. For non-profit

community organizations the concept dealt with resource conservation and community development without much focus on economic growth. For profit generating organizations economic growth was a main focus with a secondary goal of resource management. The Board on Sustainable Development of the U.S National Academy of Sciences documented *Our Common Journey: a Transition toward Sustainability* (Kates, R, Parris, T.,M., and Leiserowitz, A. A. 2005). The report was centred on intrinsic discussion and proper guidelines. There was a seemingly inherent distinction between what advocates and analysts sought to sustain and what they sought to develop. Figure 2.1 shows the relationship between the two, and the time horizon for the future.

The figure 2.1 clearly indicates three main categories of our environment which need to be sustained; nature, life support systems and community. The sub categories of these are also shown in the figure. The board acknowledged the common emphasis on life support systems, which later were defined as nature or environment as these are a source of services for the life support of humankind.

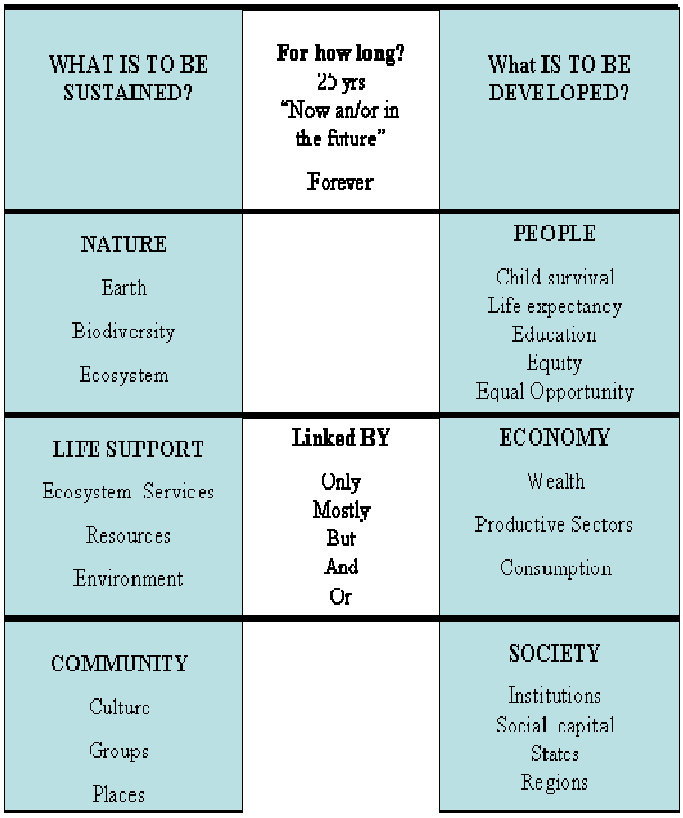


Figure 2.1: Definitions of sustainable development

(Adopted from the U.S. National Research Council, Policy Division, Board on Sustainable Development, Our Common Journey: A Transition toward Sustainability)

Over time with the increase and depth of literature regarding the environment and environment awareness the focus of the sustainable development movement was again beginning to divert from nature for its inherent values to the proper utility of it for mankind. There were also parallel demands to sustain cultural diversity, including livelihoods, groups, and places that constitute distinctive and threatened communities. (R. W. Kates, T. M. Parris, A. Leiserowitz, 2005).

On the other hand there were three definite objects of concern to be developed. They were people, economy, and society. Much of the early literature focused on economic development, with productive sectors providing employment, desired consumption, and wealth. More recently, attention has shifted to human development, including an emphasis on values and goals, such as increased life expectancy, education, equity, and opportunity. Finally, the Board on Sustainable Development also identified calls to develop a society that emphasized the values of security and the well-being of national states, regions, and institutions as well as the social value of relationships and community ties.

Robinson and Picard (2006), while summarising the Constitution of UNESCO, noted that tourism also has the capacity to assist the world's inhabitants to live better together and thereby contribute to the sense of peace in the minds of men and women.

It was only after the 1970's that literature began to show the negative impacts of tourism development both socially and environmentally. The diversity of tourist attractions and magnificence of natural beauty has assumed increasing importance in the lives of people during last century (France et al., 1997). Today it is perceived as the antithesis of work rather than as an integral part of daily routine.

Tourism forecasting is a major issue across the globe as the industry is rapidly growing and promising new paradigms for researchers to discover and new and serious questions on the sustainability of tourism to pose.

2.3 The Tourism Industry

2.3.1 Travel and Tourism vs. Recreational and Leisure interest

The desire for travel cannot be separated from the context of people's daily lives (Krippendorf, J. et al, 1986). Recreational activities provide relief from enforced daily routine, the rush and pressure to achieve or a uniformity of workplace environment and work culture. In the humdrum of a repetitive life an individual becomes overwhelmed and stressed (Iso-Ahola, 1982). Leiper (1989) affirmed the importance of leisure and said it provides the temporary escape and relief to rejuvenate a person for better output in their daily work. Britton (1991:97) described it as "the movement of people from one geographical location to another for the purpose of engaging in leisure and/or business acts, and the economic transactions that accompany this."

The meaning, definition and scope of the terms tourism, tours, travel and leisure have been explained by various authors in various texts. For example Theobold (1998) evaluates tourism from two different aspects, the academic and the practical. Dictionaries give the meaning of tours as, "*an excursion or journey for sightseeing or an extended voyage*" (Webster's Pocket Dictionary 2001:597) or "*visiting the place of interest along the route*" (Collins English Dictionary 2001:1535). A trip is explained as a return journey. Historically the word tour is derived from the Latin, "tornate" and the Greek word 'tornos" meaning "a lathe or circle; the movement around a central point or axis." The suffix "ism" denotes the continuation of an activity of moving in a circle whilst the suffix "ist" indicates performer of an action of moving in to circle (Arrowsmith 2002, ch2 pp.11). To conclude it can be seen that the meaning of tour is a round trip or a journey

beginning and returning to same place while stopping at one or more than one destination during the trip. The tourist in this context is a person who travels or undertakes a trip and stops at a few places before returning to the starting or original point. And the whole process of a trip can be seen as tourism.

Mathieson and Wall (1982) created a good working definition of tourism as "the temporary movement of people to destinations outside their normal places of work and residence, the activities undertaken during their stay in those destinations, and the facilities created to cater to their needs." Britton (1991) and Ryan (2003) expanded this definition by stating that a tour mainly comprises of three components. The first is the financial component which includes matters relating to expenditure, income and employment creation. The second component is the social, cultural and environmental consequences; and thirdly there are the psychological implications for both the visitor and the host.

According to Macintosh and Goeldner (1990) tourism is "the sum of the phenomena and relationships arising from the interaction of tourists, business suppliers, host governments and host communities in the process of attracting and hosting these tourists and other visitors."

However, the value of tourism cannot be solely judged in terms of remuneration to the individual or tourist. Nor can its value be solely expressed in relation to the economic benefits that it can undoubtedly generate. Tourism is centred on the fundamental principles of exchange between people and is both an expression and experience of culture.

For the purposes of this thesis, the word 'tourist' will be used to relate to the widest of all possible definitions to incorporate any person visiting a place on a temporary basis for few hours to 3-5 days. Furthermore, in this research, the terms 'visitor' and 'traveller' will be used as a synonym for tourist.

2.3.2 Types of Tourists

Cohen (1972) developed a two-fold typology of tourists, namely 'institutionalised' and 'non-institutionalised'. The former type is further categorised into organised mass tourist and individual mass tourist. The individual mass tourist refers to the explorer and drifter. Cohen in 1979 redefined his typology by incorporating tourist experiences. He identifies tourists as either pleasure oriented or on a modern pilgrimage. These types underpin his five-fold typology of tourist experiences as recreationist and diversionary for pleasure and experiential, experimental and existential on a modern pilgrimage.

Plog's (1977) personality-based typology introduced a new perspective in tourism research. She has identified tourist types in a continuum, wherein the psychocentric type is located at one end followed by midcentrics through to the allocentric type at other end. The psychocentric type of tourist is self-inhibited, nervous and non adventurous. They prefer the familiar destinations, indulged in low level activity and like tour packaging. Alternatively the allocentric type of tourist is variety seeking, adventurous and a confidant person who prefers less crowded areas, explore new destinations and cultures and like independent tour arrangements. The continuum was further applied in the study of market

segmentation by targeting relatively high-income allocentric tourists for newly introduced marketing products.

In a recent effort Jackson et al. (2001) have investigated personality indicators of allocentrics, psychocentrics, introverts and extrocerts for four independent and interdependent personality types of 'the explorer', 'the guided' and the 'groupie'.

The other crucial behavioural factors affecting the growth of tourism industry are time, money, mobility and motivation. All four are described in detail in table 1.

FACTORS	IMPORTANCE
Time	• Travel Opportunity increases as the amount of leisure hours' increase. • Changes in work days and hours • School Calenders • Overall pattern of vacation varies from 6-8 hours, 3-4 days and mini vacation of few weeks annually. • Long Service Leave
Money	• Majority of travel requires discretionary income. • Left over money after all financial

	obligation fulfilled.
Mobility	• Accessibility of transportation. • Quality of roads (if travelling by car) and other alternative transportation facilities. • Hours used to reach to destination.
Motivation	• Is the reason why people travel • May include meeting family or friends, education, enjoying the natural environment and seeking novelty, adventure or stress reduction etc.

Table 2.1: Crucial factors for growth of tourism industry

The emergence of the concepts of nature-based tourism and sustainable tourism has given a ray of hope to the damaging effects of tourism to the environment and its sustainability.

2.3.3 Definitions of Key Concepts: Mass, Alternative, Sustainable and Ecotourism

2.3.3.1 Mass Tourism

The tourism industry is able to achieve standardisation and economies of scale through the organisational abilities of large corporations that feature in the modern, mass tourism era.

Mass tourism saw itself as playing a key role in the social reconstruction of places (Arrowsmith, 2002). Mass tourism refers to modern, industrial tourism or religious tourism for pilgrimage purposes where with prior arrangement a large number of people or a small group of people are transported, accommodated, and entertained by well organised travel planners or tour operators (Desbiolles et al., 2006:196). Due to the large number of tourists carrying capacity, as will be discussed in detail in Section 2.4.1, the ecosystem may be challenged. Leiper (1995) argued that mass tourism damages the natural resiliency of the ecosystem and as a result the scenic beauty of place is damaged.

2.3.3.2 Alternative Tourism

Even though in a general context alternative tourism is considered the antonym of mass tourism Mowforth and Munt (2003) have arguably said that this form of tourism has many of the process and observable facts that mass tourism has. However alternative tourism has many subsets such as sustainable tourism, responsible tourism, green tourism, ecotourism, gentle and soft tourism, nature-based tourism etc (Hunter et al.1997).

Douglas et al. (2001) and Desbiolles (2006:201) termed it as special interest tourism. Douglas (2001:3) describes it as "…the provision of customised leisure and recreational experiences driven by the specific expressed interests of individuals and groups. A special interest tourist chooses to engage with a product or service that satisfies particular interests and needs, so SIT is tourism undertaken for a distinct and specific reason."

Additionally Desbiolles (2006:200) further describes it as limited-scale, low-impact, community-based and awareness raising or educational and hence should be regarded as distinct from and the opposite of mass tourism when he said that, "… alternative tourism as the ideal site for tourism as a social force. Alternative tourism can provide educative and interactive tourism experiences to counter the hedonism, materialism, individualism and uniformity..."

Fennel (1999) is also positive when commenting on this and emphasised that alternative tourism should be generating the new policies that disregard the technical and economical necessities and put an emphasis on the needs of the local host community and natural environment.

Manifold issues arise when discussing sustainable development and a sustainable approach to understanding the concept of sustainable tourism.

The lack of any common definition has lead to an assortment of sustainable developments; it is often seen as a relative term without the lack of some sound and fundamental definition. One can perceive the meaning of the term depending upon one's own knowledge and perception. Even thought, there are a few who have tried to explain the term in distinct ways. Valentine (1992:108)

regarded nature-based tourism as “tourism that is, primarily concerned with direct enjoyment of some relatively undisturbed phenomenon of nature.” And said, “To varying degrees, nature-based tourism can be denoted as ecotourism, sustainable tourism, alternative tourism, responsible tourism and many more.”

Brundtland (1987) in Our Common Future recommends minimising pollution by minimising waste generation. Further she declares that utilization of resources by any person should not adversely affect the environment and consequently human health which is irreversible. She proposed maximising the use of renewable resources as far as possible as it would be an added advantage to the sustainability movement.

To maintain ecologically sustainable development in the tourism context Brundtland, 1987 reported a few steps which are:

1. Inter-generational equity - **responsibility for the future**;
2. Intra-generational equity - **current social fairness**;
3. **Conservation of biological diversity and ecological processes** - retention of ecosystems;
4. **Precautionary principle** - anticipation of future problems, if any doubt avoid the risks and take them into consideration;
5. **Internalisation of environmental cost** - inclusion of all short and long term environmental costs; Improvement in **non-material** as well as material wellbeing;

6. **The global principle** - no industry should contribute towards unsustainable activities in another country. (Commonwealth of Australia, 1991).

2.3.3.3 Sustainable Tourism

The English Tourism Council (2002) defines the term sustainable tourism as, "It is about managing tourism's impacts on the environment, communities, and the future economy to make sure that the effects are positive rather than negative for the benefit of future generations. It is a management approach that is relevant to all types of tourism, regardless of whether it takes place in cities, towns, countryside or the coast." Hence, the resiliency of the natural environment should not be altered (Arrowsmith, 2002) and the fragile natural environment should attain its original form in less time. Viability of the natural environment is an essential aspect as tourism is in a form that can maintain its viability in an area for an infinite period of time (Butler, 1993: 29).

When combining the term sustainable with tourism, one must consider the environmental, economic and social considerations and principles that are inherent within the former. Figure 2.2 shows the relationships between these different aspects of sustainable tourism, illustrating one perspective on the tourism-environment 'balancing act' required to achieve sustainability.

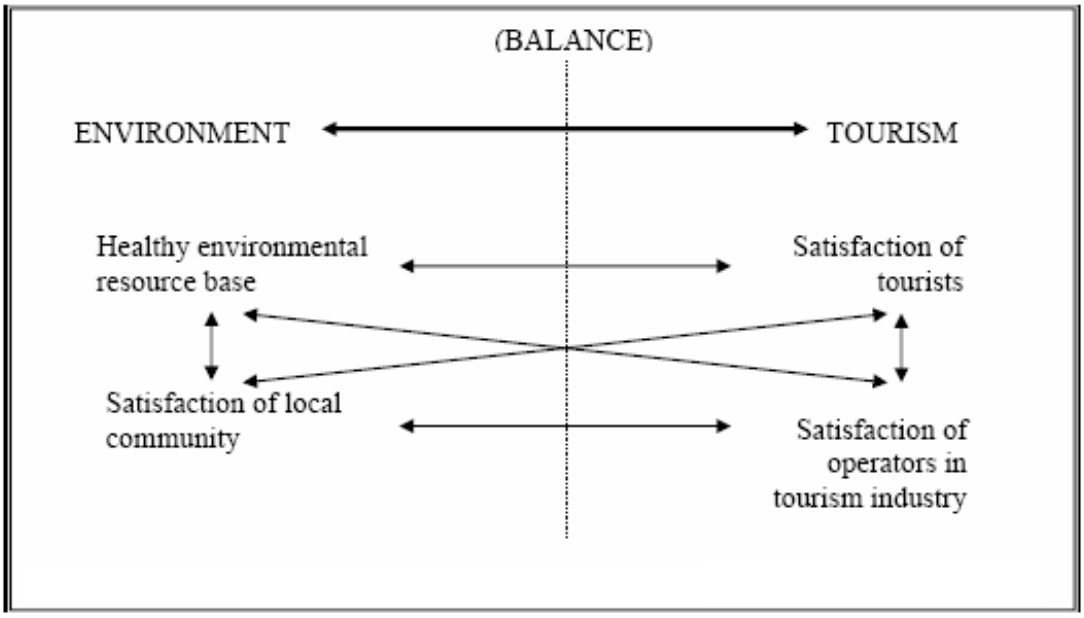


Figure 2.2: Aspects of Sustainable Tourism at destination area

(Hunter et al., 2003)

The goals of sustainable tourism as described in Figure 2.2 relate to different types of tourism carrying capacity. The figure essentially implies that no single aspect should be allowed to dominate tourism policy-making and decision-taking.

Interchangeable use of these terms create a state of bewilderment when some researchers use terms as if alternative tourism, ecotourism and sustainability in tourism are synonymous, leading to vagueness, misunderstanding and disappointment in addressing important concerns in tourism (Shaw and Williams, 2002, p. 302). Additionally, some specify “ecologically sustainable tourism” (Dowling, 2000, p.160), while others view “sustainable development in tourism” as more appropriate (Wall, 1997a, 2000a, p. 567). On this point Butler

differentiates this concept from "*tourism in the context of sustainable development"* which he describes as:

Tourism which is developed and maintained in the area (community, environment) in such a manner and at such a scale that it remains viable over an indefinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and wellbeing of other activities and processes (Butler, 1999:35). Further on Butler expands this view and delivered another definition of sustainable tourism as, "*tourism which is in a form which can maintain its viability in an area for an indefinite period of time"* (1999b, p. 36).

According to the WTO (1996), "*Sustainable tourism development meets the needs of the present tourists and host regions while protecting and enhancing the opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled, while maintaining cultural integrity essential ecological processes, biological diversity and life support systems*. "

Eber (1992:2) provides a further useful outline: "*if tourism is to be truly beneficial to all concerned . . . and sustainable in the long-term, it must be ensured that resources are not over-consumed, that natural and human environments are protected, that tourism is integrated with other activities, that it provides real benefits to the local communities . . . that local people are involved and included in tourism planning and implementation, and that cultures and people are respected*."

Figure 2.3 shows ecotourism as a subset or segment of sustainable tourism. The relationship between sustainability and sustainable has been reviewed in the section 2.3. There is an obvious inter-intra relationship which has been described between various forms of tourism.

The relationship between sustainability, alternative and mass tourism is intrinsic as all factions of tourism are called upon to implement sustainable practices. Therefore, despite the views of some analysts, sustainability is not a type of alternative tourism. For the purpose of this thesis sustainable tourism is not considered as a type of alternative tourism but a distinct entity.

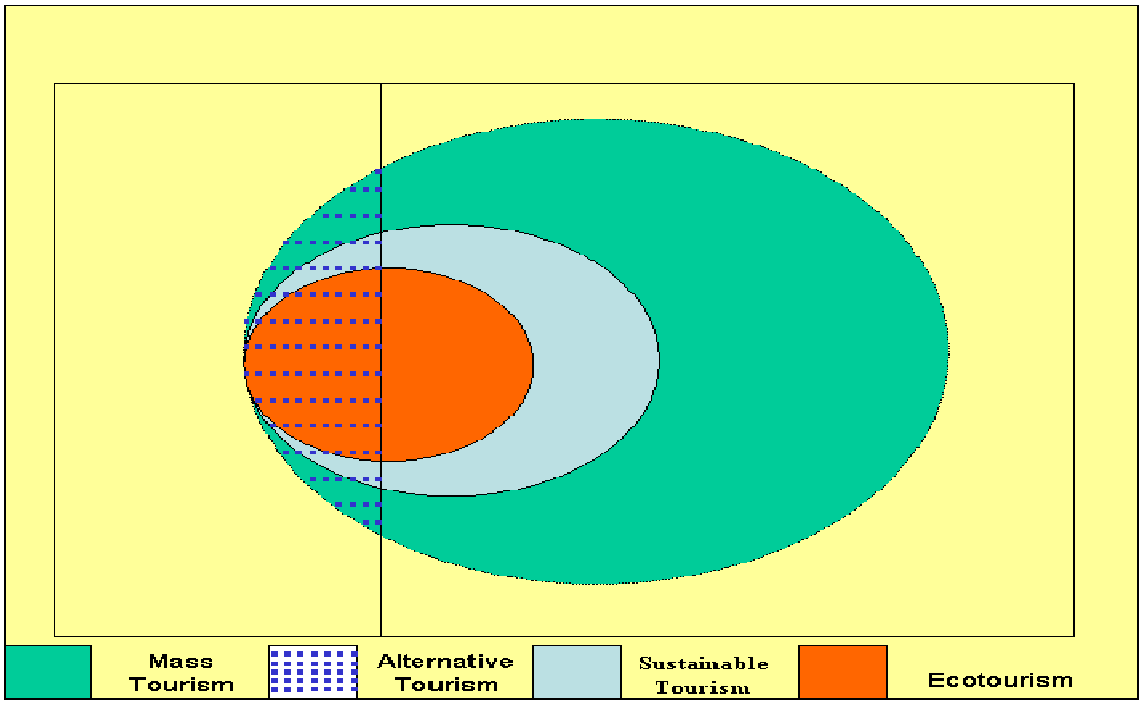


Figure 2.3: Relationship between sustainable, alternative, mass and ecotourism (Weaver, 2001)

2.3.3.4 Ecotourism

The richness and grandeur of nature and diverse natural scenic beauty has always attracted humans. The use of nature increased with the increase in leisure activities such as sight-seeing as a practical means of recreation, adventure, exploitation i.e. tourism. It's time for the tourism sector to take renewed interest in the environment in a manner so as to minimize the environmental and socio-economic impacts caused by tourism. It has been affirmed by various organization and analysts that ecotourism offers the potential to generate foreign exchange earnings, employment and other economic and social benefits, particularly in regional areas. This term emphasises the integrity of the environment in locations where tourism is developed rather than on sustaining the economics of tourism or the needs of the host community.

Sustainability has been included in this discussion because it has been a main driver in tourism differently by focusing on environmental impacts and limits to tourism.

According to a survey conducted in Lamington National Park in Queensland Weaver (2001) it was found that 83 % of respondents felt their ecotourism experience made them "more environmentally conscientious". Weaver (2001:104-106) saw that ecotourism answers of many problems for developing nations with their reliance on the capitalist economy since "with its small-scale development, provides opportunities for local empowerment, encourages the

use of local knowledge and labour, promotes local ownership, perpetuates local identity, and strengthens equity".

D. Diamantis, (1999,6:30) further expands the views of Weaver and says, *"Ecologically sustainable tourism in natural areas that interprets the local environments and cultures, furthers the tourists' understanding of them, fosters conservation and adds to the well being of the local community."*

A more comprehensive definition that serves to delineate ecotourism from the wider phenomenon of nature-based tourism is proposed by Ceballos-Lascurain (2001). This definition has received common but reluctant support as a universal definition which addresses the key aspects of the ecotourism.

This definition forms a basis for the World Conservation Union's (IUCN) platform and is added to the requirement for activities to be environmentally sound in nature and locally beneficial. It says*: Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features – both past and present) that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations* (Ceballos-Lascurain, 2001).

The Quebec Declaration on Ecotourism which described ecotourism as an amalgamation of the following basic principles. Ecotourism contributes actively to the conservation of natural and cultural heritage.

For instance Butler has provided a much more biocentric checklist for ecotourism, demanding it:

- Be consistent with a positive environmental ethic, fostering preferred behaviour,
- Not denigrate the environmental resource,
- Concentrate on intrinsic rather than extrinsic values,
- Be biocentric rather than homocentric in philosophy, accepting nature on its own benefit the resource,
- Provide a first-hand experience with the natural environment,
- Provide satisfaction to tourists in the form of appreciation and education rather than in thrill-seeking or physical achievement,
- Possess high cognitive and affective dimensions,
- Requiring a high level of preparation from both leaders and participants (J. Butler cited in Weaver, 2001, p. 6).

Because of the multitude of definitions available, many analysts simply highlight the essential attributes of an ecotourism product or service. Wearing and Neil (1999:7-8) argue that movement towards a definition can be accomplished by designating the following requirements for ecotourism:

It involves travel from one location to another; the experience should be nature-based, conservation-led and must involve a role for education (of the tourists, the local community and the tourism industry operators).

For the purpose of conservation of nature and wellbeing of tourists, the term ecotourism has been considered for it's widest of all possible meanings in this thesis.

2.4 Framework for Visitor Management

To maintain the natural resiliency of a fragile ecosystem where the sites are heavily used during a particular time of year, the park management authorities in many nations consider a few models.

These well established frameworks or models such as Limits of Acceptable Change (LAC) (Stankey and McCool, 1972; Roger and Stankey,1979) Visitor Impact Management (VIM) (Wolfgang Haider ,2004) Visitor Experience and Resource Protection (VERP) (Bacon, J., Roche,J., Elliot, C., and Nicholas, N (2006); Warzecha C.,Manning R., Lime D. and Freimund W., 2001) have their own merits and demerits.

All these frameworks were formulated with the vision of regulating the carrying capacity of parks. There is abundant literature available on the LAC/VIM/ VERP approaches however, less attention has been paid to the attitude and preferences of people and associated spatial behavioural risk.

Hence, to ensure visitors' satisfaction and minimise their behavioural risk this research project aims to develop a new behavioural risk model for the categorization of visitors to the PCNP according to their personality which is mainly dependent upon their attitude, preferences or motives and socio-demographical factors.

2.4.1 Carrying Capacity

As described in section 2.3 of this chapter due to over visitation of any natural environment the natural carrying capacity of the place is seldom compromised. Hence evidently the notion of carrying capacity has attracted a glut of definitions within the paradigm of outdoor recreational activities. The issue of carrying capacity was raised as early as 1936 (Stankey, 1981), the very first effort in this direction was made in the field of range management which was to limit the number of grazing cattle allowed in a field. Over time numerous definitions and explanation vis-à-vis the carrying capacity emerged depending upon how and on what it applies to (Ceballos-Lascurain, 1996; Farrel, T. and Marrion J., 2002).

Carrying capacity and environmental carrying capacity are both required to be addressed to conceptualise the fundamental of carrying capacity for recreational purposes. Saveriades (2000) noted," *the ability to express in terms of an unambiguous standard measure is essential in order to facilitate tourism planning.*"

The first point of view for tourism carrying capacity envisages it as the ability of the destination area to absorb tourism before negative impacts are felt by the host community. Emphasis, thus, is placed on the number of tourists that are wanted and that can be absorbed, rather than on the number of visitors that want to or can be persuaded to come to an area (Brown, F., 1998).

The World Tourism Organisation defines TCC (Tourism Carrying Capacity) as ''the level of visitors use an area can accommodate'' (Buckley, 1999:706).

However, noticeably Stankey and McCool (1972) argued that nevertheless analysts and park authorities are quite aware about the fact that there is no direct relationship between the number of tourists who visit the place and associated impacts. In fact, there are a number of factors related to how the effect will occur and where and when there is a potential chance of occurrence. Moreover various remedies can be enforced in order to reduce the negative impacts of recreational activities which occur with increasing tourist flow to our natural tourist destinations. (Marion and Farrell, 1998). Perceptibly under carrying capacity analysis, simple quantitative measures have applied which can no longer be considered as appropriate and accurate. (Abigail Rome, 1999).

Moreover the carrying capacity approach does not show any strong relationship between the amount of use and its impacts. There is no universal procedure to measure carrying capacity of a place because the differences in recreational activity and the type of tourism vary from place to place and person to person.

It is also arguable that due to the activity of visitors change is inevitable, but what should be acceptable change is not clearly understood. To avert the inaccuracies of carrying capacity Stakkey et al (*ibid*) adopted a new qualitative approach in Kangaroo Island National Park in South Australia. This was the concept of Limits of Acceptable Change (LAC).

2.4.2 Limits of Acceptable Change (LAC)

The LAC concept describes that change will occur as a result of tourism and that the key goal of visitor management is to limit impacts to predetermined

amounts. It and other similar methods set standards or ranges of acceptable change and describe a methodology for determining these standards, measuring impacts and identifying management strategies for controlling negative impacts at tourism sites. Conceptually the LAC approach consists of the 9 step cyclic approach listed below.

- Identify issues and areas of concern
- Define and describe management objectives
- Select indicators of resource and social conditions
- Inventory of resource and social conditions
- Specify standards for resource and social conditions
- Specify alternatives
- Identify management actions for each alternative
- Evaluate and select an alternative
- Implement actions and monitor conditions

The LAC approach is considered to be a framework for the establishment of appropriate and acceptable resource and social conditions in recreational pursuits. In this approach change is not about minimising undesirable change due to human attitude and/or spatial behaviour but describes how much change is allowed to occur.

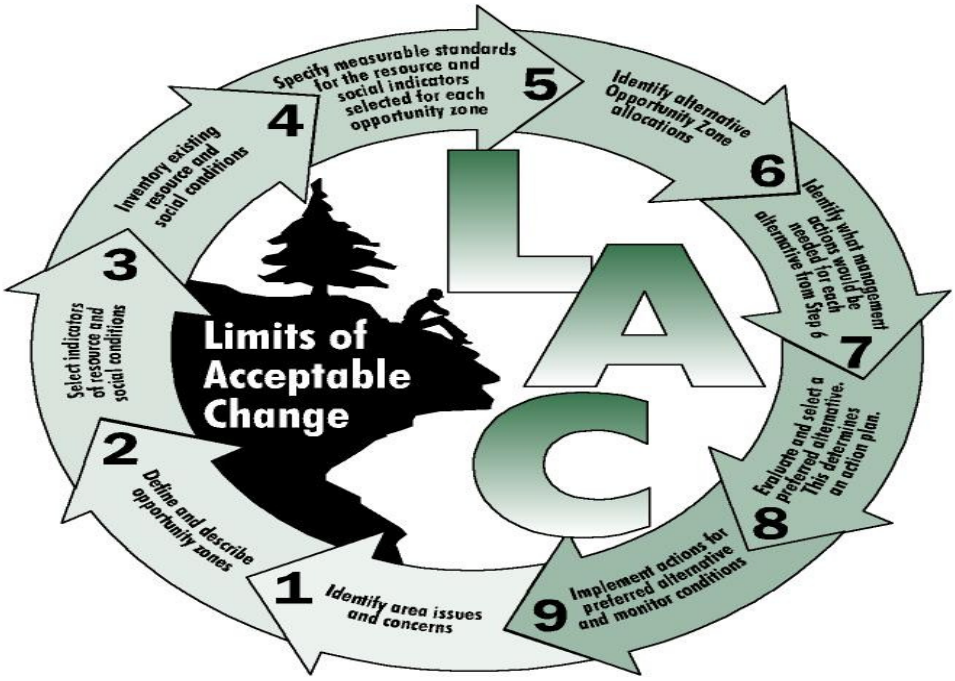


Fig 2.4: Limits of acceptable change - A cyclic approach (Source:

http://www.openspace.eca.ac.uk/costE33/ppt/WolfgangHaiderPresentation.ppt.)

Arrowsmith (2002:55) noted that for implementation of LAC at natural tourist destinations detailed information is needed along with a permanent record of resource condition. This is an essential requirement in order to react in a timely manner to newly arising problems which can result in various forms of risks.

The LAC approach is very simple in its own way however there are costs associated with adapting such generalized framework (Haider, 2004) as it requires constant monitoring (Arrowsmith, 2002:40). Due to a lack of attention to experiential knowledge of visitors' typology in this regard it leads to the need to re-conceptualization this frame work.

2.4.3 Visitors Impact Management

Like the LAC, the Visitors Impact Management is an approach which offers a framework to park authorities in order to reduce or minimise the unwanted impacts related to tourism. Visitor management processes identify indicators and standards for managers to achieve desired conditions or outcomes based on predefined standards for managing protected parks.

Unlike the LAC The VIM approach identifies the indicators and standards that park managers need to achieve required outcomes more easily. The techniques for the VIM approach are simpler and more oriented towards satisfying managers' perceptions than to stakeholders' views, however VIM can readily incorporate processes for public participation based modelling.

According to the United Nations Environment Programme in 2002, VIM follows the steps listed below (Wearing, 2007; Eagles, Hynes and McColl 2002).

- Review and identification of issues
- Selection of indicators
- Resources inventory
- Specification of standards for indicators
- Implementation through an iterative process of monitoring
- Comparison of impacts with standards
- Identification of alternative management options if standards are not met.

2.5 Tourist Destination

The area called 'tourist destination' has commonly been defined as an area with prominent natural and/or human-made features which have the potential to attract non-local visitors or tourists (Georgulas, 1970). Mathieson and Wall's (1993) definition of destination complements that of Georgulas, but emphasises the importance of destination identity, in that it must justify its attraction independent of other locations. It is important to note however that 'destination' is not restricted to its geographical connotation, but may be in fact consist of a whole plethora of activities or experiences (Ricci and Werthner, 2002).

Tourist activities, by their very nature, create their own demand for a variety of services (Kandampully, J., Mok, C. and Sparks, B. et al., 2001) and destinations. In return, they offer a number of different tourist products for consumption (Buhalis, 2000). A tourist product can refer to any number of goods, activities, and services offered to tourist by different sectors of the tourism industry in order to satisfy their needs while they are away from home. This product may even be considered to include most of what the tourist experiences on the way to and from the destination (French et al., 1995).

Buhalis (2000) summarizes the major components of the tourist destination as the following which are commonly knows as five A's for any Tourist destination to satisfy the need of a nature-based tourist destination.

Accessibility: Entire transportation system, comprising routes, terminals and vehicles, which enable a product to be reached.

Accommodation: catering facilities, retailing, and other tourist services.

Attractions: Site attractions include natural, human-made, artificial, purpose built, heritage (for example, scenic, historical, natural wonders) or special event attractions (for example, exhibitions, sporting events, and congresses).

Activities: All activities available at the destination which consumers can do during their visit (for example, outdoor and indoor recreation activities).

Ancillary services: Services used by tourists (for example, banks, telecommunications, post, newsagents, hospitals).

Fig 2.5: Five A's of a destination – the foundations for creating engaging nature-based tourism experiences (Source: Tourism Victoria, 2008:31)

In conclusion, it can therefore be said that a 'destination' for the purpose of this study can be defined as a specific geographical area that offers a unique cluster of attractions, products and services that will be consumed under the brand name of the destination.

2.5.1 Australia as a tourist destination

Australia comprises an area of some 8 million sq. km. The distance from North to South is 3700 km and from East to West is 4000 km. Within these boundaries this magnificent land is blessed with a distinct diversity of floral and fauna, a variety of climatic extremes and a host of geological marvels. Temperatures vary from an average of 30 degrees Celsius in the midsummer in the Red Centre to an average of 6 degrees in the highlands in winter.

An international visitor survey conducted by the Bureau of Tourism Research (1996) showed that international tourists rank factors such as beautiful scenery, vastness, cleanliness, natural wonders, wild-life and pleasant beaches as the major motivations for choosing Australia as a tourist destination (Mclannen, 1996).

ABS (2007) explained that in the years 2005–06, International visitors consumed $20.5 billion worth of goods and services, an increase of 4.6% on the previous year of 2004-05. Australia's natural beauty and landscape have made the country a popular destination for international travellers.

The tourism industry employed 482,800 persons in 2006–07 The number of people employed by tourism grew 9.9% between 1997–98 and 1.1% in 2005-

06. There were almost 5.5 million short term international visitor arrivals to Australia during 2005–06. This was a 1.4% increase on 2004–05 but follows strong growth in the previous 2 years, 6.9% (2004–05) and 8.6% (2003–04) respectively.

Trips by domestic visitors increased 0.1% in 2005–06. The number of overnight trips decreased by 0.3% while the number of day trips also increased by 0.3%. Australia's natural environment exhibits an historical and cultural importance to not only the International travellers but to domestic visitors as well. There is a considerable amount of money spent by Australians on tourism with the average consumption of an outbound trip increasing by $0.758 from 1997 to 2003. (ABS, 2007). This clearly indicates a rise in tourism and an increase in money spent on tourism and tourism products.

It presents Australia with the opportunity to make the most of its competitive advantage, with its spectacular and diverse natural features, unique flora and fauna and diverse cultural heritage. Allcock (1994:.5); Dejbakhsh (2008) noted that ecotourism can also provide resources for environmental conservation and management and an incentive for the conservation and sustainable use of public and private land".

2.6 Appraisal of the risk in natural tourist destinations

As discussed in section 1.4 nature-based tourist destinations are subject to a range of natural and artificial forces. As in natural tourist destinations these forces are mainly recreational based and the delicacy of park ecology is facing detrimental effects. Our parks are undergoing an exceptional growth in the

number of tourists every year. Hence, this rapid increase in visits raises the stress levels on fragile ecosystems. Moreover, the number of tourist visits is also bound to increase in the near future, as more and more people escape from their daily routine life.

Additionally, the demand of diversified recreational activities at one park is also guaranteed to increase as time goes. For example, an area that previously offered only one recreation activity like hiking is now being used for several different activities such as rock climbing, horse riding and mountain biking.

The carrying capacity of the tourist areas has been over looked in exchange for monetary profit generation by tourism. Because of this the beauty of the natural landscape has been negatively impacted as overcrowding causes trampling of plants and compaction of soil. The unfettered arrival of travellers in a specific time of year further increases such inevitable disturbances. Ziener (2002) supports these arguments and put forward the idea that, these natural conflicts on our natural settings not only resulted from the tourist utilisation per se, but from the amount of utilisation also, its distribution within a region, seasonal use and from the leisure time activities by travellers.

In addition to the changing patterns of park use, many studies have found that the physical impacts from visitor behaviour are quite alarming (Chhetri et al., 2003). Such behaviour is a threat to the more sensitive areas, particularly to those that are less resilient and heavily used; such unregulated movement and the behaviour of people results in conflicts among park users and even sometime the loss of lives in wilderness. This has also resulted in heavy

financial costs for parks and insurance companies involved in finding people who have lost their way. In extreme case, this may also lead to litigation. Ziener (2002:469) stated that conflicts in parks generally occur at the individual level (rarely up to a law suit) and it is found most of the time in domestic recreation seekers and leisure time seekers. Therefore it may be possible in the future to develop a guideline for visitor behaviour that is required to be followed during visits to parks. It is essential that that there is a need for adequate signage at critical points indicating “dos and don’ts” for regulating behaviour in the Danube Floodplains National Park, Austria.

Both, risk to the environment and risk to visitors in tourist destinations are growing with an increased complexity in tourist-environment relationships. As a result, an assessment of risk in parks has become a critical issue for park managers. They are required to maintain a synergetic balance between the conservational needs and the growing demand of recreation in parks. Therefore the complexity of factors affecting risk: visitation; usage intensity; and type of recreation, have made the decision making process far more complex and difficult. Under these circumstances, the risk of harming the environment, to participants (i.e. visitors) as well as to non participants (i.e. host community) is on a constant increase.

The discussion outlined above indicates that there is a necessity to develop a comprehensive framework to integrate behavioural dimensions into the risk evaluation but simultaneously develop methods for identifying and predicting typical behaviours that carry elements of risk in parks. Manning (2002) stated that most of the earlier approaches for park management (for example LAC,

VIM, VERP), in spite their success in a number of parks were not being used by park managers who have adopted “reactive approaches”. They further expressed a need for a “proactive approach” for park management that can predict potential problems prior to their occurrence. Zanon and Ware (2000) also noticed a need to proactively “control” visitor behaviour by restricting the number of “desire paths” as suggested at the Twelve Apostles site at PCNP. For example, trampling has been noticed to be a major problem at PCNP, especially when visitors engage in aberrant behaviour like walking off the tracks.

Risk in nature-based tourist destinations can be managed from two perspectives. The first perspective is labelled ‘a-priori perspective’(Chhetri, 2002) wherein movement patterns and the type of park uses are controlled by regulating the resources. The approach is predicated on the fact that risk can be minimised by distributing and controlling resources in parks. Parks Victoria has adopted a similar approach for controlling crowds on lookout platforms by dispersing visitors over a larger area by establishing a new car park at a distant location and multiple paths in the Port Campbell National Park. This was under the presumption that visitor movements and behaviour will change with the changes in facilities and accessibility to attractions. Contrary ‘posterior perspective’ (Dave, Arrowsmith and Chhetri, 2008) is a management view that interprets and examines need, preference and socio-demographic background of visitors prior to formulating policies and regulations.

The perspective is based on the fact that the best way of reducing the risk is to make visitors aware of the possible repercussions of their visit on the

environment as well as on themselves. There is a need to communicate risk to visitors and to make them aware of the possible repercussion of the visits. Visitors need to be involved in recreation planning by educating and preparing them for possible risk. This approach takes visitor needs and preferences into consideration before developing strategies and formulating appropriate policies and regulations for resource management.

2.6.1 The Risk

This section of the thesis will introduce the concept of risk and then will investigate its broader meaning in recent studies. Risk is defined as being a 'chance of bad consequences' or 'exposure to chance of injury or loss' (Oxford Dictionary: 1960:705). This concept is further extended as the probability of an event causing a potentially undesirable effect (Beer and Ziolowski (1995:3). Maki and Tait (1993) have defined an ecological risk as the likelihood of an event occurring that may cause adverse ecological effects. Gadlow (2001) considered risk as being composed of two components, potency and chance. Potency is a cost or severity or the extent of the loss event, whilst chance is the likelihood of the loss event. Lately the perception of stakeholders and acceptability of the risk are also being considered as components of risk. Some authors considered risk as composed of two components, hazard and vulnerability (Hickey et al. 1997; Granger 1996). Manuel et al., (1997) defined a hazard as an event or even a situation that is a potential source of harm. For example a waterfall (for rafting) or strong wind can be a hazard, although it may not be considered hazardous in its own right. However it may also include less obvious threats such as a large number of visitors (Arrowsmith 2002) or even

visitor depreciative behaviour. However, waterfalls, winds and visitor depreciative behaviours are not counted as a risk, rather their involvement in generating harm or loss create the risk. For example the probability of damaging human lives or properties by strong winds or other unpleasant experiences due to others undesirable behaviours are the risk. On the other hand, vulnerability refers to sensitivity to damage in some other way. For example the area around a cliff or tall building is found to be having relatively more exposure to incidents. i.e. they are more vulnerable. Risk in this section is taken to carry a similar meaning which defines it as an attribute of a loss event (disturbance) (Schmucker 1984; Beer and Ziolowski 1995). Risk evaluation has been further extended to risk communication. Notably, some scientists considered risk communication as a social process by which people become informed about hazards, are influenced towards behavioural change and can participate in decision making about risk issues.

Several conclusions can be derived from above definitions that enable us to further investigate the risk involved with nature –based tourism.

- Firstly, terms such as bad, injury, or damage that were used for risk in earlier studies are rigid. Recent studies have suggested more subtle words such undesirable or adverse effects instead.
- Secondly, objects/phenomena in question are not risks in themselves rather it is the severity and likelihood of those events/phenomena that cause losses.
- Thirdly risk involves some kind of uncertainty, which makes its evaluation more difficult to measure.

- Fourthly risk is the probability of an event causing significant negative impact rather than the event itself.
- Fifthly there is a need for documentation or a 'risk library' for the future as management decisions are becoming complex.
- Finally perception and communication of risk have been given paramount significance in recent studies. This shows a transformation from a stage of risk evaluation to risk communication.

Using this summary it is reasonable to extend the meaning of risk to include any object/event/phenomena/process/relation that has potential to cause adverse effects on other objects/people in the environment. The following section now will investigate the character of risk in nature-based tourist destinations in relation to general behaviour and behavioural risk in particular.

2.6.2 The Significance of Human Risk in Tourist Destinations

Travelling for leisure is often considered a means of maintaining a healthy lifestyle. It maintains a balance between work and relaxation or escape from routine life. People visit a tourist destination in order to satisfy and fulfil certain goals and needs (Cohen 1979; Pearce 1982). These needs can range from pleasure-oriented mass tourism to a search for deeper human meanings. Tourist destinations are natural and cultural environments wherein these stated or implied needs are satisfied. In this way, tourist destinations are objective entities or tourism products that consist of a range of quantifiable attributes. If attributes (e.g. attractions, climates, services, hospitality) of a tourist destination satisfy these needs (leisure needs, social needs, self-esteem and development,

fulfilments) of visitors then the trip is considered as a success. This successful trip will then lead to pleasant experiences and thus satisfied visitors. Dissatisfaction may arise either due to the declining quality of the environment or attractions that people are willing to see, or in the nature of their social interaction with other park users. Any process/object/event that produces adverse effects on visitors and on the environment therefore could be taken as a loss. These losses can be natural, economical, social or even experiential. For example crowded tourist destinations are one of the factors capable of causing an adverse effect on visitor experiences. A loss in this case represents a 'negative experience' developed due to the adverse effect of an event. The loss when combined with their likelihood of occurrence may constitute risk (Chhetri P, 2002).

Risk in nature-based tourist destination is manifested mainly in two forms. These two primary forms of risk identified in parks are environmental risk and human risk. Environmental risk is where the potential source of harm are natural factors (for example wind, flood, earthquake) whilst in human risk it is humans on each other or on themselves. However human interventions in natural systems, in many instances, trigger a loss event that is potentially damaging. Human risk is further categorised as physiological, social and experiential risk (Chhetri P, 2002). There is abundant literature on environmental or ecological risk. However not enough attention been given to other forms of human risk, particularly experiential risk (Chhetri P., 2002). Tourist environment systems consist of three elements that are under risk in any tourist destination, participants, non participants and the environment. For example fire for

recreation in vulnerable areas not only threatens the participants but also other non participants (such as residents) as well as the environment.

Figure 2.6 shows that a nature-based tourist destination is composed of three risk components identified in the tourist environment system. These risk components are risk areas, risk activities and risk behaviour.

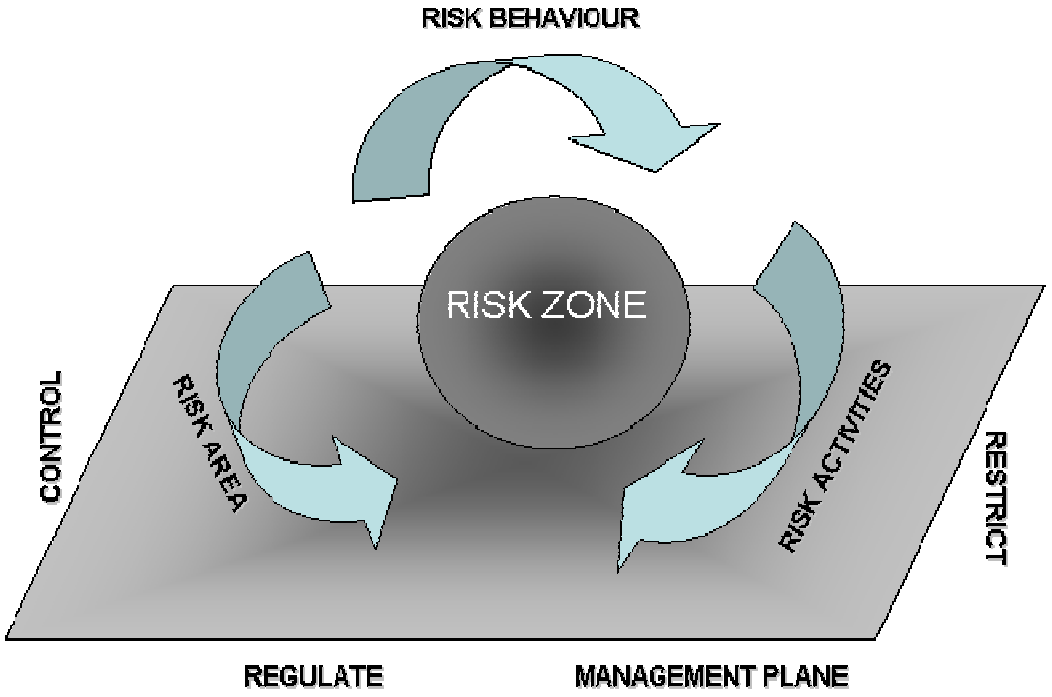


Figure 2.6 : A Conceptual Model of Risk Management

(Source: Dave, Arrowsmith and Chhetri, 2008)

2.6.2.1 High Risk Areas

Areas vary in their responses to disturbances. This is due to the fact that they are constituted from different biophysical properties. Such variation has resulted in differing resiliency. Some areas are more highly resilient than others due to

the differences in biophysical properties (slopes, surface, roughness, land cover type). This in turn produces variations in risk. Therefore those areas that are less resilient are more vulnerable to impacts and are at high risk particularly when they are intensively used. Arrowsmith (2001) considered resiliency to be a component of risk and defined it to be 'the level to which an environment subject to some force (disturbances) will respond and return to its original form'. Using this definition Arrowsmith and Inbakaran (2001) developed a 'spatial Resiliency Model' for the Grampian National Park.

Their model suggested the development of multi-path trails to minimise or spread more evenly the cumulative impacts throughout the region (Dave, N., Arrowsmith, C., Chhetri, P. 2008). Multi-path trails disperse visitors over a larger geographic area as they traverse through more vulnerable locations at the commencement of the track. These tracks then will coalesce in highly resilient areas characterised by rocky outcrops and hard surfaces at higher elevation.

2.6.2.2 High Risk Activities

With the changing pattern of park use, many studies have found that the impacts developed from visitors' behaviour are quite alarming. Recreational activities in parks vary in their intensity and involvement with the environment. For example, bird watching and viewing scenery are relatively 'passive' activities and therefore are less risky as compared to 'active' activities such as rock climbing, mountain biking, snow boarding or horse riding. As a result, potential impacts that are most likely to develop on the environment through these activities would also vary (Janowsky et al., 2002). Lepp A.,Gibson H.,

(2003) found that new recreational activities are emerging exponentially, particularly those involving an element of risk. Safety of participants and regulations are becoming vital for conducting/running these recreational activities in parks. Few studies have linked the type of recreational activity with attributes towards the environment. People who are inclined more towards outdoor recreational activities such as cross-country skiing, hiking and canoeing were labelled as "appreciative" and hold relatively more pro-environmental attitudes than those who like fishing, hunting or any other mechanised activities such as snowboarding or trail biking(Jackson 1987).

2.6.2.3 High Risk Behaviour

Risk also varies from one person to another due to the differences in their personality, preferences and socio-demographic background. Some people have risk-taking propensities whilst others tend to avert risk. For example, individuals who like adventure and are willing to take risk in the wilderness are potentially a threat to the environment as they may visit fragile areas as well as be a risk to themselves. On the contrary people who are socially interactive and like to travel in groups may have the potential to cause track erosion and overcrowding in those heavily visited sites. Uysal and Jurowski (1994) measured environmental attitudes of travellers to a natural resource destination using the New Environmental Paradigm (NEP) in the US Virgin Islands National Park. Their study concluded that the people with anthropocentric attitudes are found to be more demanding for improvements in beach and resort amenities than the people with ecocentric attitudes. Preferences for less visible structures, more wildlife and vegetation projects and fewer people and boats are linked to

ecocentric attitudes. They further suggested that the management of environmentally sensitive tourist areas should set up marketing strategies that would attract the eco-tourist segment of the travel market. As a result visitor behaviour and preference structure needs to be understood so that risk associated with them can be predicted and therefore be managed.

2.6.3 Social Anatomy of Behavioural Risk

There are several ways through which risk can be assessed in tourist destinations. One of the ways of assessing risk elements is to "stratify visitor behaviour or action". For example, lying in the grass and smoking cigarettes denotes comforting behaviour or walking over a vulnerable area indicates depreciative behaviour. This requires a meticulous monitoring of visitors behaviour and activities. One of the problems associated with this assessment is that the behaviour is actually occurring and therefore it is a reactive approach. Behaviour setting is a location bounded in time and space, which supports a series of fixed behaviour patterns or programmes (Wicker 1984). The patterns or programmes for a behaviour setting is the time ordered sequences of person-environment interactions that leads to a setting's essential functions being carried out Wicker (1984) pointed out that "behaviour setting analysis" illustrates how visitors organised and perform activities in recreational settings. Information includes: the number of times a setting gets in use; the number and type of users in a setting; and linkages with other interpersonal and socio-demographic relationships with other people.

Visitors in parks are active agents of change. Their interaction or engagement with an environment not only has the potential to accelerate natural processes (for example land slides) but also determines the nature of social interactions (overcrowding caused due to being overused). Ziener (2002; 469) considers visitor depreciative behaviour as one area of conflict. Such conflicts arise due to the disregard of regulations to stay on paths, or leaving ski trails or unleashed dogs or other pets, are the results of a lack of acceptance of the nature conservation based tourist destinations. These include intrinsic risk and extrinsic risk. Intrinsic risk is the probability of exposing oneself to injury or loss. An example of this kind of behaviour is a propensity to explore exotic and inaccessible areas wherein the chance of being lost in the wildness is high. Extrinsic risk on the other hand is the likelihood of causing harmful effects on non participants as well as on the environment. For example, walking off the designated track not only carries the risk of trampling vegetation but also has undesirable effects on other visitors' experiences.

There are three types of undesirable behaviour being exhibited by visitors in parks based upon the intensity of potential harm. These include depreciative behaviour, disruptive behaviour and destructive behaviour.

2.6.3.1 Depreciative behaviour

Depreciative behaviour is a set of observable actions and practices that do not adhere to the conservations rules and regulation of parks. This is simply a disregard for the doctrine of conservation. Examples of such depreciative

behaviour are walking off the designated tracks or walking on vulnerable areas (e.g. cliff edge or overhang) or littering.

2.6.3.2 Disruptive behaviour

Disruptive behaviour is an adverse impact that develops from interactions between visitors. Listening to loud music, occupying a scenic lookout for a very long time, rough driving and excessive consumption of alcohol are some of the examples of disruptive behaviour. This type of behaviour may cause discomfort and inconvenience to other park users. There are no formalised rules and regulations that restrict this kind of behaviour in parks.

2.6.3.3 Destructive behaviour

Destructive behaviour is those activities that are potentially harmful to the environment. Such types of destructive behaviour are deliberate damage to natural habits and the recreational resource base of an area. Artificial fires, mutilation of plants, disfigurement of cultural artefacts (e.g. cave paintings and artefacts) signify destructive behaviour of visitors.

2.6.4 Determining Dimensions of Risk Behaviour in Nature-Based Tourist Destinations

Earlier in section (2.3.1) of this chapter manifold tourist typologies have been highlighted. The tourist typologies incorporating their satisfaction, experiences, perceptions for recreational pursuits and above all tourists' attitude for adventure and risk taking preferences have been discussed. As denoted by Cohen (1972) and Plog (1997) the personality based psychographic typologies

incorporating their travel life style and patterns (Plog 1994) were being considered for the purpose of this thesis.

Jackson (1999) has attempted to use personality/traits as a basis for predicting behaviour. Such behaviour may be uncomfortable or undesirable for others it is found to have potential to damage their experiences in natural tourist destinations.

Dimensions of allocentric-psychocentric and/or extroversion-introversion either individually or collectively have been used to identify different tourist segments. The focus of these studies was to develop tourist typologies rather then assess the associated risk. Such tourist typologies were intended to identify a target market so a tourist destination could be designed and positioned accordingly. Notwithstanding, inferences can be derived from the identified tourist typologies.

The objective of the segmentation systems based on psychographic segments, when successful, produce clearly defined groupings of individuals with similar personalities, life-styles and interest patterns (Plog 1994). Though researches have been attempting to relate socio-demographic characteristics, beliefs and recreational activities to environmental impacts little has been done to observe visitor attitude and behaviour.

Hence, this research project, seeks to understand visitors characteristics that may be linked to visitor behaviour so that park managers might better select the type of tourist they seek to attract. Uni-motive analysis is a one-dimensional motivational approach and is an underestimation of the complexity of tourist needs and behaviour. The theoretical segmentation based framework of

behavioural risk in nature-based tourist destinations will help park managers to monitor and mitigate risk by taking proactive measures prior to the occurrence of any human loss event.

2.7 Spatial Behaviour

Spatial behaviour generally means the patterns of movement of people or an object in a given space (Wicker 1981). Movement is an act or process of moving – especially when referring to a change of place (Merriam-Webster, 2002).The spatial behaviour is generally characterised by origins, distances, destinations, directions, and frequencies of occurrence in that particular time and space (Lankford et al., 2004). Currently, tourism planners are faced with a lack of spatial understanding in terms of concepts, models and theories with which to make use of in spatial tourism planning (Dredge, 1999). Understanding the spatial behaviour of tourists is becoming increasingly significant as associated negative impacts are bound to increase.

Interestingly spatial patterns are one of the main characteristics of tourism studies (Shaw and Williams, 2002). The term spatial pattern is used in very generic manner. The main reasons for this are the lack of a suitable method and the sporadic nature of existing data on spatial behaviour. For example, with the traditional travel-diary method tourists' actual spatial behaviour remains unclear because of spatial inaccuracy and the poor reliability of diaries, which rely on a respondent's honesty and memory (Modsching, M., Kramer, R., ten Hagen, K. and U. Gretzel et al., 2007). In addition, tourists' spatial behaviour has been studied with different indirect statistics (logged data like overnight

stays), but the results are given in relatively general terms. Until recently, several new data collecting methods (GPS, GSM, webcams) have been adopted into tourism studies enabling a more accurate study of tourists' space-time movements (O. Järv, A. Aasa, R. Ahas and E. Saluveer ,2007). This project analyses tourists' spatial behaviour using GPS monitoring (explained in detail in Chapter 4). The advantages of using GPS are also explained in Chapter 4.

2.7.1 Spatial Data of Behavioural Pattern

The spatial behaviour of current visitors consists of specific spatial attributes as to their movement. Xia and Arrowsmith, 2005 broke down these spatial parameters into;

Identity: To determine the identity of any object in space requires constant tracking of an object in the desired period of time. GPS based monitoring can solve this problem.

Position: In the geographical context, position refers to the occurrence of any event or location where an object can be indentified. In a spatial context it can also be referred to as relative location using a spatial framework giving position in relation to other objects. Positioning information can be measured in an absolute location (x and y information) using a polar coordinate system.

Distance*:* Distance can be measured as linear distance in plan view or travel distance along a slope. Distance can be measured in the field using range

finders, GPS receivers, or by ground measurement. Typically, distance is measured from maps.

Direction of movement*:* Direction of movement is required in the construction of trip itineraries from observed data. Direction of movement can be measured if identity and position of an object or person is known for at least two locations.

Sequence and itinerary*:* The sequence provides information about how mobile objects travel along networks by following a particular order as they visits a number of attractions. Such sequences can show the decision making processes carried out by individuals. Depending upon the quality and quantity of information gathered the feasibility of sequence determination can be decided. For example the information related to identity, location and time at each destination makes it easy to determine variability in sequences.

Once sequences of visitors are known it is then easier to derive the itineraries for individuals. If any one of the above mentioned variables is unknown or measured with poor accuracy it might make it extremely complicated to develop itineraries (Arrowsmith and Chhetri, 2002).

2.7.2 Spatial Scale

Spatial scale can be regarded as one of the main components for obtaining tourist spatial behaviour in natural tourist destinations. For better understanding of tourist spatial behaviour at various spatial scales, some essential parameters have to be collected (Xia and Arrowsmith, 2005). Spatial scales are mainly of two kinds: macro level spatial scales and micro level spatial scale. On the

macro level spatial scale the movement of tourists are determined from one geographic region to another which may extend from several to a hundred kilometer away (Xia and Arrowsmith, 2005).

On the other hand, the term micro level scale reflects localized movement. In a broader sense it determines movement from particular geographical coordinates (X, Y) to another set of coordinates (X_1, Y_1) and extends further up to (X_n, Y_n) in a region. It is different to macro level scales as macro level movement is from one region to another whereas micro level movement is just centralized in one geographical region or location. In this way micro-level movement is represented by a high spatial resolution. Direction, location and sequence are all criteria used to determine the type of information to be collected at this level (Xia and Arrowsmith, 2005).

2.7.3 Techniques for tracking spatial movement patterns

There are a range of techniques offered by researchers to acquire spatial data and track visitors' movement. In this context abundant literature is available which discusses the pros and cons of each technique (Arrowsmith and Chhetri et al., 2002; Dejbakhsh, 2008; Xia and Arrowsmith, 2007). This section of the thesis is not meant to discuss those techniques. However, all the techniques have been listed below and a brief summery of their usability is highlighted along with Table 3.1. They are mainly:

1. Direct observation method
2. Camera based monitoring
3. Questionnaires with maps

4. GPS based monitoring
5. Timing systems.
6. Mobile phone based tracking.

	Methods for tracking					
Attributes	**Direct observation**	**Camera based systems**	**Questionnaires**	**GPS**	**Timing systems**	**Mobile phone**
Identity	✓	✓	✓	✓	✓	✓
Position	✓	✓	✓	✓	✓	✓
Distance	✓	✓	✓	✓	✓	✓
Direction of movement	✓	✓	✓	✓	✓	✓
Sequence or itinerary	✓	✓	✓	✓	✓	✓
Socio-demo data	×	×	✓	×	×	×
Level of intrusion	High	High	High	High	High	**High**
Reliability	**High**	**Mod**	**Mod**	**Mod**	**High**	**High**

Table 2.2: Summary of Capabilities of Various Counting and Tracking Technologies. (Source: Xia and Arrowsmith, 2005)

These techniques are not homogeneous however, and how one goes about deploying them very much depends on the complexity of the visitors within the

given travel network and the duration of their subsequent visit (O'Conner *et al*., 2005). Xia and Arrowsmith (2005) have attempted to outline the differences of such tourist movement tracking methods. At the macro level, the size of the study area is usually large and visitor movements are generally represented with a low level of spatial resolution. At this level, tourist's movement can be tracked using low resolution techniques (for example, self-administered questionnaires, observation and interview). However, at the micro level, the size of study area is usually small and the detail of movement needs to be greater compared to the macro level movements. High resolution techniques mostly applied for tracking tourist movements at this level (for example, GPS tracking and timing system). Notably, GPS and direct observation both remain well-proven technologies for capturing movement patterns of tourists at both levels (Gimblett, 2005). That being said, an amalgamation of these methods can prove to be much more helpful – terrain, geographic extent and complexity and visitor statistics may all require multiple approaches (Xia and Arrowsmith, 2007).

In an attempt to collect spatial behavioural data for this research it's essential aspect to grasp the real meaning of visitors' movement in natural settings. In this effort further insight into the terms spatial data and spatial scales are necessary. Furthermore, in gaining an insight into present behavioural conditions, the effort can be truly made to obtain real spatial behavioural data in the study area.

2.8 Summary

In this Chapter a literature based review and the overall framework for the study was discussed. In this process the key points related to tourism industries are explained. The types of tourism viz., nature-based tourism, sustainable tourism and ecotourism were elucidated. The terms tour, tourist and tourism have also been paid explained along with different visitor and management approaches.

Arguments provided in this chapter in section 2.5 justify Australia as an appropriate tourist destination for development as a sustainable tourist destination for many international visitors and local tourists. The nation is enriched with diversified tourism opportunities in terms of economic growth, frailty of the environment and varying degrees of biodiversity.

This unique land should have ecotourism sites developed in order to protect the vulnerable environment and the natural scenic beauty. This magnificent and historically, culturally and environmentally abundant land provides satisfaction to tourists and revitalizes their spirits. Proper education and knowledge should be transferred to the tourists visiting the natural environment in order to maintain the healthy state of ecotourism and wellbeing of tourists themselves.

This chapter also explained the concept of risk in natural tourist destinations. In that section it clarified the different terms associated with risk on the management level. Further it also provides details of attitude, personality, preferences of visitors which defend the idea of specific behaviour of people. The different method for acquisition of spatial behavioural risk patterns has

been focused. For the purpose of monitoring spatial behaviour or movement pattern the different scale types were explained and various techniques have been highlighted.

Of the various techniques described for gathering data GPS based monitoring was used in this research along with a questionnaire. This two way or hybrid approach to surveys is explained in detail in Chapter 4.

Chapter 3 focuses on the study area - Port Campbell National Park in Victoria a State of Australia.

CHAPTER: 3

CASE STUDY: PORT CAMPBELL NATIONAL PARK

3.1 Introduction

This Chapter introduces Port Campbell National Park as a case study for the purpose of this research. Following section 3.2 highlights the importance of PCNP. In this it shows environmental significance of the park. The floral and faunal diversity and their importance are also noted in brief. in addition the PCNP is popular nature based tourist destination and the visitation per year also increasing every year. The following section 3.3 demonstrates the significance of the PCNP amongst other Australian National Parks. The section 3.4 demonstrates the study location the Loch Ard Gorge site and its importance as a tourist destination has been highlighted in section 3.5. Later on in this chapter, section 3.6 reveals various tourist activities which can be risk inviting to the visitors or natural environment of the Park.

3.2 The Port Campbell National Park

The approach to differential spatial behavioural risk has been developed using Port Campbell National Park (PCNP) as the study area. The PCNP is a popular nature-based tourist destination, which has received remarkable growth in visitor numbers over the year. Table 3.1 explains that this gradual growth will reach up to 3 500 000 by the end of 2009.The PCNP is also an environmentally important region, supporting a wide range of flora and fauna. The park contains approximately six to eight species of national and state significance. Furthermore the PCNP supports three threatened species and a small population of nationally threatened species. (Parks Victoria pp. 12-14). A number of these floral species are region specific and found no where else in the world.

Year	Number of Visitors to PCNP
1970-80	235 840
1989-90	350 065
1999-2000	1 894 417
2008-09	3 500 000

Table 3.1 Tourist visitation at PCNP

(Source: Parks Victoria, pp.32*)*

The natural scenic beauty of parks is immensly rejuvenating. Fresh, salty air and an iconic landscape are the unique features of the park. The coastline is one of the most spectacular and atypical of the coastline of Australia. The park also offers an opportunity to enjoy wondrous and vibrant views of coastal scenery. Rugged oceanic splendour and raw seascapes of beach along with attractive wetlands within the valley of Port Campbell Creek and Sherbrook River increase the visual integrity.

The landscape of PCNP is characterised by a broad flat to a gently undulating plain with low windswept heathland vegetation. The elevation of the plain decreases from east to west and contrasts with high vertical and rugged cliffs where it meets the ocean to thrill visitors.

Western Victoria where the PCNP is situated contains coastal features erroded from soft limestone beds. Various geological rock types, including limestone, calcarnite, mudstone and standstone additing the complexity of the substrate and the range of rocky habitats available.

The Twelve Apostles are errosional remnants called “stack.” This coast’s formation began arround 10-20 million years ago.As the ocean retreated, the soft limestone was exposed to the wild seas and winds of the Southern Ocean. The sculpting of rock stacks, gorges, islands, arches, and blowholes had begun.

There are many historical places within and adjacent to PCNP which have remarkable archaeological importance. The PCNP has a rich cultural heritage and places of considerable historic interest. Glenample Homestead, adjacent to PCNP is known for its relationship to the wreck of the Loch Ard sailing ship that endows this place with a marvellous history of early pastoral settlements at this remotely located coastline.

3.3 Australian National Parks and the PCNP

Parks Victoria is a governing authority, responsible for managing over 3.8 million hectares of various national parks and natural reserves in Victoria. This comprises almost 16% of the total area of the state (Parks Victoria, 2002). It is anticipated that total visitation to parks will be 42.8 million by end of 2009 (Parks Victoria, 2002) with 27.6 million going to national parks and 15.2% to metropolitan parks. This is an estimate of the rapid growth in visitation numbers in Victorian parks.

Existing research shows remarkable growth in visitor numbers to PCNP. Parks Victoria (1998) anticipates a 5.7% rate of increase in tourist numbers to the PCNP and the Bay of Islands Coastal Park. In the future more growth is expected to originate from the west, in particular Warrnambool and Portland, Even though at the moment 65% of tourists to PCNP and 20% of tourists to the

Bay of Islands Coastal Park access them from the east via The Great Ocean Road. Parks Victoria has seen a higher concentration of visitors' to many attractions at PCNP. At the Twelve Apostles, Loch Ard Gorge, London Arc (formerly known as London Bridge) and Port Campbell foreshore it has been observed that there are higher visitations during particular times of the year. It was noticed that summer and autumn have the highest concentrations of visitors. This increased concentration puts pressure on existing parking and trail capacities (ibid). As a result of this traffic and park management problems are at its maximum level. At the Twelve Apostles and Loch Ard Gorge there are 970,000 and 620,000 annual visits respectively, representing 54% of the 2.96 million visits to all sites at Port Campbell National Park.

Parks Victoria (1998) has delineated challenges related to overcrowding and behaviour of tourists who negatively impact on the environment and the experience of other visitors. These key issues park management saw as significant to and suggested a proactive approach that addressed them in two ways. Firstly, by adding or removing facilities (for example toilets and walking tracks) and secondly by regulating visitor behaviour (for example via restrictions, schedules and booking reservations).

3.4 Study Location

The Port Campbell National Park is on the Great Ocean Road located at 38°39′02″S, 143°03′46″E in south-west Victoria: about 250 km west of Melbourne via Colac. The Park extends some 17 km eastwards and 48 km westwards along the coast from the Township of Port Campbell. The world

renowned Great Ocean Road runs through, or adjacent to Port Campbell National Park and the eastern most 6 km of the Bay of Islands Coastal Park. The PCNP has total area of 1750 ha including Sherbrook Education Area (395 ha). Port Campbell National Park is assigned the IUCN Category II (National Parks) of the United Nations' List of National Parks and Protected areas. Category II areas are managed primarily for ecosystem conservation and appropriate recreation (Parks Victoria management plan, 1998).

There are several reasons which have contributed to the selection of PCNP Loch Ard Gorge as the location of the study. Firstly, relatively little modification has been undertaken by human activities in the area. Consequently a high degree of 'naturalism' may maximise the role of processes operating within natural settings and may minimise the impact of socio-economical factors influencing tourist attitude, behaviour and experiences

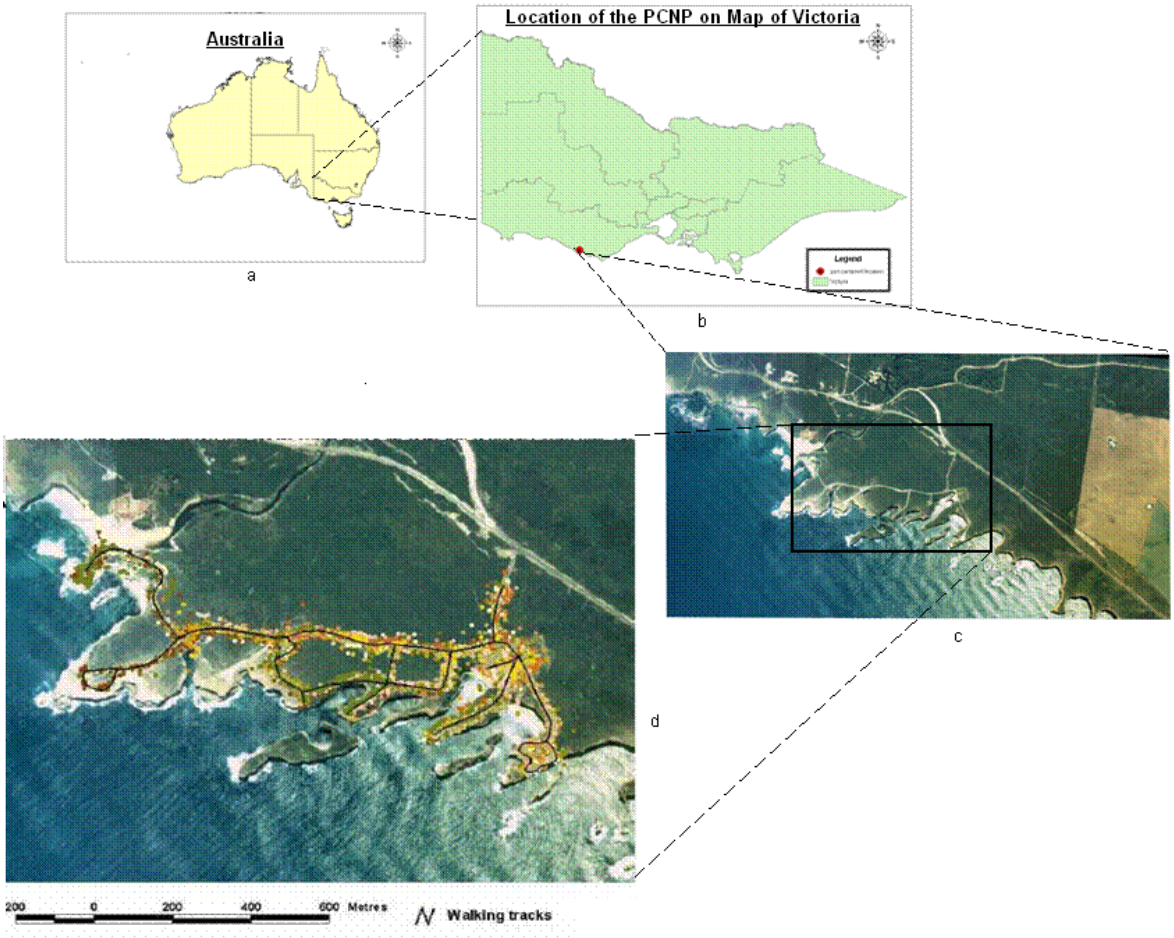


Figure 3.1: a : Map of Australia ; b; Location of Port Campbell National Park in Map of Victoria ; c; Rectified Image of the PCNP ;d: overlayed walking track at Loch Ard Gorge Site

(Source for 3.1d Arrowsmith and Chhetri.)

. The PCNP provides a near natural environment where tourist-environment interactions and involvement can be observed and assessed.

Secondly, the Loch Ard Gorge site is well known for short and long distance walks.

Figure 3.2 Loch Ard Gorge sign

(Source : Arrowsmith and Chhetri, 2005)

Such walks are an ideal instrument for observing tourists spatial behaviour. Moreover the people entering Loch Ard Gorge can be intercepted and requested to participate in the survey. Secondly long distance walks are appropriate as they induce a variety of emotional responses during the hike. The tracks pass through diversified vegetation types through to areas of spectacular views of costal scenery.

Thirdly, near Loch Ard Gorge the complex existing network of walking tracks has the capability to provide a chance of developing new methods and novel approaches of ascertaining the decision making processes by tourists.

Finally, The site is heavily visited, exhibiting pressures from overcrowding and environmental stress, particularly at peak tourist times. Hence there is a need to

address these issues in order to evaluate typologies of spatial behavioural risks exhibited by tourists. This research may identify potential recreational areas in the proximity of the heavily used walking tracks so that associated spatial behavioural risks can be typified.

In addition to the natural attractions of Loch Ard Gorge, the site is an important cultural/historic site and was the location of a nineteenth century shipwreck, and the cemetery which was established for those bodies recovered from the tragedy. And it's also very important tourist attraction.

Along the 3.3 km long walking track near the LAG site a total of 26 tourist attractions were considered for the purpose of monitoring tourist spatial behaviour and supervising of visitors' walking patterns.

Spectacular limestone curtains, a shipwreck, Mutton Bird Island, Razorback, Scenic lookout platforms are a few of the more remarkable tourist spots along the walking trail.

3.5 Tourist Attractions along the LAG

Port Campbell National Park is famous world wide for its unique and spectacular limestone formations - The Twelve Apostles. The Twelve Apostles are a magnificent sight jutting out of the ocean with swirling seas around their base. The Twelve Apostles site was originally aptly named the Shipwreck Coast, because of the tragic history of shipwrecks in the area.

Figure 3.3 Twelve Apostle Site

(Source : Arrowsmith and Chhetri, 2005)

Just past Princetown, many spots along the Great Ocean Road are worth visiting. Gibson's Steps is one of those spots, where visitors can actually get down to the beach below the Twelve Apostles. Gibson's Steps are named after the pastoralist who owned Glenample Homestead. This is the place where the last two survivors of the famous Loch Ard shipwreck, Eva Carmichael and Tom Pearce were found alive and breathing. They struggled to reach the shore and found shelter in a cave in Loch Ard Gorge. Tom then went for help, arriving at Glenample Homestead where the two spent time recuperating from their ordeal. The Twelve Apostles viewing platform can be accessed from the car park on the inland side of the road.

Figure 3.4 Beach at Gibson's Steps

(Source : Arrowsmith and Chhetri, 2005)

Loch Ard Gorge is a beautiful natural gorge shaped by years of erosion from the oceans' elements. Near the LAG site carpark visitors can take a walk to Thunder Cave, The Blowhole and Mutton Bird Island Lookouts. Past Port Campbell is The Grotto and the London Arch, previously called London Bridge, until the first section collapsed in 1990.

Figure 3.5 London Arch

(Source : Arrowsmith and Chhetri, 2005)

Port Campbell is built on the edge of Port Campbell Bay and is an ideal spot for a picnic on the grassy area overlooking the beach, or a swim at the Port Campbell Beach, which is patrolled in summer. Great surfing and fishing spots are nearby. The increasing popularity of the nearby Twelve Apostles, has seen Port Campbell evolve from what was once a quiet fishing village into a popular tourist destination with many places to eat and stay and a growing selection of interesting shops to explore.

Figure 3.6 Limestone Curtains

(Source : Arrowsmith and Chhetri, 2005)

Figure 3.7 Thunder Cave

(Source : Arrowsmith and Chhetri, 2005)

3.6 Tourist Activities at the LAG

The ability to offer a wide range of possible recreational activities is an essential component for any natural region to be developed as a well known tourist destination. Diversified cultural, historical and archaeological phenomena are the key factors why the PCNP has been developed as one of the world's famous tourist destination. The possibility for a range of outdoor recreational activities is the strength of the PCNP, offering high quality scenic viewing, walking, horse riding, swimming and surfing, bird watching, and 4 X 4 driving are a few examples of the various recreational activities.

3.6.1 Walking

Walking within the PCNP is particularly confined to vehicular tracks in the Sherbrook River Valley, and short coastal access tracks around several visitor nodes.

Hikers can also camp at the purpose-built Great Ocean Walk 'hike-in' sites along the way. These sites are located at some of the walk's most beautiful and remote locations.

Parks Victoria has designed the trek in such a way that hikers can 'step on and step off' the trail in short walk, day walk and overnight walk options. They can then choose from the wide range of accommodation and service options in the region.

There are also numerous short walking trails which can be accessed from the car parks. The Twelve Apostles to Island Archway walking track (Loch Ard

Gorge Site) has been considered for the study location. The Loch Ard Gorge (LAG) walking track extends up to 3.3 Km in length.The visible impact on walking track is clearly visible in figure 3.6 during holiday period.

Figure 3.8 Walking Track

(Source : Arrowsmith and Chhetri, 2005)

3.6.2 Cycling

Bicycle riding often occurs through out the PCNP, primarily by touring riders using the Great Ocean Road and other public roads. There is an obvious potential for an increase in demand for bicycle touring away from the roads as the PCNP has the potential to offer mountain biking. While developing opportunities for any tourist recreational activity park authorities should consider environmental resiliency of the park and visitors' satisfaction.

3.6.3 Swimming, surfing and other beach recreation

In PCNP most of the beaches are not suitable for swimming, however at the LAG site sheltered locations provide an opportunity for recreational activities such as swimming and surfing. Most of the swimming in Port Campbell National Park usually occurs only when conditions are warm to hot and relatively calm, in other words, on relatively few days of the year. When these conditions occur during the school holidays, most attractive beaches along the southwest are crowded.

Most family groups visiting PCNP prefer to swim and paddle in Port Campbell Creek, Curdles Inlet and Sherbrook River estuaries. Ocean swimming occurs mostly at Port Campbell beach and to a lesser extent at Loch Ard Gorge. Opportunities for surfboard riding off the Port Campbell coastline are important to a small number of locals and itinerant board riders. The majority of surfboard riding in the national park occurs in summer and autumn.

The shore platforms, reefs and shipwrecks off Port Campbell coastline are of considerable interest to divers. However the very dangerous seas and uncertain weather conditions greatly restrict periods of diving.

Most scuba diving is done from the shoreline at Port Campbell and Loch Ard Gorge. In calm weather other accessible sites close to offshore reefs are used, particularly Two Mile Bay and Ten Chain Reef. Many groups use small boats launched by a crane at Port Campbell jetty or from boat ramps at Peterborough or Boat Bay in the Bay of Islands Coastal Park, to reach offshore reefs and the Loch Ard and Schomberg shipwrecks.

3.6.4 Bird Watching

Pelicans, ducks, egrets and swans inhabit the estuaries and wetlands of the park and tourists coming with the idea of bird watching can have a nice time. Near the LAG, Mutton Bird Island is an important nesting place for mutton birds.(figure: 3.9) These short-tailed shearwater birds migrate about 30,000 km every year. They spend summer in the northern Pacific Ocean and return around the last week of September to nest. The place called Mutton Bird Island is an easily accessible place for bird watching and for photographic purposes. Tourists enjoy watching birds flying ashore between October and April each evening when they return home after hunting for food.

Figure 3.9 Mutton Birds Island

(Source : Arrowsmith and Chhetri, 2005)

3.7 Summary

In this chapter, the significance of the study area PCNP has been noted with particular information related to the study location, the LAG site. In this context it the reasons of selecting the PCNP and the LAG site were justified. The possible tourist recreational activities at the PCNP have also been discussed as well as the tourist spots on the site.

Chapter 4 explains the data collection techniques and the method adopted for this entire study. After collection of data it was essential to develop a framework or an inventory for the further analysis which is also explained in chapter 4.

CHAPTER: 4

DATA COLLECTION

4.1 Introduction

This section of the thesis will explain the methodology adopted for the collection of data. The types of data for assessment of behavioural risk at nature-based tourist destinations will be outlined first. It is essential that three types of data are required for the assessment of behavioural risk and to deliver the typologies for the behavioural risk pattern.

The first data type, attitudes and socio-demographic data can be considered the most crucial. Attitudes and socio demographical data is an essential component in the study as tourist's behaviour is highly dependent on those two parameters. For example an elderly couple who visit the PCNP for a couple of hours will generally like to relax and sit back and would prefer to admire the natural scenic beauty of Loch Ard Gorge from a distance. This sort of spatial behaviour can be regarded as non-risky behaviour. As a result of their spatial behaviour their exposure to risk is very low. Inversely, a group of young singles comprised of mainly males may like to be more adventurous and exhibit high risk.

The requirement for and collection of spatial data is also justified in this chapter. In order to track visitors' movements at walking tracks near Loch Ard Gorge GPS receivers were used as it provides good spatial accuracy for determining the precise walking patterns of visitors.

4.2 Comprehensive Framework for the Survey

Surveys consist of several methods through which data about visitor behaviour and travel patterns can be determined. Surveys may be administered in two

basic ways. The first is a self-administered questionnaire and the second is an interview. On-site surveys using a questionnaire or detailed interview have commonly been used to investigate needs, preferences, attitudes, experiences and the satisfaction level of consumers in market research and for visitors in the tourism context. In an effort to reduce inconvenience to participants in the survey, it is important to adopt an approach that is easy for participants to complete and only requires minimal intervention.

Questionnaires have been found to be useful in collecting a range of information whilst detailed analyses of visitors on a personal level can be explored through personal interview techniques. Integrations of these methods have also been used in tourist behaviour research. Li (2000) approaches the task of socio-demographic data gathering by combining surveys with interviews, so that rich insights about experiences can be gained with minimal intrusiveness.

4.2.1 Interviews

In addition to the above, interviewing visitors is another way of understanding visitor behaviour. The purpose of the interview is to provide the researcher with a relatively flexible format for data gathering. Although terms such as ‘guided’ and ‘open-ended’ are often found in the discourse of interviews, they are usually referred to as ‘structured’ or ‘unstructured’ (Ryan, 1995).

The structured interview, at its most formal, may be considered as an oral presentation of a written questionnaire. The interviewer will read out the questions and the person being interviewed will give their response – other

interaction is kept to a minimum. Structured interviews usually have a fixed number of questions and even the nature of possible responses may be restricted. This implies that the questions used in structured interviews will tend to be closed questions, although this is not always the case. Those who favour the structured interview will argue that this method is more efficient in terms of the time taken to collect the data and the degree of reliability and validity will be greater than in the more unstructured interview format. The main disadvantages with a structured approach is that the data gathered will lack the richness obtained by more open-ended interviews, and because the number of possible responses is often limited, participants may be forced into giving responses which do not reflect their true feelings.

Unstructured interviews tend not to use prepared questionnaires or interview schedules; rather they usually have a number of themes or issues which they aim to explore. The questions asked are more likely to be open-ended, with the participant providing responses in their own words. The respondent may have more control over the conduct of the interview in that they are often allowed to discuss issues as they arise and not necessarily in an order predetermined by the interviewer. The result of this more open-ended approach is a richness of data which is not biased by any interpretation which the interviewer may have placed on it. The main difficulties with unstructured interviews is that they are time consuming, and perhaps more importantly, the data collected from different respondents will obviously be different, and therefore not always comparable; this may raise issues of reliability and validity for data which is collected in this way. Unstructured interviews require excellent inter-personal skills to elicit the

maximum quality of information from participants. The essential criterion for interviewers is that they be neutral; their presence in the data collection process must not have any effect on the responses given to questionnaire items. Interviewers must be carefully trained to be familiar with the questionnaire, to follow the question wording and question order exactly, and to record responses exactly as they are given. Interviewers can use probes to elicit an elaboration on an incomplete or ambiguous response.

However, the advantages of a self-administered questionnaire over an interview survey include economy, speed, lack of interviewer bias, and the possibility of anonymity and privacy to encourage more candid responses from respondents.

From a self-administered questionnaire it is relatively easy to determine personal backgrounds of participants along with their anticipated actions and activities whilst visiting Loch Ard Gorge.

4.2.2 Self-administered Questionnaire

All the participants visited Port Campbell National Park for leisure or recreation, so it was important that the format of the questionnaire should not encroach into their time. The effectiveness of a questionnaire survey is highly dependent upon questionnaire design and its implementation. Hence, clear instructions are important for getting appropriate responses in a questionnaire and to ensure that the respondents answer all the questions intended for them. Fennell (1996) examined the relationship between tourism group movement patterns

and their motivation by self-administered questionnaire (as noted by Arrowsmith and Chhetri, 2003).

As Identified by several researchers (Arrowsmith and Chhetri, 2003; Fennel,l 1996, Kuppman 1999), to use attitudinal data for tourism research one needs to overcome two main problems. Firstly, the parameters or variables of attitude are not easily predictable and it is also very difficult to collect detailed data regarding tourists with traditional survey methods. (Kuppman et al., 1999). Survey research has several weaknesses namely that its contents can be somewhat artificial, potentially superficial, and relatively inflexible but despite this a great deal of social research is based on this technique. Research based on the survey has potential to deliver useful information economically; therefore the collected data can be sampled at any data entry point for further research. Another special strength of survey research is the standardisation of the data collected. Surveys are commonly used in the areas of visitor satisfaction and behaviour research (Brown and Daniel, 1987; Kroh and Gimblett 1992); several authors even suggest the use of such surveys as integral to understanding the hidden nature of visitor travel behaviour, especially where attitudes towards the environment and tourism itself is expressed (Uysal and Jurowski 1994; Kiiskilä 2001; Jackson 1986; 1987).

4.2.3 The components of questionnaire design.

The survey method used for this research project was a non-intrusive type. The survey was conducted via a self administered questionnaire at Loch Ard George in the Port Campbell National Park. The format of the questionnaire was similar

to earlier research survey conducted by Arrowsmith and Chhetri, 2003 in the area and this was by preference statements that were incorporated into a self-completing questionnaire. Due to the quantitative nature of the research and the ease of computer processing closed–ended questions were used. This was measured on a seven point Likert agree-disagree scale, where 1 represents 'strongly agree' and 7 strongly disagree'. The questionnaire was used to understand the variables of preference, attitude and motive of travel and socio-demographical background of visitors. The said variables are important to understand as they are important to understand risk taking/averting behaviour of visitors in PCNP.

A 7-point Likert scale measuring the degree of agreement /disagreement, from strongly agree to strongly disagree (1 = strongly agree to 7 = strongly disagree). Likert multi point scales have been adapted and used in many tourism research studies (McCleary and Choi, 1999; Chen, 2001; Xia and Arrowsmith, 2007; Pizam and Sussmann, 1995). Likert-type rating scales provide for a range of responses with various anchors which are numerical scores. Normally anchors range from three to nine (Zikmund, 2003). and can also be used to obtain information on many topics. Undoubtedly, therefore, the Likert scale is very popular in survey research because the method is simple to administer.

The methodological design used in the questionnaire was adapted from the pleasure-displeasure scale (Mehrabian 1980, 1995), the boredom-frustration scale (Hill and Perkins 1985) and most significantly the works of Eckblad (1981a, 1981b) and Vitterso et al. (2000). Vitterso et al. (2000) empirically

tested attitudes such as boring, easy, pleasing, interesting, and challenging and frustrating (adopted from Eckblad scheme theory) against six tourist attractions in Norway. Other scales (Hill and Perkins 1985) were also considered for the study. Ryan (1995; 48) reported a good reliability with the leisure boredom scale developed by Iso-Ahola and Weissenger (1990), despite its one-factor solution as derived in many studies. The pleasure-displeasure scale distinguishes the positive-negative affective quality of emotional states (Mehrabian 1980, 1995). Other intermediate states such as motivating, stimulating and challenging that probably lie between the positive and negative spectrum were also incorporated into the questionnaire as they may potentially represent the nature of stimuli or aroused emotions. In addition Appleton's theory of prospect-refuge was also taken into consideration in the research design to evaluate the impact of crowds, enclosure and isolation on hikers. Appleton (1980) considered enclosure not only a spatial separation but also a form of protection. For example, in natural landscapes a tree canopy or overhang which throws shadows on the space underneath offers visual protection for a person as they can see without being readily seen (ibid). These experiences are potentially vital in influencing hiking behaviour as they represent psychological (for example enclosing and isolating indirectly represents a fear of being lost) and social (crowding) states with uninhibited biophysical characteristics. Therefore, instrumentation for this study is not entirely based on the single scale due to the multitude of emotional states/feelings. Rather a range of tourist experiences has been derived from a combination of scales. For example the boring-frustrating scale has provided a spectral framework with boring at one end and frustrating

at another. The study used the on-site intercept methodological procedure whereby people visiting the park or a part of the park were approached before entering the Loch Ard Gorge sites. An ad hoc method has been used in the study wherein each person or a group travelling to the study area was asked to participate in the survey. A total of 102 completed survey responses were obtained from group representatives. Overall 36 questions were asked of each respondent of which 23 questions aimed to determine the attitudes, preferences and personalities along with 13 socio-demographical questions. The questionnaire was deliberately kept as short and simple as possible to minimize the possibilities of any kind of confusion to prevent refusal from the participants. Table 4:1 explains the framework of the questionnaire design. Acquiring data on respondents visiting characteristics was critical for this study in order to provide enough background and motivational data for a better understanding of different spatial behaviour patterns (Xia and Arrowsmith, 2005). The first part of the questionnaire deals with a set of descriptive statements regarding tourist and environmental attributes to measure the perceptions and motivations of the visitors in the study location.

Part Of Questionnaire	***Component of Questionnaire***
PART: A Attitudinal questions	**Feeling of Security and environment learning aptitude**
	visitors preference
	Motive of visiting PCNP and Level of satisfaction attained
PART: B Socio-demographical Questions	**Visitor profile**
	Type of trip
	Group type
	Travel characteristics

Table 4.1 Generic framework of the questionnaire

Perceptions gathered were about attractions, activities, and environmental learning aptitude integrated with the environment and tourism. To understand the "hidden nature" of visitor travel behavior the attitudes and satisfaction of visitors based on their preferences and attitudes is important (Jackson 1986;

1987; Kiiskilä 2001; Uysal and Jurowski 1994), so this questionnaire incorporated preference related questions as well.

To assess the Activities/ attitudes, Interests and Opinions of respondents (AIO) items, statements developed by Xia and Arrowsmith (2006) were utilized as a fundamental tool. These statements were designed to elicit information about activities/attitudes, interests and opinions (AIO) concerned with leisure time/vacation activities and general behavioural predispositions. In addition, a number of questions were developed and added in this section with a total of 23 statements. The statements that were designed and utilized in this section were about attractiveness preferences. The statements asked were about natural, cultural and recreational attractiveness viz, thrills, relaxing, facing physical challenges and feeling the ruggedness of the natural environment etc. An inclination to visit the attractions is affected by the possibility of having more recreational activities, so that attribute was also included. Most people travel in a group to tourist destinations so whether they feel secure in a group or not had to be considered. Respondents' sociability was gathered by asking them if they like to talk to people while they are visiting natural tourist places.

4.2.3.1 Associated Limitation of Questionnaire Survey

The rationale for the questionnaire was primarily to investigate the differences in spatial behaviour patterns of visitors which depended on attitude and socio-demographic characteristics. Secondly it also aimed to test the preference and environmental learning propensities which certainly influence the spatial behavioral patterns of visitors. The assumption of this section is that the spatial

behaviour patterns of visitors with various attitudinal and socio-demographic characteristics are intrinsically different, and thus are varied in terms of specific travel needs and their preferences. In this process the questionnaire techniques was intentionally kept simple and short out of consideration to visitors so as not to take up too much of the their time. Thirdly from the responses to the questionnaire it was clear that people exhibited some confusion while filling out the forms. Some people were a little apprehensive about disclosing their age.

However, with very little disparities most of the questions were filled in and eventually all 102 survey responses were considered for the next stage of this research.

4.2.3.2 Part A: attitudinal data collection

Part A of the questionnaire asked visitors about their attitude to travel. Respondents were required to evaluate each AIO statement based on a 7 point Likert scale, with the levels of strongly agree (1), agree (2), slightly agree (3), Neither agree nor disagree (4), slightly disagree (5), disagree (6) and strongly disagree (7).

Part A survey also sought to get a response on whether visitors like to go off the track or like to see the natural scenic beauty from afar. Environmental impacts such as trampling and walking off designated tracks over fragile areas reflect visitor depreciative behaviour. Besides this, the threat is potentially exacerbated in those areas that are heavily visited and are highly fragile. Overcrowding and depreciative behaviour have also been identified by Parks Victoria as an issue

for PCNP (Parks Victoria 1998, Zanon and Ware 2000). Such behaviour has resulted in adverse social and environmental impacts. Changes in itinerary or alterations in visiting habits reflect the effects of overcrowding in many parks (Arrowsmith and Inbakaran,2001) proposed a spatial approach using the *'Spatial Resiliency Model'* for the Grampians National Park where cumulative environmental impacts can be minimised or spread more evenly throughout the region by developing multi-path trails.

4.2.3.2.1 Interpretation of Attitudinal Data

The Appendix 2 questionnaire (adopted from Arrowsmith and Chettri, 2003) distinguishes all the 23 attitudinal attributes in form of questions in Part :I and the number of people for all the response classes. For example, visitors' attitudes toward environmental learning in PCNP showed that almost three quarter of the total responses were positive and wished to learn more about environment. 32 people said strongly agree and 40 agreed. It is noticeable that 40 participants said they do not prefer admiring natural scenic beauty from afar and would rather like to be in physical contact with a natural spot. This attitude suggests that if the scenic spot is at long distance from the walking track and if the visitor would prefer to be in physical contact with it then they might exhibit a risk taking attitude and behave in a risky way. This fact is confirmed by their attitudes towards the rugged environment and adventure seeking in the study area.

Surprisingly, participants gave mixed responses overall because the majority enjoyed the feeling of peacefulness found in natural tourist destinations and the

relaxation which they experienced. Conversely the categories which are indicators of a non-risk taking attitude also elicited a higher positive response. Accumulatively risk taking and non-risk taking preferences and attitude can't be indicators together for spatial risk behaviour. Hence, by looking at the nature of the data type and the mix of responses systematic data analysis techniques should be considered for further investigation of this research (Appendix 2).

4.2.3.3 Part B: Socio-Demographic data collection

In the second section of the questionnaire (Part: II), tourists were asked about their gender, age, nationality, level of education, family type and the type of group they were in while visiting PCNP. These types of questions provided basic socio-demographic, as well as cultural, characteristics of the visitors, and were effectively read as useful "differentiators" in terms of tourist choice and behaviour (Murphy and Murphy, 2004).

Furthermore, this section incorporated questions regarding the life cycle categories of respondents, such as were they young singles, young couples with or without children, young, mature, or a middle aged family. It also asked how much time the respondents intended to spend at PCNP. This could be a key determinant factor to assess the form of spatial behaviour exhibited which would finalize the associated risk. A total of 13 socio-demographic parameters were used in the questionnaire. The evaluation of patterns of use by recreational activities can lead to an assessment of biophysical and social carrying capacities of a park. It also can lead to the identification and prediction

of potential conflicts between different user groups so that adequate measures can be put in place for Interpretation of socio-demographical Data.

The socio-demographic profiles of all 102 respondents were carefully analysed into 13 different parameters. A brief description of all the 13 parameters is below:

4.2.3.3.1 Group Type Number of People in each group

The spatial behaviour of a person is obviously dependent on the type of group they are travelling in. For example, people travelling in an organised club or guided tour tend to follow the guide. The guide generally makes them aware about the risk factors of the place and tourists generally walk on designated walking tracks and hence avoid risk taking behaviour. Table 4.2 shows the group type. For all the group types the rank has been given for ease in computer processing and characterisation for further statistical tests. Table 4.3 shows the responses of the second question. On asking, "How many people are there in the group you are travelling with?" the majority of people responded 2. There were 34 responses with more than 4 people in the group.

Rank	Group Type	Number of participants
1	Travelling Alone	00
2	Travelling with Spouse/Partners	57
3	Travelling in organised group/club	00
4	Travelling with Children	18
5	Travelling with Friends/Relatives	27
6	Don't Know	00

Table 4.2: Visitors' Group Type

Rank	No. of People in a group	Number of participants
1	2 people	60
2	3 people	08
3	4 or more people	34

Table 4.3: Number of Responses for Group Size.

4.2.3.3.2 Trip Type

The range of trip types is listed in Table 4.4. A large proportion of respondents travel there in their long holiday period. There may be a chance of negative effects on the environment through overcrowding if these periods coincide with public holidays or the school holiday period. Almost 77% of visitors accumulatively form rank 2 and 3 whilst almost 65% visitors are on a day trip either from home or as a part of their long holidays.

Rank	Trip Type	Number of participants
1	A Day Trip from Home	25
2	A Day Trip as Part of Long Holiday	43
3	A Holiday in which there was a stay in the Park for at least one night	34
4	Don't Know	00

Table 4.4: Trip Type.

4.2.3.3.3 Educational Background

As shown in Table 4.3 and Figure 4.2, a total of 89 participants are in either the 2nd or 3rd category and as most of them are young participants it is assumed that they may be students.

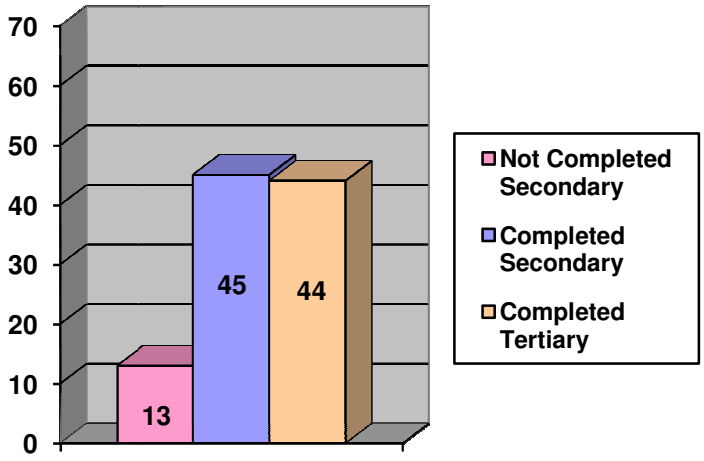


Figure 4.1: Level of Education

4.2.3.3.4 Age Groups

As Figure 4.1 shows most of the respondents travelling to Loch Ard Gorge were either youngsters (age group: 18-29) or people over 60 years of age. This shows that the study area has the potential to offer leisure to all age groups. Because of the different age groups who use PCNP the spatial behaviour of these groups should be different which, may be the main indicator of risk. Interestingly the group of middle aged people were significant in numbers and totalled 19 for a rank 6.

Rank	Age Group (years)	Number of participants
1	18-19	02
2	20-24	19
3	25-29	19
4	30-34	04
5	35-39	06
6	40-44	19
7	45-49	01
8	50-54	02
9	55-59	03
10	60-64	26
11	65-69	01
12	More Than 70	00
13	Refused to disclose age	00

Table 4.5 Ranking to age group

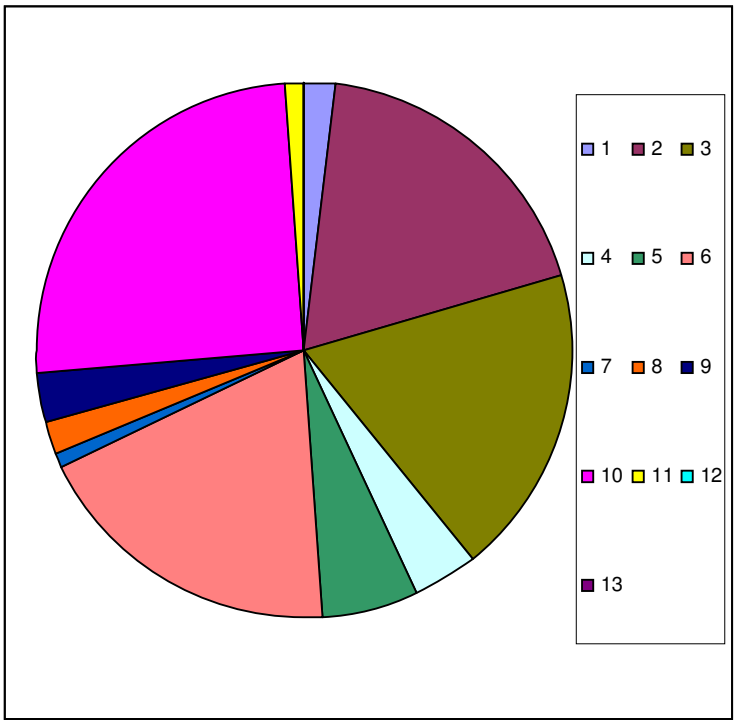


Figure 4.2: No. of respondents in each rank

4.2.3.3.5 Gender

In total 43 respondents were male and 59 were female. It was observed that the imbalance between females and males is most likely due to females, as passengers in vehicles filled in the survey questionnaire. The male respondents were categorised and given the rank of 1 and females were given 2 for ease of computer processing and statistical analysis.

4.2.3.3.6 Residential Status

The purpose of this study is not based on classifying national and international tourists according to their country of origin but looks at their preferences and motives. Hence, Table 4.6 below has only two classification types that show whether the person visiting PCNP is Australian in origin or foreign. This means that foreign visitors have been given the rank of 2 and Australian tourists the rank of 1. Visitors from across Australia have been considered locals whilst all foreign visitors irrespective to their country of origin have been considered as international.

Rank	Country Of Origin	Number of participants
1	Locals	82
2	International	20

Table 4.6 : Nationality

4.2.3.3.7 Preference of Recreational Activity

Visitors' activity preference while visiting could be the main factor in potentially risky spatial behaviour in any tourist destination. Table 4.7 shows the preferred activity by visitors at the study area.

Rank	Activity	Number of participants
1	Bird Watching	53
2	Coastal Scenery	37
3	Viewing Rock Formation	12

Table 4.7: Preference of Activity

4.3 Acquisition of Spatial data

As discussed in Section 2.7.3 and as set out in Table 2.2, of the various techniques which can be used for tracking visitors' movement patterns a GPS based technique was identified as useful for this research project. As this project is mainly designed at a micro scale the true locations of tourists in X and Y coordinates with respect to time need to be studied for monitoring of spatial movement and hence to assess spatial behavioural risk. Monitoring can be defined as a process through which changes in the characteristics of a particular object/phenomenon are assessed. It is a repetitive measurement taken over a period of time (Dejbakhsh et al., 2008).

In addition, GPS is widely used as a tool for tracking vehicles and the movement of objects. The use of it for monitoring visitors' movement and activity is identified by researchers all over the world (Shoval and Isaacson, 2007). A GPS based tracking system gives the researcher information related to direction of movement and time taken which provides velocity information as well (O'Connor *et al.*, 2005; Xia and Arrowsmith, 2007). Supporting this

Arrowsmith C. and Chhetri P. (2002) noted that acquiring tourist movements in time and space has the potential to provide arrival and departure times, nodes visited, a sequence of visited nodes, walking speed and orientation. These parameters are necessary inputs for constructing predictive models and testing future management scenarios (Arrowsmith C. and Chhetri P. (2002:15). Forer (1995) believes that movement data can be assessed to gather information on decisions made by tourists at several points during a visit as well as by providing detailed information on how tourists interact with the environment Dave, Arrowsmith and Chhetri, 2008).

For the purpose of monitoring visitors' spatial behavioural patterns this sort of information is immensely useful as GPS provides spatial and temporal data in near real time. However, as several researchers have pointed out, visitor behaviour can in fact be modified if the participant is aware that he or she is being monitored for research purposes (O'Connor *et al*., 2005; Xia and Arrowsmith, 2007). Another limitation of this method is that "canopy cover can restrict the number of satellites required for high positional accuracy" (Xia and Arrowsmith, 2007). It means the receiver provides an accurate reading only if exposed directly to satellite signals. Any kind of obstruction, regardless of whether it wholly or even partially blocks the signal, will produce an inaccurate reading. Several studies (Forer 1995; Kwan 1998; Huisman and Forer 1998a) have shown that the aggregated pattern from individual tracking data can be derived and is found to be highly significant in solving accessibility problems. However, Forer (1998b) considers the demand for additional location-based services (LBS) including guidance and support can also be assessed with this

technology. He further states that such data will provide a context for examining the needs and demands for new utilities and infrastructure. LBS have been widely applied to the management of urban provisions and utilities but only a few studies have applied the technology in non-urban settings or natural environments, (Arrowsmith and Chhetri, 2003:15). For this research project location-based data was obtained from previous surveys which were carried out by Arrowsmith and Chhetri (2002) for Parks Victoria. In order to monitor movement pattern at Loch Ard Gorge the co-ordinates of 26 attractions were stored as point features in the GIS receivers (Figure 4.3). All the 26 points of attractions have their own intrinsic natural, cultural or historical values and so can be considered tourist attractions and are listed in table 4.8. All the survey respondents were given a hand held GPS receiver to keep on their person when they walked around the attractions so that their pattern of movement (spatial behaviour) could be recorded in co-ordinates. Figure 4.3 below shows a map of all the tourist attractions at Loch Ard Gorge and Figure 4.4 shows the walking tracks along Loch Ard Gorge. The surface of walking tracks is not uniform across the area. Rather it is constructed of different material such as bitumen, concrete, gravel, rocks, sand and timber.

Attraction ID	Type of Attraction	Name
1	Car park	Car park1
2	Lookout	Loch Ard View
3	Lookout	Limestone Curtain
4	Lookout	Cliff Lookout
5	Lookout	Razorback
6	Lookout	Razorback
7	Lookout	Loch Ard Lookout to Beach
8	Lookout	Razorback
9	Lookout	Loch Ard Point - The Wreck
10	Lookout	Top of Stairs -The Survivors
11	Sign	Loch Ard Story
12	Car Park	Car Park2 - The Cemetery
13	Lookout	Mutton Bird Island
14	Lookout	Cliff Look Out
15	Car Park	Car Park - 3
16	Lookout	Blow Hole 1
17	Lookout	Blow Hole 2
18	Lookout	Over Cliffs
19	Intersection	to Blow Hole
20	Lookout	Thunder Cave
21	Lookout	Broken Head West
22	Intersection	to River
23	Cemetery	Loch Ard Cemetery
24	Lookout	Broken Head East
25	River	Sherbrooke River
26	Beach	Loch Ard Beach

Table 4.8: **Points of Attraction at Loch Ard Gorge Site**

(Source: Arrowsmith and Chhetri, 2002)

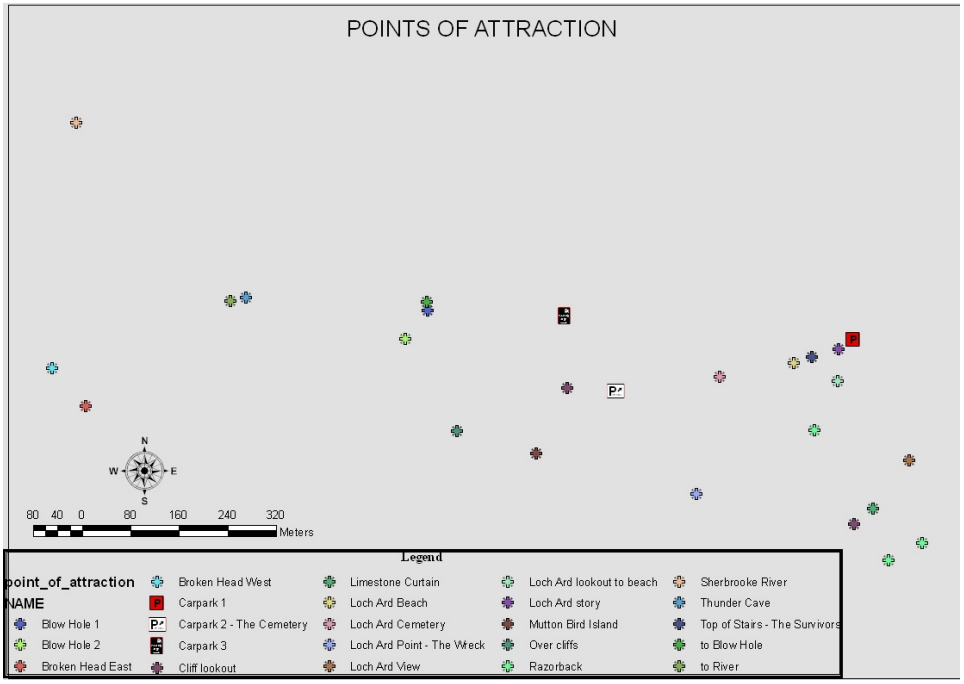


Figure 4.3 Tourist attractions depicted as points

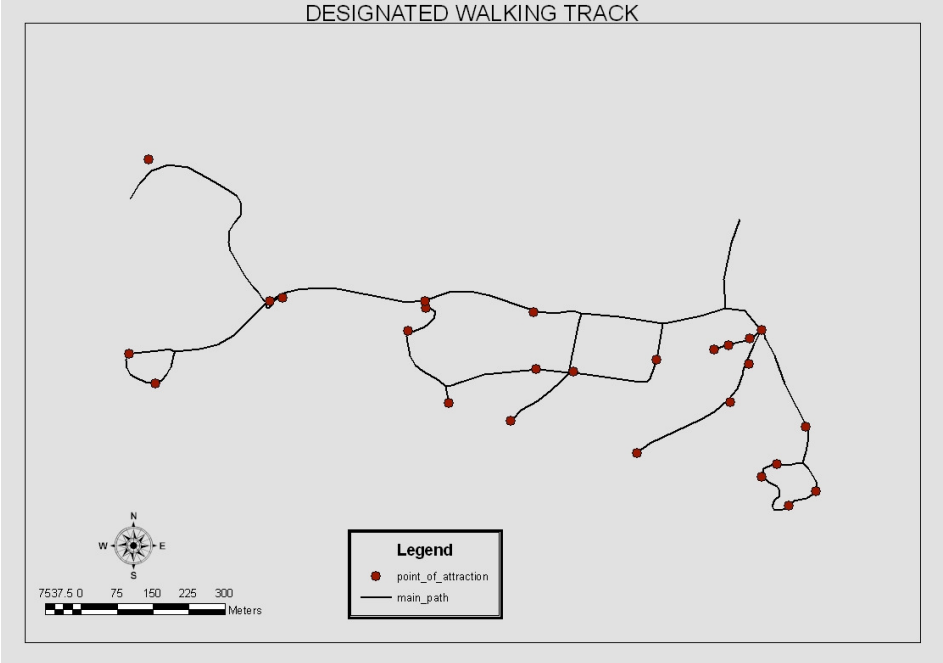


Figure 4.4 Walking Track at Loch Ard Gorge

All 102 participants used the GPS receivers and completed the questionnaire surveys. The data logged from each of the GPS receivers was then downloaded as a series of text files, one per respondent. Each completed questionnaire was designated with an identification code (**survey_id**) so that later on each completed questionnaire could be compared with its respective text log file. The text files (Figure 4.5) were then edited using Excel software, and imported into the GIS environment using ARC VIEW 9.1 as a series of point files. Each point was given a unique point identification number (**point_id**). In this process a total of 13,146 points for the completed 102 surveys were transferred into a GIS environment. A snap shot of points in a text file is shown in Figure 4.5 below and the attributes stored for each point for the purpose of this research is shown in Table 4.9 below.

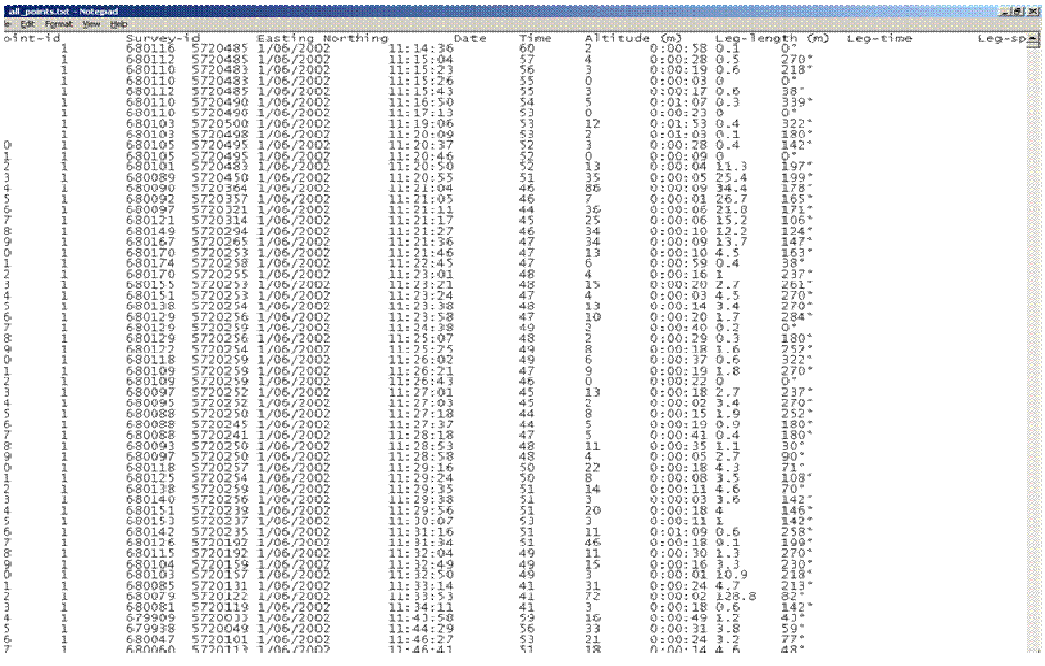


Figure 4.5: GPS Log file downloaded in text file format

Attribute	Units
Point_id	Integer
Survey_id	Integer
Easting	AMG66 metres
Northing	AMG66 metres
Date	dd /mm/yyyy
Time	HH:MM:SS
Altitude	metre
Leg_length	metre
Leg_time	Second
Leg_speed	Km/ph
Bearings	Whole degrees

Table 4.9 Attributes stored in the GIS Software

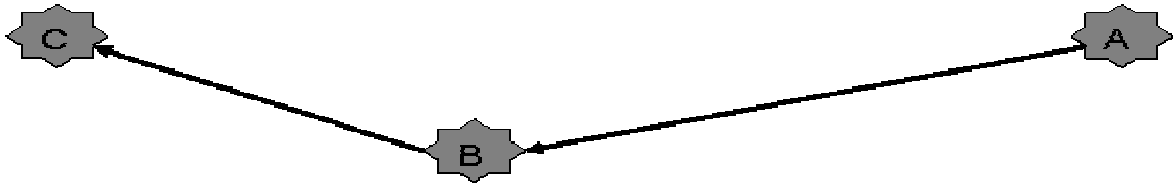


Figure 4.6: Leg speed, time and bearing recorded at point C refers to the line segment between B and C. Leg speed, time and bearing recorded at point B refers to the line segment between A and B.

Figure 4.6 shows the relationship between the leg attributes and the individual logged locations. The lines connected to each of the recorded points were

generated purely to give an indication of visitor movements along walking tracks .Leg lengths, times, speeds and bearings were recorded with logged locations within the GPS. These refer to the individual line segments traversed immediately prior to the logged location.

The study area was divided in 13 different regions to accommodate 26 points of attraction. The main purpose in doing this was to make it easy to track visitors' movements between different attractions. This can further assist when describing behaviours for different locations throughout the Loch Ard Gorge site (Figure 4.7).

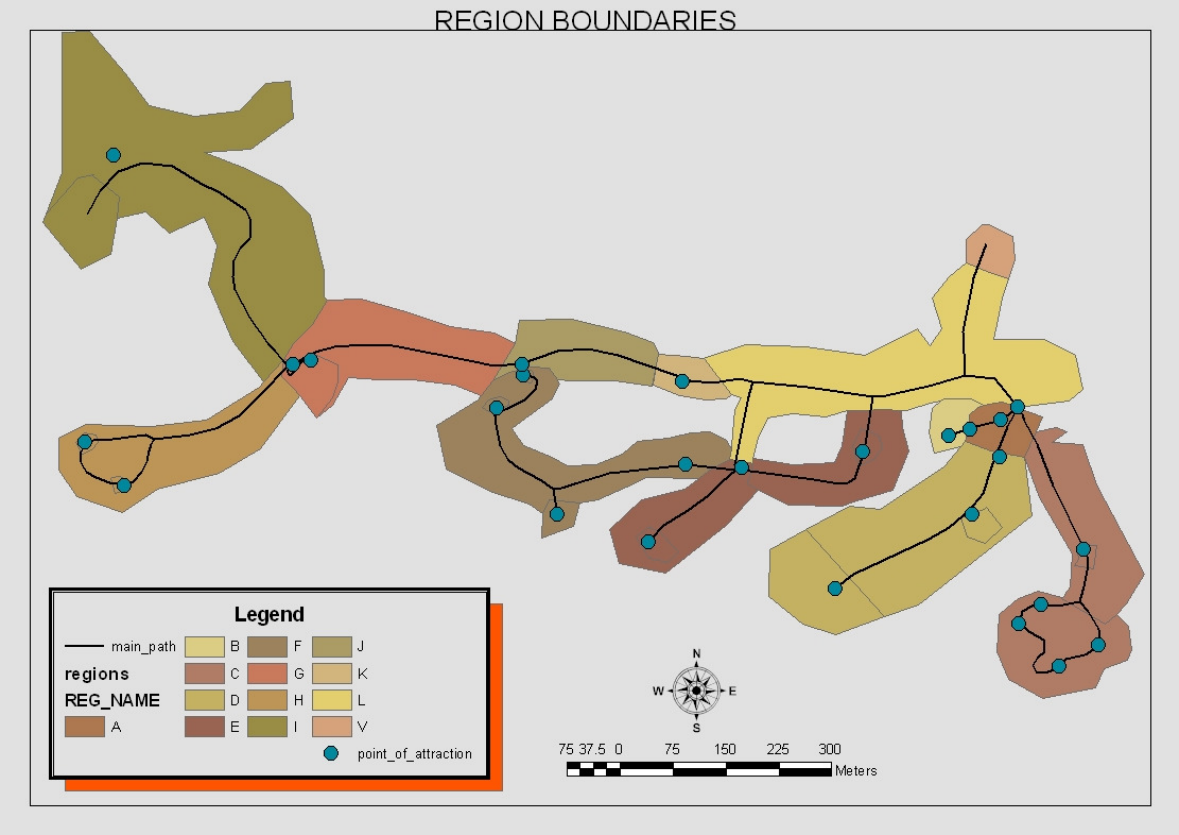


Figure 4.7: Map of Region boundaries around tourist attractions along the walking tracks
(Source: Arrowsmith and Chettri, 2003)

4.4 Summary

In this chapter the various data collection techniques such as questionnaires, interviews and self-administrated questionnaires have been discussed. The advantages-disadvantages of all survey techniques were highlighted and finally a hybridized approach was selected for socio-demographic data and attitude related data collection.

Since this thesis is researching spatial behavioural risk patterns, visitors' walking patterns were acquired using GPS receivers. Spatial data should provide a sound understanding of patterns of movement of visitors in a park setting. Placed within a geographic framework such as GIS, these movement patterns can be analysed at particular locations throughout a park. This will improve understanding of individual visitors' risk behaviour. Finally derived GPS observations combined with available spatial information were introduced into GIS software. This developed Inventory for the present study provides enough basic information about visitors' attitudes and reasons for travel and socio-demographic background, coupled with GPS movements on designated walking tracks in order to derive statistical classifications of visitors' spatial behavioural risk patterns.

Chapter 5 portrays the final phase of the entire study. It will present statistical classification of visitors based on their spatial behaviour. It is anticipated that the findings from this research can assist park managers to plan for a variety of visitors and tourists through a fuller understanding of their spatial behavioural risk.

CHAPTER: 5

DATA ANALYSIS AND MAPPING RISK PATTERNS

5.1 Introduction

This chapter deals with segmentation based analysis for the development of a final approach to generate patterns of spatial behavioural risk patterns. Of various segmentation techniques cluster analysis was selected as it has a broader use for data analysis. Clustering is the segmentation or assemblage of large complex groups of data sets. It aims to segment similarities into groups or clusters so that the degree of relationship is strong between members of the same cluster and low amongst the members of different clusters. Hence, in terms of the data gathered each cluster portrays the class to which a particular case belongs. All 102 cases were grouped on the basis of their attitudes, preferences and socio-demographical characteristics hence the questions asked in questionnaire (part I and Part: II both) (Appendix:1) were considered variables for analysis. After obtaining the segments or groups of people the typologies were verified using another statistical technique known as Discriminant Function analysis. This technique is used to determine which variables discriminate between two or more naturally occurring groups obtained through cluster analysis. And finally all movement patterns were shown with the help of maps of the respective clusters.

The attitudes, preferences and socio-demographic variables were classified into separate groups using cluster analysis and their discriminating factors were derived. With this process, 6 equations were obtained which might help park managers or researchers to decide the probability of any tourist belonging to any distinct group. From this course of action park authorities can presume what type of risk taking their visitors' have a preference for and hence avert

causalities in PCNP. The details of statistical techniques and associated maps of movement patterns are explained further in this chapter.

5.2 Statistical Analysis

5.2.1 Cluster Analysis

Using SPSS (v15.0) a total of 36 parameters or variances (all the variances are questions asked in questionnaire) were classified by cluster analysis for 102 respondents or cases. Part A and Part B of the questionnaire were designed to gather different types of data sets. Part A has discrete measurement data whereas Part B has categorical data. For cluster analysis all the desired data should be one single type. To do this a Z-score was obtained for all the data points i.e. for all 102 cases and for r responses (Variables). Z-score is a process toward standardization. Since a standard score has a dimensionless quantity, all data types can be treated equally for the purpose of analysis.

Cluster analysis is a multivariate analysis technique that seeks to organize information about variables so that relatively homogeneous groups, or "clusters," can be formed. The clusters formed with this method should be highly internally homogeneous (members are similar to one another) and highly externally heterogeneous (members are *not* like members of other clusters.)

A more precise definition of cluster analysis is the categorization of a large set of data into different groups, or in other words, the partitioning of a data set into subsets (clusters), so that the data in each subset (ideally) share some common trait - often proximity according to some defined distance measure (Jain A.K,1999).Amongst the various implementations of cluster analysis such as

Hierarchical clustering, Fuzzy *c*-means clustering, QT (Quality threshold) clustering the K-means clustering technique has been chosen for this project.

The K-means algorithm in generic terms is an algorithm to cluster *n* objects based on attributes into *k number of partitions;* (*k* < *n)*. It is similar to the study of maximum likelihood analysis for mixtures with a normal distribution of cases in that they attempt to find the centers of natural clusters in the data. It assumes that the object attributes form a vector space. It makes the analysis easy by obtaining the minimum possible intra-cluster variance or the squared error function.

$$V = \sum_{i=1}^{k} \sum_{x_j \in S_j} (x_i - \mu_i)^2$$

Where there are k clusters in S_i, i = 1, 2... k, and μ_i is the centroids or mean point of all the points $x_j \in S_i$;x= point in Euclidian space and S =space.

(Source: Hair J. F. et al., 1995)

The K-means algorithm follows the below listed steps in order to give the final cluster centers.

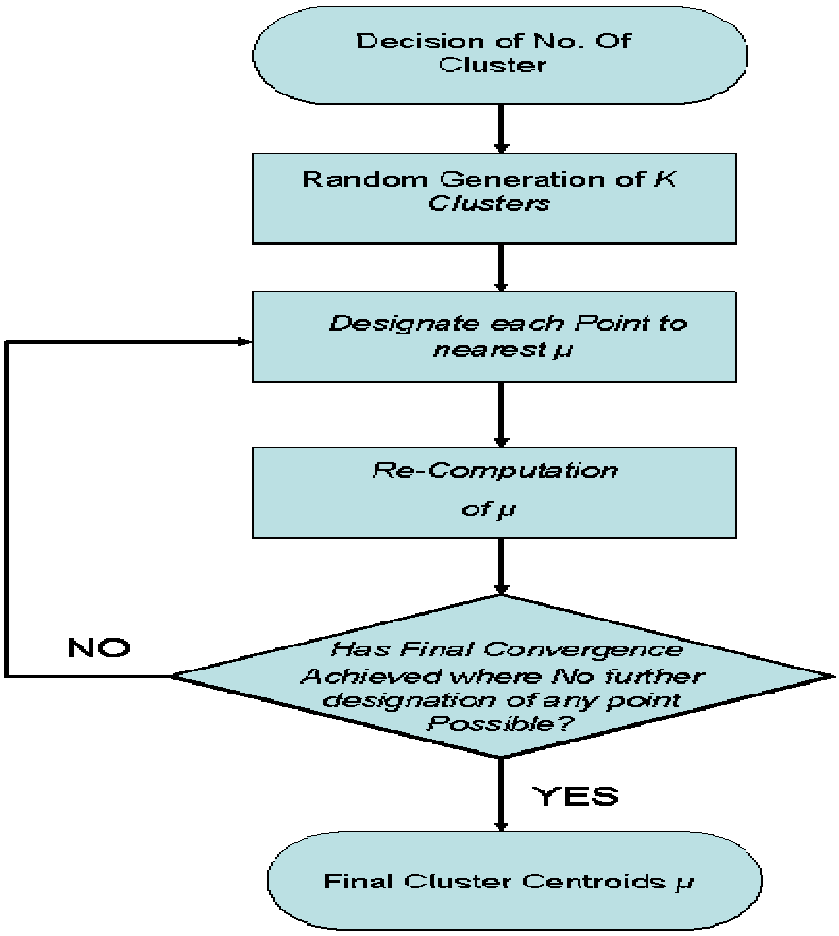


Figure 5.1: Algorithm for Cluster Analysis

After performing the algorithm several times the total number of clusters for this study was decided as six (6) as all the clusters have a relatively good distance between their cluster centers in an Euclidianspace. The minimum distance between cluster centers is between cluster no. 3 and cluster no. 5 which is 4.250 in Euclidianspace. This clearly explains that all the clusters are well spread across Euclidianspace for analysis purposes. This also determined the property of group members between these two clusters which were relatively similar compared to other clusters. For example the centers of cluster no. 1 and cluster no. 6 are separated with 8.021 and the distance between the centres of

the 3rd and 4th cluster is 7.003 in Euclidianspace. Table 6.1 shows the distance between cluster centers. The final cluster centre of all the clusters was achieved after 7 iterations of all the clusters in Euclidianspace (Table 6.2). So fundamentally since the convergence was achieved after 7 iterations the six clusters can be considered as the optimum number of clusters for this data set.

Cluster	1	2	3	4	5	6
1		5.480	4.161	6.864	4.997	8.021
2	5.480		5.023	5.660	6.094	6.810
3	4.161	5.023		7.003	4.250	8.203
4	6.864	5.660	7.003		6.208	8.421
5	4.997	6.094	4.250	6.208		8.475
6	8.021	6.810	8.203	8.421	8.475	

Table: 5. 1 Distance between Clusters' Centers in Euclidianspace

Iteration History[a]

	Change in Cluster Centers					
Iteration	1	2	3	4	5	6
1	4.869	4.111	5.609	4.172	5.468	3.977
2	.596	.000	.535	.000	.534	2.261
3	.387	.000	.485	.000	.000	.000
4	.528	.423	.393	.000	.000	.000
5	.245	.000	.287	.000	.186	.000
6	.273	.000	.230	.000	.000	.000
7	.000	.000	.000	.000	.000	.000

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 7. The minimum distance between initial centers is 9.418.

Table: 5. 2 Iteration History and Achievement of Final Convergence after 7 Iterations

The following Table 5.3 shows the number of cases or participants in each group per cluster.

Cluster	1	23.000
	2	16.000
	3	27.000
	4	2.000
	5	31.000
	6	3.000
Valid		102.000
Missing		.000

Table: 5.3 Numbers of Cases in Each Cluster

VARIABLES	CLUSTER					
	1	2	3	4	5	6
Thrill	-.41491	-.53332	-.41673	-.42721	.78676	1.93076
relaxing	-.39581	1.31343	-.11005	.21532	-.29477	-.07751
envt. Lrn	-.47977	.82341	-.29842	1.69334	-.20469	2.95869
ruggednes	-.31992	-.41542	-.53352	-.34456	.88059	.60021
peace	-.35760	.79270	-.20012	-.34242	-.28608	3.49950
family time	-.06768	.02262	-.02011	-.66968	-.12378	2.30466
do whtvr like	.39722	-.91816	.25975	-1.12680	.15776	-1.36525
off track	.28909	-1.23679	.43788	-1.32609	.30245	-1.80237
avoid diff. track	.29110	.84420	.16670	-.79626	-.61254	-1.37403
physical chlnge	-.24277	-.86338	-.15014	-.61420	.87394	-.80405
secure in grp	.51443	.37834	.39745	-1.37579	-.89648	.64204
advnt. Risk in wilderness	.03460	-.90585	-.04538	-.63881	.60165	-.81684
talk others	-.12803	.75067	.07517	.25774	-.41010	.36728
no cntrl nd guidence	-.38815	-.34127	-.22148	-.18725	.71704	-.49530
short path	.37557	-.93295	.37280	-1.21957	-.11005	.69128
avoid walk where mny ppl	.06768	-1.03458	.03198	-.92224	.54667	-.32308
more recr. Act.	.27234	-.93555	.40688	-.86729	.08393	-1.04931
see othr ppl	.35671	-.98309	.44941	-1.14966	.07114	-1.50501
avoid physical enclosure	.63231	.16093	.11715	-1.22385	-.68345	1.11789
forest stnd than open areas	.51665	.24650	.41240	-1.34299	-.82093	.39100
walk close to parking	.33382	.14838	.28597	-.26438	-.63720	.83631
admire from dist	.33846	.67101	.32921	-.58582	-.77115	-.77733
walk on hard surface	-.17063	-1.07665	.27719	-1.04522	.64189	-1.38048
VISITNUM	-.06547	-.01394	-.51435	2.11935	.43718	-.72504
TRIPDUR	.90919	-.20412	-.68105	.23992	.02347	-.15478
FIRSTSIT	-.03489	-.45260	.62412	-1.07645	-.23928	.25443
SOLEVISI	-.06490	-.24877	.37776	1.86579	-.24877	-.24877
PEOPLNUM	1.20898	-.33072	-.64182	.27406	-.17681	-.08433
TRIPTYPE	-.00168	.29542	.03013	-1.43351	-.11623	.32286
EDUCATIO	-.88624	.46781	.09682	-.44281	.45018	-.92847
GROUPTYP	1.09247	-.20334	-.77429	-.10992	-.08581	.63751
LIFECYCL	-.62397	-.29654	.70617	.01464	.02267	-.23431
ACTIVITY	.95632	-.23162	-.38191	.57994	-.35089	.57994
GENDER	-.28947	.59762	-.27000	-.15805	.26448	-1.16561
RESIDENC	-.38247	.29179	-.02730	-.49144	.15536	.34401
AGEGROUP	-.54008	-.44740	.70180	-.36845	.07471	-.31581

Table: 5.4 Final Cluster Centres

All the six clusters here have been briefly described based purely on their preferences, attitude and socio-demographic parameters. Their spatial

behaviour can be understood by their movements across the walking track, reflecting in movement pattern maps. (Figure 5.2 to Figure 5.7)

People who belong to the first cluster do not feel secure in groups, even though they were visiting the park in a group at the time of survey. This group of people is mainly comprised of young couples / young families.

They also do not enjoy being in a forest but prefer open areas and they tend to stay or visit the national park for a longer duration.

In addition, these people are well educated and were not quite sure about their preferences regarding environmental learning and seeking peace in a natural environment. However, they gave mixed responses for taking adventure, spending time with family, and walk near the car park while visiting the LAG site. The variation in responses can be observed because this group comprises young couples and young families. Naturally, visitors from this age group and life cycle categories tend to feel independent and confident. Therefore, considering their preferences regarding groups it demonstrates that they are quite confident people for their travel needs and preferences. Based on their confident personalities derived from their attitudes and preferences (and not their spatial behaviour) this group can be said to be, "**Mid-Allocentrics possibly Risk Takers**", Figure 5.2 shows their spatial behaviour across the walking track.

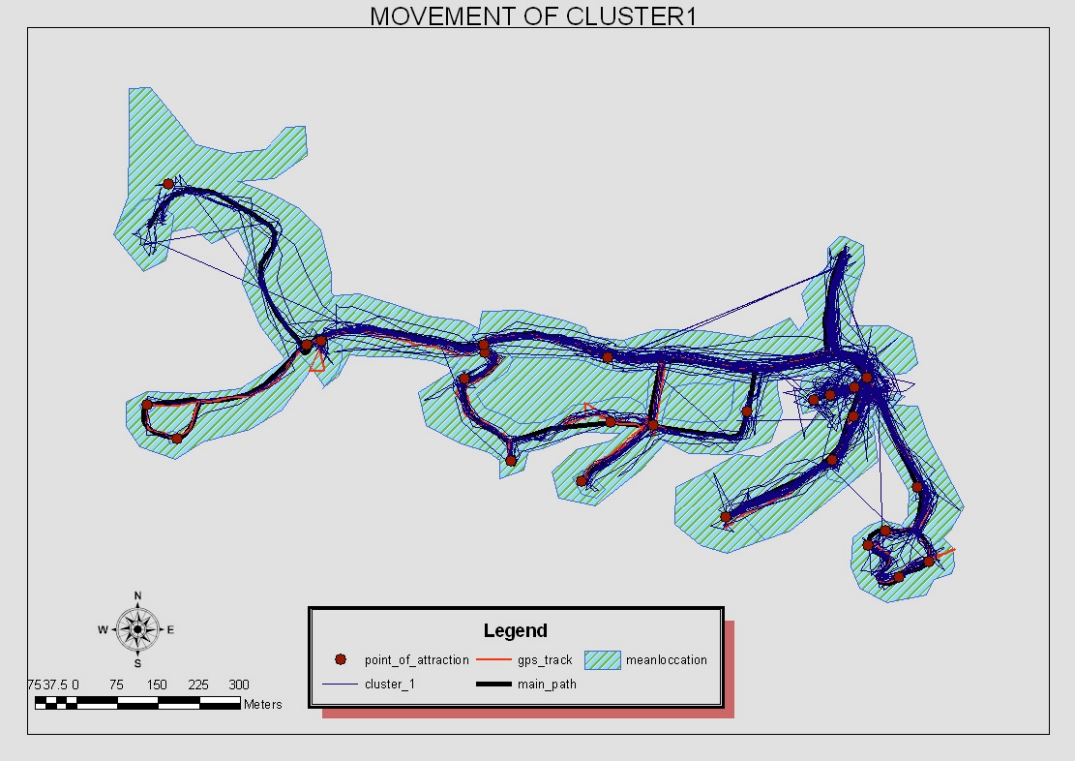


Figure 5.2: Spatial Movement patterns of visitors in Cluster 1

The first significant preference of the 2nd segment of visitors is they do not like relaxing when visiting a national park and this confirms that they are seeking thrills. They also like to take risks in the wilderness which is potentially harmful to them; furthermore, they gave highly positive responses on being asked what their inclination was to going off track to explore further.

This group possess the maximum degree of risk to themselves. Their preference and attitude collectively could lead them to take a shortcut. This further increases the risk to them as they might fall from a cliff. In support of this contention they preferred to admire natural scenic beauty up close and are more likely to go closer to it. Some places in the study area are a long distance

from designated walking tracks to avoid this type of incident from occurring. They also gave higher positive responses to walking on hard surfaces and preferred to avoid walking where there was a crowd.

So these all characteristics can be summed up to give a name to this group of people as "**Allocentrics and confirmed risk takers"** their spatial behaviour is drawn as a map in figure 5.3.

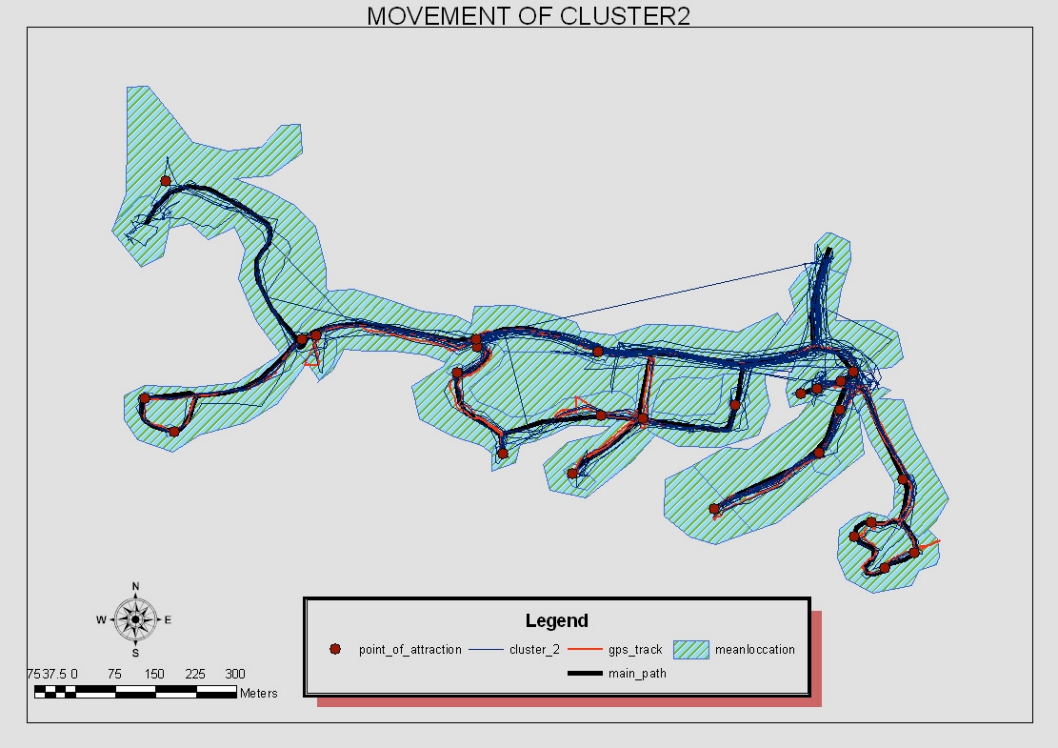


Figure 5.3: Spatial Movement patterns of visitors in Cluster 2

The 3rd cluster is almost identical to the 2nd except in one significant positive response to ruggedness in the natural environment. Their preferences are to spend time with the family, have an adventure and go for a hike in the wilderness. The tendency to avoid crowds in this cluster is insignificant as there was no clear cut response in the affirmative or the negative. In addition, they do

not appreciate having to talk to other people while walking which means that they exhibit introverted characteristics while exploring natural scenic attractions. This fact also can be interpreted as; the people who belong to this group are fond of enjoying natural attractions without any disturbance. However, they gave responsible responses for risk related questions.

Considering that they describe themselves as appreciating ruggedness in natural areas they are named, "**Mid-Psycho Centrics and Risk Averters".** Figure 5.4 shows their walking pattern along the designated walking tracks.

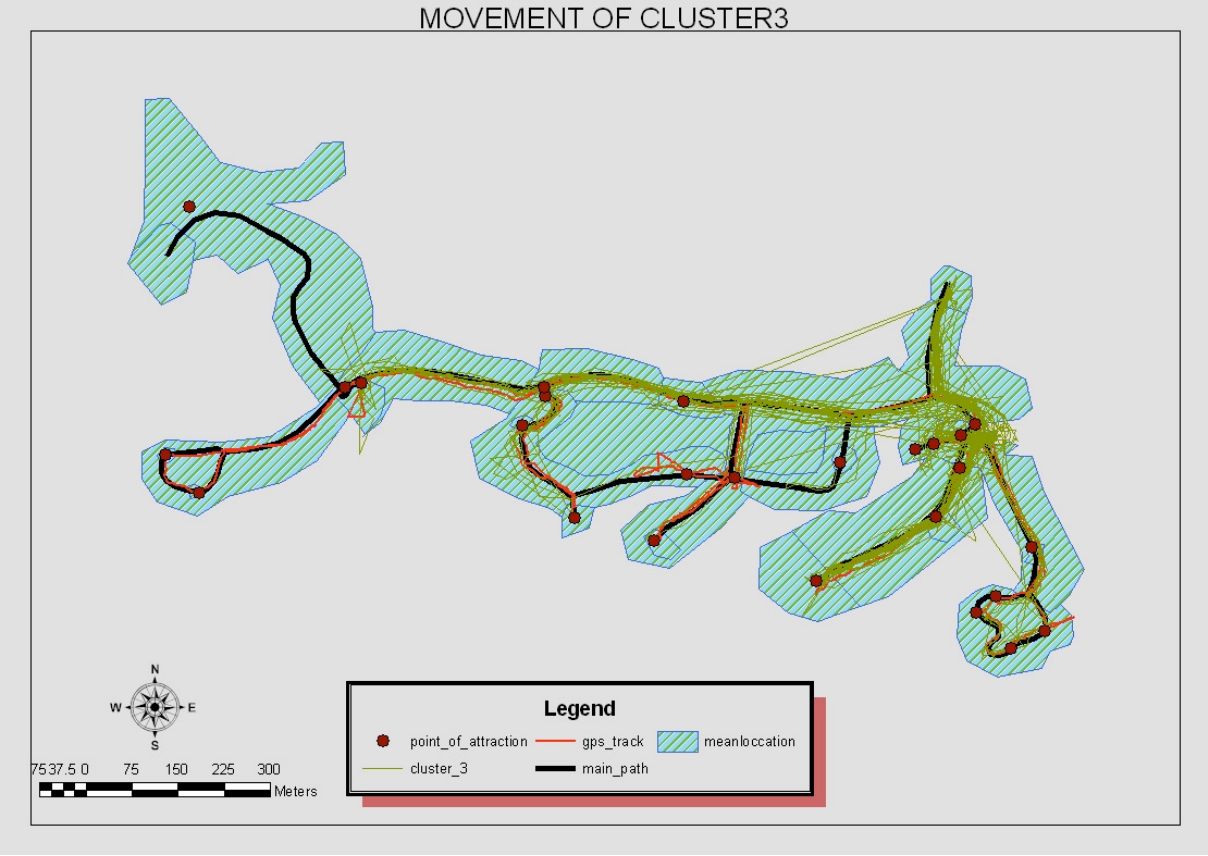


Figure 5.4: Spatial Movement patterns of visitors in Cluster 3

The group of the people belonging to the 4th cluster exhibit high thrill-seeking, adventures and risk taking attitudes. They really do not appreciate the idea of learning about the environment when they are enjoying the national park. They also like to go off track to explore further and simultaneously like to take the shortest possible path. Only 2 cases lie in this group which is not enough to draw any particular analysis. However, they suggested that they feel secure in a group while exploring new attractions.

They were visiting the park for a short time and wanted to do every possible recreational activity. But they admitted that they were in the park mainly to enjoy costal scenery with their family. The people in this group like group activities especially activities which lead to risk so; it is assumed that their risk taking propensities depend upon the activities and preferences of other members of group they are travelling in. Hence, they can be called, "**Allocentrics and dependent Risk takers**." Figure 5.5 exhibits their actual spatial behaviour in PCNP.

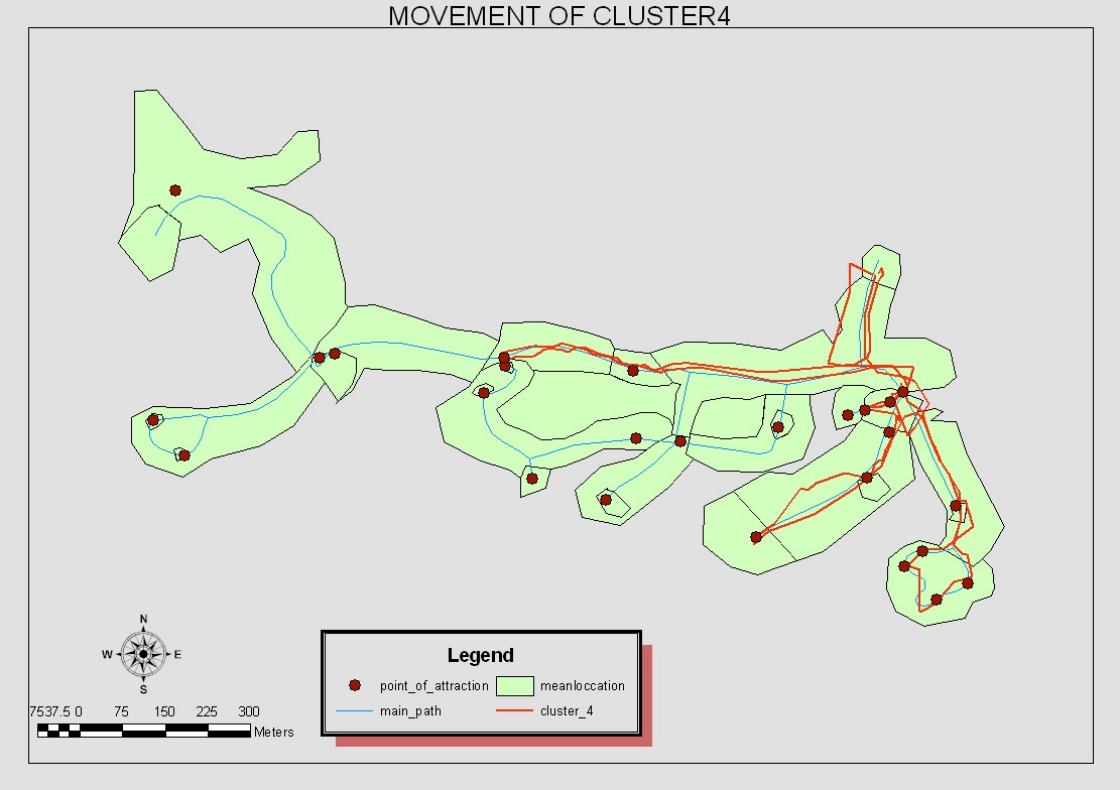
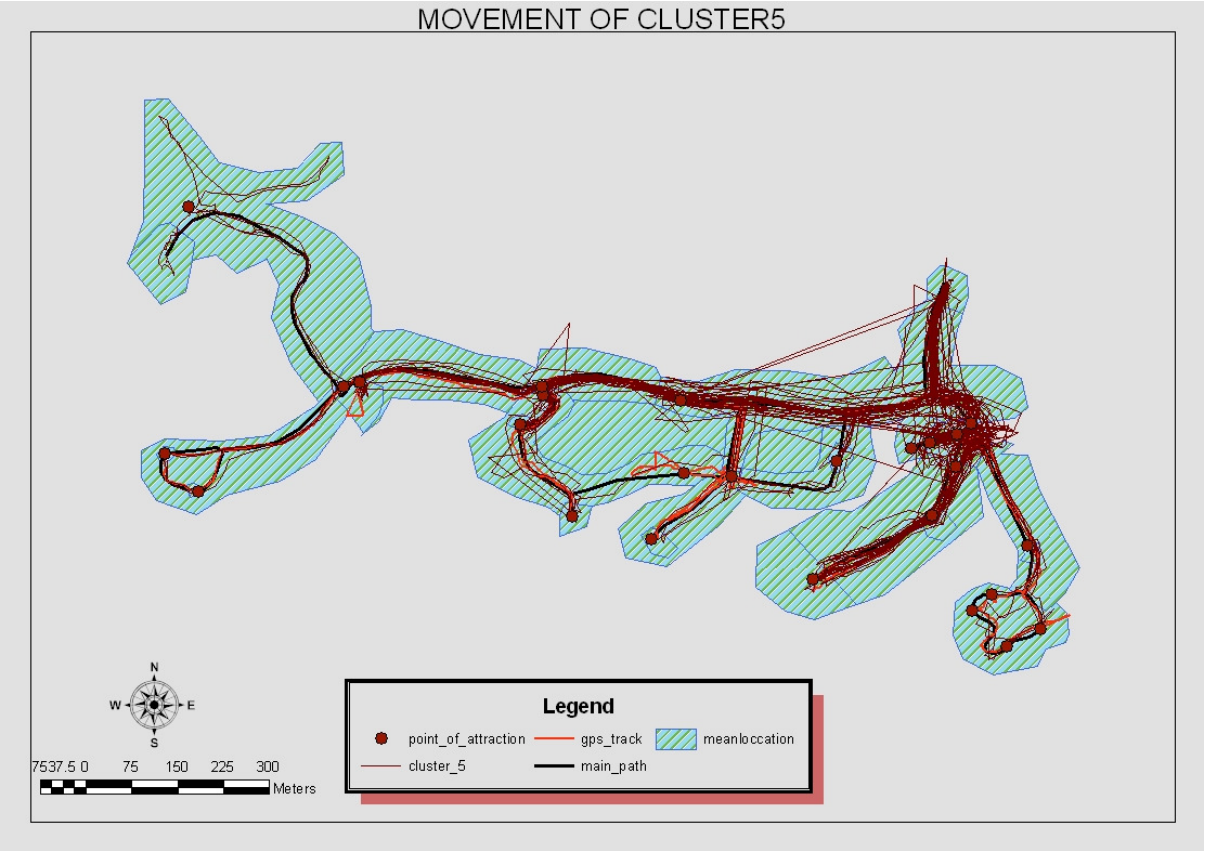


Figure 5.5: Spatial Movement patterns of visitors in Cluster 4

Noticeably the 5th cluster has more people in it so this is the dominant cluster and an important group amongst all the clusters. This group comprises almost 30.39 % of people i.e. 51 belong to this cluster.

The people in this group are not thrill seeking or not tend to enjoy ruggedness, physical challenges, and adventure and they also avoid walking on hard surfaces. These characteristics all show their non risk taking attitudes which supports the argument that they prefer to admire the natural scenic beauty from a distance and they also prefer to walk closer to the car park. This shows that this group is mainly a conforming group of people. This group of people do confirm their Non-Risky attitude and spatial exhibit same response. Hence this

group of people to sum up named as, "**Psychocentrics and confirming Risk Averters**" their spatial behaviour is in figure 5.5.



. **Figure 5.6: Spatial Movement patterns of visitors in Cluster 5**

However, some people still walk far from car park but according to their statistical type they still fall in to cluster 5.

The last cluster obtained comprises 3 people who mainly gave non adventurous responses and exhibit a non-risky attitude because they like to spend most of their time with family and mainly in the park for bird watching or for the coastal scenery. They visit the park in a group and walk near to car parks. They also admit that they like to admire the natural scenic views from a distance. This

group is relatively young and travel in organised groups as day trips or as a part of a longer holiday break. This group can be described as, "**Psychocentric and risk Averters Mass tourists".**

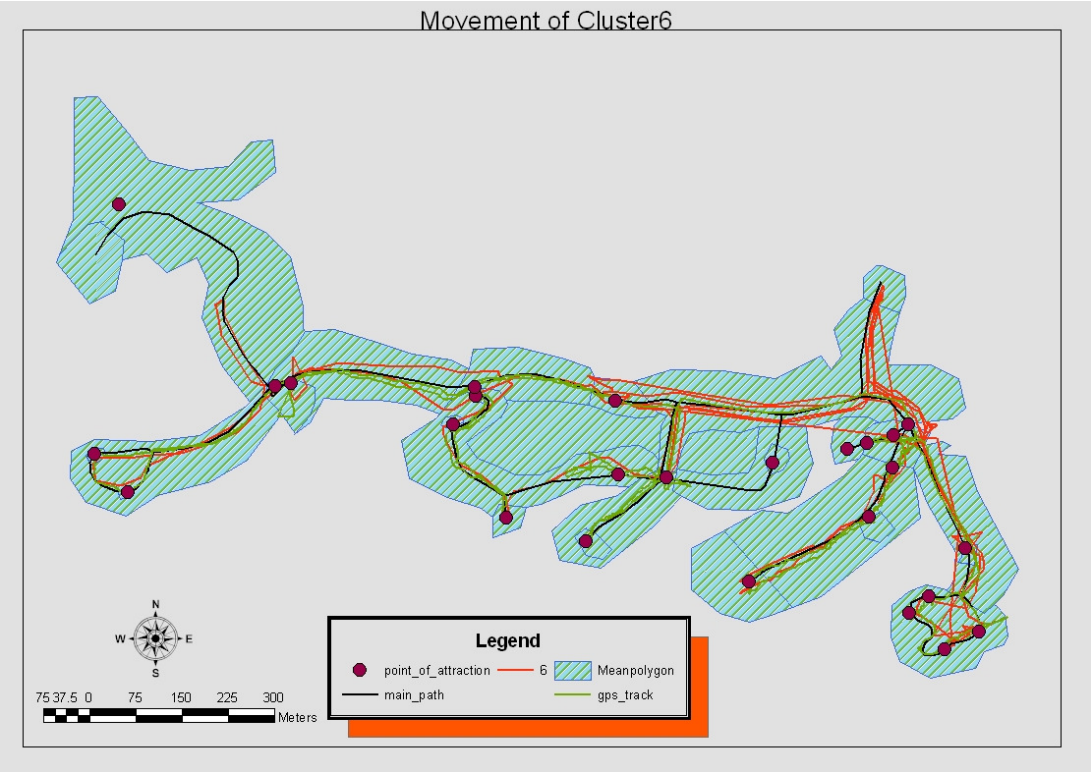


Figure 5.7: Spatial Movement patterns of visitors in Cluster 6

Visitors' personality, preferences and their precarious behaviour can be seen to vary significantly due to differences in socio-demographic background such as life cycle, gender, age, educational level etc.

Spatial behaviour or movement in a park is restricted due to enforced limits by the authorities. So, irrespective to their choice and preferences visitors have to limit themselves. However on getting a chance some still exhibit risk oriented

behaviour. In the process of performing cluster analysis visitors spatial patterns or typologies have been identified, because, clustering is the best statistical approach for typifying visitors' spatial behaviour risk,

In the next section of this chapter the use of Discriminant Function Analysis to validate the results of cluster analysis is described. Using this analysis the discriminating functions operating in various clusters have been identified.

5.2.2 Discriminant Function Analysis

Discriminant function analysis is used to determine which variables discriminate between two or more naturally occurring groups. For example, an educational researcher may want to investigate which variables discriminate between high school graduates who decide (1) to go to college, (2) to attend a trade or professional school, or (3) to seek no further training or education. For that purpose the researcher could collect data on numerous variables prior to students' graduation. After graduation, most students will naturally fall into one of the three categories. Discriminant Analysis could then be used to determine which variable(s) are the best predictors of students' subsequent educational choice.

Computational approach wise, the Discriminant Function Analysis (DFA) is opposite to MANOVA classification, since in this process the membership of a data point to groups is determined on the basis of the statistical property of the group. It is also useful follow-up procedure to a MANOVA instead of doing a series of one way ANOVAs, for ascertaining how the group differ on the composite of dependent variables. In simple terms if the height of 50 students in

a class is measured and it is found that females are not as tall as males then the mean of the heights of the students can be used to classify them as males or females. Thus in general terms the mean of a variable can be used to determine an association with an independent group. The selection of groups can be either by choice or by statistics. It is well known that a number of groups are determined because the inter group correlation is minimized making the existence of each group statistically significant.

The equation generated by this method can be linear, hyperbolic, exponential, and parabolic or any other mathematical form. But statistical techniques can be used to generate linear regression equations which can be subsequently used to predict group membership. The process of regression analysis uses the method of generalized least squares to minimize the amount of measured error in between the regression line and the actual measured point. Once the regression equation is generated then prediction can be made and these predictions can be compared to the actual experimental points to determine the amount of error in the prediction. Generally the errors are very small as indicated by the high R^2 values of a regression equation.

Once the DFA generated coefficients are used in the regression equation then the statistical significance of each of the coefficients and the entire regression equation can be statistically tested using the standard t and F test respectively.

In ideal circumstances it is very difficult to generate clusters or groups which are completely independent. Normally there is some amount of inter-correlation within the groups. As a result to use DFA factors for individual groups one must

take into consideration a weighted regression equation which then takes the inter-correlation between groups into consideration.

5.2.3 Implementation of the Discriminant Function Analysis

The research project involved the generation of survey data from independent respondents to classify the effect of individual preference and characteristics on tourism ecology. Initially the attitudinal responses (or data) of visitors at Loch Ard Gorge at PCNP was classified into relatable factors and categorized into 36 variables (Questions) .Overall 102 independent responses were taken with respect to these 36 factors. Finally the aim was to classify these responses into common trends within commonly representative groups. Hence the use of DFA techniques was obvious. Interestingly in this case the independence of data points could not be assured since the 36 variables qualitatively overlapped so the use of a covariance matrix among groups needed to be taken into consideration. This fact was further validated by the generation of a statistically significant inter-group coefficient even with the assumption of completely independent or equally weighted probabilities for each group.

The SPSS v 15.0 was used for DFA analysis. The output obtained and the methodology of selection of parameters and variables is discussed accordingly as and when required.

5.2.4 Results of the Discriminant Function Analysis

The DFA technique could be used not only for generating the regression equation but also to predict group membership. In this case the initial premise was to use half the data for generation of the regression equation and the other

half for making predictions of group membership. As a result the group data variables were randomly selected initially to generate the regression equation and then subsequently to predict group membership. It was found that since the number of data points was low this demarcation was not possible since using half the data resulted in groups which had only a single element. Also there was no convergence in the algorithm used for allocation of data points to groups. Finally all the data points were used to predict membership to a certain group.

The first step in the process was to test the statistical significance of the number of clusters selected and the individual data points within each cluster that's why the simplest procedure for doing that was to test the hypothesis of equality of the means of individual data points among groups. Since the test was inter group and not intra group the F test was required. The F test has 2 degrees of freedom. Generally if there are *n* overall data points and *m* groups then the degrees of freedom for the F test will be *n-1 , n-m* . Therefore in this case the degree of freedom is (5, 96). Physically, since the determined mean itself is a part of the sample group the degree of freedom is reduced by 1 .Also determining degrees of freedom becomes essential for the entire data set since there are 6 group means which are determined from the data set subtraction of 6 points.

The F test results show that none of the F statistics are significant at the 99% level of significance. This result was indicated by the very low *p* value (less than 1) or significance values as listed in the table for each F test performed individually on each data point from different groups. For this reason the hypothesis that the group means are equal can be rejected, which indicates that

the selection of 6 individual clusters is justifiable. Similar observations can be made using the Wilkis lambda test since this test is also used for determining the relationship between group means. (Cluster centroids).

The DFA analysis initially generates the canonical function which is used for classifying a data point to each group. The next process is to use this canonical function and generate a classification function and function coefficients that can be used to generate a linear regression equation. This equation can be further used for classifying new data points into individual clusters.

An equal or prior probability of assigning a data point to a cluster is assumed initially. Assumption of equal probabilities makes the classification of data to individual clusters independent of inherent patterns within the data set as displayed by the weighted and unweighted sample size evaluated for group statistics. Interestingly, after classification of data points into individual clusters correlations among the data points in-between different clusters are observed. This is further considered during calculation of classification function coefficients which will be used later for generation of the linear regression equation.

The ANOVA table for the cluster variables provides an interesting insight into the importance of each variable in the classification of data points for group membership.

The following ANOVA Table 5.8 can be effectively used to determine the most significant distinguishing parameters between individual clusters. As it can be seen certain variables throughout the cluster have very high F stat which would inturn result in acceptance of the null hypothesis; which is that the variances of

those variables across the clusters are the same. Hence classification of data points across the clusters would not be significantly affected by the variation in values of these parameters or variables.

Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
Thrill	.585	14.783	5	96	.000
relaxing	.660	9.889	5	96	.000
envt. Lrn	.487	20.248	5	96	.000
ruggednes	.622	11.658	5	96	.000
peace	.469	21.701	5	96	.000
family time	.827	4.005	5	96	.002
do whtvr like	.724	7.307	5	96	.000
off track	.528	17.164	5	96	.000
avoid diff. track	.677	9.178	5	96	.000
physical chlnge	.601	12.727	5	96	.000
secure in grp	.578	13.993	5	96	.000
advnt. Risk in wilderness	.730	7.095	5	96	.000
talk others	.849	3.427	5	96	.007
no cntrl nd guidence	.768	5.789	5	96	.000
short path	.745	6.555	5	96	.000
avoid walk where mny ppl	.717	7.561	5	96	.000
more recr. Act.	.750	6.385	5	96	.000
see othr ppl	.669	9.503	5	96	.000
avoid physical enclosure	.691	8.584	5	96	.000
forest stnd than open areas	.637	10.940	5	96	.000
walk close to parking	.802	4.725	5	96	.001
admire from dist	.666	9.614	5	96	.000
walk on hard surface	.584	13.649	5	96	.000
VISITNUM	.765	5.896	5	96	.000
TRIPDUR	.679	9.071	5	96	.000
FIRSTSIT	.821	4.195	5	96	.002
SOLEVISIT	.861	3.091	5	96	.012
PEOPLNUM	.528	17.135	5	96	.000
TRIPTYPE	.938	1.269	5	96	.284
EDUCATIO	.692	8.535	5	96	.000
GROUPTYP	.547	15.912	5	96	.000
LIFECYCL	.762	5.987	5	96	.000
ACTIVITY	.690	8.634	5	96	.000
GENDER	.843	3.588	5	96	.005
RESIDENC	.937	1.284	5	96	.277
AGEGROUP	.763	5.969	5	96	.000

Table 5.5: The Significance of F test and test of Equality

Interestingly the variables which have insignificant F tests would result in rejection of the null hypothesis which would physically meant that the variances of these variables across the clusters would be changing. This means that the cluster membership of a data point determined on the basis of these variances would also vary. Thus these data points can be used as a distinguishing parameter while determining cluster membership, though further accurate verification can be performed during classification function analysis.

The use of the Eigenvectors and Eigenvalues technique is a simple approach to convert the effect of an operator acting on a group of variables into a scalar field. The basic idea is to map the set of directional variables (represented by matrices) into a linear qualitative variable without changing the observable pre-existing pattern within the variable considered. The Eigenvalue table also provides some interesting results with respect to the importance of individual functions to classify data points into clusters. As it can be seen from Table 5.6 all the Eigenvalues follow a linear descending order as the cluster number changes from 1 to 6.

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	6.083[a]	35.5	35.5	.927
2	5.301[a]	30.9	66.3	.917
3	3.134[a]	18.3	84.6	.871
4	1.656[a]	9.7	94.3	.790
5	.986[a]	5.7	100.0	.705

a. First 5 canonical discriminant functions were used in the analysis.

Table 5.6: Eigenvalues Follow linear descent from cluster 1 to cluster 6.

This shows that the allocation is no longer weighted equally although this assumption was made initially. The allocation currently is to allocate highest probabilities to the first cluster which has access to the highest amount of data points. This aspect of classification makes logical sense since in case the highest probabilities are assigned to the first cluster with the highest number of sample points then the possibility of inherent data mining errors is avoided. The gradual reduction in probabilities indicates that the allocation data set is shrinking and hence the possibility of allocating a data point to a particular cluster should also change, because if it doesn't, then the allocation would be faulty. Another interesting observation is that the variance of the first two functions practically covers 70 percent of the data points. Interestingly this means that the variability in cluster characteristics is independent of the first two functions which have very high correlation as well. Physically, this means that the function 1 changes equally with respect to function 2 for all clusters and cannot be a point of demarcation between two clusters. As a result the remaining function can be points of demarcation between clusters as indicated by the individual, and over all cluster membership maps which have been drawn with respect to function 1 and function 2 only. This is illustrated in Figure 5.8

Prior Probabilities for Groups

Cluster Number of Case	Prior	Cases Used in Analysis	
		Unweighted	Weighted
1	.167	23	23.000
2	.167	16	16.000
3	.167	27	27.000
4	.167	2	2.000
5	.167	31	31.000
6	.167	3	3.000
Total	1.000	102	102.000

Table 5.7: Equal Prior Probabilities for the group membership

ANOVA

	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
Zscore(Thrill)	8.787	5	.594	96	14.783	.000
Zscore(relaxing)	6.867	5	.694	96	9.889	.000
Zscore: envt. Lrn	10.368	5	.512	96	20.248	.000
Zscore(ruggednes)	7.632	5	.655	96	11.658	.000
Zscore(peace)	10.718	5	.494	96	21.701	.000
Zscore: family time	3.486	5	.871	96	4.005	.002
Zscore: do whtvr like	5.568	5	.762	96	7.307	.000
Zscore: off track	9.534	5	.555	96	17.164	.000
Zscore: avoid diff. track	6.533	5	.712	96	9.178	.000
Zscore: physical chlnge	8.052	5	.633	96	12.727	.000
Zscore: secure in grp	8.516	5	.609	96	13.993	.000
Zscore: advnt. Risk in wilderness	5.450	5	.768	96	7.095	.000
Zscore: talk others	3.059	5	.893	96	3.427	.007
Zscore: no cntrl nd guidence	4.680	5	.808	96	5.789	.000
Zscore: short path	5.141	5	.784	96	6.555	.000
Zscore: avoid walk where mny ppl	5.707	5	.755	96	7.561	.000
Zscore: more recr. Act.	5.041	5	.790	96	6.385	.000
Zscore: see othr ppl	6.688	5	.704	96	9.503	.000
Zscore: avoid physical enclosure	6.241	5	.727	96	8.584	.000
Zscore: forest stnd than open areas	7.332	5	.670	96	10.940	.000
Zscore: walk close to parking	3.990	5	.844	96	4.725	.001
Zscore: admire from dist	6.740	5	.701	96	9.614	.000
Zscore: walk on hard surface	8.393	5	.615	96	13.649	.000
Zscore(VISITNUM)	4.746	5	.805	96	5.896	.000
Zscore(TRIPDUR)	6.481	5	.715	96	9.071	.000
Zscore(FIRSTSIT)	3.622	5	.863	96	4.195	.002
Zscore(SOLEVISI)	2.801	5	.906	96	3.091	.012
Zscore(PEOPLNUM)	9.526	5	.556	96	17.135	.000
Zscore(TRIPTYPE)	1.252	5	.987	96	1.269	.284
Zscore(EDUCATIO)	6.216	5	.728	96	8.535	.000
Zscore(GROUPTYP)	9.154	5	.575	96	15.912	.000
Zscore(LIFECYCL)	4.801	5	.802	96	5.987	.000
Zscore(ACTIVITY)	6.266	5	.726	96	8.634	.000
Zscore(GENDER)	3.181	5	.886	96	3.588	.005
Zscore(RESIDENC)	1.267	5	.986	96	1.284	.277
Zscore(AGEGROUP)	4.791	5	.803	96	5.969	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Table 5.8 ANOVA Table

The final part of this work deals with the determination of the linear regression equation for predicting group membership of data points. This work is done by using the classification functions or matrices generated using the DFA analysis. Table 5.9 shows the DFA classification function matrix. The linear regression

equation generated has 36 coefficients for the 36 variables and a constant with it. Each of the equations can be used to predict group membership. The 36 variables for each data point can be substituted into the equation and then compared with the group centroids to predict group membership. As for all the clusters, cluster means are known, so by substituting all variables into equations the obtained value can be compared with all cluster means and by this group membership can be assumed. The following 6 equations are used to predict group membership.

The generic linear regression equation for DFA analysis is:

$$Z=W_1X_1+ W_2X_2+W_3X_3 +...+ W_nX_n$$

Where;

Z= Discriminant Score

W_i= Discriminant Weight for Independent Variable i

X_i = Independent Variable i

Along this line for the generation of linear regression equations the questions asked in the questionnaires are considered as variables viz., V_1 *to* V_{36}as the responses may vary.

Derived Memberships to cluster equations for all six clusters are included in Appendix 3.

	Cluster Number of Case					
	1	2	3	4	5	6
Thrill	.560	.392	-.500	.735	-.740	5.267
relaxing	-1.447	2.292	.407	.526	.320	-8.451
envt. Lrn	-.201	.388	-.937	3.390	-.041	6.059
ruggednes	-1.328	1.108	-1.354	-2.301	1.504	2.456
peace	-.063	.361	-.972	-4.182	-.484	15.095
family time	-.868	.577	-.664	-1.339	.590	4.353
do whtvr like	.228	.806	-.430	-.106	-.232	.293
off track	.809	-3.249	1.794	-1.564	.107	-5.081
avoid diff. track	.400	.885	.917	.748	-.656	-9.763
physical chlnge	-1.648	.172	-.443	-.565	1.463	.964
secure in grp	1.412	.125	1.123	-5.811	-1.919	2.105
advnt. Risk in wilderness	1.285	-1.754	.349	-1.469	-.056	-2.084
talk others	-.275	.516	.226	1.831	-.458	.841
no cntrl nd guidence	-1.415	.485	-.893	-2.214	1.382	3.488
short path	-.664	-.750	-.472	-2.538	.748	7.302
avoid walk where mny ppl	.059	-1.005	-.489	-.069	.788	1.219
more recr. Act.	1.712	-1.337	.480	1.110	-.810	-2.691
see othr ppl	-.767	-.578	.928	-.967	.342	-2.278
avoid physical enclosure	.228	.636	-1.274	-2.771	-.073	8.928
forest stnd than open areas	1.717	.131	.584	-.616	-1.836	.260
walk close to parking	1.085	-1.649	.186	-.029	-.044	-.728
admire from dist	.782	1.927	.080	-3.093	-1.363	-.841
walk on hard surface	.713	-1.251	1.346	-2.115	-.129	-8.159
VISITNUM	-1.700	-1.544	.156	8.787	1.803	-4.621
TRIPDUR	1.491	-1.264	-1.201	-2.807	.458	3.254
FIRSTSIT	-.191	-1.697	.990	3.030	.433	-4.893
SOLEVISI	.666	-.865	.892	1.699	-.771	-1.682
PEOPLNUM	2.222	.053	1.676	-4.612	-2.168	-6.925
TRIPTYPE	-.535	.620	.682	-3.930	-.221	-.440
EDUCATIO	-.850	-.726	.130	.428	1.183	-3.296
GROUPTYP	1.195	-.402	-1.882	2.858	.263	5.299
LIFECYCLE	-2.889	.485	1.942	.674	.509	-3.621
ACTIVITY	-.158	.103	1.038	4.558	-.876	-2.669
GENDER	-.388	1.900	-.350	-1.159	-.247	-.688
RESIDENC	-.640	-.155	.773	-1.832	-.131	1.355
AGEGROUP	1.512	-.439	.379	.213	-1.168	-.736
Constant	-7.788	-10.328	-5.441	-30.475	-6.829	-80.850

Fisher's linear discriminant functions

Table 5.9 DFA classification function matrix

The coefficients of the variables in the linear regression equation were statistically tested using the F test and all the coefficients were found to be significant at the 95% confidence level. Hence, the linear regression equation has a very good fit to the data. The membership pattern to a group can be physically evaluated using the regression coefficients for each group.

Example: The probability of membership to group 1 is directly proportional to the number of people and inversely proportional to the lifecycle category in cluster number 1.

Likewise for cluster number 2, the probability of group membership is directly proportional to visitors' attitudes towards relaxing, having ruggedness in the natural environment and a preference to admire natural scenic beauty from a distance. Inversely, their preferences of walking near to the car park, need for more recreational activities and preference for getting off the track on walking trails are inversely proportional for determining the probabilities of group membership for this cluster.

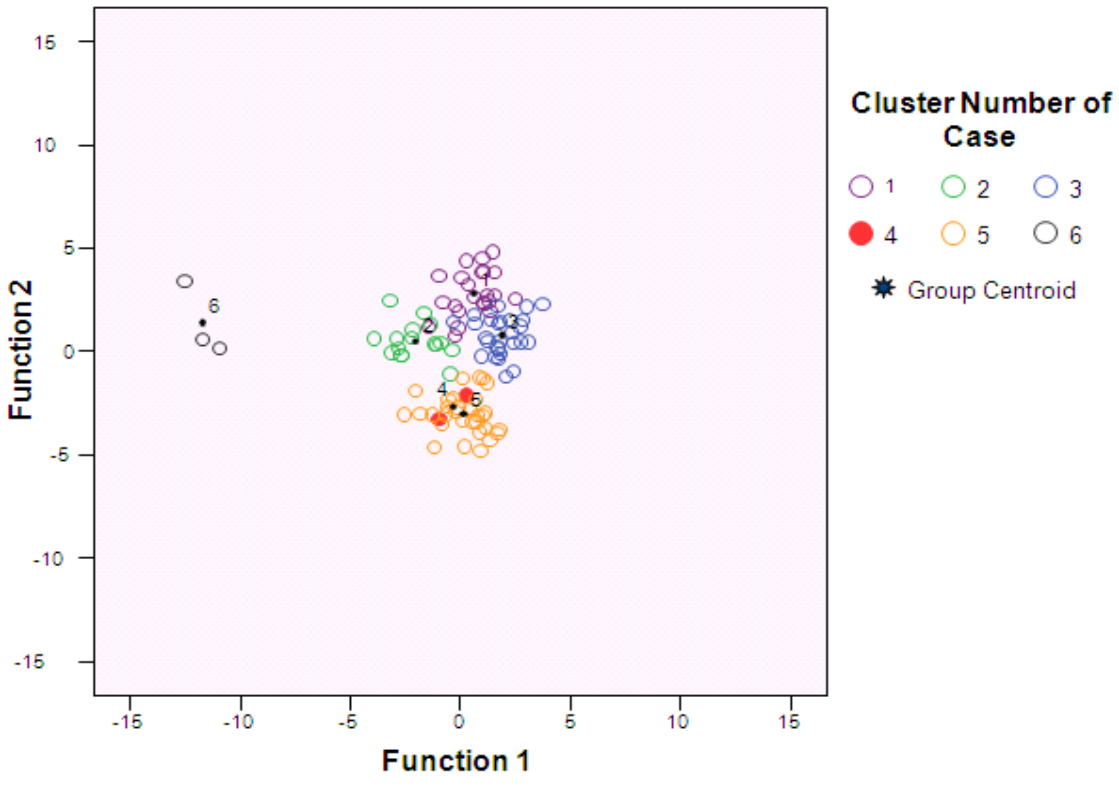


Figure 5.8 Canonical Discriminant Functions

From Figure 5.8 it is observable that cluster 6 is comprised of 3 members. All the members of the 6th cluster are mapped at a further distance on the X-axis (in between -15 to -10) than the other clusters, whilst all the other clusters are laying in between -5 to + 5 on both X and Y co-ordinates. This means that the members of these this cluster can be considered as outliers. Interestingly the data points of cluster 4 are sitting within the cluster 5.

5.3 Summary

In this chapter of the thesis an effort has been made to analyse with statistical techniques the data obtained from elicited attitudes and preferences of tourists to PCNP and to interpret those results. Visitors' attitudes and preferences can be used to frame their personalities. An attempt has been made to characterise visitors' personalities and their risk taking or averting behaviours.

Cluster analysis or typological analysis yielded the 6 types of visitors' personalities and associated risk taking propensities. These have been verified using Discriminant Function Analysis and then to predict future membership of any given random person six equations have been described.

As a result of statistical Data analysis using cluster analysis and DFA the derived six tourist typlogies are enlisted below:

1. Mid-Allocentics possibly Risk Takers.
2. Allocentrics and confirmed Risk Takers.
3. Mid-Psychocentrics and Risk Averters.
4. Allocentrics and Dependent Risk Takers.
5. Psychocentrics and confirming Risk Averters.

6. Psychocentrics and Risk Averters Mass Tourists.

Movement pattern maps have been illustrated for all six types across the LAG site. Similarly all the types can be analysed spatially with respect to visitor's movement for all the regions on walking track. An inventory is already developed which can be used for various statistical analysis and spatial analysis.

The next chapter 6 justifies the research objectives for this project. Being The final chapter, it also summarises the entire research endeavour, describes the limitations of this research and offers the ideas for future prospects of research.

CHAPTER: 6

EVALUATION AND CONCLUSION

6.1 Introduction

Chapter 3 presented a case study of LAG at the PCNP. The incorporated evaluation and application of the theories and methods discussed in Chapter 4 and 5 have been examined for consideration of inventory development to develop a new approach for the identification of differential spatial behavioural risk types.

This chapter summarises the major findings of the entire research endeavour and discusses the limitation of the theories and methods for determining the spatial behavioural risk typologies of tourists. The research objectives and research questions of this thesis are reiterated to show how they were achieved. The chapter concludes by looking at some directions for future research that have been raised through the creation of this thesis and how the determined typologies can be used to assist management authorities to meet planning objectives.

6.2 Summary of survey for developing typologies

This thesis documents investigated patterns of spatial behaviour and movement of tourists throughout the Loch Ard Gorge site within Port Campbell National Park.

Data was acquired via on-site self administrated questionnaires to determine the socio-demographic characteristics of tourists and their elicited attitudes to the site. This data was complemented with GPS observations that obtained the patterns of movement of the 102 participant visitors. The GPS readings were amalgamated with a spatial database or geographic information system with

anticipation of investigating the spatial behaviour i.e., movement characteristics for different tourist types. Furthermore, interpretation of tourists movement into, and out of, various zones within the Loch Ard Gorge walking trail was made in order to observe risk taking or risk averting spatial behaviour of visiting tourists. Finally with statistical operation-Cluster analysis six tourist types visiting Loch Ard Gorge were discriminated.

6.3 Summary of Results and Research Findings

This research project has focused on examining tourist spatial behavioural patterns in relation to park settings in order to determine visitors' spatial behavioural risk. As individual characteristics of the data most accurately reflect the tourists' actual needs and preferences, an attempt has been made in this study, to discriminate between distinct socio-demographic and attitudinal characteristics of tourists. Spatial behavioural information of tourists at the Loch Ard Gorge site was obtained. This included spatial data of the study area, movement of visitors through GPS tracking along with their attitudinal and preference statements and socio-demographic profiles. Tourists' behaviour, perception and satisfaction levels at each attraction coupled with the need and demand for more recreational activities in the study area highlights the importance of this study. The spatial movement of tourists were considered at the micro level as the movement patterns were localised or centralised in only one geographic region. This was done in order to represent the general walking patterns around the walking trails at the LAG and inside its major tourist attractions.

For the purpose of investigation of the influence of the socio-demographic background, attitudes and preferences of tourists which characterize their movements and behavioural patterns statistical approaches were used. Segmentation based statistical approaches and the K-mean Clustering Technique was used for the generation of typologies. The results were achieved through K-means Cluster Analysis then verified using Discriminant Function Analysis. In this process the F-test, One Way Analysis Of Variance (ANOVA) and a test of the equality of group means and a-priori probabilities for group membership were discussed. Finally, it was theorised that different socio-demographic characteristics along with the different attitudes and preferences visitors' have led to the formulation of specific behavioural patterns or typologies. All the attitudes, preferences and socio-demographic characteristics i.e., variables for the generation of demarcating functions between members of different types have been used for the development of equations or functions for the purpose of predicting group membership in the future.

6.4 The Influence of Attitudinal and Socio-Demographic Characteristics on Tourists Spatial Behaviour Patterns

The influence of socio-demographic profiles, attitudes and preference characteristics on spatial behavioural patterns of visitors has been tested in this research project. The results confirmed the assumption that the spatial behavioural patterns of visitors from various socio-demographic backgrounds are different, and thus they vary in terms of specific travel needs and preferences(Dejbakhsh, 2008). The attitudes of visitors also vary from time to

time and place to place depending on the socio-demographic profile they belong to.

These differences are important in so far as providing the necessary services and facilities for visitors with different socio-demographic characteristics. The following section reviews the findings of the study after the above investigation.

6.4.1 The tourist types and Inter-Relationship between tourist attitudes, preferences and socio-demographic profiles

The result of this study revealed that demographics including “gender”, “age” and “level of education” reveal great variations in the characteristics of the travel behaviour of tourists. Attitudinal and preference factors which were significant in these variations included:

- thrill seeking in nature based tourist destinations
- enjoyment of rugged areas
- seeking adventure in recreational activities in the study area
- a preference for having more recreational activities in national parks
- environmental learning propensities while visiting the national park

The results obtained from this study ties together travel and tourism related attitudes and preferences and the associated spatial behavioral risk. For example, the people who prefer to enjoy natural scenic beauty from a distance without being in physical contact with the actual attraction and have a preference for enjoying ruggedness and adventure in a natural tourist destination are likely to exhibit high risk spatial movement. Because of this fact, it’s also important to know their age and gender and their physical condition.

Hence, after performing cluster analysis all the participants were grouped according to their environmental attitude and preference for risk taking physical activity. The visitors from the first group responded that they did not like to be in a group even though there were visiting the park in a group at the time of the survey. This group of visitors were mainly comprised of young couples or young families. While walking on the LAG walking tracks they stayed at the site for a longer duration than the other groups. As they were young couples or young family groups it was assumed that their educational level was not high. By looking at their mean score for highest education level that assumption was proved correct.. By looking at the DFA Classification Function Matrix the probabilities of any person belonging to the first type and demonstrating the same preferences can be discovered by performing the summation of the constant (-7.788) with a product of their score and the co-efficient of the variable. The first tourist type was obtained through cluster analysis and verified with the DFA and given the name '**Mid-Allocentrics possibly Risk Takers**'. The results of cluster analysis does not show specific readings for an attitude towards risk, however it shows that people belonging to this cluster prefer to stay for a longer duration and may exhibit risky behaviour as they possess the allocentric personalities hence risk taking behaviour may worsen as most of them are also travelling in a group.

The second tourist type derived from cluster analysis is the **Allocentrics and confirmative risk takers.** The personalities of the people in this group are of the allocentric type according to Plog's personality based typology. This typology was considered for defining the personalities of all people in the groups. The name it self suggests that the people who belong to this group

generally are adventurous in nature and don't visit a national park for relaxation. They are also fond of taking risks and being in the wilderness. Therefore these people display a higher degree of risk which they confirm with their preference of enjoying beautiful scenery up close which might tempt them to go off the track and expose themselves to risk. After performing DFA it's predicted that the probability of any person belonging to this group is directly proportional to their attitude towards relaxing, environmental learning, being in rugged landscapes, having a sense of peace in the natural environment, etc. It is also inversely proportional to their preference for going off track and partaking in adventurous activities in the park. All attitudes multiplied with the constant (-10.328) exhibit exactly the opposite tendency. That is, the directly proportional variables become inversely proportional to the probability of group membership.

The third group are the **Mid-Psycho Centrics and Risk Averters**. The people belonging to this group tend to avoid risk and prefer to behave responsibly while visiting the national park. The people from this group gave very confident and responsible responses about their risk avoiding attitude. Considering the results from DFA after multiplication with the constant (-5.441), attitudes towards thrills, ruggedness and physical challenges were in direct proportion for any person in this group. The socio-demographic profile of this group is directly proportional to their gender type, and inversely proportional to their life cycle category and age, after multiplication with the constant.

An Allocentric and Dependent Risk taker is the fourth type derived through cluster analysis. This cluster possesses only 2 members and it appears that they are a couple by looking their responses. These people are dependent risk

takers in a sense that their decisions to take risks are dependent on of the preferences of others in the same group. If a group of visitors of this type were travelling together risk taking activities would be supported only if one person in the group initiated it. Risk taking behaviour is dependent on it being initiated by another. Otherwise if it is not initiated then it would not occur.

The fifth type is **Psychocentrics and Confirmative Risk Averters.** They tend to avoid risk exposing behaviour according to their preferences and attitudes. **Psychocentric and Risk Averters Mass Tourists** types are people who visit the PCNP in a group.

6.5 Limitation of the Research

6.5.1 Limitations with the approach

The application used for tracking visitors' movement in any location is largely dependent on the pre-defined research aims and objectives. In this research the biggest limiting factor in using self-administered questionnaires was acquiring the actual attitudes, preferences and tendencies tourists have exhibited as this would have been a good determination for a better understanding of their spatial behavioral patterns.

The self-administrated questionnaire proved to be a suitable method for obtaining socio-demographic data. Factors such as where tourists actually go inside the attractions, direction and pattern of movement are still relatively unknown. The results from this investigation into the advantages and disadvantages of techniques for tracking the spatial movement of tourists within the park settings conducted in Chapter 4 showed that usage of GPS receivers

along with a combination of several tracking techniques such as PDA might strengthen the overall tracking process.

6.5.2 Limitations of the survey design

For identification of differential behavioural patterns of visitors, the survey contained a large number of questions. For the attitude related questions a 7-point Likert scale can give inaccurate results. Instead of a 7-point a 5-point or 3-point scale could solve the problem of discreet results obtained by the responses. Many responses after performing a z-score do not show very significant results. Decreasing the value of anchors from 7 to 3 or 5 might be more helpful in providing a clearer set of attitudes. For example, strongly agree, agree, slightly agree could all be said to all represent 'agree'. Prior individual surveys may have proved useful in reducing the number of questions, and may possibly improve the reliability of results.

Spatial and social abilities of visitors, knowledge of the tourist attractions they are visiting, individual motivation, spatial constraints and the configuration of the park settings are the factors which might be influential on visitor's spatial behavioural patterns. Even with the understanding of all these factors and how the topographic and environmental conditions in the park might influence visitors behaviour the questions on attitudes and preferences does not invite comment on any one of them.

In this study attitudinal and socio-demographical parameters were presented as factors to understand visitors' behaviour. The influence of individual cultural differences such as ethnicity, language, profession etc. were not included.

6.5.3 Limitations of the survey Implementation

In this thesis, the survey was conducted at the Loch Ard Gorge site within the Port Campbell National Park. Therefore, the results at each tourist attraction point only incorporated a small section of the larger potential tourist site of the PCNP and, as such, other potential locations were overlooked.

It is essential to investigate more carefully the various tourist attractions in the existing study area in order to ascertain how prominent the social and physical features are.

It is worth noting here that each particular attraction has distinctive scenic and environmental values. However, the current study does not reveal clearly whether tourists' attitudes and hence behaviours differ from attraction to attraction.

Additionally, as the questionnaires were primarily administered in situ, views on tourist behaviour and perception were obtained only for particular tourists who were both financially and physically able to visit such attractions. For example, tourists who are not capable of taking long walks at the LAG site can't have their spatial behaviour measured. So, the samples of this research project do not represent the broad population of visitors. In other words, this study may, in some way, be biased towards a certain type of tourist. More over, a sample size of 102 data points was proven to be insufficient for the purpose of cluster analysis. Since there was no great difference in mean values of attitudinal and socio-demographical attributes amongst many of the respondents, precise demarcation of people to be in a group was difficult.

6.5.4 Limitations with analysis

In this study, 102 self-administered questionnaires were acquired from visitors to the LAG site which were incorporated into data analysis using SPSS. For classification techniques and identification of differences a larger sample size is required. A sample size of 102 data points does limit the analysis in this respect. The segmentation technique of K-means clustering has been used for this research. Other segmentation based approaches such as Hierarchical cluster analysis; 2-step cluster analysis could also be tried. The use of factor analysis could be performed in order to quantify the factor loading in order to identify prominent attitudinal and socio-demographical parameters before implying cluster analysis and the DFA. In short, three step typological approaches (PCA, CA and lastly DFA) might be proven as a best fit for the generation of typologies. For Discriminant Function analysis in this thesis the equal probability method was used. The step-wise method could be tested to see any reduction in variables.

The impact of the surrounding environment at the present location may prompt visitors to behave in risky ways while they are walking. The environmental components at the location have not been given any importance in this thesis. So it limits the scope of spatial analysis at different terrains across the PCNP.

6.6 Did this Thesis meet all the set Research Objectives?

The main objective of this research was to develop a methodology or an approach for determining the differential spatial behavioral risk patterns in natural tourist destination like Port Campbell National Park. In order to ascertain

whether this was possible, it was necessary to first uncover answers to the following research questions:

1. What is the range of activities available for tourists in national parks?
2. Does the range of different activates in a national park depend on certain attitudes and preferences of visitors? If yes what are they?
3. What is risk?
4. What are high risk areas, activities and behaviour?
5. Are there any tourist activities that might lead to risk for tourists themselves?
6. If the answer of the above research question is yes, then are the tourist activities and associated risk similar for all the tourists do they vary? If so, then what could be the basis for that?
7. Do the socio-demographic characteristics of visitors and their explicit attitudes lead to specific spatial behaviour in the study area?
8. How can the attitude, preferences and behaviour of people in the study area be modelled?

The first research questions dealt with the terms “tourists”, “tourism” and “tourism destinations”, which were defined in Chapter 2 in Section 2.3.1. In the same chapter the different types of tourist activities have been highlighted and the different management frameworks and various approaches for managing differential impacts have also been discussed. This answers the second research question of this study. Chapter 2 also reviewed the individual and physical factors that could affect tourist spatial behavioural patterns, such as the configuration of the physical environment, socio-demographic and cultural

background characteristics. These have been focused on in the literature review in Section 2.6.2, 2.6.2.1, 2.6.2.2 and 2.6.2.3. In addition chapter 2 also underpins the social anatomy of behavioural risk which satisfies the third, fourth and fifth research objectives.

Visitors' spatial behavioural patterns in any tourist destination have been discussed briefly at two different scales – the macro and micro. However considering fact that the entire study was centred in only one geographic location micro level movement and the various tracking methods for that have been explored. Ranges of models revealed by other literature have been also given emphasis throughout this chapter. In order to understand the term "behaviour', different definitions of behaviour were outlined in Section 2.6.3 and various dimensions of risk behaviour in natural settings was also recorded in section 2.6.4.

As the sixth and seventh research questions dealt with the factors that might influence such behavioral risk patterns, the belief that attitude and socio-demographic background has an important effect on tourists' spatial behaviour was further discussed in Chapter 4. This was achieved by looking at the difference between leisure and recreational patterns of different people with different attitude and socio-demographic backgrounds.

The reason for choosing the PCNP as a study area and the LAG as study location were also discussed in Chapter 3 incorporating the objectives of the study. Subsequently in Chapter 5 an attempt has been made to answer the eight research question, which clarified the relationship between the roles of

attitudinal and socio-demographical profile in certain tourists' spatial behavioural patterns.

In order to answer the ninth and final research question an attempt to develop an approach for creating typologies has been made in Chapter 5. For future use, predicting the group membership of a person was discussed. The use of Discriminant Function Analysis and the generation of differential functions or equations are roundly argued in chapter 5.

This approach distinguishes attitudinal and preference statements and the socio-demographical profiles into six differential types. Each type was reviewed in Chapter 5 in order to represent their spatial behaviour at the LAG.

By addressing all of the research questions it can be seen that the primary objective of the development of an approach for differential spatial behavioural risk patterns of tourists in Port Campbell National Park has been met. This involved developing a method of identifying tourist spatial needs, attitudes, preferences, related spatial movements and hence associated risk to them.

6.7 Scope for Future Research

The suggestions and recommendations for future research have been contemplated throughout the time it has taken to complete this study. This research provided some inventory data on visitors' attitude and socio-demographic parameters and hence their associated spatial behaviour throughout the LAG site. This thesis has uncovered a number of areas where further research is recommended.

New navigation technologies could interestingly change the method of tracking movements carried out in this project and a new paradigm for research could be developed using modern technologies such as Personal Digital Assistants (PDAs) which independently record time and location. They could then be be used to relate personal interviews and self-administrated questionnaires to analyze visitors spatial behaviour and measure risk to visitors.

Furthermore, in this thesis no attempt has been made in the questionnaire analysis to monitor the effect of time spent at a particular attraction. In addition, what is a possible location visitors might like to visit and what had been visited before coming to LAG is not discussed. In fact, it may be possible for future research to explore the development of tourists' potential needs and preferences for these variables to make a comparison of their cultural backgrounds and beliefs. Therefore, future research could extend the present study to look at patterns of travel in terms of time of residence in Australia if the tourist is an international traveller. It may lead to different results from the current study and hence revision of present typologies developed in this thesis.

The PCNP is an environmentally diversified location where cultural and historical attractions are enriching the scope of tourism. For this reason the PCNP and the LAG have been selected for this study, however environmental, cultural and historical component have not been investigated in this research. So, in future the risk to the natural environment due to certain tourist behaviours could be analysed. The spatial behavioural risk typologies can be useful to find out the effect of the natural environment on human behaviour and be extrapolated for associated risk. This study only underpins the human risk

component due to differential attitude of visitors. In a future study, the two way approach could be carried out. This could look at behaviour and its associated risk to the environment and inversely how the environment can pose a risk to visitors. Therefore, it may be useful to extend further this research by comparing visitors behavioural risk patterns at various landscape units at PCNP. This may identify whether there is a relationships between tourist spatial behavioural patterns and the surrounding environment and vice versa.

For example, how do the various attractions within the Park settings affect the spatial movement sequence of tourists? Is there any association between types of attractions and tourists' movement and behavioural risk patterns? Is there any association between attractive facilities and visitor movements? Can the number of attractions visited by tourists during a single day trip affect spatial movement? These questions are still unanswered by this research. The possible solution of this question can be dealt with the Conjoint Analysis. One of the most common uses of this approach is for the segmentation based yielded results is to group respondents with similar part-worths or importance values to identify segments. (Hair, J. F., Anderson, R. E., Tatham, R. L., Black, W., C., 1995:561)

For the purpose of segmentation of attitudinal Data, the estimated conjoint part-worth could be considered solely or in combination with other variable (e.g. Demographics) to derive respondent groupings those are exhibiting most similar in their preferences.

Indeed, there is no reason to doubt that the approach developed for differential spatial behavioural patterns can be applied more widely than just to the PCNP

and the LAG. Hence, the same studies can be carried out in different environmental settings where people have a chance to go off track and exhibit predominant spatial behaviour. For example, The Dandenong Ranges National Park offers undulating typology and a more fluctuating environment at various locations. With a larger sample size the same approach can be investigated. Certainly, there is an obvious need to maintain and to revise the developed inventory with more information for future research in order to fully quantify tourists' spatial behavioural risk patterns.

6.8 Summary

Tourism is one of the largest revenue generating industries in the world and Australia is also not behind in profiting form it. The benefits of this industry are manifold and significant all around the world. Attitudinal and social characteristics are definitely important variables to be researched by tourism management authorities and researchers. Behavioral and experiential research in the tourism industry is a requisite for adopting up-to-date and accurate strategies by management for risk to visitors through their own behaviour. Tourist managers must consider visitors' attitude and social background with keen interest in order to satisfy their needs and preferences for recreational activities while visiting a tourist site. Proper understanding of visitors' indigenous cultural beliefs, values and lifestyles are required in order to develop and provide better products and services. Appreciation of socio-cultural differences and leading attitudinal variances can demand different services that meet customer expectations which are essential in the construction of tourist destinations (Mok and DeFranco, 1999).

People working outside the tourism industry can also benefit from this research. For example, the travel patterns of tourists developed in this thesis can be implied to measure cross-cultural differential needs and develop new infrastructure within the study area. A review of tracking and survey techniques can provide guidance in other research projects of behavioral geography the aims of which are to study how the people move and behave in the environmental. Academic people such as Eco-psychologists and social scientists can review socio-demographic and attitudinal information and use them as baseline data for determination of individual behavioral differences associated with a particular risk in environmental settings.

In conclusion, this entire thesis outlines the research project carried out for a period of two years and has established an approach for differential spatial behavioral risk patterns. A case study was undertaken in the Port Campbell National Park at the Loch Ard Gorge site walking track to study, apply and evaluate methods and theories related to attitudes and social background which are responsible for spatial behavioral patterns. The methodology used in this thesis involved on site self-administered questionnaires, which were then analysed with statistical techniques and combined with spatial data. Tourist spatial behaviour on site was monitored using GPS receivers. In processing this data a GIS environment, Arc Map 9.1 was utilised for the spatial data gathered on the GPS receivers and SPSS v.15 was used for statistical analysis.

The self-administered questionnaires acquired tourists' attitudinal characteristics, socio-demographic information and their preferences while

visiting the park. This data could in fact affect tourist spatial behavioral risk patterns

This study investigated the factors that influence tourists spatial risk behaviour. The relationships between socio-demographic factors and attitudinal characteristics were investigated and their affects on travel behaviour patterns were linked. One association was the relationship between travel attitudes, preferences and the pro-environment inclination of visitors to socio-demographic characteristics.

The findings of this thesis can assist tourist managers in designing tour itineraries and packages that may support tourist organizations. Improving the management of facilities in order to avert associated risks due to tourists' spatial behaviour would be a positive step in highlighting the safety record of tourist attractions and consequently their suitability for inclusion on a tour itinerary.

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APPENDIX: 1

Survey ID. : _____/GPS CODE

Parks VICTORIA

RMIT UNIVERSITY

VISITOR SURVEY

Port Campbell National Park

RMIT University in conjunction with Parks Victoria is conducting a research project that will investigate how well national park facilities match the needs of tourists and visitors to those parks. This survey is intended to acquire information relating to the needs of tourists and visitors to Port Campbell National Park. We would like to find out more about how people use national parks and what they do within these parks. The survey in conjunction with location-based data collected using the GPS receiver, will provide supplementary information into the movement patterns of tourists and visitors.

We thank you for your time and assistance.

PART I:

Q. 1. Thinking of your visit, can you please tell us whether you agree or disagree with the following …

	Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
a) I like to experience the thrill and excitement of nature.							
b) I like to relax and escape from everyday life.							
c) I like to learn more about the environment.							
d) I like to face the ruggedness of the natural environment							
e) I like to experience the serenity and peace of nature							
f) I would like to use this visit to spend more time with my family and friends.							
g) I would like to be able to do whatever I like in the park.							
h) I should be allowed to deviate off walking tracks to explore further.							
i) I enjoy physically challenging recreational activities.							
j) I feel more comfortable and secure in a group.							
k) I enjoy adventure and the risk associated with being in wilderness.							
l) I always enjoy talking to other tourists.							
m) I don't like to be controlled and guided by others.							

	Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
n) I prefer to take the shortest path possible.							
o) I try to avoid walking on tracks that have many people.							
p) I prefer to visit places where there are a number of recreational activities.							
q) I like to see other people without being seen by them.							
r) I generally try to avoid those areas, which are physically enclosing.							
s) I feel more protected walking in a forest stand than in open areas.							
t) I like to walk on those tracks, which are short and close to the car park.							
u) I prefer to walk through attractive vegetation rather than look at scenic views.							
v) I prefer to sit back and admire scenic views of landscapes rather than actually visiting them.							
w) I prefer walking on hard surfaces (eg. Rocky outcrops).							

(Part: II)

Q.1 Including today's visit, how many times would you have visited this park in the last 12 months?

ONC E ☐ TWICE ☐ MORE THAN TWICE ☐

Q.2 How long do you expect your visit to this park will last? _____(in hours)

Q.3 Is this the first site within Port Campbell national Park that you have visited? Yes ☐ No ☐

Q4 Are you planning to stop at any other sites within Port Campbell National Park? Yes ☐ No ☐

Q. 5 Including yourself, how many people are in your party on this trip to the Park? That is, the people you will spend time with in the park. WRITE IN: _____

Q. 6 Is your trip to the Park:

A day trip from home ☐

A day trip as part of a longer holiday ☐

A holiday in which you stayed in or near the Park at least one night or longer ☐

Q. 7 ***Which best describes the highest level of education you have reached?***

PRIMARY/SOME SECONDARY	
COMPLETED SECONDARY	
TERTIARY	

Q. 8 ***Which best describes the type of group you are in?***

TRAVELLING ALONE	
TRAVELLING WITH SPOUSE/PARTNERS	
TRAVELLING IN ORGANISED GROUP/CLUB	
TRAVELLING WITH CHILDREN	
TRAVELLING WITH FRIENDS/RELATIVES	

Q. 9 ***Which lifecycle category best describes you?***

YOUNG SINGLE		MATURE FAMILY (Children older than 15 years)	
YOUNG COUPLE/NO CHILDREN		OLDER COUPLE/NO CHILDREN AT HOME	
YOUNG FAMILY (Youngest child younger than 6 years)		MATURE SINGLE	
MIDDLE FAMILY (Children 6-15 years)			

Q. 10 ***And finally what recreational activities have you planned for your visit to the Port Campbell National Park? (Select all that apply)***

BIRD WATCHING		SWIMMING AND SURFING	
COASTAL SCENERY		ROCK CLIMBING	
VIEWING ROCK FORMATION		MOUNTAIN BIKING	
BUSHWALKING		CULTURAL OR HISTORICAL INTEREST	
OTHER- PLEASE SPECIFY			

Q. 11 GENDER

MALE ☐ FEMALE ☐

Q.12 PLACE OF RESIDENCE

1. Australia Postcode ☐ 2. Overseas visitor Country ☐

Q.13 Which age group are you in?

18 - 19 YEARS		40 - 44 YEARS		65 - 69 YEARS	
20 - 24 YEARS		45 - 49 YEARS		70 + YEARS	
25 - 29 YEARS		50 - 54 YEARS		REFUSED	
30 - 34 YEARS		55 - 59 YEARS			
35 - 39 YEARS		60 - 64 YEARS			

APPENDIX 2

No. of Respondents for attitudinal variables according to their responses on Likert multi point scale of 1 to 7

(1= Strongly Agree, 2=Agree, 3=Slightly Agree, 4= neither Agree nor Disagree 5= Slightly Disagree, 6= Disagree, 7= Strongly Disagree)

Variables / *Likert Multi point Scale*	*Thrill*	*Relaxing*	*Like to learn about the environment*	*Like to feel the ruggedness of the environment*	*Like to feel peace*	*Like to spend time with the family*	*Like to do whatever they want in the park*
1	47	57	34	32	51	32	**16**
2	33	26	40	34	26	27	**19**
3	03	14	12	10	14	17	**18**
4	03	00	06	10	07	15	**06**
5	02	02	03	06	02	04	**08**
6	12	03	04	06	02	05	**23**
7	**02**	**00**	**03**	**04**	**00**	**02**	**12**

Variables / *Likert Multi point Scale*	*Like to go off track*	*Tend to avoid difficult tracks*	*Like physical challenge*	*Feel secure in a group*	*Enjoy adventure and associated risk in wilderness*	*Like to talk to others*	*Don't like to be controlled and guided by others*
1	09	10	18	06	20	13	**24**
2	16	19	33	15	26	29	**31**
3	10	19	16	10	22	25	**15**
4	03	08	12	19	07	15	**18**
5	14	09	08	11	08	11	**03**
6	27	26	11	35	13	07	**09**
7	**23**	**11**	**04**	**06**	**06**	**02**	**02**

Variables / ***Likert Multi point Scale***	***Prefer to take the shortest possible path***	***Avoid walking where many people are walking***	***Demand more recreational activities In PCNP***	***Like to see other people without being seen by them***	***Tend to avoid physical enclosures***	***Enjoy forest stand than open areas***	***Prefer to walk near parked cars***
1	05	06	14	06	02	03	**06**
2	18	28	23	21	23	20	**15**
3	17	28	14	14	16	09	**09**
4	21	09	19	20	17	26	**20**
5	08	10	10	05	05	10	**12**
6	26	18	20	29	31	30	**34**
7	**07**	**03**	**02**	**07**	**08**	**04**	**06**

Variables / *Likert Multi point Scale*	***Admire natural scenic beauty without being in physical contact with it***	***Prefer to walk on a hard surface***
1	04	**10**
2	09	**22**
3	09	**07**
4	12	**23**
5	12	**07**
6	40	**24**
7	**16**	**09**

APPENDIX: 3

EQUATIONS FOR CLUSTER MEMBERSHIP

Membership to Cluster 1 can be determined by following equation:

$$[\{(-7.788)+\{V_1 X(0.560)\}+\{V_2 X((-1.447)\}+\{V_3 X(-0.201)\}+\{V_4 X(-1.328)\}+\{V_5 X(-0.63)\}+\{V_6 X(-0.868)\}+\{V_7 X(0.228)\}+\{V_8 X(0.809)\}+\{V_9 X(0.400)\}+\{V_{10} X(-1.648)\}+\{V_{11} X(1.412)\}+\{V_{12} X(1.285)\}+\{V_{13} X(-0.275)\}+\{V_{14} X(-1.415)\}+\{V_{15} X(-0.664)\}+\{V_{16} X(0.59)\}+\{V_{17} X(1.712)\}+\{V_{18} X(-0.767)\}+\{V_{19} X(0.228)\}+\{V_{20} X(1.717)\}+\{V_{21} X(1.085)\}+\{V_{22} X(0.782)\}+\{V_{23} X(0.713)\}+\{V_{24} X(-1.700)\}+\{V_{25} X(1.491)\}+\{V_{26} X(-0.191)\}+\{V_{27} X(0.666)\}+\{V_{28} X(2.222)\}+\{V_{29} X(-0.535)\}+\{V_{30} X(-0.850)\}+\{V_{31} X(1.195)\}+V_{32} X(-2.889)\}+\{V_{33} X(-0.158)\}+V_{34} X(-0.388)\}+\{V_{35} X(-0.640)\}+\{V_{36} X(1.512)\}]$$

Membership to Cluster 2 can be determined by following equation:

$$[\{(-10.328)+\{V_1 X(0.392)\}+\{V_2 X(2.292)\}+\{V_3 X(0.388)\}+\{V_4 X(1.108)\}+\{V_5 X(0.361)\}+\{V_6 X(0.577)\}+\{V_7 X(0.806)\}+\{V_8 X(-3.249)\}+\{V_9 X(0.885)\}+\{V_{10} X(0.172)\}+\{V_{11} X(0.125)\}+\{V_{12} X(-1.754)\}+\{V_{13} X(0.516)\}+\{V_{14} X(0.485)\}+\{V_{15} X(-0.750)\}+\{V_{16} X(-1.005)\}+\{V_{17} X(-1.337)\}+\{V_{18} X(-0.578)\}+\{V_{19} X(0.636)\}+\{V_{20} X(0.131)\}+\{V_{21} X(-1.649)\}+\{V_{22} X(1.927)\}+\{V_{23} X(-1.251)\}+\{V_{24} X(-1.544)\}+\{V_{25} X(-1.264)\}+\{V_{26} X(-1.697)\}+\{V_{27} X(-0.865)\}+\{V_{28} X(0.053)\}+\{V_{29} X(0.620)\}+\{V_{30} X(-0.726)\}+\{V_{31} X(-0.402)\}+V_{32} X(0.485)\}+\{V_{33} X(0.103)\}+\{V_{34} X(1.900)\}+\{V_{35} X(-0.155)\}+\{V_{36} X(-0.439)\}]$$

Membership to Cluster 3 can be determined by following equation:

$$[\{(-5.441) + \{V_1 X (-0.500)\} + \{V_2 X (0.407)\} + \{V_3 X (-0.937)\} + \{V_4 X (-1.354)\} + \{V_5 X (-0.972)\} + \{V_6 X (-0.664)\} + \{V_7 X (-0.430)\} + \{V_8 X (1.794)\} + \{V_9 X (0.917)\} + \{V_{10} X (-0.443)\} + \{V_{11} X (1.123)\} + \{V_{12} X (0.349)\} + \{V_{13} X (0.226)\} + \{V_{14} X (-0.893)\} + \{V_{15} X (-0.472)\} + \{V_{16} X (-0.489)\} + \{V_{17} X (0.480)\} + \{V_{18} X (0.928)\} + \{V_{19} X (-1.274)\} + \{V_{20} X (0.584)\} + \{V_{21} X (0.186)\} + \{V_{22} X (0.080)\} + \{V_{23} X (1.346)\} + \{V_{24} X (0.156)\} + \{V_{25} X (-1.201)\} + \{V_{26} X (0.990)\} + \{V_{27} X (0.892)\} + \{V_{28} X (1.676)\} + \{V_{29} X (0.682)\} + \{V_{30} X (0.130)\} + \{V_{31} X (-1.882)\} + V_{32} X (1.942)\} + \{V_{33} X (1.038)\} + \{V_{34} X (-0.350)\} + \{V_{35} X (0.773)\} + \{V_{36} X (0.379)\}]$$

Membership to Cluster 4 can be determined by following equation:

$$[\{(-30.475) + \{V_1 X (0.735)\} + \{V_2 X (0.526)\} + \{V_3 X (3.390)\} + \{V_4 X (-2.301)\} + \{V_5 X (-4.182)\} + \{V_6 X (-1.339)\} + \{V_7 X (-0.106)\} + \{V_8 X (-1.564)\} + \{V_9 X (0.748)\} + \{V_{10} X (-0.565)\} + \{V_{11} X (-5.811)\} + \{V_{12} X (-1.469)\} + \{V_{13} X (1.831)\} + \{V_{14} X (-2.214)\} + \{V_{15} X (-2.538)\} + \{V_{16} X (-0.069)\} + \{V_{17} X (1.110)\} + \{V_{18} X (-0.967)\} + \{V_{19} X (-2.771)\} + \{V_{20} X (-0.616)\} + \{V_{21} X (-0.029)\} + \{V_{22} X (-3.093)\} + \{V_{23} X (-2.115)\} + \{V_{24} X (8.787)\} + \{V_{25} X (-2.807)\} + \{V_{26} X (3.030)\} + \{V_{27} X (1.699)\} + \{V_{28} X (-4.612)\} + \{V_{29} X (-3.930)\} + \{V_{30} X (0.428)\} + \{V_{31} X (2.858)\} + V_{32} X (0.674)\} + \{V_{33} X (4.558)\} + V_{34} X (-1.159)\} + \{V_{35} X (-1.832)\} + \{V_{36} X (0.213)\}]$$

Membership to Cluster 5 can be determined by following equation:

$$[\{(-6.829) + \{V_1 X (-0.740) \} + \{V_2 X (0.320) \} + \{V_3 X (-0.41) \} + \{ V_4 X (1.504) \} + \{V_5 X (-0.484) \} + \{V_6 X (0.590) \} + \{V_7 X (-0.232) \} + \{V_8 X (0.107) \} + \{V_9 X (-0.656) \} + \{V_{10} X (1.463) \} + \{V_{11} X (-1.919) \} + \{V_{12} X (-0.56) \} + \{V_{13} X (-0.458) \} + \{V_{14} X (1.382) \} + \{V_{15} X (0.748) \} + \{V_{16} X (0.788) \} + \{V_{17} X (-0.810) \} + \{V_{18} X (0.342) \} + \{V_{19} X (-0.073) \} + \{V_{20} X (-1.836) \} + \{V_{21} X (-0.44) \} + \{V_{22} X (-1.363) \} + \{V_{23} X (-0.129) \} + \{V_{24} X (1.803) \} + \{V_{25} X (0.458) \} + \{V_{26} X (0.433) \} + \{V_{27} X (-0.771) \} + \{V_{28} X (-2.168) \} + \{V_{29} X (-0.221) \} + \{V_{30} X (1.183) \} + \{V_{31} X (0.263) \} + V_{32} X (0.509) \} + \{V_{33} X (-0.876)\} + \{V_{34} X (-0.247)\} + \{V_{35} X (-0.131)\} + \{V_{36} X (-1.168)\}]$$

Membership to Cluster 6 can be determined by following equation:

$$[\{(-80.850) + \{V_1 X (5.267) \} + \{V_2 X (-8.451) \} + \{V_3 X (6.059) \} + \{ V_4 X (2.456) \} + \{V_5 X (15.095) \} + \{V_6 X (4.353) \} + \{V_7 X (0.293) \} + \{V_8 X (-5.081) \} + \{V_9 X (-9.763) \} + \{V_{10} X (0.964) \} + \{V_{11} X (2.105) \} + \{V_{12} X (-2.084) \} + \{V_{13} X (0.841) \} + \{V_{14} X (3.488) \} + \{V_{15} X (7.302) \} + \{V_{16} X (1.219) \} + \{V_{17} X(-2.691) \} + \{V_{18} X (-2.278) \} + \{V_{19} X (8.928) \} + \{V_{20} X (0.260) \} + \{V_{21} X (-0.728) \} + \{V_{22} X (-0.841) \} + \{V_{23} X (-8.159) \} + \{V_{24} X (-4.621) \} + \{V_{25} X (3.254) \} + \{V_{26} X (-4.893) \} + \{V_{27} X (-1.682) \} + \{V_{28} X (-6.925) \} + \{V_{29} X (-0.440) \} + \{V_{30} X (-3.296) \} + \{V_{31} X (5.299) \} + V_{32} X (-3.621) \} + \{V_{33} X (-2.669)\} + V_{34} X (-0.688)\} + \{V_{35} X (1.355)\} + \{V_{36} X (-0.736)\}]$$