universität wien

DIPLOMARBEIT

Titel der Diplomarbeit

Traditional Ecological Knowledge (TEK) in West Arnhem Land, Northern Australia

The Ecological, Economic and Cultural Potential of Fire Management

Verfasserin

Anna Davey-Hiesleitner

Angestrebter akademischer Grad

Magistra der Philosophie (Mag.ª phil.)

Wien, 2011

Studienkennzahl lt. Studienblatt	A307
Studienrichtung lt. Studienblatt	Kultur- und Sozialanthropologie
Betreuerin:	Univ.-Prof. Dr. Elke Mader

ACKNOWLEDGMENTS

I would like to express my gratitude and appreciation to Professor David Mearns from Charles Darwin University and Glenn James from the North Australian Indigenous Land and Sea Management Alliance (NAILSMA) for acting as my co-supervisors and for their continuing assistance and advice. This thesis would not have been possible without the support of NAILSMA and the Commonwealth Science and Industrial Research Organization (CSIRO) who let me join them on the field trips to West Arnhem Land. It goes without saying that I am deeply indebted to the Bininj people of West Arnhem Land for allowing me to visit their country and their willingness to share information. In particular, my sincere thanks go to the Traditional Owner 'Lofty' Bardayal Nadjamerrek (deceased 2009) and to Dean Yibarbuk. I would also like to express my deepest gratitude to the Larrakeyah Primary School for the opportunity to undertake three months practical work with class teachers and specialist Indigenous language teachers. Many thanks go to the interview partners and experts for taking time out to answer my questions and for providing me with a deeper understanding of the topics under research.

At the University of Vienna, I am greatly indebted to Elke Mader, my University internal advisor for all her genuine guidance throughout my thesis. I strongly thank her for always taking the time despite an imposing schedule, for her immediate feedback and encouragement as well as for her friendly approach and helpful scientific advice. Finally, many thanks go to my family and friends for their support and encouragement, and especially to James for his tremendous patience and endless support.

TABLE OF CONTENTS

TABLE OF FIGURES

ABBREVIATIONS AND ACRONYMS

ABTA	Aboriginal Benefits Trust Account
AEP	Aboriginal Education Policy
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
ALEP	Aboriginal Landcare Education Programme
ALFA	Arnhem Land Fire Abatement
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
ALT	Aboriginal Lands Trust
ANCA	Australian Nature Conservation Agency
ATSIC	Aboriginal and Torres Strait Islander Commission (defunct)
BFC NT	Bushfires Council of the Northern Territory
BIITE	Batchelor Institute of Indigenous Tertiary Education
CBD	Convention on Biological Diversity
CCNT	Conservation Commission of the Northern Territory
CDEP	Community Development Employment Programme
CDU	Charles Darwin University
CFCU	Caring for Country Unit (Northern Land Council)
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Science and Industrial Research Organization
CSR	Corporate Social Responsibility
DEH	Commonwealth Department of the Environment and Heritage
DEETYA	Department of Education, Employment and Training and Youth Affairs
DEWR	Commonwealth Department of the Environment and Water Resources
DLNG	Darwin Liquefied Natural Gas Pty Ltd
DSEWPC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ETS	Emission Trading Scheme
IK	Indigenous Knowledge
ILC	Indigenous Land Corporation
IPA	Indigenous Protected Area

MCEETYA	Ministerial Council on Education, Employment, Training and Youth Affairs
NAILSMA	North Australian Indigenous Land and Sea Management Alliance
NCRM	Natural and Cultural Resource Management
NHT	Natural Heritage Trust
NLC	Northern Land Council
NNTT	National Native Title Tribunal
NRETA NT	Department of Natural Resources, Environment and the Arts
NTETA	Northern Territory Employment and Training Authority
NTOC	Northern Territory Open College
NRM	Natural Resource Management
NRS	National Reserve System
NSW	New South Wales
NT	Northern Territory
NTER	NT National Emergency Response (2007)
NTG	Northern Territory Government
PES	Payment for Environmental Services
QLD	Queensland
RTO	Registered Training Organisations
SA	South Australia
TAS	Tasmania
TNNT	Training Network Northern Territory
TSM-CRC	Tropical Savannas CRC
VET	Vocational Education and Training
VIC	Victoria
WA	Western Australia
WALFA	West Arnhem Land Fire Abatement (Project)

1. INTRODUCTION

Indigenous people around the world have an extensive knowledge of the local ecology collected and used by many generations. This local knowledge often extends beyond that of scientific knowledge and has been increasingly acknowledged as valuable for natural conservation programmes and resource management practices. The multifaceted environmental crisis that Australia is currently facing is mainly due to unsustainable approaches that have not considered Indigenous peoples knowledge systems. However the Indigenous role in resource management will continually increase as it is likely that more than 30 per cent of the Australian land mass will be owned by Indigenous people through land purchase, land rights and native title claims. In the Northern Territory (NT), areas of great biodiversity and conservational value are already owned and managed by Aboriginal people, who hold 45 per cent of land and 85 per cent of the coastline. Indigenous land management is therefore a major topic for now and for the future.

The northern Australian savannas have not been affected by any significant degree of land clearance or habitat destruction in contrast to southern and eastern Australia. Due to the relatively late colonisation, traditional ecological knowledge and land management practices such as the complex technology of fire management are still maintained and practised. Fire is an important component of the ecology of tropical savanna landscapes with approximately 50 per cent of northern landscapes burnt each year. It has been used for tens of thousands of years by Aboriginal people to shape the highly flammable environmental setting as well as by other land managers to attain certain outcomes for pastoralism, biodiversity conservation and national park management. In the last century however, fire management has changed dramatically across northern Australia due to a recent change in people's activities, settlement patterns and political and economic activity. Many areas, like the West Arnhem plateau are now sparsely populated with Indigenous people living mainly in larger settlements. The lack of fire management is considered by some scientists as the main reason for the increasing wildfires. Opponents to this view however point out the lack of scientific evidence and knowledge about traditional fire management. Also the environmental and cultural changes are emphasised and seen as a reason to question the efficiency of Aboriginal landscape burning today.

Growing interest in and research on traditional fire management shows the importance of fire for the maintenance and change of local environments. Contemporary fire practice and its relationship to historical practice is probably best documented in the Northern Territory (e.g. Thomson 1949a, 1949b, 1949c; Jones 1975, 1980; Haynes 1985, 1991; Lewis 1989; Meehan 1991; Lucas et. al. 1997; Russell-Smith et al. 1997; Yibarbuk 1998; Cooke 1999; Bowman et al. 2001). Jones' (1969) work of 'fire stick farming' in Tasmania, Gould's (1971) research of Aborigines' use of fire in the Western Desert, and studies in the tropical areas of northern Australia (Harris 1977; Haynes 1985; Jones 1975) illustrate that fire has been used across the continent in the context of hunting-gathering adaptations. Lewis (1989) in contrast compared fire management techniques from North America to Australia and noticed that the same basic principles have been applied. The range of applications of fire technology is pointed out by Goodale (1971). She describes how the Tiwi people utilised fire as a visible sign to highlight their right to use the resources of the land burned.

The ecological, economic and cultural potential of such a knowledge based land management technique for Indigenous livelihoods is the topic of this thesis. Before analysing the relationship between natural resource management (NRM), traditional ecological knowledge (TEK) and sustainable livelihood outcomes for remote Indigenous communities, the theoretical and methodological approach of this thesis are illustrated in the first two chapters. Whilst the fourth and fifth chapter provide an ethnography of the study area and illustrate the importance of TEK for fire management, the subsequent chapter six presents on the basis of a case study the potential of NRM for cultural revitalisation (TEK) and community outcomes. In the final chapter the conclusions of these chapters are put into context in order to answer the research question of the relationship between NRM, cultural resource management (TEK) and livelihood outcomes.

The theoretical part looks at anthropological models of human-environment interaction. Drawing from Ingold's theory of direct perception and cognitive anthropology, the relationship between how people perceive and interpret their environment as well as how they act within it is described. The focus here is on traditional ecological knowledge (TEK), a subfield of ethnoscience in order to demonstrate the connection between social and cultural aspects and land management practices. In the chapter dealing with the method, the research process with its data collection and data analysis is explained. This thesis is based on research carried out from the beginning of April until the end of December 2009 in the

Northern Territory of Australia. During my research in Darwin I was refining my thesis structure according to actual research access. The research was conducted under the supervision of Professor David Mearns from the Charles Darwin University and Glenn James from the North Australian Indigenous Land and Sea Management Alliance. While the field trips to Litchfield and Kakadu Nationl Parks were used to get a better idea of joint management programmes between Parks Australia and Aboriginal traditional owners, the field trips to the Arnhem Land plateau were conducted in the scope of the West Arnhem Land Fire Abatement (WALFA) project. Through these field trips, which lasted for approximately one week each time, I had the opportunity to talk with different Indigenous and non-Indigenous stakeholders, observe the fire management practices and to take part in a number of talks and focus group meetings. During my three months voluntary work at the Larrakeyah Primary School in Darwin, I had the opportunity to work closely with class and specialist Indigenous language teachers. The insights gained were used to improve the educational outcomes of the WALFA project. In addition to the field trips and the voluntary work, I also took part in anthropological seminars and an Indigenous symposium. Apart from observation and participation, the collected data is based on informal and open-ended interviews as well as on half-standardised interviews. As methodology frameworks for analysing and interpreting the significance of TEK for resource management as well as the social outcomes of the WALFA project, the knowledge-practice-belief framework following Berkes (1999) and the social impact assessment (SIA) methodology are applied.

The ethnographic overview of western Arnhem Land given in the fourth chapter, examines not only information on the environmental, historical, demographical and land rights situation, but also gives an account of the social, cultural and economic life of the Bininj people of the Arnhem Land plateau. The subsequent chapter presents the significance of TEK in the contemporary practice of fire management by the Bininj people. In this context Bininj perspectives, values and attitudes towards fire management are highlighted as well as the policy and other settings which influence, change and promote fire management.

The fifth chapter starts with giving an overview of the current socio-economic situation of Indigenous communities in northern Australia. Information is delivered on existing and future employment opportunities in remote communities. Natural resource management is considered an important key sector for providing environmental, economic and social outcomes at the local, regional and national level. The potential of NRM programmes is

analysed in the context of the West Arnhem Land Fire Abatement (WALFA) project which has been one of the first NRM projects in a carbon trading context. Through the WALFA agreement Indigenous land managers are paid for offsetting greenhouse gas emissions through improved fire management. Based on an adapted social impact assessment the implementation and design of the WALFA project with its intended objectives and stakeholder interests are presented. Finally the outcomes of the WALFA project linked to biodiversity, economic development and employment as well as social and human aspects are analysed. The many unique opportunities and future challenges that arise from the project are also outlined.

The objective of this thesis is to show the relationship between TEK and resource management and how through the payment for environmental services such as fire management the economic development of remote communities can be improved. TEK is a critical factor for success in land management programmes, however both Indigenous and Western knowledge systems are needed in order to be able to address the full range of issues related to all resources and values. My thesis was inspired by the increasing need to engage Aboriginal people in resource management practices, and my interest to learn more about the ecological, social and cultural uses of controlled fire in northern Australia. The aim of this work is to demonstrate the potential of NRM projects which address environmental and linked social problems whilst engaging Aboriginal people in the sparsely populated northern Australia.

2. THEORETICAL FRAMEWORK AND CONCEPTS

Due to current environmental concerns throughout the world, there has been an increased interest in environmental matters. This chapter gives an overview of how anthropological studies of human-environment relations have developed over the years and focuses in particular on theoretical approaches relevant for this paper. The aim of this chapter is to provide insights into the relationship between how people perceive and interpret their environment and how they act within it. Cognitive anthropology with its description of people's conceptual worlds and classification of their natural environment therefore plays an important role. Recent theoretical developments such as the questioning of the postmodern relativism and Ingold's (1992) theory of direct perception have been influential for this work. The remainder of this chapter looks in more detail into traditional ecological knowledge (TEK) in order to show the connection between values, beliefs, kinship structures, political ideologies, ritual traditions and land management practices. The main focus lies here on the knowledge-practice-belief complex of Berkes (1999) which builds the foundation for analysing the role of TEK in western Arnhem Land for fire management.

2.1 Theoretical Models of Human-Environment Interactions

In ecological anthropology the early models of human-environment interactions were mainly dominated by a deterministic view, but a major shift took place in the late 1950s and 1960s, when social scientists criticised the focus on causal explanations and developed new approaches in analysing their data. In the 1990s another major upheaval took place which questioned the extreme relativism of the postmodern era and the modernist dichotomies such as culture and nature (Milton 1997, p. 477).

2.1.1 Environmental Determinism

Ecological anthropology has been mainly shaped by the idea that the characteristics of human behaviour can be explained through the environments in which they have developed. This view is influenced by the Darwinian theory that biological diversity can be explained by environmental pressures. The early applications of environmental determinism are also known as 'anthropogeography'. Theorists such as Mason (1896) or Huntington (1924) for example focused on correlations between natural features and human

technologies, and they considered climate as the main influence on civil development. Through detailed ethnographic accounts, it became obvious that environmental determinism does not coincide with observed realities. As a result, anthropogeography was replaced by a weaker form of determinism often referred to as 'possibilism' where the environment was considered as setting the boundaries of cultural development instead of shaping human culture (Milton 1997, p. 478).

In order to explain more about human culture diversity and to demonstrate that the environment has more than a mere limiting influence on human society, the theory of 'cultural ecology' was developed. The origins of cultural ecology lie in the work of Steward (1955) who criticised possibilism for presenting the environment as too passive in human affairs. Steward considered cultural features and the modes of production as adjustments to the local environment on which they depended upon, and as a kind of superorganism that is itself undergoing adaptation. Culture therefore directs how an environment is to be exploited, but at the same time the environment prescribes certain ways of doing things. Some of these cultural features are more likely to be shaped by environmental factors than others and some environmental features have a stronger influence than others. He referred to this specific formula as the 'cultural core'. This concept can be however criticised as it denies that cultures are systems in which everything is connected to each other. An approach which avoided this kind of distinction between cultural features, but kept the concept of adaptation as the central explanatory mechanism, was Harris' 'cultural materialism' (Milton 1997, p. 478).

2.1.2 Cognitive Anthropology and the Ecosystem Approach

The approaches described above lost importance in the 1960s and 1970s as more and more empirical observations showed that not all cultural features adapt to environmental conditions. It had become obvious that some cultural practices are maladapted to their environment, resulting in a decline and sometimes in the extinction of the communities. Beyond that, a significant shift in emphasis could be observed. Instead of primarily unravelling the workings of social and cultural systems, anthropologists focused more on decision-making processes, and wanted to know why people do what they do. On this point, causal explanations were insufficient as they deny the possibility of choice. This new approach looks at human activities in terms of their goals and the knowledge needed to

achieve them. Knowledge here refers to assumptions, beliefs, values, norms, etc. In order to understand decision-making processes, people's own conceptual worlds - how they perceive and interpret the world around them became important (Milton 1997, p. 481).

Rappaport (1971) brought an innovative insight into ecological anthropology by adopting the ecosystem approach and considering that human beings have an impact on their environment as well as being influenced by environmental forces. His work (1968) about rituals and warfare among the Tsembaga Maring people of New Guinea Highlands demonstrates that the ritual practice of slaughtering pigs and the swidden cycle not only provided required nutrition but also sustained the carrying capacity of the land. He used therefore an analytical combination of ecology, religion, and 'cognized' models. The term of 'cognized' models is used to describe the thought processes and environmental perception that led to ecological management and to the control and protection of natural resources. This approach combines the understanding of the material impact of human populations on their environment (and vice versa) as well as how people think and why they do what they do (Ingold 1992, p. 48).

From the 1960s onwards anthropologists became more and more interested in people's own cultural understanding and perception of the world. This interest formed the field of 'cognitive anthropology' which involves subfields such as 'ethnobiology', 'ethnomedicine', 'ethnobotany' and 'ethnoecology'. The prefix 'ethno-' signals a field of knowledge from the viewpoint of the people being studied. A wide range of ways in which people perceive and interpret the world was revealed through cognitive anthropology (Milton 1997, p. 485). It is important to note that the development of cognitive anthropology and therefore ethnoecology was under the influence of structuralism. Representatives of this theory such as Lévi-Strauss (1963) considered certain binary oppositions (nature/culture, female/male, night/day, body/mind) as universal in human thought. However, in the 1990s anthropologists started to question these dichotomies as they are mainly based on Western frameworks and often have no equivalent in other cultures. Ingold (1996, p. 117) for example emphasised that hunter-gatherer societies do not have the concept of nature as "*the world can only be 'nature' for a being that does not belong there*". The concept of nature depends therefore on whether the society considers their environment as an integrated whole or distinguishes between familiar and unfamiliar spaces, which in turn is influenced by how they live in and use their environments (Milton 1997, p. 488).

The perception and interaction with the environment of hunter-gatherer societies have frequently been the topic of discussion. In Australia, Aboriginal people were regarded as being entirely dependent on what nature produces without having any influence on it. The view persisted that hunter-gatherers did not shape the landscape, and that the landscape was only influenced as a by-product of their foraging actions. This view is described by Ingold (1996, p. 148) as follows,

> "*the producer is seen to intervene in natural processes, from a position at least partially outside them; the forager is supposed never to have extricated him- or herself from nature in the first place.*"

The differentiation between the person who changes the land and the person who uses it was strongly connected with the understanding of property. In other words, ownership was derived from the labour that affects the land. It was in that sense, that Australia was seen as *terra nullius*, which does not mean unoccupied land but rather land belonging to nobody. This view was challenged by Rhys Jones (1969) work of 'firestick farming' which describes the use of fire as a system of land management to improve food resources and by doing so influencing the environment. That is why the landscape cannot be described solely as a natural landscape but to some extent at least as a cultural landscape. By doing so he raised a contentious issue in the hunter-gatherer debate by questioning the great divide between farmers, who use and affect the land and are civilised, and hunters, who were seen as people who have no impact on the landscape (Jones 1995, p. 15).

2.1.3 Recent Developments and the Theory of Direct Perception

During the 1990s, the extreme cultural relativism of the past two decades and the modernist dichotomies between body and mind, action and thought, nature and culture have been questioned. Cultural relativism has been one of the guiding theories in anthropology for many years. It implies that cultures can only be understood 'in their own terms' and that all cultures are equally true and valid interpretations of reality. This view that all cultures are equally true is based on the idea that worldviews are socially constructed through the experience of living in a particular area and are not influenced by those living outside their social arena (Milton 1997, p. 486). However, if anthropology wants to be able to study the contemporary world, it needs to be able to look at global issues which cannot be addressed if cultures are regarded as separate entities (Appadurai 1990; Hannerz 1990).

Anthropologists, such as Ingold (1992) have also put the logic of social construction in question as constructions cannot be derived out of nothing. The cognitivst perception for example implies that persons can neither know nor act upon their environment directly, but only indirectly through their culture. The 'raw' sensory data that is derived from reality is in the cognitivst view detached (as 'stimuli') from the environment and attached (as 'sensation') to humans according to cultural-cognitive schemata that is located in the head of the perceiver. Production and consumption are also regarded separated from nature. While production is considered as the imposition of a cultural design upon the external environment, consumption is seen as the integration of raw material from nature into culture. The focus is placed here on the meaning-making process of perceivers and by doing so the reality of the environment in which they live is diminished. In this view, perceptions can be only shared through language which is based on terms of conventionally agreed categories (Ingold 1992, pp. 39-51).

Ingold suggests an alternative ecological anthropology approach that would get past the cognitivst account of perception. This approach follows a notion that (1992, p. 51)

> *"persons and environment are mutually constitutive components of the same world, and that in both perception and consumption, meanings embodied in environmental objects are 'drawn into' the experience of subjects."*

This theory of direct perception is understood as an ongoing process of action in which living beings perceive the world because they move and act in it. Language is here neither necessary for generating internal perceptions of the environment nor for sharing perception. Symbolic thought and language are not essential to know the world, but are required to make such knowledge explicit. The awareness of living in a common world as well as the joint action in the same environment which forms the base of society, does not depend on the translation of percepts. Also a different view of production and consumption is taken. In the process of production, people shape their environments not through inscribing meanings into it, but rather through activities undertaken by persons in relation to it or in other words through the embodiment of past activity. While culture theory only recognises the historical quality of human work, the direct perception considers the past activities of persons within the environment. The dialectics of the interface between persons and environment should therefore be considered as a dichotomy not between culture and nature but between affectivities and affordances or in other words between the action possibilities of subjects and the possibilities for action offered by objects. This alternative theory of perception

assumes that people can directly acquire knowledge from their environment through their practical activities. Culture is according to Ingold a framework not for *perceiving* the world, but rather for interpreting it for oneself and others. However things do not need to be interpreted in order to perceive them. Such a theory can also be found in the 'ecological psychology' of Gibson (1979) who constantly emphasised the continuities rather than the contrasts between human and non-human perceptions of the environment (Ingold 1992, pp. 39-53). In anthropology relations among humans are mediated by a symbolically constituted system known as 'society'. While societies serve to come in contact with other humans, culture is necessary to come in contact with the environment. Ingold (1992, p. 54) on the contrary argues that

> *"we relate to others directly in terms of our perception of the possibilities they afford for interaction, rather than indirectly through the filter of social rules and categories."*

The latter is however important to the way in which we assess our own and others' social action.

In this paper the theoretical focus lies on how Aboriginal people in western Arnhem Land perceive and interpret their environment in order to explain why they interact with their environment as they do and to make sense of diversity between and within cultures. This is based on the approach that the ways in which people interact with the environment shape the ways of understanding it, but at the same time the way people understand their environment influences how they interact with it. Cultural perspectives however provide the knowledge, assumptions, values, goals and rationales which lead human activity. Local communities, such as those in this thesis, derive their knowledge of the environment by experiencing it from within. The significance of local or traditional ecological knowledge in this context is covered in more detail in the following section.

2.2 Traditional Ecological Knowledge (TEK)

Over the past twenty years, Indigenous people with their languages, cultures and knowledge systems have gained increasing international attention. This is mainly due to the growing interest in the utilisation of the native flora and fauna and the recognition of the potential of traditional ecological knowledge to contemporary resource management and environmental problems. Additionally, resource management programmes have recognised that rural Indigenous livelihoods are closely intertwined with culture and tradition which is why TEK cannot be disregarded if a successful outcome is to be achieved. This section gives an overview of the context and definition of TEK followed by the knowledge-practice-belief complex of Berkes (1999). Finally the significance and challenges of TEK in Australia are addressed in order to highlight how TEK might support sustainable environmental and cultural practices.

2.2.1 Definition and Context

The study of traditional ecological knowledge developed from the field of ethnoscience with its identification and classification of species as well as from human ecology which concentrates on peoples' understanding of ecological processes and their relationships with the environment. Traditional ecological knowledge may be regarded as a sub-area of Indigenous knowledge studies, which is understood as local knowledge unique to a given culture or society. However, there exists no universally accepted definition of traditional ecological knowledge as it is comprised of the words traditional and ecological which are themselves ambiguous and controversial. The term 'traditional' is commonly used to describe a particular kind of otherness which derives from a modernity-traditional dualism. For some scholars the concept of tradition implies cultural continuity and is contradictory to change. These are some of the reasons why the terms 'Indigenous' or 'local' are often favoured. Some people have also avoided the use of the term 'Indigenous knowledge' and instead preferred the term 'Indigenous knowledge systems' in order to emphasise the ongoing practical, social and cultural nature of Indigenous knowledge. The definition of the term 'Indigenous' is in itself quite problematic since it carries a strong conflicting political and moral perception because of its past use by colonial oppressors. In the broadest sense 'Indigenous' refers to the first known inhabitants, or beliefs and practices of an area, whereby the term is often used interchangeably with 'native' or 'Aboriginal'. The term often refers to societies that have lived in the same area and interacted with their

environment in the same ways for many centuries. Further characteristics are that they are small scale, relatively isolated and that they use what might be called 'low technology'. People also identify themselves as Indigenous to claim rights, to protect their interests and to be supported by NGOs and the government (Kempton 2001, p. 50; Ellen, Parkes et al. 2000, p. 321; Nakashima and Roué 2002, p .2). The term ecological knowledge also has definitional problems, especially if it is defined narrowly as a branch of Western science. But if the term represents the accumulated knowledge of relationships of living beings with one another and with their environment, it becomes more appropriate. Levi-Strauss (1962) speaks in this context of the '*science du concret'*, a native knowledge of the natural environment which is deeply rooted in the reality and personal experience. Indigenous knowledge does not, in contrast to science, oppose the secular to the spiritual, and therefore does not consider the empirical and objectives apart from the sacred and intuitive. This 'science du concret' regards the concrete and the spiritual as partners who complement and enrich each other instead of competing and contradicting one another (Nakashima and Roué 2002, p. 2; Berkes, Colding et al. 2000, pp. 1252-1259).

The main characteristics of TEK are therefore that it is *local*, *orally-transmitted*, *engaged in routine practices of everyday life* and that it tends to *empirical knowledge* rather than theoretical knowledge. It is *performative* and *differs from place to place* as it is embedded in culturally-specific, context-specific practices. However, in some cases, like in shifting cultivation or in fire management systems, traditional systems around the world often show functional similarities and involve long-term adaptations to specific environments and resource management problems (Berkes 1999, p. 48). TEK is *owned* and *accountable*. It is characteristically asymmetrically distributed within a population, by gender and age and maintained through the distribution of memories of different individuals. TEK is *collectively owned* and used differently by groups depending upon their collective memory, language, practices, traditions and land. TEK is furthermore *responsive*, *active* and *constantly renewed*. (Ellen, Parkes et al. 2000, pp. 4-5; Christie 2007, p. 87). TEK is not only supporting the conservation of natural resources by giving *moral support* to certain norms but also gives people the means to circumvent the same norms (Ellen, Parkes et al. 2000, pp. 324-328.).

In this work traditional ecological knowledge is defined following Berkes (1999, p. 8) as

> "*a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.*"

In other words traditional ecological knowledge is an integrated package that combines local knowledge and classification systems with environmental management practices and their social institutions as well as with the local worldviews which provide the ideological or ethical basis. The term traditional is not considered as an inflexible adherence to the past but rather as time-tested products building on experience and adapting to change, as societies continually redefine their understanding of 'traditional'. Due to the fact that Indigenous peoples themselves seeing many positive meanings in the word tradition, make the use of the term appropriate. Traditional ecological knowledge is also considered more in the context of 'time-space compression', which emphasises the removal of spatial barriers and the rapidity of time.

2.2.2 Knowledge - Practice - Belief Framework

The management practices based on traditional ecological knowledge often automatically imply the monitoring of ecosystems and resources, the protection of certain species, the temporal restriction of harvest as well as resource rotation and succession. The practice of causing ecosystem renewal by creating small-scale disturbances is also used by some traditional societies but seldom in conventional resource management. These practices are in contrast to scientific ecological knowledge based on local social mechanisms which can be seen as a hierarchy that spans from local ecological knowledge to social institutions, to mechanisms for cultural internalisation, and to world views (Berkes, Colding et al. 2000, pp. 1253-1256). Berkes (1999) developed in this context a knowledge-practice-belief complex through which traditional ecological knowledge is looked at on four interrelated levels (see Figure 2.1).

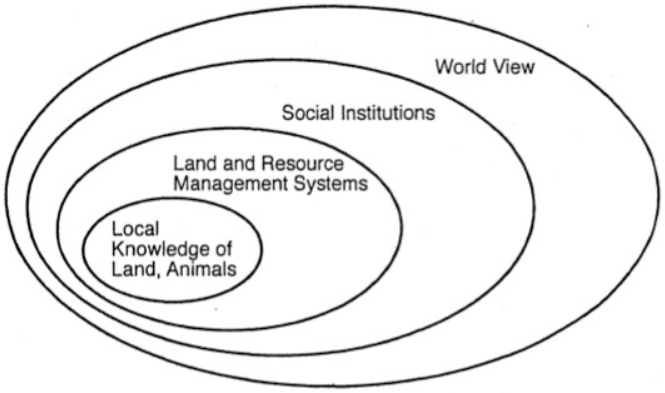

Figure 2.1 Levels of analysis in traditional knowledge and management systems

The first level contains local knowledge of species and landscape which is based on empirical observation. The second level in contrast concentrates on resource management systems which include not only local environmental knowledge, but also an appropriate set of practices, tools and techniques. At the third level, the social institutions which are responsible for coordination, cooperation, social restraints and rule enforcement are analysed. Finally, at the fourth level the worldview is examined. It includes religion, ethics, and more general belief systems, looks at environmental perception and gives meaning to environmental observations. The four levels of analysis are often closely interlinked what makes the distinction between them difficult (Berkes 1999, pp. 13-14).

2.2.3 The Significance and Challenges of TEK in Australia

Indigenous ecological knowledge is valuable for ecological, social, cultural, political and economic reasons and includes a number of interlinked issues, like worldviews, cultural survival, intellectual property rights, empowerment, local control of land and resources, cultural revitalisation, and self-determination (Berkes 1999, p. 23). Apart from the significance of TEK for all these different areas, the contemporary challenges for the maintenance and continuity of TEK will be discussed.

2.2.3.1 Local Environment and Sustainable Practice

Since the 1992 UN Conference on Environment and Development, and through the enforcement of the Convention on Biological Diversity, the importance of Indigenous knowledge for global biodiversity conservation has been stronger emphasised. This is also due to the recognition that around 90 per cent of the earth's most biologically-diverse lands

are mainly looked after by Indigenous people who have lived for centuries in these environments and know how to use, modify and rely on them (Christie 1996, p. 65). Traditional ecological knowledge therefore supports local land management and often represents biological knowledge which is unknown to Western science. The Australian Federal Government states the maintenance and recording of TEK as one of its targets for biodiversity conservation. However, only a few studies have systematically been carried out. In particular in the Northern Territory, there is a need for extensive knowledge of the local ecology in order to ensure the conservation of the declining populations of mammals and other vertebrate species (Telfer and Garde 2006, p. 381). While many traditional practices pursue conservation, other practices may have unintended conservational consequences. Clearly, many Indigenous people have an environmental awareness and an understanding for the need to limit exploitation of natural resources in order to avoid environmental degradation or local species extinction. Nevertheless, there are enough examples of unlimited exploitation of resources, based on the assumption that particular natural resources or certain 'wild' things are unlimited or beyond human powers to control (Healey 1993, p. 22).

2.2.3.2 Cultural, Economic and Political Significance

It has been recognised that there is a connection between cultural, linguistic and biological diversity. This connection not only merges the sometimes divergent activist goals of cultural survival and biological conservation but also underpins the importance of linguistic preservation. TEK plays a key role in preserving local languages and cultural integrity. It is therefore important to understand the processes and forces that support or prevent the transfer of knowledge within societies. The practice of TEK not only strengthens the social identity of a group through maintaining the cultural values and ideologies as well as the social relations within the group, but also transfers the knowledge, values, and identity to the next generations (Berkes 1999, p. 23). The use of TEK is still an essential part of livelihood in rural and tribal communities. It can be used to improve local self-sufficiency through the continuation of traditional subsistence strategies as well as through the development of market-oriented projects such as the production of handcrafts for the tourism industry. In the tourism industry, TEK also plays an important role for adventure and cultural holidays (Healey, 1993, p. 24).

TEK is also political and a major source of power. It is not only important for the status and position of tribal elders but also for the change of power relations between Indigenous groups and the dominant society. It is often suggested that Indigenous people have no other option than either follow their ancient way of life, or to abandon traditional beliefs and practices and become assimilated into the dominant society. Increasingly, Indigenous people decide for a third option which combines the old and new ways. Traditional knowledge has become an important symbol and strategy for Indigenous people to regain control over their own cultural information as well as for revitalisation movements. It is also essential to make claims such as the right to control their lands and resources; the right to self-determination and to self-govern; as well as the right to represent themselves through their own political organisations. These claims are based on Indigenous peoples' knowledge of, and attachment to the land, their traditional knowledge and management systems as well as on their local institutions (Berkes 1999, p. 168; Colchester 1994).

As mentioned above, Aboriginal Australians have an extensive knowledge of biodiversity and its uses. This knowledge is for Western science of particular value as the knowledge of the environment helps not only to locate particular organisms and resources but also to develop inventories. The relationship between the custodians of TEK and those who want to gain access to that knowledge for legal, ethical or economic reasons is influenced by power and political factors. Generally the relationship is very unequal where the power concentrates on the side of researchers, sponsors and consumers rather than on the traditional communities'. Research into TEK therefore takes place in a political economy of the global system (Healey 1993, pp. 21-25). Particularly in the field of 'biotechnologies', TEK is often under risk of being exploited by industrial interests. This kind of new colonialism is manifested in intellectual property rights (Christie 1996, p. 61). It is essential for policy development to realise that the transformation of sensitive and culturally determined Indigenous knowledge into information can have a widespread impact on the integrity of Indigenous cultures. Once this knowledge becomes public, the cultural meanings are not only lost but are also accessible to everyone (Dodson 1996, pp. 30-32). Indigenous knowledge operates therefore in a highly sensitive political context in which research, development, planning and conservation activities take place.

2.2.3.3 Preservation and Maintenance

There are many threats to the continuation of Indigenous knowledge. The main challenges are the recording and the passing on of knowledge from one generation to another. One of the major problems is the fact that knowledge cannot be learnt from a book. The complexities of 'country' are learned through observation, experience, and repetition (Wohling 2001, p. 157). At the moment, many of the Aboriginal elders who possess strong traditional knowledge pass away and as a result traditional knowledge systems and Indigenous languages are facing an increasing threat of being completely lost (Warddeken Resources 2008). The issues regarding the maintenance of TEK are complex and involve several challenges:

- Many traditional experts are reluctant to pass on knowledge, because they have no trust in younger generations to use the knowledge appropriately
- Many young people are growing up without having the chance to learn about their country and from traditional elders or prefer living in the cities and may regard traditional knowledge as no longer relevant
- Inter-generational language change complicates the capacity of elders to explain complex conceptual frameworks
- Attempts to maintain traditional knowledge have hardly made use of linguistic expertise which could improve the description and conceptualisation of complex areas of Indigenous ecological concepts
- Previous efforts have mainly focused on the extraction of knowledge for conservation or pharmacological purposes rather than concentrating on the maintenance of knowledge within the cultural group
- Technical, ethical and legal issues complicate the collection and passing on of knowledge
- Limited effort has been undertaken for developing co-existent management regimes
- Knowledge is entwined with customary law, what means that people have legal and social obligations in sharing and maintaining knowledge (Worth 2005, pp. 73-74).

The difficulties in maintaining Indigenous knowledge and languages show the increasing need for collaboration among linguists, Indigenous people and scientists. With the increasing codification and documentation of this knowledge by regional and international Indigenous resource centres, it is important to implement a number of legal and political measures in order to protect, monitor and control the effective transfer of Indigenous knowledge. If ethnoecological studies and recordings are implemented as part of negotiated community collaborations, they can assist to make knowledge accessible to younger generations as well as offering meaningful employment opportunities. It is important that there is a stronger co-operation within the education system and that the knowledge is developed into bilingual storybooks and teaching resources for the outstation schools (Telfer and Garde 2006, p. 381). This chapter has given an overview of the significance of TEK in Indigenous livelihoods to gain an understanding of its important social, cultural and environmental roles in land management practices such as fire management. The relationship between TEK and resource management as well as between TEK and community development will be discussed in the following chapters.

3. RESEARCH METHODS

From the beginning of April until the end of December 2009, I conducted research in the Northern Territory of Australia. The first part of my research in Darwin was based on an investigation into Indigenous resource management under the supervision of Prof. David Mearns from the Charles Darwin University and Glenn James from the North Australian Indigenous Land and Sea Management Alliance (NAILSMA). The regular meetings with them and their support have been central not only for gaining access to my field of study but also for the progress of my thesis. The second part of my work in the Northern Territory included fieldwork in the form of observation and participation as well as formal and informal interviewing. The research process was characterised by a dialectic interplay of data collection and data analysis (Hammersley and Atkinson 1995, p. 205). Through the circular interlinking of theory and methodology a process-oriented understanding was possible (Titscher 2000, p. 34). Before going into depth about the process of data collection and data analysis, the used methodology frameworks are explained.

3.1 Ethnography and Social Impact Assessment

As a methodology framework for analysing and interpreting the context of TEK in fire management and the outcomes of the WALFA project, the knowledge-practice-belief framework following Berkes (1999) which is described in the previous chapter and the social impact assessment methodology are applied. Although these frameworks influence the direction of the analysis, the research process was still open enough to redefine the scope and focus of the research. While the chapter about the importance of TEK in West Arnhem Land for fire management provides an ethnography of the study area and focuses on a micro level, the subsequent chapter about the social impact assessment of the WALFA project is shaped by different levels of generality and inclusiveness. For the WALFA project it was important that the data was sourced from a wider local, bureaucratic, regional and national framework as the distinctive levels and their interrelationships are essential parts of the analysis. The social impact assessment (SIA) was chosen for analysing the WALFA project as the management aspect of resource management requires a practical, action and outcomes orientated approach.

According to the International Association of Impact Assessment (IAIA) (2003) SIA is:

> *"the processes of analyzing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment."*

Social impacts can be direct or indirect and differ in outcome, as the latter one does not per se change human behaviour or welfare for better or worse. They refer mainly to long-term changes and are often difficult to determine (Richards and Panfil 2010, pp. 5-8). The focus lies here on short- and medium-term social benefits in the form of project outcomes. The SIA of the WALFA project started with extensive familiarisation with the project context and a secondary data review in order to narrow the focus of social assessment, to identify experts and institutions, and to establish a relevant framework with key social variables in advance. The following guidelines were considered (Rezende and Merlin 2003, p. 77):

BASIC GUIDELINES
1. Local, regional and national context
2. Perspectives and interests between stakeholders
3. Community-centred: local aspirations and social relations
4. Peoples' potential, resources and survival strategies (TEK)
5. Local ecosystem and its biodiversity
6. Existing power relations and the political context
7. Comparison of the outcomes and impacts with desired goals and aspirations

Due to restricted time and access as well as the fact that the SIA was conducted when the project was already being implemented, an adapted SIA framework was used. The methodology's perspective is community-centred. Instead of looking at what is lacking, it focuses on people's potential and resources which is in this research context TEK and land management practices (Rezende and Merlin 2003, p. 77). Although each stage is clearly defined (see Figure 3.1), the process is strongly iterative and interconnected.

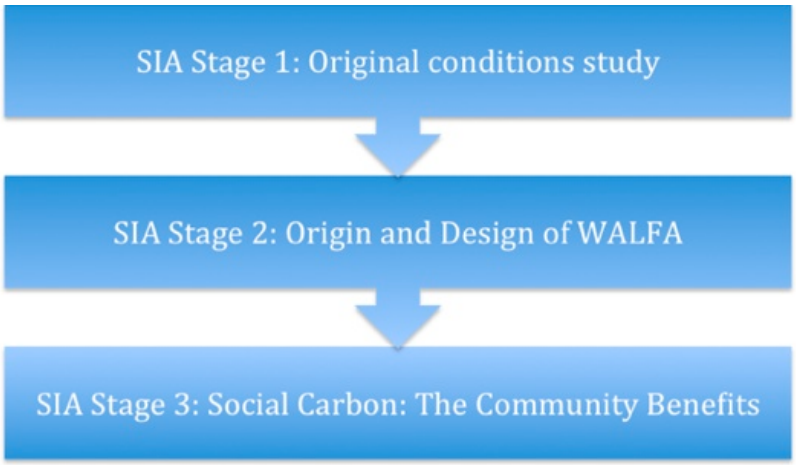

Figure 3.1 Adapted SIA framework

Stage 1: Original Conditions Study / Extensive Profile

In the first stage a description of the socio-economic conditions of the project area before project start-up is given. This description helps to identify the likely impacts of the project. For an extensive profile, the following key social variables are used:

- Land use and livelihood systems (especially linked to natural resources)
- Economic and employment profile
- Community infrastructure, social organisations and populations
- Cultural information - the way people think, behave and act
- Policy and tenure context
- Social problems and development constraints

Stage 2: The Origin and Design of the WALFA Project

In the second stage, the implementation and design of the WALFA project with its intended objectives are presented. It highlights how the project proponents and stakeholders think the social objectives will be achieved and which strategies and activities should be implemented to accomplish them. At this second stage the following questions are addressed:

- What are the social problems and needs that the project is trying to address?
- How are the objectives achieved?
- Who are the key actors/stakeholders and what are their interests and goals?

This information helps to identify institutions and relations which can have a positive or negative influence on the project.

Stage 3: Social Carbon: The Community Benefits

In the last stage, an analysis of the negative and positive outcomes is carried out. The following questions are addressed:

- What are the positive and negative outcomes?
- What are the critical success factors?
- What indicators should be monitored to show that social benefits are achieved?

In order to be able to identify if social outcomes and objectives are achieved, indicators which derive from the 'assets' of the sustainable livelihoods framework (SLF) are used. These indicators are environment and biodiversity, economic and financial resources as well as social and human resources. They provide according to the SLF model the foundation of people's livelihood choices. Also indicators which are identified by local stakeholders are included in order to consider their definition of a project success (Richards and Panfil 2010, p. 36; Ashley and Carney, 1999, p. 1; Becker 1997). The used indicators are presented in Figure 6.10.

It is important to note, that the term 'sustainability' is difficult to define, as people, communities and organisations have their own needs, wants, prejudices and values. 'Sustainability' is therefore like 'development' a value loaded term which can mean anything to anybody (Lea 1992, p. 15). Sustainability or sustainable development is here understood as following the Brundtland Report (WCED 1987) which defines it as

> "*a process of change in which the exploitation of resources and technological development were in harmony with current, and future, human needs and aspirations.*"

In other words, sustainability tries to meet the basic needs of all, and to extend to all the possibility to fulfil their aspirations for a better life now without taking away the chance of future generations to meet their own needs.

3.2 Material and Data Collection

For my research, I used sources of information from academic libraries, government and university departments as well as private sectors. Apart from secondary sources, the data has mainly derived from fieldwork. The term fieldwork refers to all observation, participation, formal and informal interviewing in which I was engaged during the following:

(a) Four field trips (2 x Arnhem Land plateau, Kakadu and Litchfield National Park),
(b) 13 weeks practical work at Larrakeyah Primary School in Darwin,
(c) Anthropological seminars and symposium and in
(d) Interviews with experts outside the named research setting

3.2.1 Participant Observation

Participant observation is an important field technique in cultural anthropology to collect qualitative data and to obtain in depth understanding of peoples' motivations and attitudes. The method of participant observation includes an explicit behavioural analysis as well as the systematic use of recorded information. It is therefore both a data collection and an analytic tool (Dewalt et al. 1998, p. 259). Participant observation was a key element of my qualitative research in order to capture the unexpected, unusual and unsaid. It was useful in getting a better understanding of the context, in assessing the quality of relationships as well as in gaining new insights into areas which people may not wish to discuss in interviews. Before taking field notes, I started to question when, how and especially what to write down, or in other words, what kind of information do I want to obtain. I kept in mind that the records of observations always imply issues of perception and interpretation. The records were always located in relation to who was present, where, at what time, and under what circumstances. Apart from informal talks and activities emotional responses were also written down. A certain emphasis was put on the recording as field notes are simultaneously data and analysis. Field notes were therefore regarded as subtle and complex understandings of the fire management routines and meanings (Emerson et al. 1995, pp. 5-8).

The conducted field trips mainly focused on Aboriginal fire management. While the trips to the National Parks served to get a better insight into joint management programmes

between Parks Australia and Aboriginal traditional owners, the field trips to the Arnhem Land plateau were conducted in the scope of the WALFA project. Through these field trips, which lasted for approximately one week each time, I got the chance to talk with different Indigenous and non-Indigenous stakeholders and observe their interaction with one another. The first field trip at the beginning of July, where I joined Glenn James from NAILSMA, was a science and Aboriginal ranger field trip, where ranger groups from different parts of northern Australia gathered to discuss and exchange their knowledge about fire management with each other, additional scientists and with the Indigenous people who are involved in the WALFA project, since similar projects would be set up in their areas in the next couple of years. Apart from fire management practices, a number of talks and focus group meetings were held. The focus group meetings, which lasted one to two hours, constituted a rapid way to collect comparative data from a variety of stakeholders. The second field trip at the end of September, where I joined scientists from Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) mainly served to collect scientific data on late fires. During my three months voluntary work at the Larrakeyah Primary School over the period from May until August 2009, I had the chance to work with classroom teachers and specialist Indigenous language teachers in developing literacy, numeric and sensory motor programmes with Indigenous students deemed at risk. The insights and the data were used for the improvement of the educational outcomes of the WALFA project.

3.2.2 Interviews

The conduction of interviews was divided into three main stages: (a) planning and preparation, (b) the interview itself and (c) transcribing and interpreting the interview which will be explained in more detail in the next section. The planning and selection of informants was based on what Glaser and Strauss (1967) call 'theoretical sampling'. Who is interviewed, when, and how was dependent on the research progress. While questions were asked informally and open-ended with people as the opportunity arose, half-standardised interviews in form of expert or ethnographic interviews were utilised in a more formal way. The half-standardised interviews were kept to a specific structure which allowed the interview to be focused but at the same time open enough to give space for unanticipated issues. The questions ranged from micro-level details of people's daily lives to detailed questions about organisations and institutions or macro level policies. For the expert-

interviews an intensive preparation was necessary in order to show not only the familiarity with the area of studies but also with the work of the expert. Expert interviews were conducted with people who have knowledge developed over a long period and who can explain not only what was done, but also why and the judgement behind the action. In contrast to ethnographic interviews, expert interviews were set at a certain place and time. Access and making time were the biggest challenges for this kind of interview (Flick 2009). In ethnographic interviews the questions are not decided beforehand and can vary between directive and non-directive questions. Nonetheless ethnographic interviews require a certain structure and a list of issues to be covered in order to clarify what is relevant and what is not (Hammersley and Atkinson 1983, pp. 113-114). The ethnographic interviews arose during participant observation and informal talks. In contrast to informal conversations, my role as a researcher was more apparent and the questioning and structuring of the talk were more controlled. Following Spradley (1979) mainly descriptive questions were used in order to gain an insight into the particular cultural scene as well as to discover other culturally relevant questions. In total I conducted more than 20 interviews with Aboriginal people, scientists, those involved in the WALFA project, teachers and educational experts as well as others working in the field of natural resource management. The statements and talks were written down immediately in the field or later from taped interviews. For every interview or talk, a customised set of questions were prepared according to the profession and background of the interview partners. These questions served as a backup, however, every interview developed its own core themes. Most interviews were conducted on a one-to-one basis. More detailed information about the field trip and interview partners can be found in the Appendix.

3.2.3 Fieldwork Limitations

As perfect fieldwork research rarely exists, I was also confronted with some limitations. Particularly at the beginning of my research, access to several key areas was not possible. Due to these conditions, the research design was adjusted and focused mainly on fire management activities as I was unable to collect much ethnographic information on topics such as traditional ecological knowledge and daily life in the community. By learning through active participation, I was aware that my role as field researcher cannot be completely neutral and that the participation was limited by my own personal background. (Emerson et al. 1995, p. 3).

3.3 Data Analysis, Explanation and Interpretation

The analysis of qualitative data is a dynamic, creative process of reasoning, thinking and theorising which continues throughout the research. After collecting information and data through interviews and observations, the data was converted into text via recording and transcription. In this data analysis, partial transcriptions were used in order to transcribe only the important and most valuable parts of an interview. However to ensure that the most valuable information is identified and to provide an accurate reflection of the interaction, a combined process of audio taping, making field notes and memoing was conducted (Flick 2009). The data was coded in accordance with the strategies of ethnographic text analysis and thematic coding whereby a provisional 'start list' of codes were used. The list was derived from the conceptual framework and the research questions and was not produced until the exercise of coding. The data was collated by grouping answers from interview partners by theme. As consultants were not asked exactly the same questions, it was not possible to statistically analyse the proportion of similar responses. This scheme helped to ask questions, to compare across data and to keep the categories flexible in order to change or drop them if needed (Flick 2009, pp. 319-320). The used ethnographic analysis required a considerable amount of contextual knowledge in order to explore patterns of explanation and rationalisation for the 'members' of social units. This ethnographic method differs clearly from methods like content analysis, which approach texts with concepts fixed in advance. Although ethnographic methods also work with categories, they tend to be more provisional and may change during the research process (Titscher 2000, p. 99). Thematic Coding was used in contrast to look at the social distribution of perspectives on a phenomenon or a process (Flick 2009, p. 318).

This chapter has described the research process with the applied data collection and data analysis methods. The applied qualitative approach was based on the anthropological and ethnographic tradition, where smaller samples lead to a better understanding of the society under investigation. Analytic induction seemed for the research process more appropriate than the hypothetico-deductive method. Interview transcripts, notes of informal talks and field notes were not added at the end of this work, because of moral and ethical concerns.

4. ETHNOGRAPHIC BACKGROUND

In the Northern Territory 45 per cent of the land and 85 per cent of the coastline are owned by Aboriginal people (Whithead et al. 2003). Unlike southern and eastern Australia, the northern Australian savannas have not been affected by any significant degree of land clearance and traditional ecological knowledge and land management techniques are still maintained and practised. In the last century however, changes in ecosystems and Aboriginal cultures could have been observed. This can be due to the recent change in people's activities and settlement patterns across northern Australia as well as to the political and historical implications. In this chapter an ethnographic overview of western Arnhem Land is presented. While the first part gives an account of the environmental, historical, demographical and land rights situation, the second part looks into the social, cultural and economic life of the Aboriginal people of the Arnhem Land plateau who refer to themselves as *Bininj.*

4.1 Regional Context of the Arnhem Land Plateau

Arnhem Land is a region of around 97,000 km^2 in northern Australia (see Figure 4.1). Proclaimed as an Aboriginal reserve in the 1930s and managed by an Aboriginal land trust since the 1970s, the area is almost all Aboriginal land besides some parts leased for other purposes like Gurig (Coburg Peninsula) National Park and the mining operations near Nhulunbuy (Gove) and on Groote Eylandt. Apart from a small area of pastoral land in the south-west of Central Arnhem, Arnhem Land forms together with the neighbouring Kakadu National Park the largest block of land in the tropical savannas with no cattle grazing. The Arnhem Land plateau is located in the west of Arnhem Land, next to the World Heritage listed Kakadu National Park and is with 32,000 km^2 roughly the size of Switzerland. The plateau possesses a rich biodiversity, and is of great cultural significance because of its diverse body of rock art which is thought to be the longest continuous record of human culture anywhere in the world. These rock paintings are evidence that people moved into this country around 40-50,000 years ago (Warddeken Resources 2008; Savanna Explorer viewed 2009).

Figure 4.1 Map of Arnhem Land

4.1.1 Environmental Setting

The Arnhem Land plateau is home to a large diversity of animal and plant communities, which occur nowhere else in the world. The area is therefore recognised under the NT Parks and Conservation Masterplan as an area of biodiversity significance and as a high conservation priority across the Northern Territory. The tropical savanna landscape in West Arnhem Land is characterised as 'woodlands with a grassy ground layer'. The small areas of Monsoonal rainforest and Myrtaceae forest which are left in the basin are of high value for Aboriginal people because of their food sources and their associations with ancestors (Warddeken Resources 2008). The climate of the region is tropical monsoon with an annual wet season from December to March, during which annual grasses can grow to over three meters in height. This is followed by a long dry-season, where those grasses became extremely dry and prone to fire. The frequency and intensity of wild fires is closely related to the amount of rainfall and its distribution throughout the year (Kemp 1981, p. 8). Early dry-season fires are relatively 'cool' and do not seriously damage the landscape as they do not burn the canopy of the trees and all of the fallen debris. Late dry-season fires in contrast can burn out of control for months and can damage vast tracts of land (HREOC 2008, pp. 258-259). However not only do late dry-season fires have a negative impact on this ecosystem but also on weeds and feral animals. Buffalos are considered in an ambivalent way, as on one side they are valued for subsistence hunting and commercial purposes but on the other side landowners see the damage that buffalos do to the country (Warddeken Resources 2008).

4.1.2 Historical and Demographical Context

Aboriginal and Torres Strait Islanders make up 2.5 per cent of the Australian population. The Indigenous population has an annual growth rate of 2.2 per cent, which is significantly higher than the average annual growth rate of 1.7 per cent. New South Wales and Queensland comprise together about 57.8 per cent of Australia's Indigenous population. The Northern Territory has with around 13 per cent, also major concentrations of Indigenous people who make up 30 per cent of the NT's population. Australia's Indigenous policies programmes as well as the colonial history have had a major influence on current population distribution and on the extent of dispossession and dislocation (FAHCSIA 2010). The history of policy development went from white Australia policy to assimilation, self-determination to the present practical reconciliation.

4.1.2.1 Protection, Segregation and Assimilation

In the 19th century, Europeans settled in the Northern Territory and started to set up cattle stations, mining camps and buffalo hunting operations. At this time, Arnhem Land was recognised as an Aboriginal Reserve and closed to all outsiders except the Church Missionary Society. Although some cultural change occurred during this time, most Aboriginal people retained close bonds with their traditional land and cultures. The Aboriginal Reserves were areas into which Aboriginal people were moved by Government under the former policy of protection. Up until World War II the Arnhem Land plateau was occupied by Aboriginal people who were seasonal moving through the landscape and trading with other community members. During World War II, the Bininj and other Aboriginal people of the area were brought into Katherine and other settlements for their own protection were many stayed after the end of the war. A further factor that affected Aboriginal people on the plateau were the various forms of forced removal into missions and settlements which were accompanied by the assimilation policy. Other aspects of the policy were racial segregation and the lack of right to citizenship. Disease, access to destructive drugs, and the migration of individuals to gain access to Western resources had another major impact on the communities. A slow emigration from the plateau started in the 1940s and by the mid-1960s the majority of Bininj people had moved to places like Gunbalanya (Oenpelli) or into the coastal towns. Social changes were therefore set in motion mainly by depopulation rather than by direct foreign invasion as the plateau was of no economic interest to non-Aboriginal people (Garde et al. 2010, p. 90; Thomas 2007).

4.1.2.2 Self-Determination and Reconciliation Australia

In 1972 the introduced policy of self-determination by the Federal Whitlam Government, replaced the earlier frameworks of assimilation and integration. This new policy was followed by the acknowledgment of land ownership rights and encouraged Indigenous incorporations to 'self-management'. Dissatisfied with the life in missions and settlements, and worried that the Government would give their lands to mining companies, many Aboriginal people started to move back to their traditional estates to set up small communities. This outstations or homelands movement, which started in the early 1970s has changed the population distribution slightly again (Savanna Explorer viewed 2009). It has been encouraged by the Aboriginal Land Rights Act (NT) 1976, and the purchase of traditional lands by Governments, land councils and the Aboriginal Benefit Trust Accounts. The most recent policy response, incorporated in the Howard Government's Election 2004 has followed the practical approach to reconciliation which means closing the gaps in health, housing, education and employment. It suggests that support is especially needed in remote communities where the population is growing significantly and where problems are most acute (Altman 2005, p. 124). After looking at the impact of colonial history and the contemporary Indigenous demography, the question comes up of the real opportunities for Indigenous resource management and looking after country. In reality, a large proportion of Indigenous people do not have the option to return to their country because of limited economic and infrastructure support in rural areas. This is especially the case for people on the west Arnhem plateau (Yibarbuk and Cooke 2001, p. 35).

4.1.3 Land Rights and Land-Use Legislation

This section looks at various legal and political trends that have had an influence on Aboriginal and Torres Strait Islander people's past and current involvement in land and resource management. It examines the connection between land rights and land use in Australia. In general it can be said that the efficiency of Indigenous land management depends on the distribution of Indigenous land ownership, the coexistence of Indigenous and non-Indigenous land rights as well as on the relationship of these features to resource management policies and programmes. Around 20 per cent of Australia is Aboriginal land. The amount of land differs considerably by State and Territory, with South Australia, Western Australia and the Northern Territory holding the greatest areas of Aboriginal land. The largest proportion of land, about 50 per cent, was given back in the Northern Territory.

These Aboriginal lands stand under a number of different tenures which result from the various types of State and Territory legislation. Before the 1970s, the Indigenous relationship to land was mainly recognised in federal, state and territory heritage protection legislation. The Northern Territory holds as a federal territory an unique position in the Commonwealth of Australia. Although it has been given self-governing status, the parliament cannot legislate on every topic (Head and Hughes 1996, p. 281; McNee et al. 1993, p. 101). The geographical imbalances in Indigenous land rights legislation have led to different degrees of control and opportunities for working on land. Some groups, like the people of Yirrkala in northeast Arnhem Land have been relatively lucky with their secure land title they could establish Indigenous-controlled land management initiatives. In contrast, most Indigenous people from southern and eastern regions of Australia face massive limitations and have to defend their own rights and interests in land and resources from powerful competing interests (Baker et al. 2001, pp. 5-7). Due to these legal differences, it is important to distinguish between 'land-use class' and the more complex issue of land tenure. In the Northern Territory over 40 per cent of the land, including 87 per cent of the coastline is owned by Indigenous people under the Aboriginal Land Rights (NT) Act 1976, whereas 49.5 per cent is pastoral leasehold which is also claimable as freehold by Aboriginal people. Aboriginal land tenure is therefore mainly freehold, followed by unallocated Government lands ('Vacant Crown Land') which is claimable through the Native Title Act. Areas with significant conservation purpose including Aboriginal land under freehold tenure such as Kakadu and Nitmiluk National Parks are leased back to the Commonwealth as national parks. In these joint management agreements, Aboriginal land management expertise and techniques are considered and protected (McNee et al. 1993, p. 101; Russell-Smith 2001, p. 8).

4.1.3.1 Aboriginal Land Rights (NT) Act 1976

The Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA) was the first step by the Australian Government to legally recognise Aboriginal traditional rights to certain land and to put into law the concept of statutory inalienable freehold title. When the ALRA was passed, the former 'reserves' were automatically transformed into Aboriginal land. Apart from these statutory land rights, Indigenous people got the chance to claim unalienated Crown land, which is land that no-one else is using or has an interest in. A 'land claim' is an opportunity for Aboriginal people to state to an Aboriginal land commissioner, that they are

a local descendent group with an ongoing strong traditional attachment and rights to the land. The Minister for Aboriginal Affairs balances afterwards the advantages and disadvantages of a land grant. Successful land claims are granted under inalienable freehold title, which means that Indigenous people have a high level of control over access to their land and over the way of using it, but it cannot be sold. The decisions about the land are made by the Aboriginal Land Trust (ALT) which is made up of Traditional Owners who hold the title for the interest of all traditional landowners. The ALT is advised by the land councils which were established as statutory authorities under the ALRA. These representative bodies not only support Indigenous people in the claiming, management and protection of their land but also administer the financial income received under the Act. The Northern Land Council (NLC) is the representative body for Indigenous people in the northern part of the NT (Altman et al. 2007).

4.1.3.2 Native Title Act 1993 (Cwlth)

The Australian High Court's Mabo case decision in 1992 was an essential turning point in Australian law as it finally legally recognised Indigenous peoples as the original owners of Australia. In doing so, the court got rid of the notion that Australia was *terra nullius* (land belonging to no one) and therefore set the course for the Australian Parliament to pass the Native Title Act in 1993 (Cwlth). The Native Title Act acknowledges Indigenous cultural rights and integrates Aboriginal and Torres Strait Islander law and customary uses of land and responsibilities for management into existing property rights (Dodson 1996, p. 30). Although the Mabo decision put the contemporary scene of Indigenous management into a new light, only a small proportion of native title claims have been resolved so far. This could be due to the complex political and economic issues as most of the native title claims are not only located in the densely settled urban and agricultural regions but also cannot prove the required ongoing relationship to land due to past Government assimilation and dispossession policies. The definition of 'traditional owner' has therefore reached a new level of complexity. It is also no coincidence that native title is mainly granted to sparsely populated arid and monsoonal regions which often already possess Indigenous statutory rights. This spatial unevenness in Indigenous rights to land and resources has promoted tensions between 'northern' and 'southern' Indigenous groups and has diminished solidarity in their negotiations with Governments. The Native Title Act has caused much controversy as it expects coexistence of Indigenous and non-Indigenous tenure rights, especially on

pastoral leases, national parks, and foreshore reserves. This situation has caused considerable hostility and fear by rural and mining industry groups, as they have no longer unrestricted access once land is under Aboriginal control (Baker et al. 2001, pp. 8-11). In the Northern Territory, the Mabo decision and Native Title Act have not had the same impact as in the rest of Australia, because of the fact that most of the land which could have been claimed had already been owned by Aboriginal people (Hughes 1995, p. 45).

4.1.3.3 International and Environmental Legislation

The growing recognition of the connection between biological and cultural diversity as well as the importance of Indigenous peoples have stimulated the discussions on Indigenous rights on an international level. The United Nations has passed after 20 years of discussion the *Declaration on the Rights of Indigenous Peoples*. Malezer (2008, p. 526) outlines the Declaration as follows:

> *"In 2007, the UN Declaration on the Rights of Indigenous People was formally adopted by the United Nations as a comprehensive international standard on human rights. The Declaration emphasizes the collective rights of indigenous peoples. It elaborates upon existing international human rights, norms and principles as they apply to indigenous people. (...) In short, the Declaration lays out minimum standards for the survival, dignity and well-being of indigenous peoples."*

Article 8(j) of the C*onvention of Biological Diversity* (Rio, 1992) has also contributed significantly to the recognition of Indigenous knowledge for sustainable development and biodiversity conservation by demanding signatories to:

> *"respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life-styles relevant for the conservation and sustainable use of biological diversity."*

At a national level, the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) represents a major reform of the Australian environmental legislation as it considers not only the importance of Indigenous Australians in conservation and sustainable development but also elaborates Indigenous people's rights in relation to protected area management (Sutherland and Muir 2001, p. 38).

4.2 Bininj Kunwok: Aboriginal People of the West Arnhem Land

The Bininj Kunwok clans are the traditional owners of the west Arnhem Land plateau. The high plateau country is collectively described as *kuwarddewardde*, 'the rock country' or 'stone country' and is home to the Kundedjnjenhmi speaking clans (Warddeken Resources 2008). This section provides an overview of the social, cultural and economic context of the Bininj people as well as of the different cultural, traditional and economic ways of using land. Finally it gives an insight into the current infrastructure realities and governmental services.

4.2.1 Social and Cultural Context

In 1939 the local population of the Arnhem Land plateau was estimated to be somewhere around 250 people. The area is largely unoccupied today with some small family-based outstations (~25 persons each) living there. The Kabulwarnamyo outstation was re-established in 2002. There are four other communities that have been re-vitalised since the mid-1980s such as Malkowo, Manmoyih, Kamarrkawan and Kumarrirnbang. However, small groups of Aboriginal people stayed on the plateau throughout the 20th century which is why some senior Aboriginal people still possess strong traditional knowledge. Others by contrast were moving back and forth between their homelands and the bigger settlements (Warddeken Resources 2008; Garde et al. 2010, p. 90). Since 1997 traditional owners like 'Lofty' Bardayal Nadjamerrek[1], Peter Biless, Jimmy Kalariya together with Peter Cooke have been trying to help the Bininj people to reconnect with their country (Warddeken Resources 2008).

[1] 'Lofty' Bardayal Nadjamerrek's[2] (deceased September 2009; Wamud/na Kodjok subsection, Mok clan) had an incomparable knowledge of the region. He spent much of his youth following traditional walking routes across the plateau, visiting the Oenpelli Mission, the Maranboy tin mines and the Second World War army camps at Mataranka. His country is called Sugar Bag Country. He guided the land management and community of Kabulwarnamyo, on the upper Liverpool River (Garde et al. 2010, p. 88).

4.2.1.1 Language and Aboriginality

There are estimates that around 250 distinct languages with multiple dialects were spoken in Australia before European contact. A recent study of the language situation in Australia demonstrates that 160 languages are extinct, seventy are under threat and only twenty may survive. The Aboriginal languages in Australia are very different in nature although they originate from a common source. English and Indigenous languages have also influenced each other which can be seen in the development of pidgins and creoles as well as in the common linguistic use of Indigenous words such as kangaroo, billabong, dingo and koala (Walsh 1993, p. 8).

The Arnhem Land plateau is dominated by the Gunwinyguan language family. The individual languages of this language family are Rembarrnga to the east of the plateau, Dalabon to the south, Jawoyn to the south-west and Bininj Kunwok in the north (see Figure 4.2). Bininj Kunwok is a collective term for a number of mutually understandable dialects (Kuninjku, Kune, Gundjeihmi, Kunwinjku, Mayali, and Kundedjnjenghmi). Aboriginal people often hold close affiliations with several languages, but identity is mainly derived from the language spoken by their father. The language group defines a person's responsibility and affinity with their country (Warddeken Resources 2008; Garde et al. 2010, p. 88). The distinct and local identity of a group is therefore mainly established through the use of locally distinctive ways of speaking. This is a crucial function as a person's right to be at a particular place, to use the resources, and to bring strangers to that place is proved by the way one speaks. The world-view of a particular culture and the social and communicative functions that come along with it will always be reflected in the semantic structure of its language (Garde 2008, p. 159). Language plays therefore a crucial role for ethnic and territorial identity as well as for the social cohesion of a group. Once a group has lost its language, it is more likely to lose its separate identity and to become assimilated into another, more dominant political group (Dixon 1980). The importance of language is also pointed out by Bowden and Bunbury (1990, pp. 32-33)

> *"Oh, it's our lifeblood. This is what we tell the young people. You have to know your language because you'll never be able to learn your Dreaming and if you don't know your Dreaming you can't identify where you belong. If you don't identify where you belong you may as well say you're dead. As an Aboriginal person you have to know your language to be able to learn your Dreamings."*

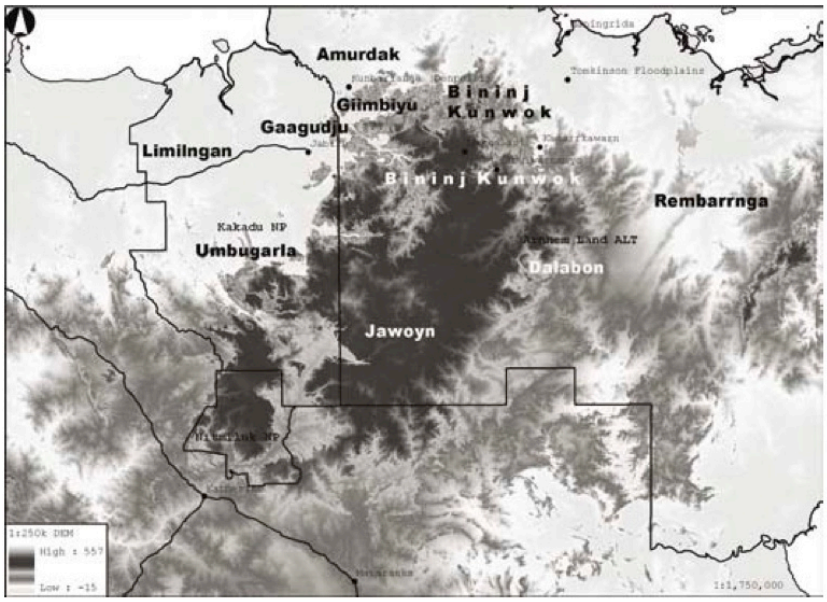

Figure 4.2 Languages of the Arnhem Land

4.2.1.2 Social Organisation and Kinship System

Individuals are part of a group on the basis of sex, age, community, language and customs (tribe), possession and occupation of a territory (horde), and on the basis of kinship and marriage (family, clan, section and moiety). The Aboriginal kinship system considers the whole group as a family which is why the terms of family members are extended to everyone in the tribe. The kinship system and the division of sections and moieties enables Aborigines to figure out exactly where they stand in relation to any other member of the community or even to an outsider (Radcliffe-Brown 1930, p. 63). The kinship system and the division of sections and moieties In western Arnhem Land all people, clans, places, estates, plants, animals, natural phenomena and supernatural beings are associated with either the *duwa* or *yirridjdja* patrimoities. A duwa man will marry a yirridja woman and the other way around. They also have matrilineal moieties such as *-ngarradjku* and *-mardku*. Through this intricate kinship system conflicts are minimised also (Garde et al. 2010, p. 91; Telfer and Garde 2006, pp. 388-393). An important aspect of the kinship system are the economic obligations such as giving and receiving gifts from certain kinsfolk. The economic activity is not for personal profit or economic gain but rather for reinforcing social bonds and for fulfilling kinship obligations. The relationship between man and women are not characterised by dominance and subservience but rather by terms of partnership. This is represented by male hunting and female gathering. The men have more power and authority in political affairs which can be due to the fact that after marriage

women move to the territory of their husbands. Power and authority in Aboriginal society mainly stays with the older men, but also older women have a say in camp affairs. There is no leader but rather an egalitarian share of power among a few older men. The authority of the elders is based on tradition and kinship rules (Broome 1994, p. 17).

4.2.1.3 World View and Cosmology

In Aboriginal Australia, the living world is created by creative beings called Dreamings. The Dreamtime refers to the spiritual domain or time, when ancestral totemic beings moved through the landscape and subsequently shaped it. The paths that ancestral beings walked, provide mental maps that explain the country, and link groups of people with specific places. Apart from the physical, the ancestors have also created the spiritual, cultural and social world which has to be kept alive through keeping up all the practices handed down. They have given the Aboriginal people songs, dances, narratives, ceremonies, sacred objects, and paintings in order to sustain the bond between land, people, and totemic beings (Berkes 1999, p. 25; Rose 2001, p. 105). The ancestors have also set the rules for the social classification system which divides the natural and spiritual world into two named patrilineally inherited moieties and eight subsections. Elements of the natural and supernatural world are incorporated into this system as the religion tells them that at the time of creation all animals had a human form and have since transformed into all the animal species of the region. This special system of relations is also known as ‘totemism’. An important aspect of totemism in Australia are sacred local totem centres which are associated with certain natural species and mythical beings. The term totemism is also used to describe the use of natural species (generally animals) as representatives of social divisions (Radcliffe-Brown 1930, p. 62; Garde et al. 2010, p. 91; Telfer and Garde 2006, p. 388-393). Another important aspect of the cosmology of the Bininj people are the concepts of ‘secret’ and ‘sacred’. Secret or sacred may be material objects (including artwork), verbal cultural manifestations such as oral traditions and stories, as well as ideas, themes, motifs and knowledge. Within the object some parts may be ‘secret’ and others not. The secrecy is determined by the context and the people to talk to (Dodson 1996, p. 32).

4.2.2 Land Tenure and Land Use

The Aboriginal system of land tenure comprises of rules for resource allocation and access as well as rights for the transmission of resource-use rights to others. The production of the land is therefore determined by rules, social obligations and allocation decisions whereas the land rights itself never change. The rights are based on correlated religious and kin-defined sanctions. The religious beliefs and myths therefore play an important role, as not only social identity is derived from them but also the moral foundation of access and control over resources (Berkes 1999, p. 48). People retain their clan membership and ownership of land from their father whereas certain rights and obligations come through their mother's land. People who are related to the country through their mothers are called *djungkay*, which means guardian. The djungkay have certain responsibilities for managing their mother's country and work in cooperation with the traditional owners. They need to be involved in land-management activities such as landscape burning. Whenever Aboriginal people in western Arnhem Land return to their land or a site they have not been on for some time, they need to address the country and the ancestral spirits to explain their absence. It is believed that inappropriate behaviour at a site or the presence of strangers might provoke the anger of these spirits resulting in accidents, illness or other kind of misfortune. In order to avoid this, any visitor to the country needs to ask for permission and must be introduced to the ancestral spirits by being sprayed with water by a person whose mother is a member of the land owning clan (see Figure 5.11) (Garde et al. 2010, p. 91; Garde 2008, p. 156).

Aboriginal people use the land in many different ways which can be grouped in interrelated cultural, traditional and economic land uses. It should also be considered that Indigenous lands in Australia are very diverse and therefore land management needs may vary substantially. An important question in this context is whether the Aboriginal land can continue to provide for people's cultural, traditional and economic needs. Traditional land use refers to the lifestyle component whereas cultural land use relates to the physical and non-physical spiritual aspects of land use. These spiritual aspects manifest themselves in the strong association with land, including systems of inheritance and responsibility for land as well as in the sacred sites and areas of cultural importance (McNee et al. 1993, p. 102). The Aboriginal perception of the environment varies greatly from the Anglo-Australian one. While the European philosophy considers land belonging to people, Aboriginal perspective views people belonging to the land and being part of it. There is a spiritual, ecological, economic and social connection between the land and its people. For

Aboriginal people their land and water reinforce who they are and provide the basis for their knowledge and their very survival as people. They are convinced that living things cannot be separated from the land, and that the peoples knowledge and practices cannot be separated from their culture and their living on the land. When uprooted from their lands, Indigenous peoples are often also disconnected from their cultures and their traditional ecological knowledge (Christie 1996, p. 65). The strong connection and feelings for the country are expressed in ethics of care and custodianship. Cultural land management involves performing ceremonies, visiting sites and monitoring consumption taboos as well as kinship and community rules (Sutherland and Muir 2001, p. 25). Research on economic land use and resource utilisation demonstrated that Aboriginal people around floodplains and riverine habitats of the Alligator River region to the west of the plateau had an abundance of resources compared to the populations on the plateau, which was reflected in a far lower population density (Garde et al. 2010, p. 92). Although the importance of bush foods in the diet of Aboriginal people today is less studied, some surveys indicate that Aboriginal people are still highly dependent on particular wild animals and plants for food and income. A study of the Kunwinjku people has shown that mammals make up to 91 per cent of their energy intake. Given the importance of kangaroos as a food source, it is not surprising that they have a strong cultural and mythological significance (Telfer and Garde 2006, p. 382). The opening up of communities to the broader market has not destroyed foraging and hunting per se, as it still provides people with satisfaction which is partly related to food production. This can be found where the knowledge is purely maintained. However, the incorporation of new technologies and cash have also increased Aboriginal consumption and therefore also their responsibility for environmental impacts.

4.2.3 Current Situation: Infrastructure and Services

The disadvantaged socio-economic position of Indigenous Australians is well known. In the Council of Australian Governments' 2007 Overcoming Indigenous Disadvantages: Key Indicators (OID) report, it was pointed out that Indigenous Australians suffer from lower life expectancies, higher infant mortality rates, lower rates of education, employment, and homeownership, as well as from higher rates of imprisonment and chronic disease. Many Indigenous communities, especially those in remote areas, have restricted access to information as well as to education and health care services. There are hardly any employment opportunities and cash income comes mainly from the Australian Department

of Social Security. Many Aboriginal people suffer under social problems like alcohol abuse, violence, crime, and poor community health. Poor health is a sign of weak social vitality and at the same time leads to its continuation. The social problems and demoralisation also influence the social dynamics and traditional learning among young Aboriginal. These factors not only have a negative impact on local communities, but also disrupt resource management as well as traditional practices and responsibilities (Sutherland and Muir 2001, p. 26; Rose 2001, p. 238). Although the Kabulwarnamyo outstation at the Arnhem Land plateau is a ten hour drive away from Darwin and only accessible via an airstrip in the wet season, this remote family-based outstation is characterised by good social and physical health. This can be due to the partnership between different stakeholders which enabled innovative land management practices such as the WALFA project. In August 2007, the corporation Warddeken Land Management Limited was set up at the Kabulwarnamyo outstation. A main achievement of Warddeken has been the declaration of the land as an Indigenous Protected Area (IPA) in 2009. Through these environmental services and cultural and natural resource management within the IPA, income and jobs for people on the country have been provided. The set up and housing of the camp are also quite distinguishable from other outstations. It has been made of suspended wooden platforms with mosquito dome tents and a tarpaulin roof over the top. Power is supplied by solar panels whereas water comes from rainwater tanks and from the nearby fresh water spring. There is also an office/knowledge centre in the camp which is set up with computers and other technology. Despite these favouring conditions, the outstation is facing many challenges such as getting young people on the ground as they are mainly based in Oenpelli. More detailed information about the study area will be given in the following chapters. This ethnographic background has provided the basis for putting the research question of the significance of TEK for fire management into context.

Figure 4.3 Facilities at the Kabulwarnamyo outstation

5. TRADITIONAL ECOLOGICAL KNOWLEDGE IN WEST ARNHEM LAND FOR FIRE MANAGEMENT

Landscape burning is an essential part of the traditional Australian Aboriginal hunter-gatherer lifestyle and has been used for tens of thousands of years to shape the highly flammable environmental setting "*from one of rare, high-intensity fires to one of frequent, low-intensity ones"* (Jones 1975, p. 26). The majority of the Euro-Australians consider 'bushfires' as destructive and Aboriginal technology as 'simple'. Due to this cultural background it is hardly surprising that early navigators and explorers mentioned fires frequently in their reports as destruction caused by the 'savages'. In this context ecological, social and cultural uses of controlled fire regimes in northern Australia are commonly misinterpreted and compared with the potentially catastrophic fires of temperate southern Australia. Traditional burning differs from natural fires in seasonality, frequency, intensity and control of fires but also has many reasons, from cultural obligations through to hunting and managing resources. It is part of the practical, ritual, and aesthetic concerns that Aborigines have about 'caring for country' (Altman 2007, p. 37). Contemporary, the attitude towards fire management slowly changes and especially government agencies, conservation authorities and scientific research groups have recognised its significance (Nakashima and Roué 2002, p. 5).

In this chapter the knowledge and practice of fire management with its local knowledge, tools and techniques as well as with its complex cultural protocols that structure decisions about who burns, when and where are discussed. It demonstrates that although there have been dramatic changes, Bininj people still burn for different cultural and economic reasons. At the same time, environmental, social and political changes have led to new fire-related challenges, such as the lack of burning in remote areas and a decrease in TEK among younger generations. In the next step, I move away from fire as a tool and the ecological implications of burning, and point out some of the social mechanisms behind this practice as well as the underlying world view and values associated with the burning of country.

5.1 Knowledge: Generation, Accumulation and Transmission of TEK

The heart of a tradition is not its material by-products which are embodiments of the shared ideas of people but rather the great sum of knowledge. This knowledge comprises specificities of the local environment such as: where resources are located, where water can be found, which ecological events signal other ecological events, weather signs and patterns, where the sacred and dangerous places are located, how to address the sentient land and what kind of fires to use in particular land-forms at particular times of day and year. The knowledge of the right burning strategy is therefore grounded on the local knowledge of habitat diversity (Hunn 1993, p. 14; Rose 2001, p. 107).

5.1.1 Generation: Bininj Classification of Landscape and Fire

The contrasts between European and Aboriginal relationships to land and the environment have often been demonstrated. In Australia, fire management is often used as an example to emphasise these differences. According to cognitive geographers the linguistic category of landscape terms is universal in all cultures, however the cognitive schema for how landscapes are referred to and how they are classified can be greatly different. Indigenous classification systems are for example less applicable across taxonomic categories and rarely correspond to scientific systems. In the Bininj system of land classification, the combination of topography, soils, and vegetation is for example used to produce distinctive land units which are inextricably linked with land ownership and religious life. The environmental knowledge and physiographic setting have therefore an influence on the mythological knowledge as well as on the definition of boundaries (Baker 1993, p. 130).

The various Aboriginal names used for species and ecological phenomena show great familiarity and depth of knowledge. In the Arnhem Land plateau over 300 terms for landforms and ecological zones have been recorded. Different Aboriginal groups have developed classifications of those elements of the environment that are of great importance to them whereby the ethnoscientific classifications are not restricted to plants and animals. The terminology may differ by dialect, by village, and even by individual. In this context the distinction between culture-specific and referential meanings in ethnoscience needs also to be considered (Berkes 1999, pp. 42-45; Garde, with et al. 2010, p. 119).

The importance of fire for Aboriginal people is expressed by its extensive classification. The general term for fire in Bininj Kunwok is *kun-rak* what means ‘firewood’ in a domestic use. There are also specialist terms such as *man-wurrk* for ‘bushfire’ or *biblik* for an intensive fire that burns beneath the roots of riverbanks. There are a number of different terms describing the dynamics of *man-wurrk* ‘landscape fire’ which demonstrates its significance for the community (see Figure 5.1). Furthermore, there are sacred terms for fire. As is the case for all vocabulary, there exists a special word for fire which is used when one speaks to affinal kin such as in-laws who are considered to be ‘taboo’. In such situations, the word *kun-rak* would be avoided and the alternative word *kun-mimal* is used (Garde et al. 2010, p. 125).

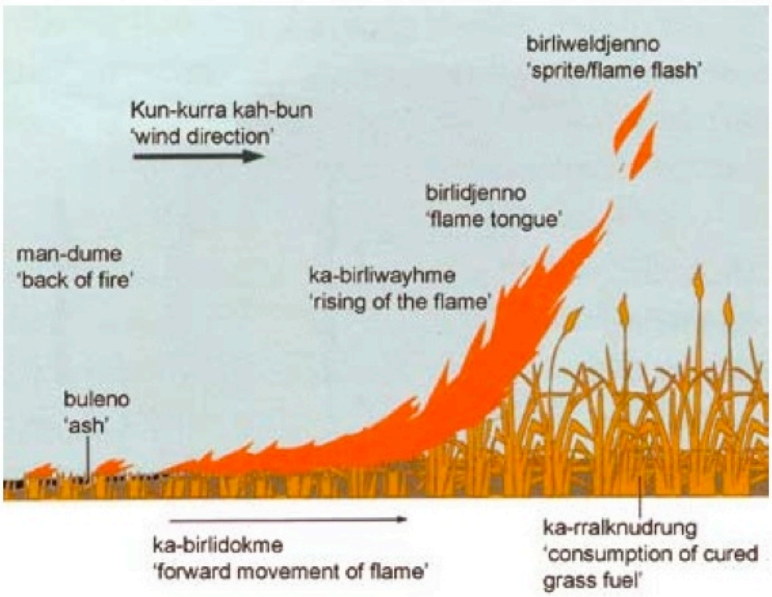

Figure 5.1 Bininj Kunwok terms relating to ‘landscape fire’

The region’s tropical climate is shaped by an intensely seasonal variation between the dry season and the wet season. However it is an Eurocentric view to consider that there are only two seasons. The Bininj distinguish between six seasons, which differ from one another by changes in weather and behaviour of the biota. Three of these seasons make up the wet season: first, a season of pre-monsoon storms, followed by the monsoon period; and finally a period of storms. The dry period in contrast starts with a cool, humid season, followed by a cold weather season and finally a time of hot, dry weather. The name *wurrkeng* for the peak burning season is derived from the name *wurrk* what means ‘bushfire’. This name demonstrates the relationship between seasonality and frequency of fire (Garde et al. 2010, p. 110; Nakashima and Roué 2002, p. 5).

Wind plays an important role as a seasonal marker for the Bininj people. This can be seen from the many different names (see Figure 5.2) and the emphasis of the traditional owner Jimmy Kalarriya given to it.

> "*It keeps blowing like that and then in the wet season it changes direction and we see the korlkkorlmi winds that make the thunder. The wularri wind cuts down the grass for the magpie geese. Wularri blows from the west. Then they lay eggs. That wularri wind. That's what that wind is called. That big wind from the west we call it wularri*" (Garde et al. 2010, p. 94).

<table>
<tr><th colspan="3">Dry seasons</th><th colspan="3">Wet seasons</th></tr>
<tr><td>Yekke</td><td>Wurrkeng</td><td>Kurrung,
Djurlirrmi</td><td>Kunumeleng</td><td>Kudjewk</td><td>Bangkerreng</td></tr>
<tr><td>early dry season</td><td>cool dry season
wurrk fire > season of fire</td><td>hot dry, build-up season
literally:
Ku- LOCative
dung 'sun'
Djurlirrmi is mid-kurrung when humidity and temperatures are both very high.</td><td>first storms of the monsoon</td><td>full wet season
Ku- LOCative
djewk rain</td><td>last rains knockemdowns
bang strong, powerful.</td></tr>
<tr><td colspan="6">Seasonal wind names</td></tr>
<tr><td colspan="3">Dalukorro
strong dry season winds from the east, especially in the mornings.</td><td>Walirr
hot south-east winds in kurrung season.</td><td></td><td colspan="2">Kularri (variant=Wularri)
strong westerly winds associated with magpie geese egg laying.</td></tr>
<tr><td rowspan="3"></td><td colspan="3" rowspan="2">Lidjalidja
late dry season winds which have moved from easterly to southerly.</td><td colspan="2">Korlkkorlmi
westerly winds which bring thunder storms and the rush of cool air just before a thunder storm.
Niyaniya
southerly winds that swing from the south >west and then from the north.</td><td>Nakul
'knockemdown storms' which lay down the tall stands of sorghum spear grass.</td></tr>
<tr><td colspan="3">Barlmarradja general westerly wet season wind.</td></tr>
<tr><td>Kun-mayorrk
gentle south-east winds. This word is also a general term for 'wind' in some dialects.</td><td>Mahbilil
evening kurrung season winds from the coast. Also known closer to the coast as Barra 'northerly/north-west winds' just starting at the end of kurrung (Makassarese loan word).</td><td>Barra
northerly/ north-west winds continue from kurrung to kunumeleng.</td><td>Makkumbu
westerly winds associated with extended periods of rain. (variant= Nakkumbu)</td><td rowspan="2"></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Djimurru
a wet season north-easterly wind (Makassarese loan word).</td></tr>
</table>

Figure 5.2 Bininj Kunwok names for the seasons and winds

5.1.2 Mechanisms for the Accumulation and Transmission of TEK

The management, control and transmission of knowledge in Indigenous societies rests upon strict codes of conduct which define who has the right to know what, and how knowledge has to be passed on from generation to generation. Although specialised knowledge is often held by particular groups or individuals, the body of a people's knowledge is shared collectively, and intergenerationally. Such as land, knowledge is maintained for the benefit of the community and for future generations (Dodson 1996, p. 32). However nowadays with the increasing extinction of local traditions through drastic cultural change, sharing TEK becomes more and more important as it ensures its survival. The way of intergenerational knowledge transmission is rooted in social systems. TEK may be passed on from person to person, as has happened for generations, whereby the medium of its transmission is mainly linguistic which is why the study of traditional ecological knowledge requires knowledge of the native language. Transmission is however not only oral, but also happens in the practical context of doing. Among the Bininj, successful transmission of bush skills and knowledge is defined by the time spent on the land (Hunn 1993, p. 14). Young people's first experiences with fire are with adults who show them that fire has a deeper meaning than just for cooking and hunting. They see fires in the landscape (*manwurrk*) as well as in the family living area (*kunrak*) and start making their own little campfires at an early age. This learning by experience and experimentation is always followed by the watchful eye of adults or older children. As they attend ceremonies, they learn to respect sacred fires which are crucial for most ceremonies (Yibarbuk and Cooke 2001). Another form of social mechanism refers to the cultural internalisation, which involves rituals, ceremonies**,** and other traditions which will be described in a later section.

5.2 Practice: TEK in Fire Management

In this section, the practice of fire management with its tools and techniques and the knowledge of when to burn are explored. In this context the forms of control and proprietary rights, which are involved in the use of fire are considered. This is a topic of great significance for the people concerned, since it could have an impact over competing or shared rights to land and land use practices. Finally the different reasons and purposes for burning are summarised.

5.2.1 Aboriginal Burning Practices: Functional Relationships

Most fires in Australia start through wanted and unwanted human ignition and some may be caused by lightning associated with the onset of monsoonal conditions. In general it should be considered that there are geographical and cultural differences in burning practices across northern Australia. The fundamental knowledge and practice may be the same but there are still differences and this is what non-Aboriginal people need to understand. In this thesis fire management will refer to the burning practices of the Bininj people in West Arnhem Land.

5.2.1.1 Implementation of Burning: People Involved

Burning is not done by just one clan. Towards the end of the wet season when the country is drying out and movement through the country gets easier, people start coming together to talk about the burning of the country and to approach the 'right' people such as the *djungkay* to ask for permission to burn. The *djungkay*, or ceremonial managers have the right to burn country, or to allow others to burn for them. Neighbouring groups also need to be involved to avoid difficulties, as fire does not respect boundaries. This can sometimes be difficult, especially when estates are unoccupied for extended periods. The rights to burn and to hunt on burnt country are still strictly guarded. In other words the burning of country requires knowledge not only in regards to when and how to burn, but also in relation to who will burn, hunt and gather (Bradley 1995, p. 30). Both men and women carry out burning while men move faster and over greater distances, women gather the resources from burned areas. Bardayal Nadjamerrek noted that

> *"(...) women came behind (when travelling) burning as they went and following the burnt patches the men had made ahead of them. They used to say 'Follow the burnt patches!' Women and men, old and young (burning), that's what happened in yekke 'early dry'"* (Garde et al. 2010, p. 107).

Women also burn around billabongs and water holes in order to find turtles. Young boys and girls also take part in seasonal burning on flood plains to help in the hunt for goannas, snakes, wallabies and freshwater turtles. The dangerous fire drives for kangaroos, wallabies and emus are however only conducted by men (Yibarbuk and Cooke 2001).

5.2.1.2 Patterns of Burning: Knowledge When to Burn

Patterns of burning mean that particular areas are burnt at different times, varying from habitat to habitat and depending on rainfall patterns, vegetation, soils and topography. The major differences lie in the scale, frequency, intensity and length of the burning period. For example, the escarpments and rocky outliers are in contrast to the eucalypt woodlands, much more irregularly burned. These differences in burning are important for the food chain as it has an impact on the productivity and diversity of plants and animals. For instance, areas that are burnt early provide early hunting and foraging for human and animal life (Lewis 1993, p. 21). This shows that Aboriginal burning is not done randomly but rather with precise control.

> *"This is not a random business, it is well organised, and is carried out by men as a communal enterprise, although in a restricted and controlled manner with 'drives' for kangaroos, wallabies and other game. The actual burning of grass is directed by the old men of the clan, or by others who have an hereditary right"* (Thomson 1949, pp. 16-17).

An important aspect for the control of fire is that there are places which must not be burned. These places house species which do not easily regenerate after fire or where spiritual beings are supposed to reside. The knowledge of when to burn particular areas is derived from observation and from a number of seasonal indicators such as the strengthening of the winds, the swarming of dragonflies, the blossoming of certain plants, the arrival of particular animals or the condition of fuels. Dragonflies for example are regarded as a calendar insect, indicating the end of the rains. These seasonal 'events' form the 'divisions' of the biological calendar, or in other words the country tells when and where to burn (Lewis 1993, p. 20).

A key element of traditional burning is to carry out burning consistently throughout the dry season. Burning starts as soon as the grass will catch fire. In *yekke*, the early dry season, grassy fuel is still moist, temperatures are cooler and winds are still light, meaning that fires that do occur are usually patchy and go out at night. This 'slow burn' is used to protect areas of significance and to create fire breaks. The important thing of this 'colder burn' is to be able to control and put out the fire if needed. The peak burning period is during the relatively cooler 'winter' days, around June-July, which is named *wurrkeng* by Gunwinggu-speaking people. At this time of the year the overnight minimum temperature can reach as low as 4°C on the plateau. Fires that are pushed by strong winds do not cause severe

damage to grasses, plants and trees as the effects are like passing your hands quickly through a flame. The hot fires are also required for certain seeds to regenerate. At *kurrung* (August), the hottest and most humid time of the year, large macropod fire drives are carried out. These hot fire drives are conducted to injure large kangaroos. Through the burning of small areas the amount of fuel has been reduced and patches of burned and unburned country emerge. This praxis of creating burned breaks helps to prevent high frequencies of large, late dry season wildfires which occur from August onwards until the start of the wet season in December (Garde et al. 2010, p. 113).

In areas that have been unmanaged for an extended period, Aborigines will make fires that may result in conflagrations and are seen in the Western view as ‘great devastation’. However, this is not done to destroy the habitat but rather to ‘make it right’ and to renew and restore the habitats to conditions which are more easily and effectively managed. These so called corrective fires can be conducted at any time during the year, though the best time is after mid-August as the intense fires have the maximum effect for ‘cleaning’ the country. Further delay in burning the country makes according to Aboriginal people the situation even worse. Aboriginal people are aware of the impact from corrective burning and the generated temporary and seasonal setbacks, but for them the problem is the absence of burning and that there have not been enough low intensity fires in previous years.

> *“What are aesthetically unpleasing, impractical, and undesirable for Aborigines are over-aged forests, largely unproductive stands of vegetation, 'dirty' with build-ups of ground litter and understory growth, resulting in what some Aborigines called 'rubbish country'“ (Lewis 1993, p. 22).*

When fires are set after mid-August, plants hardly ever recover until the onset of the wet season. By March and April, however, these forests often look the same as those burned in the early dry season, which shows, that a number of Australian plants belong to the most fire-tolerant plants in the world (Lewis 1993, p. 22).

5.2.1.3 Purposes of Aboriginal Burning

Burning by Aboriginal people was and is done for a number of different reasons. It is not only connected to their domestic, social and ritualistic life but also offers different opportunities for hunting and collecting food. Hunting is nowadays done by stalking and shooting instead of spearing. In areas with short grass for example, small game is hunt by

walking with the advancing flames and a few days after burning, goannas and other lizards are tracked down through the trails on the ashy surface. A couple of weeks after the burning, the fresh green grass attracts kangaroos, bush turkeys and other game. Aboriginal use therefore fire to attract kangaroos and to maintain kangaroo population. Another hunting technique are the ritually important kangaroo fire drives which are held at *yekke*. While the first two hunting practices are mainly carried out by women, the last one is dominated by men. A variety of reasons for Aboriginal burning found in literature as well as contributed by Dean Yibarbuk and Lofty Bardayal Nadjamerrek is summarised in Figure 5.3 (Braithwaite 1995, p. 99; Garde et al. 2010, p. 124).

Figure 5.3 A summary of landscape burning purposes

Purpose	Description
Control of landscape	Reducing fuel and creating fire breaks through a mosaic of patchily burnt country in order to avoid destructive late dry-season. These fire breaks are important for the protection of the environment and the sacred sites.
Resource management	Burning in order • to protect resources such as fruit trees from hot late-dry season fires • to protect the important food resources of the less fire tolerant monsoon forest areas or 'jungles' (yams, flying foxes, honey and palm tree meristems) • to improve the abundance of certain species and creating green pick encouragement • to improve the efficiency of hunting for kangaroos as well as of harvesting, such as tuber collecting, finding ground hives of native honey bees, exposing the breathing holes of long neck turtles, ...
Communication	Using the smoke to signal messages to others.
Protection	Burning to clear living spaces and camp sites. This makes it easier to recognise dangerous animals, such as snakes, centipedes, scorpions and other enemies.
Rituals	Smoke and fire are essential cleansing and protecting agents from evil spirits used in a variety of rituals. Some aspects of ritual use of fire give information about Aboriginal attitudes to hot late-dry-season fires.
TEK	Education and the demonstration of status and skills

5.2.2 Legal Rights for Aboriginal Burning

In the analysis of traditional ecological knowledge for resource management, attention is also given to the legal and institutional status for Aboriginal burning. In this chapter, the effects of government legislation, particularly the Bushfires Act 1980 (NT), the Aboriginal Land Rights (NT) Act 1976 as well as the Native Title Act on Aboriginal burning practice are reviewed. The Aboriginal law and local social norms for fire management with their rights of access to certain resources and rights to custodianship of certain knowledge are already described in the previous chapters.

Outside urban areas in the Northern Territory, fire management applies according to the Bushfires Act 1980 (NT). However as already mentioned, rights to use Aboriginal land in accordance with tradition are ensured through the Land Rights Act as well as through the Native Title Act. Aboriginal land use in the form of burning practices is therefore protected under law if the burning practices occur in accordance with tradition. As a result of this, pastoral leases in the Northern Territory have to follow 'a reservation in favour of Aboriginal people', permitting them to hunt and gather for ceremonial reasons. Burning the land is allowed under the reservation as a way to hunt. The Bushfires Act applies therefore under certain conditions on Aboriginal land tenures but nevertheless has an impact on it (Hughes 1995, p. 45). Landowners are allowed to burn their land except (a) on fire ban days, (b) in fire protection zones and (c) in fire danger areas. The declaration of fire danger periods has probably the most adverse impacts on Aboriginal landowners, as it means they need to apply for a permit every time they want to burn. This makes it difficult in particular for people living on outstations and away from towns. When Aboriginal land is stated as a fire protection zone or fire danger area under the Bushfires Act, then a number of restrictions apply concerning the use of fire. This would be however in direct contradiction with the Land Rights Act (Head and Hughes 1996, p. 284). Although native title holders are protected from most of the restrictions of the Bushfires Act, it does not mean that the Bushfires Act has no application at all. Given the legal reality and the fact that 87 per cent of the Northern Territory is under pastoral or Aboriginal land tenure, it is surprising that Aboriginal people have hardly any involvement in fire management decision-making at regional or Territory levels. For instance, Aboriginal people are not represented in the Bushfire Council (Hughes 1995, p. 50). Considering the interplay of Commonwealth and Territory law with regards to Aboriginal burning practices on different land tenures, it is obvious that those land management practices stand under considerable legal protection.

Despite this legal protection, many Aboriginal people share the opinion that they no longer have rights to burn land and stopped burning in the past because 'whitefellas said it was bad' and that they would be fined for 'setting fires'. This opinion could also be due to the message communicated by Bushfires Council road signs which say: *No lighting of fires during fire danger periods. Penalty $1000 or 6 months imprisonment*. This also shows that the Bushfires Act speaks only of the aim to 'prevent' and 'control' fire, but not about the options of using fire actively in the landscape. (Head and Hughes 1996, p. 281; Cooke 1999, p. 106).

5.2.3 TEK and Aboriginal Burning Practices Today

In many parts of the world local knowledge no longer exists due to further colonisation and the resulting intense competition for resources and land which led to reduced Aboriginal populations, resettlement and to environmental change. In the places where Indigenous traditions are still in practice, people have limited possibilities for dealing with contemporary resource management problems. In Australia, the main challenges could be due to the high Indigenous population growth in recent decades, the transformation of the production systems as well as to the competition with other users, such as National Parks, timber and mining interests, pastoralism and tourism. In other words the correlation between the three variables of environment/resources, population and technology, which are influenced both internally and externally, plays an important role for the continuation of TEK and for the future interactions with the environment (Head 1993, pp. 66-68).

5.2.3.1 Environmental and Resource Use Change

Today, Indigenous people are continually regaining their rights to manage their lands. However, they are increasingly confronted with European-induced environmental degradation caused by decades of misuse and exploitation as well as by introduced animals and weeds. For example the introduction of the highly invasive, flammable plants like gamba grass, para grass and mission grass have the potential to transform fire regimes due to an increased fuel load and fire intensity (Russell-Smith 2001, p. 22). Bininj people are most aware of environmental changes that have an impact on the resources they hunt and gather. Cattle as well as the introduced feral Asian Water Buffalo significantly contributed to the environmental change. They are not only causing a drastic landscape damage through

subsequent erosion but are also responsible for lagoons no longer lasting through to the next wet season. Due to this environmental change, Indigenous knowledge and traditional burning regimes are alone insufficient in dealing with the new circumstances. This demonstrates the importance of synergies between government agencies, scientists and Indigenous people in order to explore new ways for contemporary land management practices (Baker et al. 2001, p. 5; Baker 1993, p. 134).

5.2.3.2 Changes in Settlement, Behaviour and Knowledge

Today fire is not being well managed. The underlying reason is the change in people's activities, settlement patterns and the loss of knowledge. Effects have varied greatly across northern Australia and as mentioned earlier, the change in customary lifestyles and practices has been comparatively recent in West Arnhem Land. The introduction of pastoralism in the 1850s did not necessarily mean the complete discontinuation of customary practices as the work at cattle stations also included the use of fire to provide 'green pick' for cattle. Such a convergence undoubtedly reflects a knowledge and technological transfer (Whitehead et al. 2003, p. 416). The contact-induced redistribution of Aboriginal people in centralised settlements has had an effect on the use of fire as people are no longer at the right place at the right time to conduct customary burning and are not longer dependent on burning for food gathering (Haynes 1991, p. 63). The Australian Government is additionally enforcing this trend by encouraging Aboriginal people to move into centralised settlements. This course of action is primarily based on the advantages of providing services and administering Aboriginal people, but may also be due to an interest in developing vacant land. The view that Aboriginal people have an unhealthy and under-fed life out in the bush is also used to justify these policy trends (Baker 1993, pp. 134-136). The changed economic activity has led to changes in customs, lifestyles and culture. These changes in Aboriginal culture are often used as an argument to question the efficiency of Aboriginal fire management. Nowadays many young people ignite fires anywhere without respecting the Aboriginal law and culture. Due to this dispersal and loss of knowledge, it is also difficult to figure out the right people who need to be involved and to co-operate with neighbouring clans when the estates are unoccupied for extended periods. Furthermore it is difficult for individuals and family groups to re-establish full customary control over the use of fire, if their neighbours are not motivated and equipped to conduct active management of their adjoining estates (Whitehead et al. 2003, p. 419; Yibarbuk 2001).

5.2.3.3 *Changing Technology and Collaboration*

Further changes include the burning of areas by non-Aboriginal people, the alteration in the pattern of fires because of roads and settlements and the use of vehicles. Extending active and intense fire management to sites which are far away from dwellings is quite difficult as it often requires highly mobile and lightly equipped individuals who walk long distances through rough terrain. This is probably not a realistic approach, however elements of it need to be part of a larger solution. It shows that support and incentives of various kinds, such as vehicles are necessary in order to achieve reasonable outcomes. The available financial resources for fire management in Arnhem Land as well as the challenges and difficulties which go along with it will be discussed in more detail in the following chapter (Whitehead et al. 2003, p. 420).

Aboriginal burning is often rejected and misunderstood by pastoralists. This is mainly due to the different purposes of fire management. While Aboriginal people burn to promote a suite of resources, pastoral burning is only focussed on encouraging grass for cattle. Furthermore the wider set of cultural and linguistic barriers and the deep-seated racism which can be predominant in rural localities needs to be considered. In recent years the degree of conflicts with pastoral burning regimes has often changed depending on the pastoral managers involved (Lewis 1993, p. 20). Despite the differing attitudes, scientists, many pastoralists and the Bushfires Council have recognised the importance of fire in environmental management. In particular the Commonwealth Science and Industrial Research Organization (CSIRO) and the Conservation Commission of the Northern Territory (CCNT) are involved in research about the effects and uses of controlled burning. Although there exist discrepancies about how and when fire should be used, the basis for potential co-operation is given. Considering the lack of personal financial resources of landowners, it is important to establish a strong partnership and collaboration between a variety of stakeholders such as Aboriginal organisations, business interests and scientists (Head and Hughes 1996, p. 287).

5.3 Belief: Values and Attitudes towards Fire Management

Traditional knowledge contains values and beliefs which not only provide the basis for understanding the world but also guide the use of this knowledge. This makes up the knowledge-practice-belief complex. Fire is as integral to the mental as it is to the material existence of Aboriginal people. It is not only an accompaniment to rituals but also an object of ceremony and a routine participant in the mythological life of the Dreamtime. It divides the human world from the nonhuman, but at the same time bridges the mental world with the material as spiritual invention often depends on heat and light. The possession of fire represents both extraordinary power and an exceptional danger which is why its proper usage needs to be defined and explained. The knowledge and experience are recorded in stories, songs, ceremonies, paintings and rituals. Burning land is therefore not just fire, smoke and burned vegetation, but involves people who are interpreting their place within their environment (Pyne 1991, p. 105). This section gives an account of Aboriginal attitudes towards fire management as well as the importance of fire in the mythical and ritual life.

5.3.1 Aboriginal Attitudes towards Fire Management

Fire is for Aboriginal people not only a tool, but is also linked to events associated with the past and the future. It is an expression to demonstrate continued links between people and their country. The right way of burning is a key responsibility for Aboriginal landowners and managers, and also a powerful expression of identity and cultural continuity. Country that has not been burned for a while is seen as being ‘shut up’ by the ‘old people’ who are angered by the living people who have been careless in their social responsibility towards the country. There is the belief that living people are becoming ‘weak’ if the country is not looked after in a proper way and if particular sacred sites are not protected. The relationship between Aboriginal people and the land is reciprocal: you take care of the country and the country will look after you. Smoke and fire are therefore a sign that the land is still utilised and looked after, it shows that there are people moving around and that they keep up the integrity of the landscape (Bradley 1995, pp. 26-28; Head and Hughes 1996, p. 278).

> “*The secret of fire in our traditional knowledge is that it is a thing that brings the land alive again. So we do not necessarily see fire as bad and destructive - it can be a good thing and bring the country back to life. But it is not a thing to play with unless people understand the nature of fire*” (Yibarbuk and Cooke 2001b).

For sacred sites areas very hard-edged decisions are made to prevent the fires burning into those places as they not only contain important food sources for people, animals and sacred beings but also have a cultural significance as *kunredkuken* 'traditional ancestral camping sites' (Yibarbuk and Cooke 2001, p. 34). The importance of the care was also emphasised by Bardayal Nadjamerrek:

> *"We would watch over the fire until it died down and then (we would say) 'Tomorrow maybe we'll light it again, ... when we get up (in the morning)'"* (Garde et al. 2010, p. 148).

New land uses not only change the landscape in radical ways but also involve people who are not the traditional owners. This is seen to be wrong, as these people are considered to lack the sensitivity required to do it in a way which will not upset the spirits inhabiting the landscape and the living people responsible for the country (Bradley 1995, p. 28).

> *"People are saying that the right people should be on their country looking after it to protect it from wild fires"* (Dean Yibarbuk; Field trip 2009, 29. June - 04. July).

The burning of country also provides continuity with the people who have died, as the spirits of these people still inhabit the landscapes. In traditional fire management the country that was burnt was left for several days so the spirits of the ancestors could hunt first. Yanyuwa people of Borroloola for example believe that when the 'new' spirit is getting closer to the spirit land it gets attacked by a number of crows who try to kill the spirit by hacking it into many pieces. But the spirit is defended by the hawks and falcons, the 'followers of the fires over country', who are calling out, '*Leave that spirit, when it was a living person, it burnt the country for us, it enabled us to eat*' (Bradley 1995, pp. 26-28).

5.3.2 Mythic Fire

Aboriginal mythology serves to explain the creation out of the Dreamtime, to legitimate contemporary beliefs and behaviours, and to vitalise the important rites of passage in the life of individual Aborigines. In this context fire plays a significant role and establishes important symbolic relationships. For example, the stories of creation are almost always retold or re-enacted around a fire and narrators mainly use fire to get back to the Dreamtime in order to communicate with the spirit world. There are many stories about fire, the stealing of fire and the first use of fire. In Arnhem Land, a version of the story tells that the women were the owners of fire before it got stolen by their sons, who became crocodiles. They did not want to share it and wanted to keep it for themselves until it was stolen by the

rainbow bird who put fire everywhere. At the end, the rainbow bird put the sticks of fire in his behind. The identification of fire with birds is one of the most interesting motifs among the fire myths. In some cases, fire is used to explain the unusual plumage of birds but the major raptors such as eagles and kites and sometimes crows are considered themselves as fire preservers and fire users. They are often presented as users, captors or as rescuer of fire from some sinister creature that wants to extinguish it. This image clearly derives from the frequent appearance of such raptors at savanna fires. According to Aboriginal people not only people but also raptors, in particular *karrkanj* the brown falcon, light fires by picking up a smouldering stick and dropping it on unburned land (see Figure 5.6). This connection of brown falcons and fire is also celebrated in rituals such as the hollow log ossuary ceremony known as *lorrkon*. For a couple of nights, sacred songs accompanied by boomerangs are sung in the middle of the camp. When the men leave the camp to go to a sacred and restricted location, they line up and imitate the brown falcon in song and ritual. In many origin myths, the fire is owned by a creature who does not deserve it and who does not want to share it such as a lizard, a crocodile or another aquatic dweller. Through the cleverness of his rival the fire hoarder loses the fire. The stories not only re-establish the proper relationship between human and non-human, but also between fire and water. The reliance on crocodiles and a division of the world into wet and dry also has close affiliations with the Australian tropics. Those myths demonstrate the proper use of fire by shaping fire practices around waterholes, campsites, hunting grounds, and along the tracks of the Dreamtime. Fire brings power and if not properly used or shared, it will be removed from its possessor and given to others (Pyne 1991, pp. 107-108; Garde et al. 2010, p. 145)

5.3.3 Ritual Fire

Rituals not only re-enact the actions of ancient beings, but also somehow recreate them. The past is brought into the present and the people are getting connected with their land and their symbols. Rituals also reinforce rules through reminding people and through interpreting signals from ecosystem change (Berkes et al. 2000, p. 1258). Fire is a crucial component in nearly every rite and is often a practical necessity for providing heat and light. The principal colours used for ritual decoration resemble the colours of fire - white (ash), ochre (flame), and black (charcoal) (Pyne 1991, p. 114). In the following section different ceremonies and rituals are presented which enforce the transmission of TEK in the context of fire use.

5.3.3.1 Rite De Passage: Initiation

Initiation starts at birth. Often a woman in labour would position herself over a small fire to encourage birthing. After birth she would hold the baby over a fire, so the smoke can dry the mucous membrane and seal into the body the life spirit. Similar rites of purification are used at other important life passages in order to express a rebirth into a new status. This is for example the case in a young man's initiation including circumcision. After the ritual cutting, the young man will stand over a fire to progress the healing not only learn the sacred songs and totems, such as the bushfire song and the fire totem but are also not allowed to take firesticks from a fire where his sisters are sitting. This avoidance behaviour is strictly pursued for many years. Fire is also an important purifier and protector from evil spirits that search for souls at night and invest the living with illness and death. Death finishes the ritual cycle. The function of the funeral fire is to divide the living and the dead. Fire is used to drive away the lingering spirit of the deceased and stops its reinvasion of the body (Pyne 1991, pp.114-116; Yibarbuk 1998, p. 3).

5.3.3.2 Fire Drives

The ritually important fire drives are conducted at the hottest and driest time of the year and involve a significant danger, as sometimes people are burnt to death. The fire drives are mainly used for hunting kangaroo species that live on the plains or rocks in order to drive them towards waiting hunters. These kind of hunts were restricted to specific places and used to happen every year, but nowadays they are relatively uncommon events (Yibarbuk and Cooke 2001, p. 34; Telfer and Garde 2006, p. 396). The use of fires in hunting kangaroos was a strictly controlled territorial right. It was important that the fire drive areas were unburned until the hunt was carried out. Conflicts could arise if somebody burns a hunting ground without appropriate customary law rights. Mick Kubarkku notes in this context

> "*They used to be strong in defending their control over their fire drives. (...) If they burnt off someone else's place they'd spear each other and have to give meat to the people whose land they burned*" (Bowman et al. 2001, p. 68).

The fire drives required considerable planning and discussion with strict protocols regulated by the kinship system. An invitation for a fire drive was done by sending a torch, to the neighbours. Many ritual restrictions had to be followed when staying in the

preparation camp. All spears in the camp had to be laid down flat on the ground otherwise kangaroos would sense their presence and run away. Bardayal Nadjamerrek commented:

> *"If we were to put the spears upright in the camp, then the mind of the kangaroo would be alerted because yirridjdja moiety kangaroos are like humans. Those kangaroos know everything about our intentions and can think 'Oh I fell energy welling up in my body, there must be humans coming'. (...) those yirridjdja moiety kangaroos are associated with the Ubarr and the Lorrkkon ceremonies and have supernatural power. (...) But the duwa moiety kangaroos, our moiety, they are not powerful like that. Yirridjdja moiety kangaroos are like 'clever man', like human witch doctors."* (Garde et al. 2010, p. 131)

Special ceremonies and associated dances and songs would be conducted during the fire drives in order to guarantee the success of the hunt. Mick Kubarkku mentioned

> "*Yes, they had those special songs for fire. Each species of kangaroo had one, such as antilopine kangaroo and the black wallaroo.*" (Bowman et al. 2001, p. 67)

After the hunt, the game was ritually purified by the use of smoke so that women and children could eat it. This was important, as the fire-drive is itself considered as sacred, which was first enacted by the major creative beings of that area (Yibarbuk 1998, p. 5).

5.3.3.3 Sacred Fires and the Honey Ritual

Sacred fires are located between the ceremony grounds where children and women stay and the more spiritually dangerous ceremony areas where only senior initiated men will be. The male ceremonial managers or *djungkay* control how these fires are looked after, whereas senior female *djunkay* are responsible for keeping the fires going and that the preparation of sacred food in them is carried out according to the rules. At the end of the ceremonies, these fires need to be left alone (Yibarbuk 1998, p. 3).

In the Ankung Djang 'honey dreaming' estate of Bardayal Nadjamerrek exists a 'Nabiwo honey sacred site'[2] which is marked by a small rock of some 30 cm in height. A honey increase ritual is conducted here every year in order to make sure that there will be plenty of honey and to protect the honey hives from destructive hot late-dry-season fires. The

[2] *Nabiwo* stands for a variety of native stingless honey bee. The native stingless bee holds an important place in the religious, ceremonial and daily life of Aboriginal people in northern Australia.

ritual includes clearing the ground around the *nabiwo* stone by circling and sleeping around the fire until it had died down. The aim is to make sure that the fire will burn at a low intensity. Mary Kolkkiwarra emphasised that for this ritual it is important that the right people are involved

> *"Kabbindi don't you be shy, you are the right person to do this, you are the ritual boss from the correct moiety. Clean it up there, just push all of the debris out of the way. (...) There's more 'correct people' (ritual bosses) here. You two (boys) clean up this area here so that we leave it clean. Come on quick"* (Garde et al. 2010, p. 143).

This linkage of ownership, knowledge and mythology is important to consider in order to understand why ceremony and land are crucial factors in shaping both the past and the present of Bininj life.

This chapter has given an overview of the relationship between TEK and traditional fire management in the west Arnhem Land plateau. Firstly, Aboriginal landscape burning is based on a knowledge system that includes detailed information about plant and animal ecology, animal behaviour, fire behaviour and climate. Secondly, fire management is carried out to obtain specific ecological objectives. It is used to change the landscape in order to make resources more accessible and abundant. Lastly, Aboriginal burning is strongly intertwined with the world view and belief system of the Bininj people. European settlement, economic development and political implications have indeed changed the relationships between Aboriginal people and their environment due to demographical, technical, geographical, socio-political and educational developments. TEK and traditional practices however still have an important role which can be seen in the growing significance of TEK for conservation as well as in the increasing co-operation between Aboriginal people, scientists and other stakeholders in the field of fire management. The social, cultural and economic implications of TEK for fire management will be addressed in more detail in the following chapter which focuses on the WALFA project and how through land/fire management programmes and Aboriginal engagement, the livelihood outcomes in remote areas can be improved.

Figure 5.4 Arnhem Land plateau - *kuwarddewardde*, 'the rock country'

Figure 5.5 Tropical savanna landscape

Figure 5.6 *Karrkanj* the brown falcon is dropping a fire stick. Painting by Billy Yalawanga

Figure 5.7 - Rock art at the Arnhem Land plateau

Figure 5.8 Asian water buffalo and little corella

Figure 5.9 Fire management - Late dry-season fires at the Arnhem Land plateau

Figure 5.10 Landscape after prescribed burning


Figure 5.11 Introducing the visitors of the Aboriginal ranger and science field trip to the country


Figure 5.12 Aboriginal ranger and science field trip at the Arnhem Land plateau


Figure 5.13 Scientific measurement in the WALFA project

6. ABORIGINAL LIVELIHOODS IN NATURAL RESOURCE MANAGEMENT: THE WALFA PROJECT

If the last 30 years have been characterised by the land rights policies, the next 30 years will be the era of land and resource management challenges. This chapter explores in the first part alternative development possibilities in the context of natural and cultural resource management for Indigenous Australians living and working in rural and remote Indigenous communities in the Northern Territory. Natural resource management (NRM) is an important key sector for economic development as it has the potential to provide significant environmental, economic and social outcomes at the local, regional and national levels. This potential will be explored in the second part of this chapter based on the West Arnhem Land Fire Abatement (WALFA) project which has been one of the first NRM projects in a carbon trading context that pays Indigenous land managers for offsetting greenhouse gas emissions through improved fire management. In order to examine the relationship between NRM, traditional ecological knowledge and sustainable livelihood outcomes, an adapted social impact assessment is used. The assessment process is divided into three main stages whereby the first stage delivers a comprehensive profile of the socio-economic environment of the project area in order to determine the impacts of the project. Therefore mainly existing information sources about lifestyles, attitudes, social organisation, population distribution, land use and tenure, and an economic and employment profile were used. These factors and an extensive profile of the Aboriginal people involved in the project area have already been presented in more detail in the previous chapters. In the second stage, the implementation and design of the WALFA project with its intended objectives are presented. In this context also the interactions of stakeholders as well as the roles of the Commonwealth, Northern Territory and local government agencies in relation to NRM are described. In the final stage an analysis of the project outcomes is carried out.

6.1 Alternative Economic Development on the Indigenous Estate

Before going into alternative economic development options on the Indigenous estate, a short review of the history and policy context of Indigenous socio-economic change is given. The ongoing low labour market status of Indigenous Australians is due to historical, locational and cultural factors. The exclusion from the mainstream provisions of the

Australian state until the late 1960s as well as living predominantly in remote areas with a less developed labour market and less employment opportunities has influenced the socio-economic living of Indigenous people. The cultural location-specific priorities and responsibilities also have an impact on the willingness of Indigenous people to migrate for employment possibilities. Education is also an important determinant of employment outcomes whereby the educational status is clearly influenced by location of residence (Altman, et al. 2004, p. 6). Since the 1970s, the Commonwealth Indigenous affairs policy was shaped by the principle of self-determination which was followed by the acknowledgement of land ownership rights. In the Northern Territory, the Aboriginal Land Rights Act 1976 (ALRA) also considered social measures to improve economic development for Aboriginal people. These measures involved independent funding to land councils, the reduction of negative impacts of mining industries as well as the supply of resources for economic improvement. The ALRA is mainly financed from mining activity on Aboriginal land. The mining royalty equivalents are distributed by the Aboriginal Benefits Trust Account (ABTA) to incorporated Aboriginal groups which are affected by mining whereby the land councils decide how these royalty payments are to be divided up. The payments for the benefit of Aboriginal people are therefore discretionary, as they are mainly based on the recommendations of an all-Aboriginal advisory committee nominated by the land councils. It is important to note that over the period 1978-79 to 1995-96 only 16 per cent of the ABTA's total income was used for payments to Aboriginal people, whereas 40 per cent was used for land council operational costs. The cost of land councils has been highly contentious and also the question whether the millions paid to the land councils to claim and manage land have been appropriately spent is difficult to answer and not topic of this thesis (Altman 2001, p. 1). A further influential factor in the economic development of Indigenous estates has been the introduction of the Community Development Employment Programme (CDEP) scheme by the Commonwealth Government in 1977 under which Aboriginal people work for unemployment benefits (Altman et al. 2004, p. 6). In the 'reconciliation decade' from 1991 to 2001, there has been according to Altman and Hunter (2003) no statistical evidence that Australian Government policies and programmes provided better economical outcomes for Indigenous Australians than those before. This is alarming considering that is was during a time when the Australian economy was growing rapidly. It demonstrates that problems are deeply entrenched and that there is still a big gap between 'practical' and 'symbolic' reconciliation.

Considering the marginal economic productivity of most Indigenous-owned lands, it is virtually impossible that Indigenous people living there will ever be economically independent. There is also a growing public frustration about the amount of money that the Government needs to put into Indigenous support services. However if Indigenous people should earn enough from their lands, radical policy reforms like Indigenous ownership of mineral and petroleum resources are required. This is however highly unlikely to occur. In some situations, Indigenous people managed to set up economically viable businesses, however most remote communities are struggling to achieve social and economic sustainability (Baker et al. 2001, p. 341). In remote communities the market or private sector are hardly represented, whereas the state as a provider of citizenship entitlements (health, housing and education) and income support plays a disproportionately high role. Development policies for remote communities based on the private/public sector mix have not worked because of the above mentioned reasons. The main involvement of Indigenous people in the market has been the sale of art, commercial wildlife harvesting and engagement with tourism and mining. There is the opinion that education is the path to a better future and that people should migrate for education and employment, while having connections to home communities. However, it is appreciated that economic development needs to occur in home communities in order to strengthen the engagement with the national economy (Altman 2005).

In the analysis of the economy of Indigenous communities, Altman (2005, p. 124) defined three overlapping sectors (see Figure 6.1): (1) the state as in welfare support, or public sector employment - including the CDEP scheme, (2) the customary or non-market which refers to the traditional lifestyle of Indigenous people where hunting, gathering, fishing and land management are part of the daily life, and (3) the market as in private sector employment or commercial enterprise. The model has four areas which overlap: (4) between the state and customary, such as when people's domestic consumption is covered through land while paid CDEP wages; (5) the state and the market, when people are employed in enterprises while paid CDEP wages; (6) the customary and the market, an informal exchange; and (7) the state, customary and market, as in the sale of art via a state-supported art centre.

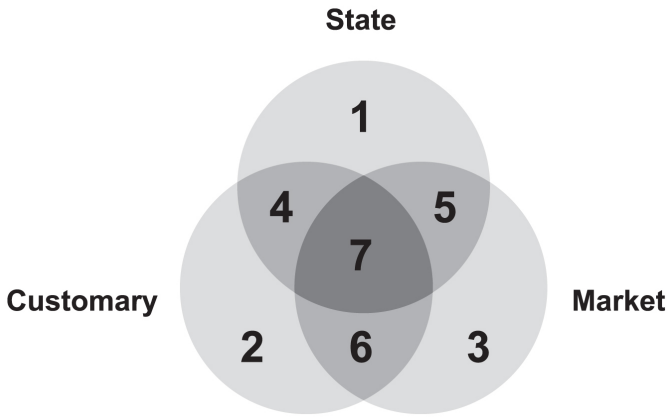

Figure 6.1 The hybrid economy framework

The hybrid economy according to Altman has the advantage that it does not separate the category ‘culture’ from ‘economy’ and it illustrates how the customary sector can be an integral component of the contemporary economy. The idea of payment for environmental services (PES) illustrates this concept through its creation of linkages between the customary sector and the state and/or market sectors (Altman 2005, p. 122). The engagement of Indigenous people in environmental services has become increasingly significant due to the fact that most biodiverse land is Aboriginal land and that they are ideally placed to be able to perform environmental services in remote areas. PES establish markets for environmental services such as carbon sequestration, biodiversity conservation, and watershed services. This fee-for-service basis has the potential to generate economic benefits for Indigenous people living on their country which matches with local aspirations, whilst providing global and national benefits (Morrison 2007, p. 251). PES can be generally divided into impactor and beneficiary pays approaches. While in the first penalties are collected from those who damage or degrade natural resources, beneficiary pays goes towards the maintenance of natural resources and may be dependent on the Government. Indigenous people who look after land would in this case be paid by the beneficiaries (i.e. taxpayers) for desirable NRM. Currently Indigenous people are often voluntarily delivering NRM public good services without direct support. In order to increase impactor incentives, it is important to create policy frameworks that expect industries to offset negative impacts. The West Arnhem Land Fire Abatement (WALFA) project is an example of an impactor pays approach and illustrates how PES can not only abate carbon, but also deliver sustainable on-country development for traditional owners through new economies while assisting in environmental management (Luckert and Whitehead 2007, p. 12).

6.2 Origin and Design of the WALFA Project

In this second SIA stage a clear presentation of the project design with its project logic of how the desired social effects and objectives are to be achieved is outlined. Before going into the different local, regional, national and international interests which have an influence on the outcomes of the project, information regarding the operation and implementation of the WALFA project with the involved stakeholders is provided. In this context not only the implementation of the WALFA agreement but also the previous preconditions which paved the way for the project are described.

At the end of the 90s more and more concerns about the negative effects of the lack of fire management in western Arnhem Land were expressed by Aboriginal people. A series of innovative land management planning meetings and back to country trips were organised to discuss the damage to land and biodiversity from wildfires, feral animals and the loss of Indigenous knowledge (Warddeken Resources 2008).

> *"We were amazed to see the effects of feral animals and weeds, and unmanaged fire in some places. We noticed that there was less variety, less biodiversity of both plants and animals in places that had been having late hot fires every year for years. We also saw country where people were trying to protect it from fire, to have lots of fruit trees and shrubs for animals, like emu especially and people"* (Bowman et al. viewed 2009).

The reconnection with the Arnhem Land plateau was encouraged through the leadership of senior traditional owners and an unusual cross-cultural partnership with Peter Cooke from the Northern Land Council (NLC). In 1998 Bardayal and his people joined forces with Bushfires NT, the Jawoyn Association and other Aboriginal landowners to receive a three-year National Heritage Trust (NHT) grant to develop and establish a fire management programme for western Arnhem Land. The initial funding for the Arnhem Land Fire Abatement (ALFA) project was composed of $768,040 from the NLC and $533,570 from the NHT. But also CDEP was important in getting the project started. Through the involvement of the Northern Land Council's Caring for Country Unit more landowners and Aboriginal community rangers up on the plateau and the towns like Bulman, Maningrida and Gunbalanya got involved (Bowman et al. viewed 2009). With the knowledge that the NHT funding would run out by June 2006 and the realised potential of improved fire management for the reduction of greenhouse gas emissions, the group expected to continue its work on private enterprise funding based on the greenhouse gas offset agreement

between the NT Government and Darwin Liquefied Natural Gas (DLNG), a subsidiary of the oil and gas giant ConocoPhillips. The Darwin Liquid Natural Gas applied in 1997 to construct and run a Liquid Natural Gas processing plant at Wickham Point in Darwin Harbour. The Northern Territory Government allowed the construction on the condition of offsetting the greenhouse gas emissions from its plant (approximately 100,000 tonnes of carbon dioxide equivalent) as well as the rainforest area cleared to accommodate the plant. The area of the WALFA project (see Figure 6.2) was chosen as it was Aboriginal land which was largely depopulated, poorly managed and which received very little commercial development opportunities. This agreement led to the WALFA project, the first abatement project of its kind in the world (HREOC 2008, pp. 265-266).

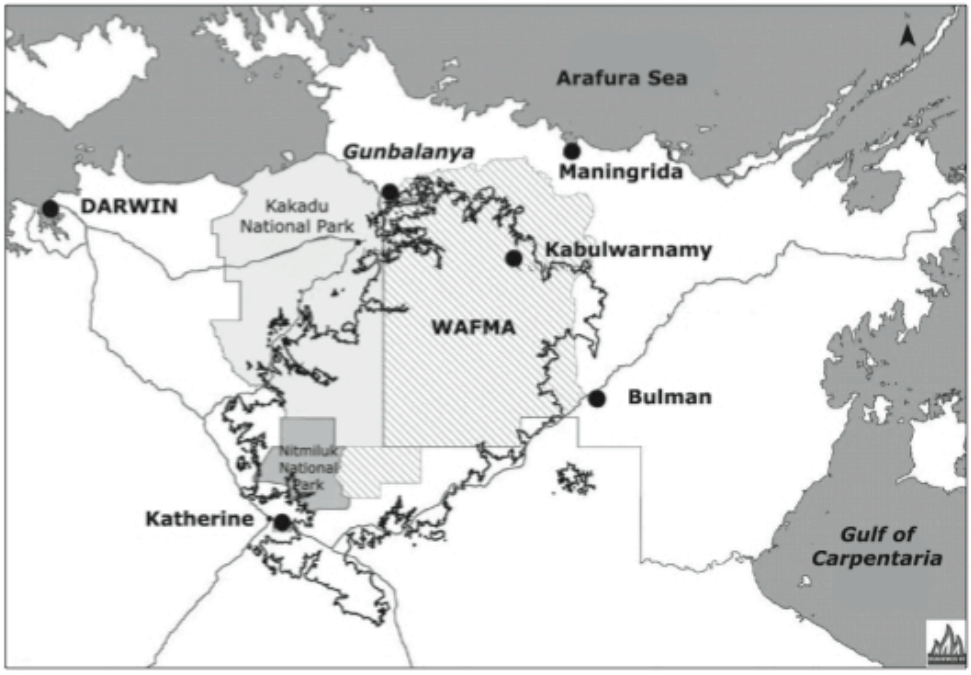

Figure 6.2 WALFA (WAFMA) (Russell-Smith 2007)

6.2.1 Operation and Implementation Context

The WALFA project was implemented in 2006 when the agreement between Darwin LNG and the Northern Territory Government was signed. The agreement certifies that the WALFA project abates at least 100,000 tonnes of carbon dioxide equivalent each year through the reduction of wildfires over the sparsely populated Arnhem Land plateau. The contract is valid for a 17 year period. Since the commercial agreement in 2006, the Darwin LNG pays the Northern Territory Government approximately $1 million each year as a fee to fulfil the carbon abatement agreement. This amount is based on $10 per tonne for carbon

abatement. The agreement contains some renegotiation clauses over the life of the project in order to be adaptable to the market value of carbon abatement in the future (HREOC 2008, pp. 265-266). The Northern Territory Government transfers the money to the NLC which is responsible for bookkeeping and management of the project's burning. Subsequently the NLC allocates the money to the five partner community ranger groups, where the Indigenous rangers receive their wages directly paid into their bank accounts. The approximately 30 Indigenous rangers conduct strategic fire management from early in the dry season to reduce the size and extent of wildfires and therefore the emissions of greenhouse gases from that landscape. Strategic fire management involves on-ground patch-burning as well as larger scale fire breaks lit along tracks, rivers, and creeks from helicopters (HREOC 2008, pp. 265-266).

In order to achieve the WALFA objectives, a management committee was set up to ensure that the agendas of government agencies, research organisations, industry players, community groups and land owners are met. Through technical auditing and monitoring it is ensured that the targets are achieved. A project coordination committee was set up at the ground level to guarantee smooth collaboration with ground level participants and ranger groups. This coordination committee together with the WALFA project coordinator, Peter Cooke discuss the WALFA project burning for the year. The produced fire map for the firebreaks required from each ranger group for the 2007 season is shown in Figure 6.3. The Aboriginal community-based ranger groups work closely together with traditional owners and non-Indigenous partners (Warddeken Resources 2008).

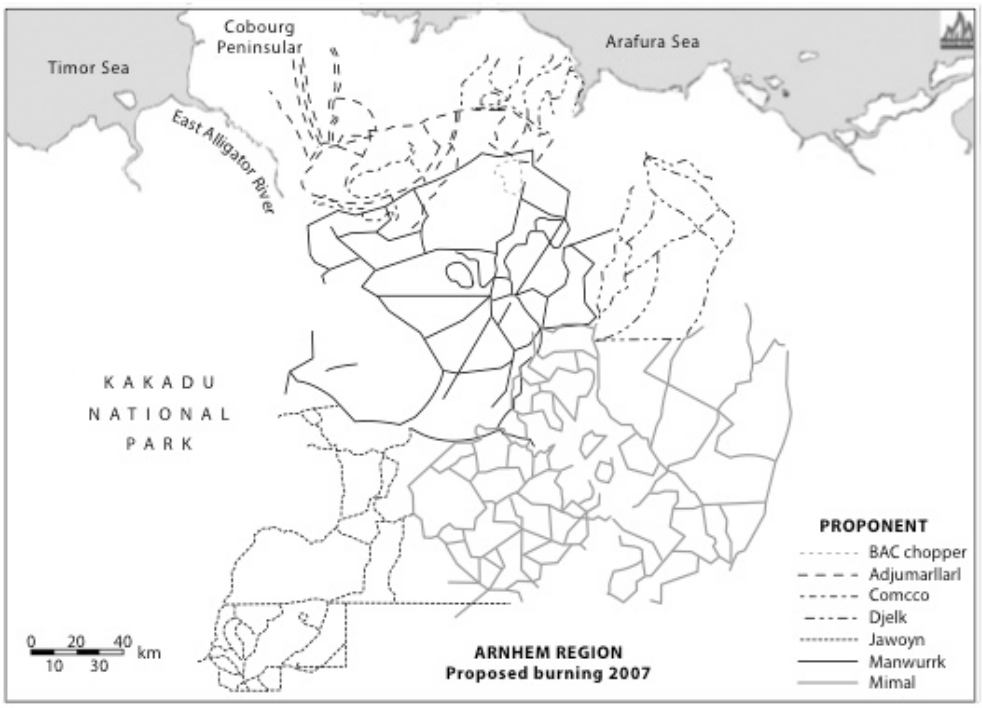

Figure 6.3 2007 WALFA proposed burning

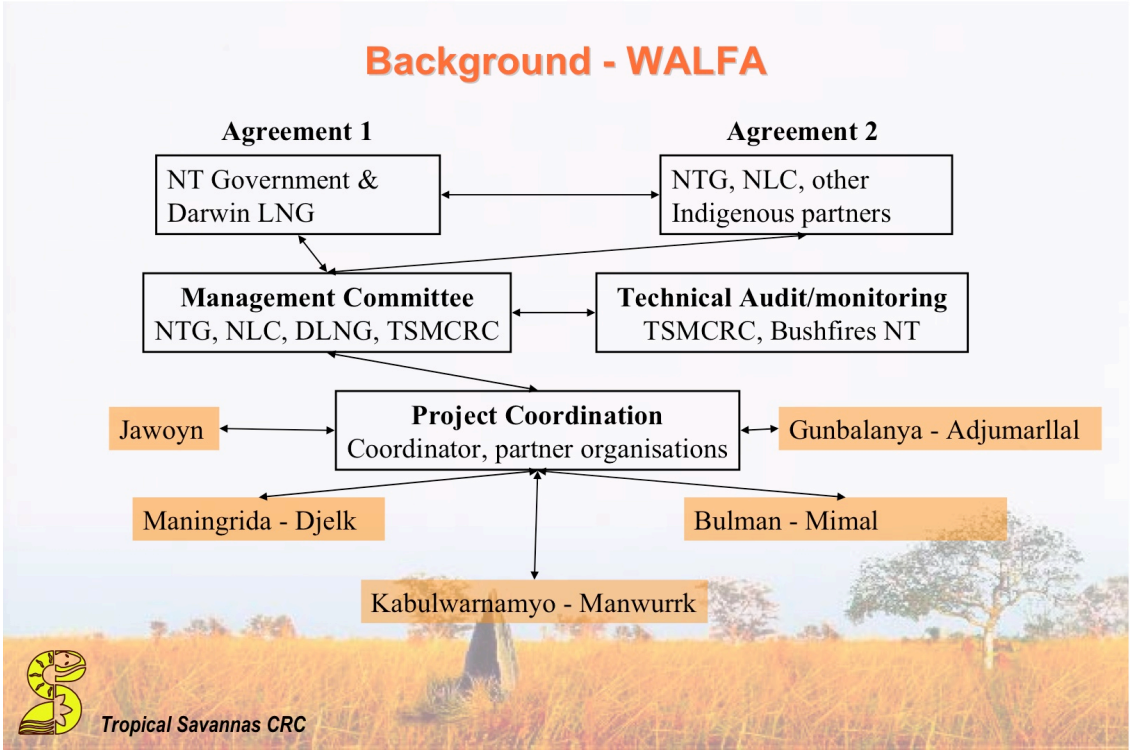

Figure 6.4 Interactions and agreements involved in the WALFA project

6.2.2 Local, Regional and National Stakeholders

NRM requires partnerships among many organisations and agencies. Agreements and programmes have to be set up by an integrated approach incorporating funding, monitoring, evaluation, and community and landowner capacity building. This section describes the roles of government agencies, research agencies, industries, coordination and facilitation bodies, funding bodies and ranger groups in regards to Indigenous NRM in the Northern Territory. The focus lies in particular on these organisations and agencies which have had directly or indirectly an influence on the WALFA project as well as on the programmes which will be crucial for the future of the project. Some of the following mentioned stakeholders got involved at a later stage of the project in contrast to the ones presented in Figure 6.4 who have been part of the project since the beginning.

6.2.2.1 Government Agencies

NRM initiatives, policy and funding are defined by the Commonwealth Government however they are often implemented by Territory and shire agencies. In the last few years raising awareness of Aboriginal land management requirements together with major changes in national policy agenda could be observed. These encompass the reinforced profile of environmental issues, the start of Landcare programmes in 1990, the Government's Ecologically Sustainable Development (ESD) process and the Government's 'reconciliation' process with Indigenous people (Young 1991, p. 7). In July 2008 the Caring for our Country initiative was implemented by the Commonwealth Government in order to improve biodiversity and sustainable practices as well as to integrate previous NRM programmes. Funds for Indigenous NRM are available through the following programmes: the employment of Indigenous Rangers ($90 million), the expansion of the Indigenous Protected Area ($50 million) and by supporting Indigenous Australians to enter the carbon trading market ($10 million) (Caring for our Country 2011). The Indigenous Protected Areas (IPA) Programme, a programme of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) was established in 1997 as part of the National Reserve System (NRS). The programme encourages Indigenous people to contribute to the goals of the NRS by declaring that some or all of their land is managed according to the Convention on Biological Diversity. The NRS itself makes up 10.5 per cent of Australia's land mass whereby IPAs represent over 20 per cent of it (see Figure 6.5) (Altman et al. 2007, p. 39).

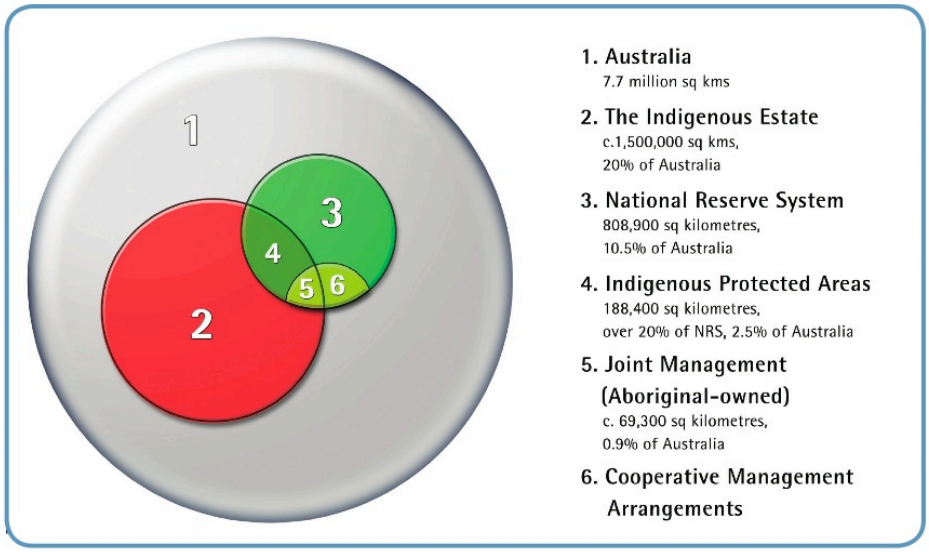

Figure 6.5 Relationship between Indigenous estate and conservation estate

In contrast to joint-management arrangements with national parks, Aboriginal people are in IPA agreements as primary managers of their land and able to define their own partnerships and outcomes. The engagement of Indigenous people in protected area management has also provided a basis for the Indigenous tourism industry as well as for the establishment of community ranger services. Although it provides further financial support for the work on Indigenous land, it is not created to replace CDEP which delivers the base-level income for IPA Indigenous rangers. The success of the IPA Programme can be seen by the constantly increasing number of declared Indigenous Protected Areas (see Figure 6.6) (Altman et al. 2007, p. 39; Baker et al. 2001, p. 13). Another national funded initiative of the DSEWPC is the Working on Country programme which employs Indigenous people to provide environmental services in particular in rural and remote locations. Initially 47.6 million dollars was budgeted for one hundred Indigenous ranger jobs in 2007-2008 with the potential to increase to 200 by 2010-2011 (see Figure 6.7) (Morrison 2007, p. 256). Another source of funding in the context of NRM is the Government's Carbon Pollution Reduction Scheme which limits the amount of pollution, industries can emit. However, no policy is currently installed to assist the voluntary carbon market or to support agreements such as the WALFA project (Tropical Savannas CRC 2008).

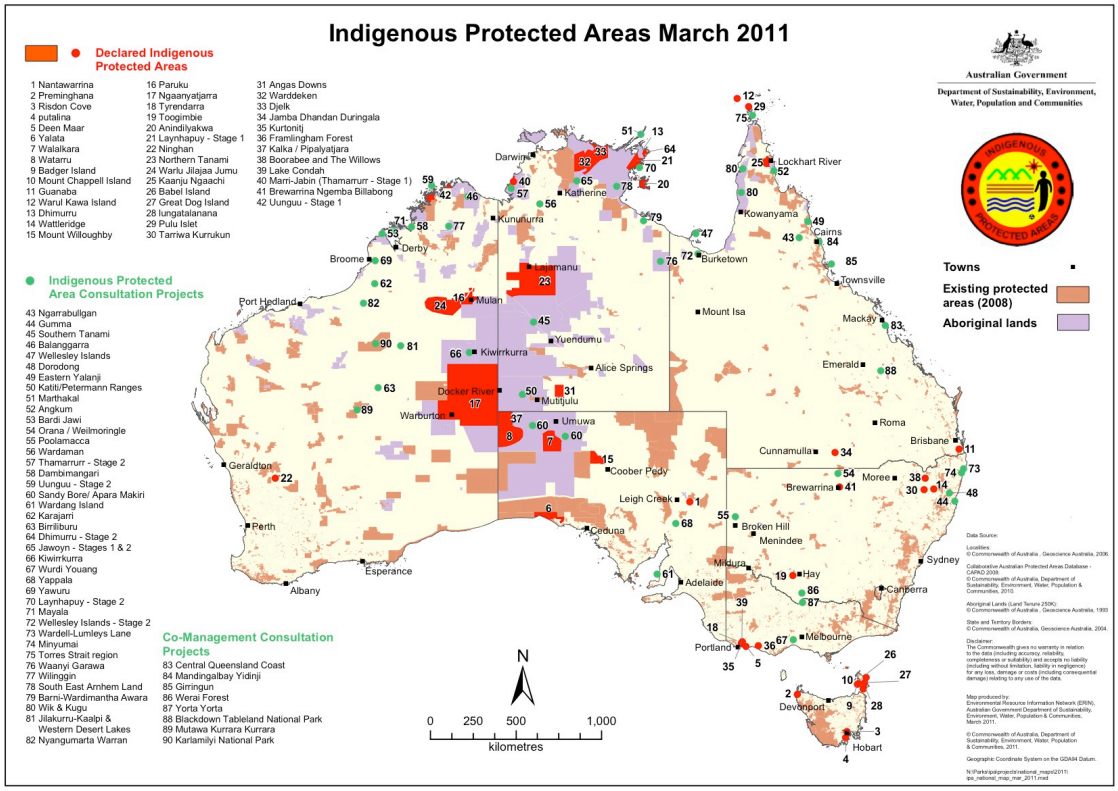

Figure 6.6 Indigenous Protected Areas

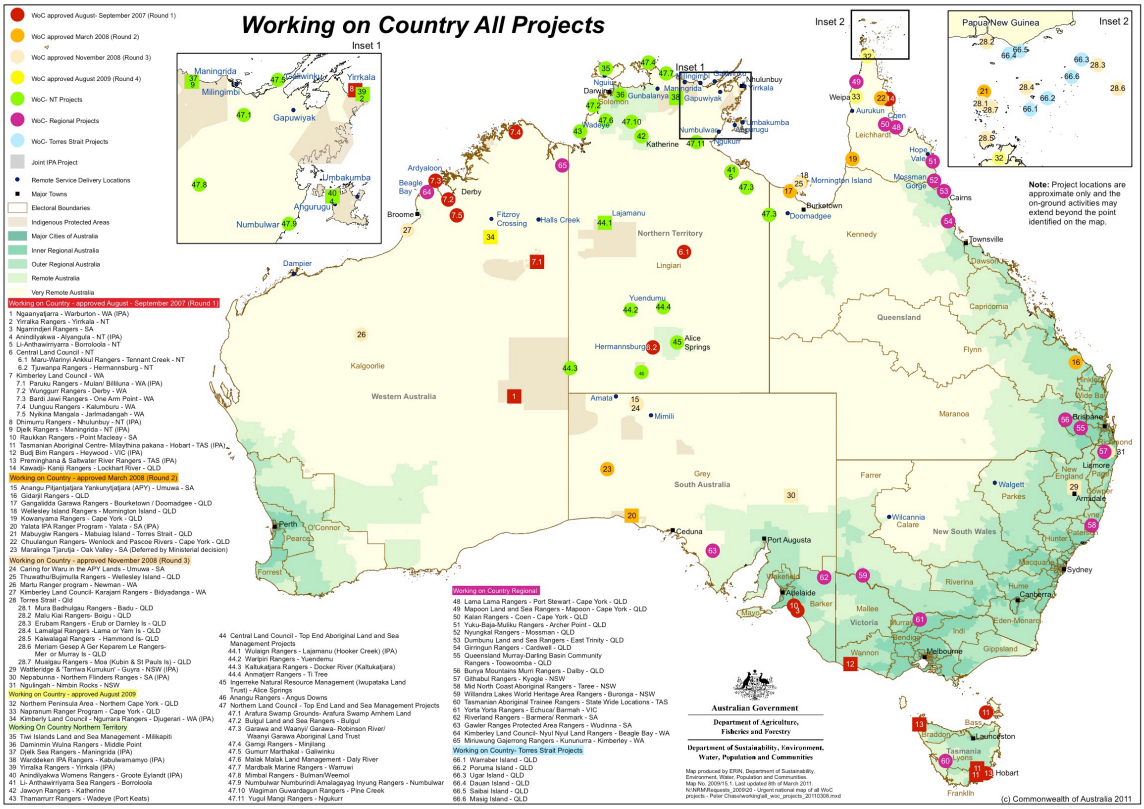

Figure 6.7 Working on Country all projects

On the NT Government level, the Integrated Natural Resource Management Plan needs to be mentioned. The plan was developed in 2005 by the National Heritage Trust and Landcare Council NT. It considers the importance of people staying on the land and rewards their contribution to NRM. In July 2008, the NT Government replaced the local government framework from 57 community Government Councils and 'Association Councils' to nine new Shire Councils (DLGH 2008). With regards to the WALFA project the above mentioned NRM programmes and policy changes play an important role for the future of the project and will be discussed in the analysis of this chapter.

6.2.2.2 Scientific Research Agencies

A number of research agencies in the Northern Territory have the ability to measure, monitor and evaluate environmental services such as Tropical Savannas CRC (TSM-CRC) (before their abolishment), Bushfires Council NT (BFC), CSIRO and the Charles Darwin University (CDU). The Bushfires Council NT, located within the NT Department of Natural Resources, Environment and Arts (NRETA), is responsible for implementing the Bushfire Act. The Bushfire's expertise as well as legislative and policy roles are essential for the success of the WALFA agreement. TSM-CRC in contrast played an important role in facilitating partnerships among the different stakeholders. CSIRO's ecological research experience as well as their recent research focus on working in partnership with people who influence, use and manage Australia's tropical savannas has been crucial for the scientific side of the WALFA project. CDU has been partially involved in the WALFA project and is important because of its leadership experience and capacity to attract and manage funds (Field trip 2009, 29. June - 04. July).

6.2.2.3 Industries

The Northern Territory has a number of advantages in the emerging market of PES. This could be due to the growing mining industry as well as to the relatively intact landscape and maintenance of Indigenous knowledge and management practices. The expansion of the DLNG plant and the likely set up of the Japanese owned INPEX gas processing plant could lead to further demand in fire abatement agreements. Extractive resource industries such as Rio Tinto could in contrast contribute to biodiversity conservation (Kerr 2008).

6.2.2.4 Indigenous Representative Organisations

There are a number of institutions which represent the interests of Indigenous people in the Northern Territory. The main ones are the Northern Land Council (NLC) and NAILSMA. In 1995, the NLC established the Caring for Country Unit (CFCU) in order to address land and sea management challenges and to improve the economic development of Indigenous enterprises. CFCU has been central to the establishment and extension of community-based Aboriginal ranger groups (Altman et al. 2007, p. 40). In the WALFA project, the NLC takes the role as project developer and manager of the fire regimes. In conjunction with NAILSMA, which is important for developing network and alliance groups across northern Australia, it also performs important mediation and protection roles for Indigenous groups and landowners.

6.2.2.5 Aboriginal Owners and Ranger Groups

A recent development in Aboriginal land management is the increased establishment of community-based ranger groups which are responsible for all sorts of land management issues such as the control of resources, weeds and feral animals, wildfire abatement, as well as for cultural maintenance activities. These groups are mainly supported by the land councils, Native Title representative bodies and regional outstation resource centres. Through the Caring for Country Unit (CFCU) 35 ranger groups with over 400 participants were established by 2006 (see Figure 6.8). In some locations these groups have set up well-established organisations with their own NRM Plans and have become part of IPAs (Altman et al. 2007, p. 40). The local ranger groups involved in the WALFA project are:

- Adjumarllarl or Demed Rangers based in Gunbalanya (north western area)
- Djelk Rangers based in Maningrida (north eastern area) (1991)
- Jawoyn Association based in Katherine (south western area) (1990)
- Manwurrk / Warddeken Rangers based in Kabulwarnamyo (central area) (1999)
- Mimal Rangers based in Bulman (south eastern area) (1998)

The Djelk Rangers as well as the Jawoyn Rangers were one of the first ranger groups in the Top End whereas the Manwurrk Rangers were established in 1999 through the ALFA project. The Indigenous ranger programmes represent an extraordinary success in a long history of failed Indigenous labour market programmes in remote areas. Most of the funds for wages and operations have come from CDEP (Young 1991, p. 158).

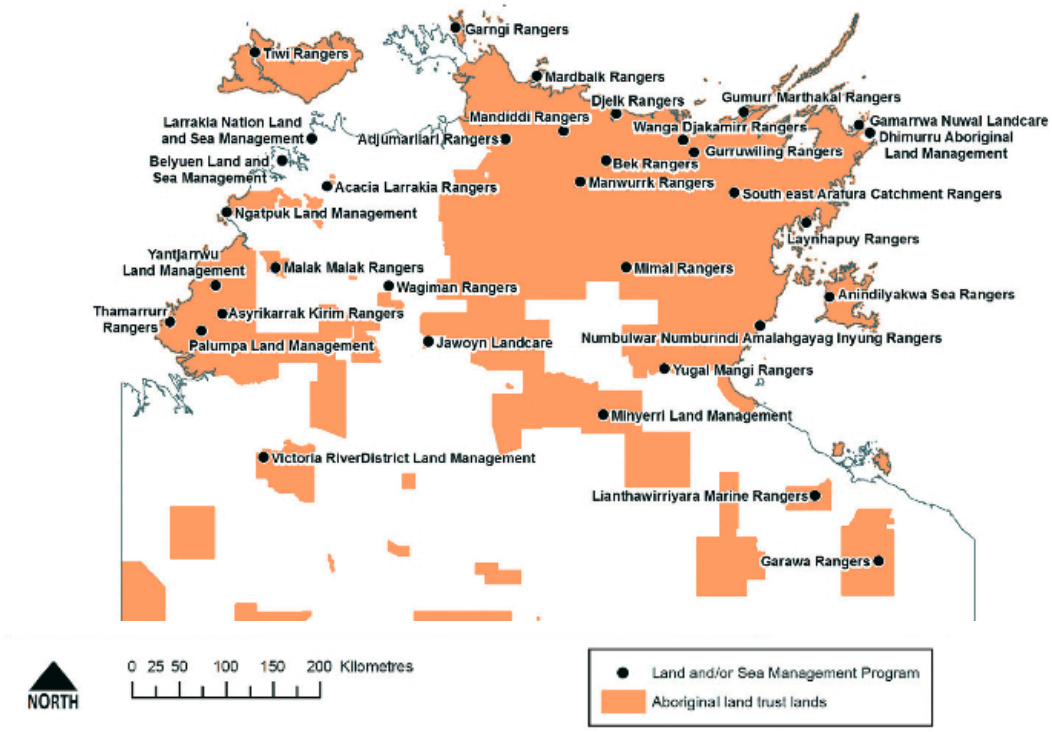

Figure 6.8 Northern Territory Indigenous ranger groups

6.2.3 'Two tool kit': Science and TEK

The applied fire management in the WALFA project is heavily reliant on the application of both Indigenous ecological knowledge and Western science. While scientific monitoring and measurement is necessary to ensure that the agreed targets are achieved, TEK has been crucial for the sustainability of the project as it considers the social and cultural significance of fire management for the Indigenous people. The various meanings of TEK in fire management or NRM have already been described in the previous chapter. This innovative approach to resource and environmental management in Australia is also known as a 'two tool kit' approach which includes techniques like cross-cultural planning and assessment, long cross-country bush walks, burning programmes, sophisticated fire-mapping technology and the use of different indicators (Yibarbuk and Cooke 2001, p. 36).

Late dry-season wildfires are responsible for 48 per cent of the Northern Territory's and 2 per cent of Australia's total green house gas emissions (HREOC 2008, p. 257). In per capita terms Australia has the fifth highest emission of carbon-dioxide in the world and is placed third after Africa and America in regards to biomass burning. Savanna fires cause emissions

such as CO, CO_2, CH_4, non-methane hydrocarbons (NMHCs), nitrous oxide (N_2O), nitrogen oxides (NO_X = NO+NO_2), halogenated and oxygenated compounds, and aerosol particles (Russell-Smith et al. 2003, p. 292). In response to the increasing international demand for greenhouse gas offsets, an increasing scientific effort is put into measuring the greenhouse gas emissions from fires. The abatement of carbon emissions can happen mainly through the reduction and the frequency of the area being burnt. By doing so, the landscape capacity to store carbon is also increased. The research in these fields is mainly funded by the Australian Greenhouse Office and by Land and Water Australia (Luckert and Whitehead 2007, p. 24). Due to the absence of traditional fire management, the WALFA project area has been particularly affected by very hot destructive late dry-season fires. Through remote sensing and satellite mapping it is possible to compare regional fire regimes in different years and to provide information on fuel load build up, flammability, fire hot spots and fire history (Russell-Smith et al. 2003, p. 284). The proportion of area affected by fire between 1994 and 2004 (see Figure 6.9) has been used as the baseline for the WALFA project in order to compare subsequent burning regimes and to define how much abatement has been achieved. The baseline shows that 40-70 per cent of the area has been affected by wildfires each year. Although there will always be a mix of early and late dry-season fires due to the nature of the landscape, the aim of the WALFA project is to reduce the amount of country burnt in the late dry season to 25-30 per cent. The WALFA project has offset 256,000 tonnes in its first two years of operation, which is more than the agreed target of 100,000 tonnes abatement per year (HREOC 2008, p. 265).

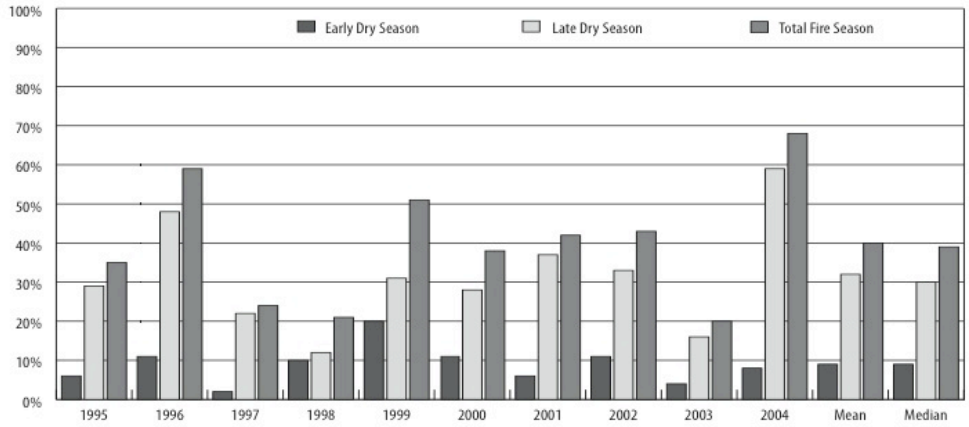

Figure 6.9 The proportion of area affected by fire of the 28,282 km^2 WALFA area

The international Kyoto Protocol (1997) has provided the specific framework for the WALFA project through its creation of new markets in which the offset and abatement of greenhouse gasses (measured as carbon dioxide equivalent) can be sold and traded. In December 2007, Australia ratified the protocol after a decade of resistance and has left the United States as the only developed nation not recognising the accord. To meet the requirements the abatement must involve greenhouse emissions that are caused by people. CO_2 emissions caused by fires cannot be counted as they are considered to be re-absorbed by new plant growth. The WALFA project counts therefore only the abatement of non-CO_2 gases such as methane and nitrous oxide[3] (HREOC 2008, pp. 267-271). It is important to consider that WALFA is not officially a carbon trading agreement but instead seen as a fee for service arrangement that creates a carbon offset. However, the process and accounting practices used in the project will make carbon trading possible when the time arrives. This distinction has been necessary as carbon trading in Australia is not operational yet and there are no clear industry regulations.

6.3 Objectives and Desired Results

In this section the objectives and desired social results which the WALFA project is trying to address are examined. A range of stakeholder groups on different local, regional, national and international levels have an influence on the results including the communities affected by the project, the implementation team, the Government and the project funders. The different stakeholder groups may be interested in different kinds of information and outcomes. While the Government and project funders are more focused on environmental and socio-economic measures, local communities are more interested in how individual villages and groups are affected. But also the disparity of desires within Indigenous groups as well as between Indigenous and non-Indigenous cultures need to be considered. These different perceptions have not only an impact on each other but are also indicators of the relative power and possible explanatory factors for the different development impacts. The roles of facilitators who ensure that stakeholders share the same interests cannot be understated.

[3] Savanna fires also release other greenhouse gases like ozone or other volatile organic compounds. Currently they do not count towards its abatement but there is potential in the future to consider these gases.

In general, the WALFA project aims to simultaneously deliver social and environmental benefits by involving all land owners, using modern technologies and by getting the federal and state agencies as well as other stakeholders involved. The intention is a long term strategic programme that will be self-funding. Apart from environmental interests and the gathering of new ecological data, the significance of TEK as an essential component of long-term management of land as well as the improvement of further collaborations between Indigenous and non-Indigenous specialists are in the centre of attention. Furthermore the project aims to be validated and verified against standards such as the Climate and Biodiversity Standards as this puts the project in a stronger position where it can attract offset buyers (Field trip 2009, 29. June - 04. July).

6.3.1 Local Interests: Aboriginal Traditional Owners

Many Aboriginal people live in poor social and environmental health conditions this is why interests revolve around community living areas, cultural protection and socio-economic improvements. Bininj people when asked through a series of meetings and talks, identified the following points as their priorities: secure property rights, reconnection with country, strengthening and maintenance of culture, TEK and language, land and controlling fire management, as well as educating people in the traditional and Western way. Apart from local participation and the application of TEK, Aboriginal people also express their aspirations for improved government services in health, transport, marketing facilities, local business opportunities, protection from foreign capital-intensive companies as well as for an enhanced local autonomy (Field trip 2009, 29. June - 04. July). From an Aboriginal perspective, it is also important that the culturally correct people are involved in order to secure the well-being of the country and the success of the project. This is contrary to non-Indigenous approaches which focus rather on ‘who’ should do the job and ‘who’ has the skills for it (Ross 2001, p. 338). In general, Aboriginal people must assert their management interest not only to protect their environment, but also to ensure the viability of their society and their belief systems as well as the inheritance of this knowledge for future generations. The wishes of older generations and ranger groups which were expressed regularly on the field trips, was the need for young people to learn how their grandparents’ generation interacted with the land and how land management practices should be conducted. This is why the involvement of young Aboriginal people in contemporary land management activities is of a high priority (Field trip 2009, 29. June - 04. July).

6.3.2 Regional and Non-Indigenous Interests

On a regional or territory level, the focus lies on a science-based, strategically directed and goal-oriented practice in order to obtain specific ecological outcomes such as the reduction of wildfires and carbon dioxide. The concept of biodiversity conservation is often approached differently by Aboriginal people and scientists. In the European scientific sense, the classification of plants is motivated by intellectual interest whereas the lack of a term in Bininj Kunwok can be due to 'utilitarian considerations' (Garde et al. 2010, p. 116). In general it can be said that sustainability is understood by Aboriginal people synonymous with survival and is inextricably linked to the dependence on land and resources. Although there is an interest to improve cooperation and employment possibilities for Aboriginal people on land, there is also the tendency among non-Aboriginal fire managers to focus only on the basic principles of Aboriginal fire management. The concentration of burning from helicopters provides for example more economic efficiency and productivity but at the same time reduces the involvement of traditional owners to a large extent. Thus fire management may lack the accuracy of conducting burning on the ground by people with an extensive knowledge of the land (Bowman et al. viewed 2009).

6.3.3 National and International Interests

Indigenous people and their lands can and do contribute towards the achievement of national and international goals of managing the earth's biodiversity, reducing greenhouse gas emissions, managing water resources and reducing the risk of exotic pests and diseases (Morrison 2007, p. 250). The interests of the Federal Government involve not only the fulfilment of international obligations such as the agreements under the Convention on Biological Diversity (CBD) and the Kyoto Protocol but also the reduction of economic costs of Indigenous underdevelopment through PES and working on country programmes (Luckert and Whitehead 2007, p. 101). These programmes have also further national benefits such as the strengthening of Indigenous cultural conditions and engagement as well as cost-effective on site environmental and conservation management. The Carbon Pollution Reduction Scheme and the associated Emissions Training Scheme represent other interests on a national level. These points illustrate that public investment in Indigenous natural resource management programmes delivers high national economic and social returns (Altman et al. 2007, p. 46). It is also important to note that achievements of Indigenous people can have positive impacts on working on country programmes for other

Indigenous groups in Australia. The sharing of Indigenous information within global forums such as the United Nations Working Group on Indigenous Populations "*(...) have the advantage of putting Australia's record of recognition, or otherwise, of indigenous rights into the international spotlight and promoting the accountability of Australian governments under the terms of the international conventions*" (Baker et al. 2001, p. 344). In contrast to the national Government, private industry and buyers of environmental services may enter into a PES agreement due to legal obligation, shareholder pressure or because of marketing reasons relating to sustainability, conservation and Corporate Social Responsibility. The main aim of the DLNG plant has been to offset carbon emissions for governmental obligations, ethical and sustainability reasons, publicity and for possibly better public relations with share-holders.

As per above, managing land for social, cultural and economical reasons and managing land according to the non-Aboriginal concepts such as sustainability, economic development, and conservation are two different ones with different land management goals. Non-Aboriginal fire management is driven by a particular task or by a 'problem' that needs to be solved. In contrast to the desired ecological outcomes of traditional burning which are often hard to determine and where motivations are often not related to ecological 'problems' at all. This section has shown that there are differences in particular in the areas of biodiversity conception, socio-economic interests as well as employment and resources interests.

6.4 Community Benefits: Success Factors and Emerging Challenges

In this chapter, I will explore the outcomes of the WALFA project linked to the livelihood assets of biodiversity, natural, economic, financial, social and human resources. The sub-indicators of the main assets as well as the identified preconditions that arose out of the research process and were regarded as key variables for the success or the failure of the project (see Figure 6.10). In addition, a critical appraisal of the WALFA project is provided in both regional and wider contexts in order to point out some of the emerging tensions and dilemmas it faces, despite its obvious success. In this context, I also want to make a few further observations, moving from the particular WALFA project to the more general context of natural and resource management programmes. In the final chapter, the results of the WALFA project are put into context with the findings of the previous chapter in order to answer the research question of the relationship between NRM, cultural resource management (TEK) and livelihood outcomes.

Figure 6.10 Livelihood assets and derived indicators of the WALFA project

GENERAL CONDITIONS / PRECONDITIONS	
Policies and Resources	• Policy coherence • NT policy changes • Carbon policy • Local government and service delivery • Empowerment and bottom-up approaches
Mutual Cross-Cultural Partnership and Communication	• Sharing of research and information • Kind and duration of relationship • Strong leadership • Co-operation, co-learning and networking • Conflicts
ENVIRONMENT AND BIODIVERSITY	
Environmental impact	• Reduction of greenhouse gas emissions • Mitigation of biomass burning • Management of remote, uninhabited locations

ECONOMIC AND FINANCIAL RESOURCES	
Culturally appropriate Employment Opportunities	• Establishment of Indigenous NRM enterprises • Creation and strengthening of Aboriginal Ranger groups • Economic development • Aboriginal economic independence
Funding and Financial Resources	• Extent and duration of funding • Indigenous aspirations for funding • Financial challenges in the WALFA project and possible options
SOCIAL AND HUMAN RESOURCES	
Culture and TEK	• Importance of language and TEK • Maintenance and transfer of language and TEK • Documentation of language and TEK
Human Health	• Improvement through being on country • Better well-being • Positive impact on health budget
Education and Training	• Considering local community needs in terms of learning, employment, cultural maintenance and identity • Informal Aboriginal and formal non-Aboriginal learning • Linkage between schools and communities • Both ways / community learning
Community Organisation	• Re-establishment of the Kabulwarnamyo outstation in 2002 • Establishment of Indigenous NRM corporation - Warddeken Land Management Limited • The need for a stronger involvement of all members of the community

6.4.1 General Conditions and Preconditions

From the buyers perspective of environmental services it is important to keep the costs low and to enter into a PES agreement with someone who is eligible and able to provide reliable services. The seller of the services on the other hand needs to have some command over the land, for that reason it is important that the land rights are sorted in order to know who can participate. Significant costs may for example arise in areas with conflicting tenure arrangements where mediation and institutional frameworks are required for dealing with these complexities. The clarity and longevity of the Arnhem Land Aboriginal freehold title has therefore favoured potential agreements with external parties. The community capacity to deliver the service including having the knowledge, technical, administrative and language skills as well as existing infrastructure has also been crucial for entering into the WALFA agreement. Because of this, PES agreements are more likely to be implemented in areas where previous agreements have already been established. The WALFA agreement was the first of its kind in Arnhem Land and required approximately 10 years of preparation and facilitation prior to commencement of operation. However, it needs to be considered that many of the ranger groups and people involved have a lot of onsite experience and knowledge. The fact that the WALFA project has been initiated by Indigenous people themselves, made clear that the desire to enter into a PES agreement was present. Apart from these general preconditions, the policies and resources as well as the way of communication and partnership also played a major role in the implementation of the WALFA project.

6.4.1.1 Policies and Resources

The policies in the Northern Territory are characterised by both success and failure with regards to NRM. In general, the Territory and Commonwealth Governments and industries make use of command and control policies which often not only result in conflicting agendas but also in a failure to address the root of a problem that Indigenous people face (Morrison 2007). The emergence of bottom-up initiatives such as the WALFA project demonstrates new ways in engaging Indigenous people into the mainstream economy. Participation in Indigenous NRM has the potential to increase choices for Indigenous people in a manner that existing government investments with their focus on emergency response do not address (Luckert and Whitehead 2007, p. 106).

There are also considerable governmental policy agenda discrepancies between the Northern Territory and the Commonwealth Governments. While the NT Government focuses on huge infrastructure projects in Darwin, the Commonwealth wants to develop 'real jobs' which are rarely offered in remote communities (Gerritsen 2007). The Commonwealth Government can significantly reshape the governmental funding and service delivery systems of northern Australia, considering that 80 per cent of the money spent by the NT derives directly or indirectly from the Commonwealth. Here it is important to note that much of the money stays in Darwin and Alice Springs (Whiteside 2009, pers. comm., 10. November). The Commonwealth Government can also in an unpredictable manner interfere in the Territories' policy jurisdictions, which was the case in the 2007 NT National Emergency Response (NTER). This strategy has not fully addressed the root cause of Indigenous children abuse but rather has led to incomprehensible land reform measures (Garnett et. al 2008, p. 15).

On the Commonwealth level also the forthcoming Carbon Pollution Reduction Scheme (CPRS) and the associated Emissions Training Scheme (ETS) have an impact on fire management, as the way it is dealt with by an ETS will influence the income generated by fire management. The WALFA project has been for example acknowledged in the Draft Garnaut Climate Change Review and the CPRS Green Paper as an income source for Indigenous land managers (Topical Savannas CRC 2008, p. 28). The pushing for Corporate Social Responsibility (CSR) within industry by both Commonwealth and NT Government additionally plays a major role for NRM programmes. Examples of industries adopting CSR in the NT are Rio Tinto's biodiversity strategy and the DLNG plants' involvement in the WALFA agreement (Purdon 2007). On the NT level, there have also been major changes in Indigenous affairs policy such as the reform of the Community Housing and Infrastructure Programme, the handing back of responsibility for outstations to the NT, the recently developed NT outstation policy, the abolition of the CDEP scheme and the change of the local and administrative landscape through the introduction of a new shire system.

The assistance for living on outstations is an essential part of current Indigenous policies. While housing and services such as water and electricity are mainly delivered by the Commonwealth Government, Territory departments are responsible for providing education and health assistance. Despite the many environmental, social and economic advantages,

the Government is currently reducing support for small outstations and welfare payments (Luckert and Whitehead 2007, p. 103).

> *"(...) Government does nothing for homelands and where they do something 60-70 per cent of the money stays in administration. (...) homelands are healthier and cheaper but the Government follows more a western ideology which is more important than the evidence. (...) Government should focus more on what is successful and meaningful in order not to destroy any good cooperation"* (Greatorex 2009, pers. comm., 19. December).

The NT outstations policy demonstrates that the policy development process has not been empirically grounded and does not consider Indigenous cultural and social values. It would be more important to 'stabilise' and 'normalise' remote communities instead of 'weakening' them through a continually changing political course. Indigenous affairs policies that pursue mainstreaming and urbanisation of remote communities also represent a threat to the conservation values of the Indigenous estate (Altman 2006). Indigenous NRM programmes, such as the WALFA Project not only help Aboriginal people to re-connect with their countries but also provides economic development and gives them more independence from government payments. Additionally they offer an economic argument for the maintenance of outstations in pointing out that outstations are crucial for effective land management since they place land managers in a landscape that is otherwise inaccessible.

The constant abolition of CDEP demonstrates another discrepancy between Indigenous affairs, employment and environmental policies. Although the Federal Department of Environment and Water Resources demonstrates strong leadership in recognising that land management through community-based ranger programmes deliver environmental services of national and global interest, an expansion of these contributions on a political level would be required in order to meet the challenges faced (Morrison 2007, p. 259). The constant political change in the NT is also expressed through the introduction of new local Government 'super' shires in July 2008. This ongoing shift of political and administrative landscapes makes it difficult for various institutions to achieve their targets and to enter into agreements. Shires could have a crucial role in local NRM activities in the way of providing administrative support. However so far there is little evidence of coordination between shire, traditional owners and local institutions regarding NRM activities (Kerr

2009, pers. comm., 07. December). Greatorex (2009, pers. comm., 19. December) also pointed out that the new shire system is another way for the Government to take responsibility away from Aboriginal people. Generally it can be said that government service delivery agencies do not recognise their multiple roles for the sustainable development of Aboriginal communities. An overarching regulatory authority of the savanna region would have the advantage that not only the inter-agency-communication between the different government levels but also the use of resources could be improved. Additionally funds could be attracted on a much larger scale. Generally, it can be said that the best approach to policy making is to build on successful programmes and support bottom-up approaches which often lead to long-term strategies and to the reduction of economic problems.

6.4.1.2 Mutual Partnership and Communication

People are key in every project. The networking, communication and meaningful local participation have been the most effective ways in ensuring the success of the WALFA project. Better communication, facilitation and mediation are not only essential for the WALFA project but also for the improvement of the well-being of Aboriginal people. They provide the basis for bridging the gap between Aboriginal and non-Aboriginal values and concerns about land and land management techniques. In the WALFA project, key people and organisations such as NLC and NAILSMA act as vital links between traditional stakeholders, markets and policy. In the WALFA project, a mutually-respectful cross-cultural partnership was needed that involved traditional owners in order to ensure that ownership, protection of TEK and cultural values and development are driven by local people. In looking at communication, also the way information is passed on plays an important role. At present most scientific papers on fire management are stored at libraries and are often inaccessible to many Aboriginal people. This has not only caused barriers of understanding but also has undermined the opportunity of Aboriginal people to access funding (Liddle 2001, pp. 147-150). It is therefore important that NRM programmes have their origin in communities on site and not in institutions or the Government. On land research and management planning undertaken with the appropriate custodians on land is a central approach in the WALFA project and has been supported through the Warddeken Land Management Limited which is run from the Kabulwarnamyo outstation (Morrison 2007, p. 249).

The information provided by Western science and Indigenous knowledge has to be given equal value in order to avoid paternalistic colonial dominance. Joe Morrison (2007), emphasises in this context that projects should not try to integrate Western and Indigenous knowledge but rather respect and value each other's knowledge and decide when it is best to use Indigenous practices and when it is best to apply a more Western approach. It is also important that the vocabulary and ecological referential systems of Aboriginal people are continually used by the younger generations and not being replaced by the European scientific ones. Indigenous people are keen on taking part in scientific training but only a few have got the chance to join in any other way than as manual labour (Liddle 2001, pp. 151-152). It is important to get more Indigenous people through education so they can do the research themselves. Not only Aborigines should get familiar with the scientific practices, but also non-Aboriginal people have to learn about traditional practices.

> "*It's always been the Europeans taking out the Aboriginal people to help the Europeans to do the burning. Never been the other way around, never. I'm not sure how Europeans would handle that, actually.*" (Non-Aboriginal park ranger in Lewis 1989, p. 952)

The lack of Bininj speaking non-Indigenous people and English speaking Indigenous people is an obvious barrier and source of misunderstanding. Yibarbuk emphasised the communication difficulties occurring in relation to on-ground co-ordination, and consultation with the NLC and government agencies. He noted that it was also important to define boundaries with outside institutions and that burning and other activities have to take place with the necessary permits from traditional owners in order to avoid conflicts. Intellectual property rights have to be regarded, considering the possible wider publication of traditional knowledge. Yibarbuk explained that many years of consultation with Indigenous and non-Indigenous institutions were necessary before the WALFA project could get off the ground (Field trip 2009, 29. June - 04. July).

Another important aspect of partnership is the kind and duration of the relationship or in other words the commitment by the non-Aboriginal field worker. Bininj people often work with someone they have known over a number of years, where trust and respect have developed. They may go on a field trip or meeting not because of the importance to them but rather of a perceived relationship obligation. It is therefore important that people that gain knowledge from Indigenous people stay within this area (Wohling 2001, p. 161).

> "*We need non-Aboriginal people who understand our ways of doing things and our language, as many non-Aboriginal people do not know Kunwinkju. I want to make my place where we Aboriginal people make use of both Aboriginal and non-Aboriginal cultural practice*" (Garde et al. 2010, p. 117).

Peter Cooke is such a key person on the ground who has an extensive knowledge of Western legal, economic and administrative frameworks as well as of the Bininj knowledge systems. He provides not only suitable facilitation but also reduces transaction costs. Yibarbuk is another crucial middleman. He noted that not everyone felt comfortable with him as a middleman at the beginning and emphasised the importance of re-connecting, co-operation and creation of a 'family tree' of relationships and responsibilities (Kerr 2008, p. 85). The success of the WALFA project is therefore also due to the complementary skills and strong leadership between traditional owners like Lofty Bardayal Nadjamerrek, a culturally informed and politically-astute coordinator, onsite project manager Peter Cooke (Warddeken Land Management Limited and former NLC - Caring For Country Senior Project Officer) and scientists such as Jeremy Russell-Smith (TS-CRC and Bushfires NT). This partnership made it possible to keep an eye on each other and guaranteed a degree of accountability which may not be given in monopoly management.

In order to achieve a high attendance rate at meetings and field trips, the setting also plays a major role. Meetings which are held in the field, have a greater success than meetings in cities. In this context the distance to their lands as well as the customary behaviour rules for accessing the country of other Aboriginal groups need to be considered (Liddle 2001, p. 149). The Aboriginal ranger and science field trip in July 2009 for example had not only the goal to provide scientific measurements but also to support the understanding of different perspectives, to stress the importance of TEK and to improve the networking among various stakeholders. The WALFA project therefore supports cooperation, co-learning and networking between different agencies, user groups, stakeholders as well as between Indigenous groups. Partnerships between scientists and Aboriginal landholders have many advantages. They not only help to attain the necessary financial resources but also provide opportunities for Aboriginal people to obtain training in scientific research. Through the partnership and involvement of Western scientists, monitoring systems have been set up which are capable of measuring relative performance in terms of agreed outcomes. This provides valuable information and a basis for negotiation at a national and international level.

Finally, the appearance of possible conflicts needs to be mentioned. While project benefits may leak to neighbouring communities, they may also be the reason for new conflicts and jealousy. The growing non-Indigenous presence in the community may also favour tensions. The decentralisation of power in land management strategies can often lead to the situation that only a few 'elite' local or regional groups are strengthened whereas non-participants are negatively impacted or miss out. It is therefore important that non-participants of a PES strategy are also considered in order to avoid negative outcomes (James 2009, pers. comm., 19. October). In general it can be said that there have been only a few low intensity conflicts in the WALFA project, which could be due to the strong leadership and the clear land rights situation in Arnhem Land (Kerr 2009, pers. comm., 07. December).

6.4.2 Environment and Biodiversity

In order to look at the impact of the WALFA project on biodiversity and natural resources, factors such as the degree of disturbance in local ecosystems, the amount of protection they are afforded, and the required land management are considered. As already mentioned, fire is a natural part of the environment of northern Australia and has been used for tens of thousands of years by Australian Aboriginals to shape the highly flammable environment. They have changed the Australian fire regime *"from one of rare, high-intensity fires to one of frequent, low-intensity ones"* (Jones 1975, p. 26). The controlled use of fire is an essential land management practice to retain biodiversity whereby a range of fire regimes is needed to meet the requirements of different habitats and species. Although the eucalypt-dominated savannas are highly resistant to frequent low-to-moderate intensity fires, some sensitive species needs to be considered as they will otherwise become locally extinct. The prevailing frequent and intense fire regimes of the last decades have had dramatic implications for landscape health. It reduces the amount of obligate seeders (woody plants which can only re-sprout through seeds), which make up a considerable part of the ecological fabric of this ecosystem (HREOC 2008, pp. 258-259). Through the WALFA project, fire regimes have been re-introduced which are based on TEK and scientific knowledge. The achieved environmental protection can be seen from the comparison of fire maps and the proportion of area affected by fire (see Figure 6.9). In general it is proven that the WALFA project reduces greenhouse gas emissions through the reduction of burnt areas and therefore helps mitigate climate change as well as enhances biodiversity conservation,

particularly of fire-sensitive sandstone heath and rainforest assemblages. Through this community based resource management programme very remote, uninhabited locations can be accessed. Local service provision reduces environmental costs as on-ground services by local people are much cheaper compared to the costs of paying urban personnel to travel to remote areas. The levels of abatement have shown that WALFA is a highly efficient and cost-effective carbon abatement project (Whitehead et al. 2003, p. 422). Additionally, through the conservation of biodiversity, long-term benefits for the community, tourism and environmental services can be achieved.

6.4.3 Economic and Financial Aspects

For the economic development and financial resources of the WALFA project, the factors analysed included access to funding, financial resources and the state of the local labour market. Discussions on the economic development of Australia's tropical savannas are often based on an optimistic view referring to the vast natural resources of this area. Northern Australia is nevertheless characterised by an economic marginalisation due to an inefficient labour market, welfare dependence and a relative lack of innovation. There is not only a massive shortage of skilled workforce but also the industries are dominated by mining and construction with hardly any knowledge-based enterprises. If the economic growth which is mainly based on the mining industry, is to decline, less economic opportunities will be left. This would mean continued emmigration of people, and more seriously, an increased disadvantage to the region's Indigenous people. A populations social function and quality of life may decline due to the reduced liveability (Garnett et al. 2008, p. 35). For remote Indigenous communities it is assumed that future economic development lies mainly in PES and the relationship with mining companies.

6.4.3.1 Culturally Appropriate Employment Opportunities

The absence of meaningful employment in remote northern Australia, especially in Aboriginal communities, is one of the central social issues. Traditional Indigenous beliefs and practices which reject the accumulation of capital or economic individualism are often conflicting with the capitalist economy. Moreover, the attraction of welfare payments has led to an increasing apathy in finding work. It is therefore important to provide culturally appropriate employment opportunities (Luckert and Whitehead 2007, p. 98). Community-

based ranger programmes have created new potential opportunities in this context as the institutional structures combine customary authority and knowledge, statutory land ownership and management roles with techniques drawn from Western knowledge. The WALFA project supported not only the establishment of the Manwurrk/Warddeken Ranger group but also created a long-term-fee-for service funding agreement which made it possible to employ rangers in full time positions. The enhancement of Aboriginal employment is not only working towards the improvement of Aboriginal livelihood but also towards the reduction of financial pressure on the Australian Government and taxpayers. It is also important that Indigenous people are getting better trained and educated as the goal should be that Indigenous people take up jobs which are currently occupied by non-Indigenous people. This would have the advantage that the high staff turnover could be avoided as people with a permanent attachment to the country are taking over.

6.4.3.2 Funding and Financial Resources

Indigenous land management projects are mainly funded for short periods, which constitutes a fragile arrangement with many groups being chronically under-funded and confronted with an extensive reporting procedure. It is for example common for individual ranger programmes to have more than 10 different short-term funding sources. The CFCU officers and ranger facilitators therefore spend much of their time on funding applications and writing reports. Some ranger groups, such as the WALFA one have set up their own enterprises or are able to source funding from 'fee-for-service work' (Kerr 2009, pers. comm., 07. December). Although the WALFA project funds are a stable income stream, the involved ranger groups are still dependent on other sources as they are not paid for the entire year, but only for the period they are doing the on-ground seasonal burning. Further funding has come from the CDEP scheme. The WALFA project pays the CDEP participants 'top up' in differing rates, depending on the community and the type of work (James 2009, pers. comm., 19. October). Commonwealth Government funding for NRM activities in the NT is increasing and demonstrates that PES is gaining credibility among policy-makers. However, the extent of support is quite small and timelines are still relatively short. The lack of continuity leads to the circumstances that when the project is at a stage where processes are understood, the funding runs out. Aboriginal groups need secure recurrent funding in order to be able to plan and organise their land management activities but also to attract, and keep high-quality staff (Wohling 2001, p. 162). Policies and the resulting

funding are often affected by economic decline and a change in Government. Australian Government NRM funding programmes also need to consider that NRM costs and returns vary depending on the specific programmes and local situations (Luckert and Whitehead 2007, p. 100).

The Commonwealth CDEP programme has been fundamental to the success of most Indigenous ranger programmes. However, instead of building on the success of such community-based ranger programmes and making them more sustainable for the long-term, the scheme has gradually been abolished. The CDEP top-up salary structure was also criticised by Aboriginal people such as Otto Campion for not reflecting the customary land management knowledge, nor the services that are offered. These services have not been equivalent with non-Indigenous land management wage structures and give the feeling that Government and certain institutions are 'free-riding' on the goodwill of those people (Kerr 2008, p. 86). Apart from the criticism, it needs to be emphasised that there have been no other programmes designed to replace the CDEP scheme. The IPA Programme for example has not been financially expanded, despite its substantial success and the increasing amount of new NRS land. The Government Budget 2007-08 allocated instead an extra $47.6 million for the Working on Country Programme (Altman et al. 2007, p. 43; Morrison 2007, p. 255).

The chronic underfunding is also reflected in the Batchelor Institute's training offer as well as in the CFCU of the NLC which cannot be extended despite increasing demand (Bowland 2009, pers. comm., 02. December). In this context also the high programme administration and operational expenses of the land councils in comparison to the payments which are finally used for the benefit of Aboriginal people needs to be pointed out. It is also important to consider that the NLC gets funding mainly through development which has led to situations where traditional authority was undermined and wishes were ignored (Greatorex 2009, pers. comm., 19. December). Also the discretionary way in which regional incorporated groups are chosen has been politically contentious at times. The institutional structures of the ALRA and its land councils also need to adapt from land rights to land and resource management challenges. On top of this, both the Commonwealth and land councils need to work more closely together in order to improve the effectiveness of royalty associations for example, land councils do not monitor the activities of royalty associations at the moment as this may put them in conflict with their constituents (Altman 2001, p. 6).

The Indigenous people's goals for their own development encompasses a number of activities in the community, like housing, health, cultural maintenance, care for land and schooling. However the government funding is constrained to specific spheres of activity which make it hard for Indigenous people to use them effectively for working on the land. Some of the Aboriginal rangers have for example emphasised that they have the feeling that the Caring for Country programme is more of an external bureaucratic top-down and economic-driven planning approach, which is influenced by 'funding' rather than by their local priorities and needs. A consequential issue is that the means to generate financial resources or funding for research and landcare programmes have mainly been outside Aboriginal control (Liddle 2001, p. 152). Also the low socio-economic status of Indigenous people coupled with a history of exclusion and marginalisation weakens the position of Indigenous people as legitimate resource users and NRM managers (Luckert and Whitehead 2007, p. 103).

A challenge of the WALFA project has been to increase the local Indigenous benefits out of the project. Even though the WALFA project has the potential to deliver environmental, economic, social and cultural benefits, unfortunately only the first two are covered at the moment as all of the available money is needed for expenses and wages. Hopefully with time when the project reaches maturity and the start-up costs are reduced, excess money could be used in the interests of traditional owners. In 2007 for example, the $1 million funding was divided as follows:

- $130,000 was paid to the Tropical Savannas CRC for monitoring and auditing
- $380,000 was for wages
- $500,000 was spent on operations (vehicles, helicopter charter, fuel, ...)

The $10 per tonne of carbon abatement does not leave much surplus but if the national carbon price would be set to $20 per tonne, the surplus could be used to generate community development outcomes (HREOC 2008, pp. 267-273).

In order to ensure further progress and success of the WALFA project the social and cultural outcomes have to be more strongly integrated also means finding access to more resources. The access and use of a range of potential funding sources have also been indirectly applied in the WALFA project through programmes, workshops and agencies which have been run in the wider context of the project. The Warddeken Land Management, based at the Kabulwarnamyo outstation, has been central in this context, as it supports different cultural

and natural resource management activities and research projects. A main goal of the corporation is to become independent of the Government through raising and attracting its own funds from individuals and organisations in Australia and around the world. The NLC for example obtained a grant from the Christensen Fund to support the preservation and propagation of traditional knowledge on the West Arnhem Land plateau through activities such as bush walks. Another option to find non-Government funds to pay landowners to walk through the country is tourism. Tourists can for example pay for this environmental and cultural experience of being guided by Aboriginal people (Cooke 1999, p. 106).

The above mentioned points demonstrate that there is a need for coordination across a range of potential funding sources in order to increase the extent of funds available as well as their continuity. This co-investment in Indigenous NRM could be beneficially expanded to include health, education and others. In this context it is considered that the natural science or professional land management aspect behind many of the NRM projects such as in the WALFA project is strong whereas the view on socio-economic information or social outcomes is often constrained and fragmentary (Mearns 2009, pers. comm., 19. October).

6.4.4 Social and Human Aspects

For the human resource, the aspects looked at encompass the areas of culture and TEK, health, education and training as well as the degree of community organisation. The tight interconnection between Indigenous land management practices with social and cultural aspects has already been illustrated in the previous chapter. In this section mainly the cultural and social aspects which are essential in the context of the WALFA project are highlighted.

6.4.4.1 Culture and TEK

At the ranger meeting, Indigenous rangers described their struggles to preserve their language and Indigenous knowledge. They spoke strongly of their community efforts to stop the loss and also of their disappointment in the lack of the Australian Government's support and funding. Although the maintenance of Aboriginal languages is important for cultural and natural resource management, less attention and funding is put into it (Warddeken Resources 2008). Aboriginal people would like to see much more effort being put into recording and strengthening the knowledge of their elders through actions such as

land management workshops, bush walks and a corresponding school curriculum. This is important in order to signal to young people that traditional knowledge is highly valued and to enhance their learning in a context they can understand. Jimmy Kalarriya stated:

> *"This (land management and traditional ecological knowledge recording project) is a good thing and is something we have all wanted. I have really wanted to see this. Our young people working (in this project) is a good thing. We elders need to teach these young people so they will gain this knowledge, because when we three have died (Bardayal Nadjamerrek, Jimmy Kalarriya and Peter Biless) then it's up to young people to look after the country. (...) We can work together with non-Aboriginal people so that we use both our Aboriginal language terms and the English words together"* (Garde et al 2010, p. 117).

The WALFA project highlights the importance of reciprocity between Western and Indigenous knowledge systems. It demonstrates to young Aboriginal people the value of TEK outside their community and illustrates its potential as a resource for economic benefit and land management. No one is under the illusion today that there can be a return to the former kind of nomadic lifestyle. However, the knowledge of previous generations is crucial for the development of contemporary management which is also emphasised by Otto Campion:

> *"Young people today cannot manage the land well without this knowledge (...) We don't know what the future holds for our land we don't know what the young generation will do without this guidance, so we need to rely on what we know from the past (to manage fire on our country). (...) We need to follow the footsteps of each preceding generation (...) knowing that the knowledge remains (...) you can say farewell (with confidence) you can say farewell to the country (knowing that the knowledge will be handed on (...))"* (Garde et al. 2010, p. 152).

One of the major cultural advantages of the WALFA project is that people get the opportunity to actively practice and sustain their culture and knowledge through getting back and working on the land. Since 1999, the NLC's Caring for Country Unit has established in conjunction with the Jawoyn Association and the Bushfires Council NT regular bush walks into the western Arnhem Land plateau. Regular movement across the country visiting family and cultural significant sites as well as carrying out land management activities re-enforces and maintains Indigenous knowledge (Warddeken Resources 2008). It also demonstrates their obligations to their country and family, at a time

when the values of mutual obligation start to disappear. The main goal of these bush walks is that young Bininj learn both Western and Indigenous ecological concepts as well as listening to the Dreaming stories. These activities on country also enhance self esteem and reduce social alienation (HREOC 2008, p. 269; Morrison 2007, p. 254). Bat (2009, pers. comm., 08. December) however noted in this context

> *"(...) you just can't take a whole bunch of children out on the country and the old people can fill them with knowledge, there are rules about what knowledge they are allowed to have, you have to build a continuous program, so they can learn more as they get older."*

Another important aspect of bush walks is that old people get the opportunity to visit places which they otherwise would not get to. The organisation of bush walks can however be difficult, as the possibilities of conducting one are limited considering funding, dry season, school holidays as well as family and ceremonial obligations (Wohling 2001, p. 163).

The efforts of the WALFA project have supported the progress of the documentation of traditional practices and Indigenous languages. Through land management workshops and the support of the linguist Murray Garde, DVD's and a database have been produced such as 'Language of Land', documenting Indigenous land use terminology and 'Fragments of the Owl's Egg', which shows ranger work and the search for a 'lost' rock art site. The use/ implementation of databases as well as the application of intergenerational transmission and networking in the Top End becomes increasingly important for the maintenance of TEK. In this context the issues of intellectual property rights need to be considered.

6.4.4.2 Human Health

The health of Australia's Indigenous people is in comparison to non-Indigenous Australians still unacceptably poor. There has been hardly any change over the last 20 years and diseases from Westernisation such as obesity, hypertension, diabetes, strokes and heart attacks are drastically increasing. Land management programmes such as WALFA not only have a positive impact on the health of the landscape, but also on the people living there. Owning and living on one's traditional land often includes better nutrition through the production and consumption of harvested game, better physical activity and a better well-being through the improvement of individual autonomy and social cohesion. It has been recognised for a long time that Indigenous people display a greater well-being when being

back on the land. The Garnett and Sithole report (2007) for example demonstrated that there are reduced incidence of chronic disease and beneficial outcomes when people are living on the land. The report also emphasises the positive impact of Indigenous NRM on the health budget (Luckert and Whitehead 2007, p. 101).

6.4.4.3 Education and Training

A central point which I often came across during my field research was the topic of educational quality in remote areas. Although the impact of education is most likely weak or an indirect effect of most resource management projects, I argue here, that it is very crucial for the long term running of the project. Current education policies are having limited success in the schooling of Indigenous people. In the Northern Territory the situation is even worse as there is a rapid decline in educational outcomes for Indigenous children. Factors such as the physical and social environment of rural schools, combined with the high turnover of staff, teacher inexperience, resource shortages, and isolation contribute to the worrying curriculum adaptation and implementation.

A brief historical overview of Indigenous education policy at the national level is offered in order to provide an overview of the needs and challenges in this field. In 1967 the Australian Commonwealth Government developed a national Indigenous education policy framework. On the basis of the findings and advice, the National Aboriginal (and Torres Strait Islander) Education Policy (AEP) with its 21 long-term goals was implemented in 1990. These goals should be achieved with four primary aims: involvement of Aboriginal and Torres Strait Islander people in educational decision-making; equality of access to education; equity of educational participation; and equitable and appropriate educational outcomes. The National Strategy for Indigenous education from 1996-2002 was characterised by measuring outcomes and progress instead of improving inputs. Although the Howard Government's plans for the period 2005-2008 focussed on the needs of Indigenous students in remote areas, it was done by suggesting that students should be sent away to boarding schools in capital cities. This proposal implies the assumption that education in remote areas is not working. The policy however not only focused on 'relocating' remote students but also on new education programmes in communities themselves. Through 'shared responsibility agreements' with communities, the Howard Government made funding dependent on school attendance, which is also known as the 'No

School No Pool' programme combining incentives and sanctions (Schwab 2005, p. 167). Generally, it can be said that the relationship between the NT and Commonwealth Government regarding educational interests has deteriorated significantly in the last years (Lea 2005, p. 153). It is interesting to note that the older generation possesses often a better education than the younger one which can be due to the missionary influence as well as to the lack of educational structure in communities in the last years (Whiteside 2009, pers. comm., 10 November).

Apart from school education, the Vocational Education and Training (VET) scene in the NT also needs to be considered. The VET courses offer more practical, work-orientated training than the higher education system and are administered by the Northern Territory Employment and Training Authority (NTETA). The VET courses are provided by Registered Training Organisations (RTOs) such as the Charles Darwin University, Centralian College, Batchelor College and the NT Rural College. In 1995, the Training Network Northern Territory (TNNT) was established and replaced the former Northern Territory Open College (NTOC) system, which carried out Aboriginal adult education on a holistic and community-based approach. The TNNT is administered by the NTETA and examines the training needs, identifies training providers and facilitates the delivery to areas outside Darwin and Alice Springs. This replacement implicates a move from a community-based system to a centralised approach with a few main offices which do not have the staff nor the resources to spend enough time in all communities. Unfortunately VET funding models are mainly based on enrolments rather than on graduates which favours on-campus delivery instead of following the wishes of Aborigines for onsite training (Australian National Training Authority 1998, p. 7). The VET in Australia has developed into a more industry-driven national training package system with the disadvantage for Indigenous people that they and their local needs and issues are not adequately considered (Baker et al. 2001, p. 145).

In order to make Indigenous education more effective a basic understanding of how learning occurs is required. There are major differences between informal Aboriginal and formal non-Aboriginal learning. The differences in learning styles, language, perspectives, expectations and understandings often lead to major communication problems in the classroom and to low Indigenous school attendance. Many teachers are unaware that there is a big gap between their own culture and the cultural values of their students. In this

situation often the children and not the education system are seen as the problem. Social factors such as poor housing, conflict between the values of parents and schools, prejudice from classmates, poor self-esteem and lack of employment prospects can also play a major role in the failure of Aboriginals to progress through school. It is also important to consider that Aboriginal parents often do not see the purpose of schooling as there is little need in Aboriginal society for formal education as all learning which is necessary for the participation in the group (apart from secret/sacred knowledge and Western knowledge) can be learnt through the day-to-day process of socialisation (Christie 1985, pp. 46-55).

In order to overcome some of these specific problems, the curriculum as well as the staffing in rural schools needs to be reconsidered. It is important to realise that curriculum goals and objectives cannot be treated in isolation from the surrounding society with its economic, demographic, social and cultural situation. It has also shown that the employment of Aboriginal teachers and staff is not only important for effective education and training delivery but also for the avoidance of high staff turnover (Whiteside 2009, pers. comm., 10. November). Although there are a number of innovative education programmes in existence, less has be done on a national level to coordinate and identify the most effective and successful ones (Bat 2009, pers. comm., 08. December). Generally, a coordinated approach is needed which is not based on a rapid flying in and depart approach. In the last years reforms have also been passed which intentionally or unwittingly serve to ‘urbanise’ rural education and training delivery services. These reforms are not only likely to fail but also have negative effects on the communities. The arguments for urbanisation are often based on the high delivery costs to sparsely populated areas. However rural schools have been able to reduce their economic burden through strategies suited to the rural conditions. Despite the relatively small training system in the NT, Aboriginal community representatives and providers are confronted with a considerable bureaucratic maze. It is also not making it easier when the political and institutional directions are frequently changing (Australian National Training Authority 1998, p. 8).

Generally it is important that education in Aboriginal communities is on the one hand culturally grounded and fits to the needs of Aboriginal people, and on the other hand integrates an economic development model that enhances English literacy and numeracy skills in order to be able to participate in the labour market and to handle the information processes which occur at the Aboriginal-non-Aboriginal interface. There is not only a

challenge to improve Western but also traditional Indigenous education, upon which the potential to benefit from NRM activities is based (Luckert and Whitehead 2007, p. 102).

> *"Lofty is particular keen to educate the younger generation in managing the country and many of his teenage grandsons have chosen to stay in the bush with their grandfather, rather than pursue more usual teenage activities in the nearest towns about five hours away"* (Natural Heritage 2004, p. 5).

Indigenous NRM such as the WALFA project favours the transfer and application of Indigenous knowledge through the support of Indigenous ranger programmes and the ongoing management of the lands which is closely tied to the maintenance of ties between families, clans, language groups and the passing on of knowledge (Luckert and Whitehead 2007, p. 102). Indigenous ranger programmes not only provide a strong drive for the rangers themselves to learn English but also offer a good role model to young people. The WALFA project also provides extended training to ensure that the expertise remains in the community and that data collection and analytical skills are taught to Indigenous researchers. A core group of rangers is for example now qualified to deliver aerial controlled burning (ACB) from helicopters and fixed-wing aircraft. The demonstration of such employment opportunities has also the potential to re-engage early school leavers in learning again.

> "*We also are thrilled to hear that Indigenous children have an increased interest in science at school, after seeing traditional rangers and western scientists work on the scheme*." (Russell-Smith viewed 2009)

Taken together, the main claims in Indigenous education are to re-conceptualise learning and to transform conceptions and experiences around education by concentrating within, and not outside of local Indigenous communities. Bat (2009, pers. comm., 08. December) emphasised

> *"Both ways learning is about to support who they are, it is about supporting, teaching the child you got and not teaching the child you wish to have; leaving the child who they are; it is about strategies which can support the child; it is about identity."*

An Indigenous learning community is required which promotes life-long learning, builds partnerships between families, schools, business and government and considers the needs and interests in the development of skills and knowledge. Indigenous learning communities will differ in form from place to place as they are shaped by the unique needs of the people.

Communities not only need more control over the curriculum but also over the money spent for educational purposes. Finally it is also important to note that although it is a main goal of the Education Policy to teach all Australian students about Aboriginal Australia, it is still poorly implemented in the school curriculum. The same lacking can be observed in the training of teachers who often know nothing about Aboriginal cultures.

6.4.4.4 Community Organisation

Since 1997 traditional owners and Peter Cooke have supported Bininj people to get back on the land and to re-establish the Kabulwarnamyo outstation. As the landowners did not have their own association, the funds were looked after by the NLC. In order to get more independence and to be able to manage funding themselves, they set up the corporation Warddeken Land Management Limited in August 2007. In the next step, Warddeken Land Management proposed to declare their land as an Indigenous Protected Area (IPA) in order to get funding from the Australian Government as well as being able to make their own partnerships with private organisations and to determine their own outcomes. In September 2009 their land was officially declared as an IPA. Warddeken along with traditional owners have been involved in a number of research projects. Also new ways of providing a cash income source for people on country are supported. It is important to note that Warddeken will not spend funds on vehicles or other items for private use but rather undertakes land management work for the benefit of all landowners (Warddeken Resources 2008).

The WALFA project does not undermine the Bininj belief system and social order. Through the employment and training of rangers not only economic and cultural advantages, but also improved self-esteem through things such as training, uniforms and vehicles as well as through mutually respectful interactions with non-Indigenous visitors can be achieved. In this way ranger groups act as local examples of effective governance and improve community function. Therefore, ranger work fulfils broader goals such as individual and community well-being, cultural maintenance and revival, security and enhanced political power (Luckert and Whitehead 2007, p. 101). Training is not only strengthening their position on the labour market but is also inextricably linked to good governance since it is through education that the community improves their capacity to understand and debate issues. Improved governance on the other hand will improve social function through increasing the levels of personal safety and reducing rates of incarceration (Garnett et al.

2008, p. 9). Negative cultural impacts from the WALFA project have not been noticed so far. However a stronger involvement of all members of the community including women and youth is needed. For example, Lofty Bardayal's daughters teaching experience and knowledge could be more involved in the education context of the WALFA project. A stronger involvement would also strengthen the Indigenous language and community identity. An alternative would be to seek within the scope of the WALFA project more wealth generating opportunities for local people.

6.5 WALFA: Discussion and Conclusion

The West Arnhem Land Fire Abatement agreement demonstrates a new model for integrated fire management practices, namely the coexistence of fire, people and biodiversity in northern Australia. There are many reasons for the success of the WALFA programme, however the core of the success can be traced back to the strong leadership and partnership between Aboriginal and non-Aboriginal people and institutions, the partial independence from the Australian Government through commercial payments as well as to its longevity, institutional stability and secure land rights situation. In particular the initiation of the project by Indigenous people themselves was a crucial precondition for the success of the project. A distinctive feature of the WALFA project is that it is not only focusing on one aspect but produces economic, environmental, social and cultural outcomes at the same time, as it (a) delivers significant biodiversity and environmental benefits, (b) produces positive economic outcomes in remote Indigenous communities through the creation of employment as well as through the development of skills and organisational capacity, (c) maintains and strengthens cultural values, TEK and traditional practices of fire management, (d) increases the competencies in dealing with the outside world, through training, education and collaboration with scientists, government and other bodies and (e) provides national and international benefits. Some of these outcomes arise directly from the WALFA project, such as maintenance of biodiversity, the reduction of wildfires and the sequestration of carbon. Benefits for the community can be seen in the form of increased equipment, mobility and access to remote areas. Other outcomes result indirectly from the WALFA project or from the programmes and workshops which occur in the wider context of the project, such as maintaining cultural values, improving education and the health of Indigenous peoples.

The great economic strength of the project is that it can offer rare job opportunities in remote Indigenous communities and the engagement with the national market economy without transforming traditional ways of life. The WALFA project does not only satisfy carbon abatement concerns but also supports Indigenous land management and cultural practices by supporting Indigenous people being back on their homelands. The WALFA agreement took many years to get off the ground. The WALFA project with its two-way approach philosophy provides numerous benefits to Aboriginal people. It strengthens people's relationship with the land and traditional law and points out the validity of traditional knowledge in the modern world. In this context it acknowledges senior Aboriginal people as experts and hopefully encourages young Aboriginal people to continue to learn and maintain their traditional skills. Aside from that, it also assists Aboriginal people to be recognised by non-Aboriginal people as equal management partners. It gives Aboriginal people the opportunity to instruct non-Aboriginal people in the methods of caring for country. Through the project, alternative lifestyles in the bush away from some of the negative social pressures such as 'grog culture' in the townships are offered. The WALFA project highlights the potential of a collaborative engagement of researchers, Aboriginal people and other stakeholders. In order to enhance the collaboration, gaps in relevant education and job opportunities need to be closed. The project also contributes towards national and international goals through improved carbon and biodiversity management as well as through taking responsibility for Indigenous heritage. Additionally, financial pressure on the Australian Government and taxpayers is reduced due to a stronger Aboriginal economic situation, better Aboriginal health outcomes and lower environmental costs. The success of the WALFA project can be also seen by its extension to five other areas in the fire-prone savannas shown in Figure 6.11.

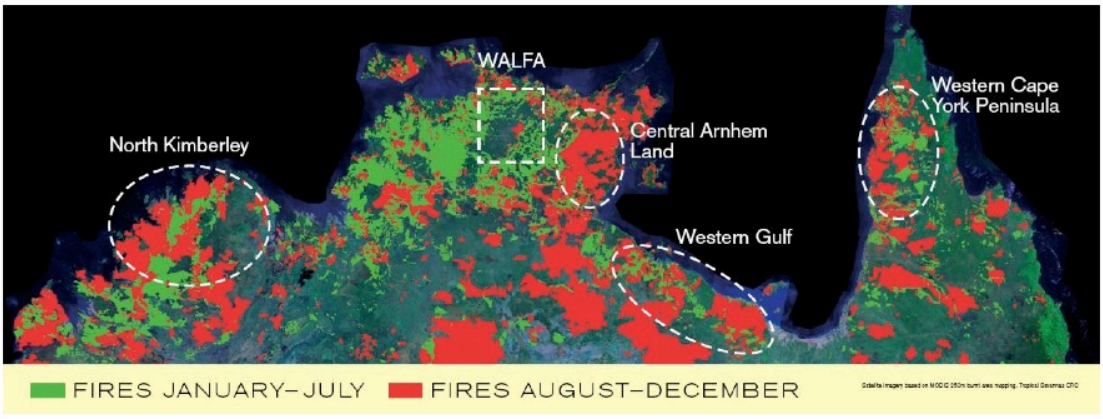

Figure 6.11 Greenhouse gas offsets agreements in five areas in the tropical savannas

It is obvious that the WALFA project offers a great opportunity to work with local communities to reinforce and extend their ability to obtain sustainable livelihoods. However it is still not utilised to the extent which would be necessary, as the project has currently no resources left to directly improve social and cultural outcomes. Currently, these are mainly covered through programmes and agencies which occur in the wider context of the WALFA project. However for the successful continuation of the project local needs have to be satisfied and the community organisation needs to be strengthened. In particular young people need to get more involved in land/fire management practices in order to ensure the future of the country and the maintenance of TEK. However many challenges and problems are faced in this context, for example the new released policies to centralise remote Indigenous populations and services into townships and to eliminate bilingual education. The failure of schooling and formal training to lead to employment, combined with short-time and uncertain funding start to undermine the positive advances made by traditional owners and projects such as the WALFA project. Although the project offers employment through the creation of ranger jobs, the economic development is still very limited and only a few people are favoured. The WALFA project should be seen as part of a greater whole which sets the basis for different programmes and agencies to complement and stimulate each other. Also policy conditions and changes such as the abolishment of CDEP influence the outcomes of the WALFA project. It is therefore important that Territory and Commonwealth Governments ensure a continuity and efficiency of policy.

Generally it can be said that the WALFA project has the potential to tackle contemporary problems related to greenhouse gas emissions, cultural stability and economic development strategies in remote areas as it offers careers in the bush and enables local people to practice their culture in a strong and traditional manner. However the question is how these benefits are shared and transformed into sustainable futures on the land for local Indigenous community members. Therefore, especially governmental agencies and Indigenous representative organisations are asked to take responsibility.

7. CONCLUSION

Fire was and still is an important component of the ecological, geomorphological and cultural landscape of northern Australia, however at the same time it is one of the major land and wildlife management challenges today. Effective fire management is therefore a necessary requirement for the conservation of the ecosystem. Research and observations have shown that the restoration of customary fire management practice and the revitalisation of TEK play an important role in the maintenance of savanna biodiversity. Aboriginal land managers in remote northern Australia, who have the knowledge and are skilled in the use of fire, should therefore be viewed as important national assets. Apart from the significance of TEK for conservation and environmental management services, also the increasing land ownership and management by Aboriginal people makes it clear that Australia needs the support of Indigenous landowners in order to meet its regional, national and international commitments for the maintenance of biological diversity.

The exchange of fire management expertise as well as the re-establishment of TEK into practice is crucial, especially when there is so little known of northern Australian landscapes. Knowledge has been lost through population decimation and dislocation of Aboriginal people; however more Aboriginal people and Aboriginal knowledge has survived in Northern Territory than anywhere else in Australia. Nonetheless, as senior Aboriginal people with their extensive ecological knowledge pass away, the opportunities for recording knowledge and assisting with inter-generational transfer of knowledge are fading away. With the loss of this knowledge and cultural heritage, the ability to comprehend the complexity of human interactions with this particular environment is certainly limited. As emphasised, the Aboriginal perception of the environment differs greatly from the Anglo-Australian one and determines how Aboriginal people act within it. Ingold's theory of direct perception with its emphasis on shaping the environment through activities and the embodiment of past activity facilitates the understanding of Aboriginal perspective towards fire management. Aboriginal people are not seeing themselves separated from land, quite the contrary, the land reinforces who they are and keeps them connected with their culture and traditional ecological knowledge. Living or moving on the land is therefore an important precondition to keep the relationship with the land upright and strong. However the significance of language cannot be underestimated in this context,

as language is for Aboriginal people closely connected with their Dreaming and therefore with their ethnic identity and relationship to the land.

In order to address the global, environmental and cultural challenges that northern Australia is facing in the 21st century, an integrated approach is needed which supports the people who carry out these environmental services. The complexity of Indigenous development issues cannot be understated and there is no question that health, education, employment and other social infrastructure are not sufficiently accessible. Most people writing on Aboriginal self-determination focus on the constitutional or structural aspects of self-government. Self-government can be realised only when individuals are secure in their cultural identity and can contribute to the transformation of their communities. Education, training and good governance also provide the groundwork for the reduction of economic and social disadvantage. However, only if matched to real needs and wants can any measurable benefit be realised.

Environmental change and the move towards corporate social responsibility and payment for environmental services are creating a new market for Indigenous NRM. This combination of PES together with integrated NRM initiatives that combine Western science and TEK have shown to be an important livelihood strategy for Aboriginal communities. The combination of contemporary and traditional land use, including social and cultural values along with the aim of generating incomes, offer alternative development opportunities on the Indigenous estate. Integrated approaches are key in maintaining important NRM knowledge as well as the integration and preservation of Australian cultures of northern Australia. Therefore cross-disciplinary cooperation amongst ecologists, linguists, and social scientists working together with Indigenous communities is significant. However to make collaborative research and development possible, it is important to identify Aboriginal agendas and priorities and to improve the participation by traditional owners in statutory and other government processes for environmental planning and land-use decision-making. These partnerships are the key to successful land management strategies.

Although the NT Government is facing many challenges in improving Aboriginal livelihoods, it also has a number of advantages in the emerging PES market by private companies due to its relatively intact landscape and maintenance of Indigenous knowledge

and land management practices. This new source of private money has the potential to move away from governmental funding which can change with economic recession or the following period of governance, towards increased income and permanent contract positions. The secure long term commercial funding in contrast to short term government funding that is under high administrative burdens, makes it possible to establish sustainable cultures of change and growth. However, currently much of the PES on Indigenous estate are funded via Commonwealth programmes or need at least its additional support. However, as pointed out, the political environment in Australia and the NT is constantly changing and there are major gaps between policy statements, the action imperatives contained within them and the reality on-the-ground for Aboriginal communities. These strategies are often unhelpful or get in the way of achieving the goals that are supposed to be achieved. Analysis of the literature shows that these problems were publicly emphasised already years ago, but little has been done to address them. A governmental landscape is needed which is characterised by a stable policy and funding regime as well as by continual consultation and facilitation services on the ground level in order to address the cultural and socio-economic disparities. It is also necessary to provide greater transparency in relation to budget and financial resources. The aim should be programmes which lead to real benefits for the people who really matter in resource projects on Indigenous lands, the local Indigenous community members.

The potential of private sector or private/public mixed funding of PES is demonstrated in the case of the WALFA project in western Arnhem Land. The WALFA project is one of the largest greenhouse gas abatement operations in Australia and it has been largely achieved by Indigenous people in some of the most disadvantaged communities. It illustrates an exciting possibility for combining Indigenous expertise plus Western ecological knowledge and technology for producing tradable carbon offset. Through the integration of environmental, social and cultural concerns, the WALFA project offers ‘real’ sustainable management of Indigenous estate. There is a great need for NRM initiatives like WALFA which stimulate the local economy market, which goes along with the interests of local people and which is based on skills additional to or instead of formal education. The numerous beneficial outcomes that potentially arise from Indigenous NRM to Indigenous people and the public at large demonstrates that government and/or private sector support is increasingly justified. Contrary to the urbanisation tendencies of the current Government,

NRM projects such as WALFA show the improvements in social, cultural and landscape health through renewing access to country for Indigenous communities.

The aim of this work has been to demonstrate the connection between traditional ecological knowledge, natural resource management and community development. Through highlighting the social, cultural and environmental role of TEK in contemporary NRM practices such as fire management it has been shown that TEK and social knowledge are important for the commercial success of programmes and the improvement of Indigenous livelihood. Apart from illustrating changes and challenges faced by TEK and land management practices, its significance as an asset to improve cooperation between Aboriginal and non-Aboriginal people in the field of NRM as well as to empower Indigenous communities to maintain livelihood options and to develop new strategies is shown. In this connection the importance of maintaining and conserving Indigenous local knowledge systems as well as the possibility of being on the land and using the land for the improvement of the well-being of Indigenous communities are pointed out. The case study of the WALFA project with its analysis of the social outcomes has therefore been used to demonstrate new alternative development possibilities for Indigenous estate through the payment for environmental services. It emphasises how both environmental and linked social and economic problems can be addressed at the same time through the engagement of Aboriginal people.

8. REFERENCES

Altman, J. (2001). Aboriginal Economic Development and Land Rights in the Northern Territory: Past Performance, Current Issues and Strategies Options. *CAEPR Discussion Paper No. 126*, CAEPR, ANU. Canberra.

Altman, J. and Hunter, B. (2003). Monitoring Practical Reconciliation: Evidence from the 2001 Census. *CAEPR Discussion Paper No. 254*, CAEPR, ANU. Canberra.

Altman, J. et al. (2004). Indigenous Socioeconomic Change 1971-2001: A Historical Perspective. *CAEPR Discussion Paper No. 266*, CAEPR, ANU. Canberra.

Altman, J. (2005). 'Economic Futures on Aboriginal Land in Remote and Very Remote Australia: Hybrid Economies and Joint Ventures', in D. Austin-Broos and G. Macdonald (eds.), *Culture, Economy and Governance in Aboriginal Australia*. University of Sydney, NSW.

Altman, J. (2006). The Indigenous Estate and the Conservation Estate: Integration Possibilities for Effective Environmental Management. Paper presented at the Parks and Protected Areas Management Conference, 2-3 August, Queanbeyan. NSW.

Altman, J., Buchanan, G.J. and Larsen, L. (2007). The Environmental Significance of the Indigenous Estate: Natural Resource Management as Economic Development in Remote Australia. *CAEPR Discussion Paper No. 287*, CAEPR, ANU. Canberra.

Anderson, R. (1995). 'Bushfires Council, the Community and You', in D.B. Rose (ed.), *Country in Flames: Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia*. Canberra.

Appadurai, A. (1990). Disjuncture and Difference in the Global Cultural Economy. *Public Culture*, vol. 2 (2), pp. 1-24.

Ashley, C. and Carney, D. (1999). *Sustainable Livelihoods: Lessons from Early Experience*. DFID. London.

Australian National Training Authority. (1998). *Djama and Vet : Exploring Partnerships and Practices in the Delivery of Vocational Education and Training in Rural and Remote Aboriginal Communities - Research Report Volume 1*. Northern Territory University Press. Darwin.

Baker, R. (1993). 'Traditional Aboriginal Land Use in the Borroloola Region', in N. M Williams and G. Baines (eds.), *Traditional Ecological Knowledge: Wisdom for Sustainable Development.* Australian National University. Canberra.

Baker, R., Davies, J., and Young, E. (eds.) (2001). *Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions*. Oxford University Press. Melbourne.

Becker, H. (1997). *Social Impact Assessment*. UCL Press. London.

Berkes, F. (1999). *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis. Philadelphia.

Berkes, F., Colding and J., Folke, C. (2000). Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*, vol. 10 (5), pp. 1251-1262.

Bowden, R. and Bunbury, B. (1990). *Being Aboriginal. Comments, Observations and Stories from Aboriginal Australians*. ABC Books. Sydney.

Bowman, D., Garde, M., and Saulwick, A. (2001). Kunj-ken Makka Man-wurrk 'Fire is for Kangaroos: Interpreting Aboriginal Accounts of Landscape Burning in Central Arnhem Land', in A. Anderson et al. (eds.), *Histories of Old Ages: Essays in Honour of Rhys Jones*. Pandanus Books. Canberra.

Bradley, J. (1995). 'Fire: Emotion and Politics. A Yanyuwa Case Study', in D.B. Rose (ed.), *Country in Flames: Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia*. Canberra, pp. 33-42.

Braithwaite, R. (1995). 'A Healthy Savanna, Endangered Mammals and Aboriginal Burning', in D.B. Rose (ed.), *Country in Flames: Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia*. Canberra.

Broome, R. (1994). *Aboriginal Australians: Black Responses to White Dominance, 1788-1994*. Allen & Unwin. St. Leonards.

Brundtland, G. et al. (1987). *Our Common Future: World Commission on Environment and Development*. Oxford University Press. Oxford.

Christie, J. (1985). *Aboriginal Perspectives on Experience and Learning: the Role of Language in Aboriginal Education*. Deakin University. Victoria.

Christie, J. (1996). 'Biodiversity and Intellectual Property Rights: Implications for Indigenous Peoples', in Northern Land Council (ed.), *Ecopolitics IX Conference Papers and Resolutions.* Northern Territory.

Christie, J. (2007). 'Knowledge Management and Natural Resource Management', in M. Luckert (ed.), *Investing in Indigenous Natural Resource Management*. Charles Darwin University Presss. Darwin.

Colchester, M. (1994). Salvaging Nature: Indigenous Peoples, Protected Areas, and Biodiversity Conservation. *United Nations Research Institute for Social Development Discussion Paper,* vol. 55. Geneva.

Cooke, P. (1999). 'Fire Management on Aboriginal Lands in the Top End of the Northern Territory, Australia', in J. Russell-Smith et al. (eds.), *Fire and Sustainable Agricultural and Forestry Development in Eastern Indonesia and Northern Australia*. Australian Centre for Internatinal Agricultural Research. Darwin.

Dewalt, K., Dewalt, B. and Wayland, C. (1998). 'Participant Observation', in HR. Bernard (ed.), *Handbook of Methods in Cultural Anthropology*. University of Florida.

Dixon, R. (1980). *The Languages of Australia*. Cambride University Presss. Cambridge.

Dodson, M. (1996). 'Indigenous Peoples and Intellectual Property Rights', in Northern Land Council (ed.), *Ecopolitics IX Conference Papers and Resolutions.* Northern Territory.

Ellen, R., Parkes, P. and Bicker, A. (2000). *Indigenous Environmental Knowledge and Its Transformations: Critical Anthropological Perspectives*. Harwood Academic. Amsterdam.

Emerson, R., Fretz, R. and Shaw, L. (1995). *Writing Ethnographic Fieldnotes.* The University of Chicago Press. Chicago & London.

Flick, U. (2009). *An Introduction to Qualitative Research*. SAGE Publications Ltd. London.

Garde, M. (2008). Kun-dangwok: Clan Lects and Ausbau in Western Arnhem Land. *International Journal of the Sociology of Language,* vol. 191, pp. 141-169.

Garde, M. et al. (2010). 'The Language of Fire: Seasonality, Resources and Landscape Burning on the Arnhem Land Plateau', in J. Russell-Smith et al. (eds.), *Culture, Ecology and Economy of Fire Management in North Australian Savannas: Rekindling the Wurrk Tradition*. CSIRO Publishing. Collingwood.

Garnett, S. et al. (2008). *Future Options for North Australia*. Charles Darwin University Press. Darwin.

Gibson, J. (1979). *The Ecological Approach to Visual Perception*. Houghton Mifflin. Boston.

Glaser, B. and Strauss, A. (1967). *The Discovery of Grounded Theory*. Aldine. Chicago.

Goodale, J. (1971). *Tiwi Wives: A Study of the Women of Melville Island, North Australia*. University of Washington Press. Seattle.

Gould, R. (1971). Uses and Effects of Fire among the Western Desert Aborigines of Australia. *Mankind*, vol. 8, pp. 14-24.

Hammersley, M. and Atkinson, P. (1983). *Ethnography, Principles in Practice*. Tavistock. London & New York.

Hannerz, U. (1990). 'Cosmopolitans and Locals in World Culture', in M. Featherstone (ed.), *Global Culture*, Sage. London.

Harris, D. (1977). 'Subsistence Strategies across Torres Strait', in J. Allen et al. (eds.), *Sunda and Sahul: Preshistoric Studies in Southeast Asia, Melanesia and Australia*. Academic Press. New York.

Haynes, C. (1985). The Pattern and Ecology of Munwag: Traditional Aboriginal Fire Regimes in North-Central Arnhem Land. *Proceedings of the Ecological Society of Australia*, vol. 13, pp. 203-214.

Haynes, C. (1991). 'Use and Impact of Fire', in C. Haynes et. al. (eds.), *Monsoonal Australia: Landscape, Ecology and Man in Northern Lowlands*. Balkema. Rotterdam.

Head, L. (1993). 'The Value of the Long-Term Perspective: Environmental History and Traditional Ecological Knowledge', in N. Williams et al. (eds.), *Traditional Ecological Knowledge: Wisdom for Sustainable Development*. Australian National University. Canberra.

Head, L. and Hughes, C. (1996). 'One Land, which Law? Fire in the Northern Territory', in R. Howitt et al. (eds.), *Resources, Nations and Indigenous peoples: Case Studies from Australasia, Melanesia and Southeast Asia*. Oxford University Press. Melbourne.

Healey, C. (1993). 'The Significance and Application of TEK', in N. Williams and G. Baines (eds.), *Traditional Ecological Knowledge: Wisdom for Sustainable Development*. Australian National University. Canberra.

Howitt, R. (2001). *Rethinking Resource Management: Justice, Sustainability and Indigenous Peoples*. Routledge. Oxon.

Hughes, C. (1995). 'Fire Management in Northern Territory post-Mabo. The Legal Basis for Aboriginal Burning', in D.B. Rose (ed.), *Country in Flames: Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia*. Canberra.

HREOC (Human Rights and Equal Opportunity Commission) (2008). *Native Title Report 2007*. Aboriginal & Torres Strait Islander Social Justice Commissioner, Report No. 2. Sydney.

Hunn, E. (1993). 'What is Traditional Ecological Knowledge?', in N. Williams and G. Baines (eds.), *Traditional Ecological Knowledge: Wisdom for Sustainable Development*. Australian National University. Canberra.

Huntington, E. (1924). *Civilization and Climate*. Yale University Press. New Haven.

IAIA (2003). International Principles for Social Impact Assessment. *IAIA Special Publication Series*, vol. 2, May 2003. International Association for Impact Assessment. Fargo.

Ingold, T. (1992). 'Culture and the Perception of the Environment', in E. Croll and D. Parkin (eds.), *Bush Base, Forest Farm: Culture, Environment and Development*. Routledge. London.

Ingold. T. (1996). 'Hunting and Gathering as Ways of Perceiving the Environment', in R. Ellen and K. Fukui (eds.), *Redefining Nature: Ecology Culture and Domestication*. Berg. Oxford.

Jacklyn, P. and Russel-Smith, J. (1998). *Proceedings from the North Australia Fire Management Workshop Darwin 24-25 March 1998*. Tropical Savannas CRC. Darwin.

Jones, R. (1969). Fire-Stick Farming. *Australian Natural History,* vol. 16, pp. 224-228.

Jones, R. (1975). 'The Neolithic, Palaeolithic and the Hunting Gardeners: Man and Land in the Antipodes', in R. Suggate and M. Cresswell (eds.), *Quaternary Studies*. The Royal Society of New Zealand. Wellington.

Jones, R. (1980). ‘Hunters in the Australian Coastal Savanna’, in D. Harris (ed.), *Ecology in Savanna Environments*. Academic Press. London.

Jones, R. (1995). ‘Mindjongork: Legacy of the Firestick’, in D.B. Rose (ed.), *Country in Flames: Proceedings of the 1994 Symposium on Biodiversity and Fire in North Australia*. Canberra.

Kemp, E. (1981). ‘Pre-Quaternary Fire in Australia’, in Gill et al. (eds.), *Fire and the Australian biota. Australian Academy of Science*. Canberra.

Kempton, W. (2001). ‘Cognitive Anthropology and the Environment’, in C. Crumley (ed.), *New Directions in Anthropology & Environment*. AltaMira Press. Walnut Creek.

Kerr, A. (2008). *The Potential Institutional Arrangement to Deliver Benefits to Indigenous People through Fire Management in Northern Australia*. Master thesis Charles Darwin University. Darwin.

Lea, D. (1992). ‘Sustainable Development, People, Planning and Ethics’, in North Australian Research Unit (ed.), *Conservation and Development Issues in Northern Australia*. NTU. Darwin.

Leach, E. (1976). *Culture and Communication*. Cambridge University Press. Cambridge.

Lévi-Strauss, C. (1963). *Structural Anthropology*. Basic Books. New York.

Lewis, HT. (1989). Ecological and Technological Knowledge of Fire: Aborigines Versus Park Rangers in Northern Australia. *American Anthropologist*, vol. 91, pp. 940-961.

Lewis, HT. (1993). ‘The Technology and Ecology of Nature’s Custodians: Anthropological Perspectives on Aborigines and National Parks’, in J. Birckhead et al. (eds.), *Aboriginal Involvement in Parks and Protected Areas*. Aboriginal Studies Press. Canberra.

Liddle, L. (2001). ‘Bridging the Communication Gap: Transferring Information between Scientists and Aboriginal Land Managers’ in R. Baker et al. (eds.), *Working on Country: Contemporary Indigenous Management of Australia’s Lands and Coastal Regions*. Oxford University Press. Melbourne.

Lucas, D., Gapindi, M. and Russell-Smith, J. (1997). ‘Cultural Perspectives of the South Alligator River Floodplain: Continuity and Change’, in D. Rose and A. Clarke (eds.), *Tracking Knowledge in Northern Australian Landscapes*. North Australian Research Unit. Australian National University. Darwin.

Luckert, M. and Whitehead, P. (2007). 'A General Case for Natural Resource Management. Market Failures and Government Policy', in M. Luckert (ed.), *Investing in Indigenous Natural Resource Management*. Charles Darwin University Presss. Darwin.

Malezer, L. (2008). 'The UN Declaration on the Rights of Indigenous Peoples', in K. Wessendorfer (ed.), *The Indigenous World 2008*. International Work Group for Indigenous Affairs. Copenhagen.

Mason, O. (1896). Influence of Environment upon Human Industries or Arts. A*nnual Report of the Smithsonian Institution for 1895*, pp. 639-665.

McNee, A. et al. (1993). 'Land Management and Use: Sustainability for Aboriginal people', in J. Birckhead et al. (eds.), *Aboriginal Involvement in Parks and Protected Areas*. Aboriginal Studies Press. Canberra.

Meehan, B. (1991). 'Wetland Hunters: Some Reflections', in C. Haynes et al. (eds.), *Monsoonal Australia: Landscape, Ecology and Man in the Northern Lowlands*. Belkema. Rotterdam.

Milton, K. (1997). Ecologies: Anthropology, Culture and the Environment. *International Social Science Journal*, vol. 49:154, pp. 477-495.

Morrison, J. (2007). 'Coercive Reconciliation: Stabilise, Normalise, Exit Aboriginal Australia', in J. Altman and M. Hinkson (eds.), *Caring for Country*. Arena Publications. North Carlton.

Nakashima, D. and Roué, M. (2002). 'Indigenous Knowledge, Peoples, and Sustainable Practice', in P. Timmerman (ed.), *Encyclopaedia of Global Environmental Change*, vol. 5. John Wiley & Sons. Chichester.

Northern Land Council (2006). *Celebrating Ten Years of Caring for Country: A Northern Land Council Initiative*. NLC. Darwin.

Purdon, P. (2007). *A Northern Perspective: Savanna Management*. Climate Change: Land Management, Agriculture and Forestry Workshop. Melbourne.

Pyne, S. (1991). *Burning Bush: A Fire History of Australia*. Holt. New York.

Radcliffe-Brown, A. (1930). The Social Organization of Australian Tribes. *Oceania*, vol. 1, pp. 34-63.

Rappaport, R. (1968). *Pigs for the Ancestors*. Yale University Press. New Haven.

Rappaport, R. (1971). 'Nature, Culture and Ecological Anthropology', in H. Shapiro (ed.), *Man, Culture and Society*. Oxford University Press. Oxford.

Rezende, D. and Merlin, S. (2003). S*ocial Carbon: Adding Value to Sustainable Development*. Instituto Ecológica. Sao Paulo.

Richards, M. and Panfil, S. (2010). Manual for Social Impact Assessment of Land-Based Carbon Projects. *Forest Trends, Climate, Community & Biodiversity Alliance, Rainforest and Fauna & Flora International*, vol. 1. Washington D.C.

Rose, D. (2001). 'Sacred Site, Ancestral Clearing, and Environmental Ethics', in A. Rumsey and J. Weiner (eds.), *Emplaced Myth: Space, Narrative, and Knowledge in Aboriginal Australia and Papua New Guinea*. University of Hawaii Press. Honolulu.

Ross, H. (2001). 'Social Impact Assessment: Coronation Hill', in R. Baker et al. (eds.), *Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions*. Oxford University Press. Melbourne.

Russell-Smith, J. et al. (1997). Aboriginal Resource Utilization and Fire Management Practice in Western Arnhem Land, Monsoonal Northern Australia: Notes for Prehistory and Lessons for the Future. *Human Ecology*, vol. 25, pp. 159-195.

Russell-Smith, J. (2001). Pre-Contact Aboriginal, and Contemporary Fire Regimes of the Savanna Landscapes of Northern Australia: Patterns, Changes and Ecological Responses. *Ngoonjook*, vol. 20, pp. 6-23.

Russell-Smith, J. et al. (2003). Contemporary Fire Regimes of Northern Australia, 1997-2001: Change since Aboriginal Occupancy, Challenges for Sustainable Management. *International Journal of Wildland Fire*, vol. 12, pp. 283-297.

Sahlins, M. (1971). *Stone Age Economics*. Aldine.

Schwab, J. (2005). 'Education and Community', in D. Austin-Broos et al. (eds.), C*ulture Economy and Governance in Aboriginal Australia: Proceedings of A Workshop held at the University of Sydney, 30. November-1 December 2004*. University of Sydney Press. Sydney.

Spradley, J. (1979). *The Ethnographic Interview*. Holt, Rinehart & Winston. New York.

Steward, J. (1955). *Theory of Culture Change*. University of Illinois Presss. Urbana.

Sutherland, J. and Muir, K. (2001). 'Managing Country: A Legal Overview', in R. Baker et al. (eds.), *Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions*. Oxford University Press. Melbourne.

Telfer, W. and Garde, M. (2006). Indigenous Knowledge of Rock Kangaroo Ecology in Western Arnhem Land, Australia. *Human Ecology*, vol. 34:3, pp. 379-406.

Thomas, M. (2007). Taking Them Back: Archival Media in Arnhem Land Today. *Cultural Studies Review*, vol. 13 (2).

Thomson, D. (1949a). *Economic Structure and the Ceremonial Exchange Cycle in Arnhem Land*. Macmillian & Co. Melbourne.

Thomson, D. (1949b). Arnhem Land: Explorations among an Unknown People. Part II. The People of Blue Mud Bay. *Geographical Journal,* vol. 113, pp. 1-8.

Thomson, D. (1949c). Arnhem Land: Explorations among an Unknown People. Part III. On foot across Arnhem Land. *Geographical Journal,* vol. 113, pp. 53-67.

Titscher, S. et al. (eds.) (2000). *Methods of Text and Discourse Analysis*. SAGE Publications Ltd. London.

Tropical Savannas CRC. (2008). *Annual Report 2007-2008*. Charles Darwin University. Darwin.

Walsh, M. (1993). 'Languages and their Status in Aboriginal Australia', in M. Walsh and C. Yallop (eds.), *Language and Culture in Aboriginal Australia*. Aboriginal Studies Press. Canberra.

Whitehead, P. et al. (2003). Customary Use of Fire by Indigenous Peoples in Northern Australia: Its Contemporary Role in Savanna Management. *International Journal of Wildland Fire*, vol. 12, pp. 415-425.

Wohling, M. (2001). 'Ngaparrtji Ngaparrtji Nintilpayi. Reciprocal Thinking in Indigenous Land Management', in R. Baker et al. (eds.), *Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions*. Oxford University Press. Melbourne.

World Commission on Environment and Development (WCED) (1987). *Our Common Future*. Oxford University Press. Oxford.

Worth, D. (2005). *The Natural Heritage Trust and Indigenous Engagement in Natural Resource Management*. National Native Title Tribunal. Research Unit. Commonwealth of Australia.

Yibarbuk, D. (1998). 'Notes on Traditional Use of Fire on the Upper Cadell River', in M. Langton (ed.), *Burning Questions: Ongoing Environmental Issues for Indigenous Peoples in Northern Australia*. Northern Territory University. Darwin.

Yibarbuk, D. and Cooke, P. (2001). Bininj mak balanda kunwale manwurrk-ken. *Ngoonjook*, vol. 20, pp. 33-37.

Young, E. (1991). *Caring for Country: Aborigines and Land Management*. Australian National Parks and Wildlife Service. Canberra.

Audiovisual

Fragments of the Owl's Egg 2006, video recording, Australian National University. Canberra.

The Language of the Land, Ku-Warddewardde Arnhem Plateau 2005, video recording, Australian National University. Canberra.

The Old People Footsteps 2007, video recording, Australian National University. Canberra.

Internet Articles and Websites

Bowman, D. et al., Traditional and non-traditional viewpoints Arnhem Land Fire Stories; EnviroNorth Publications viewed 13. October, 2009, http://www.environorth.org.au/publications/information_sheets.html

Caring for our Country 2011, Australian Government, viewed 12. April, 2011, http://www.nrm.gov.au/

Convention of Biological Diversity, viewed 27. September, 2009, http://www.cbd.int/convention/wg8j.shtml

Gerritsen, R. (2007). Fear of a Black Planet. Awaye! ABC Radio National 2008, viewed 04. September, 2009, http://www.abc.net.au/rn/awaye/stories/2007/1836130.htm.

Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FAHCSIA) (2010), Closing the Gap - Prime Minsiter's Report 2010, viewed 10. September, 2009, http://www.fahcsia.gov.au/sa/indigenous/pubs/general/Documents/ClosingtheGap2010/sec_1_1.htm

Natural Heritage (2004), Community rangers tame. Arnhem Land bushfires, The Journal of the Natural Heritage Trust, No. 19, Autumn 2004 http://www.savanna.org.au/land_manager/downloads/arnhem-rangers-nht-story.pdf

Russell-Smith, J. West Arnhem Land Fire Abatement. Savanna Explorer North Australian information resource, viewed 20. September, 2009, http://www.savanna.org.au/al/fire_abatement.html

Savanna Explorer: North Australian information resource, viewed 20. September, 2009, http://www.savanna.org.au/al/

Warddeken Resources, People on Country: Warddeken Land Management Limited Warddeken Land Management Limited 2008; Australian National University, viewed 04. September, 2009, http://www.anu.edu.au/country/warddeken.php

Yibarbuk, D. and Cooke, P. (2001b): Traditional burning practices, viewed 10. September, 2009, http://www.savanna.org.au/environorth/windows/al/al_trad_burning.html

Source of Figures

Figure 2.1 Levels of analysis in traditional knowledge and management systems (Berkes 1999, p. 13)

Figure 3.1 Adapted SIA framework (personally created)

Figure 4.1 Map of Arnhem Land (Savanna Explorer: North Australian information resource, viewed 20. September, 2009, http://www.savanna.org.au/al/index.html)

Figure 4.2 Languages of the Arnhem Land plateau (Garde 2009, p. 87)

Figure 4.3 Facilities at the Kabulwarnamyo outstation (IKRMNA - making collective memory with computers, viewed 20. September, 2009, http://www.cdu.edu.au/

9. APPENDIX

9.1 Interviews and Field Trips

Temporal scale: April 2009 – December 2009; Darwin, Northern Territory

- Four field trips (2 x Arnhem Land plateau, Kakadu and Litchfield National Park),
- 13 weeks practical work at Larrakeyah Primary School in Darwin from 01.05 - 19.06.2009 and 20.07 - 01.09.2009
- Anthropological seminars and symposium (monthly from July - October 2009)
- Interviews and informal talks outside the field setting

Field Trips

25.06. - 27.06.2009 - Kakadu National Park field trip

29.06. - 04.07.2009 - Science and Aboriginal ranger field trip at the Upper Liverpool River, Gurrunuki

Involved: NAILSMA; Bushfire, CDU, NLC, CSIRO, Scienstists from abroad (Christ Justice & David Roy USA; Martin Wooster UK; Jose Pereira Portugal), Ranger groups (Arnhem Land, Cape York, Kimberley Rangers: Uunguu Rangers, Gulf of Carpentaria, Cape York: Gangalidda/Garrawa Wild River Rangers (QLD)

Informal talks: Glenn James (NAILSMA); Samara Erlandson (NAILSMA); Lorrae McArthur (NAILSMA); Scott Heckbert (CSIRO); Steve Sutton (Bushfires NT)

Talks / Presentations: Ranger meeting talks, Joe Morrison (NAILSMA); Anna Morgan; (Department of the Environment, Water, Heritage and the Arts); Paul Josif (Healthy country, healthy people programme); Ross Garnaut (Garnaut Climate Change Review); Sam Johnston: (United Nations University); Jeremy Russell-Smith (Bushfires NT); Luigi Boschetti: (University of Maryland); Owen Price (Bushfires NT); Garry Cook (CSIRO); Dean Yibarbuk (Manwurrk Bushfire Rangers)

25.08. - 28.08.2009 Litchfield National Park field trip

Involved: Ranger from Wildlife Service and PHD-student Sofia Olivera (Bushfires NT)

29.09. - 05.10.2009- Science field trip at the Upper Liverpool River, Gurrunuki

Informal talks: Jeremy Russel-Smith (Bushfires NT); Garry Cook (CSIRO); Mike Meyer (CSIRO); Scott Heckbert (CSIRO); Dean Yibarbuk (Manwurrk Bushfire Rangers); Peter Cooke

Interviews and Informal Talks Outside the Field Setting

National Park Ranger, Parks and Wildlife Commission, August 25th 2009, interviewed at Litchfield National Park.

Glenn James, Carbon Social Programs Officer at NAILSMA, October 19th 2009, interviewed at CDU Casuarina Campus, Darwin.

David Mearns, Associate Professor of Anthropology at Charles Darwin University, Ocotber 19th 2009, interviewed at CDU Casuarina Campus, Darwin.

Jennene Marum, PHD student, October 23rd 2009, interviewed at CDU Casuarina Campus, Darwin.

Tim Whiteside, Senior Lecturer at the Batchelor Institute of Indigenous Tertiary Education, November 10th 2009, interviewed at Batchelor Office Darwin.

Anthony Kerr, Northern Land Council, November 10th 2009, interviewed at NLC office in Darwin.

Graham Chadwick, Principal of the Larrakeyah Primary School, December 01st 2009, interviewed at the Larrakeya Primary School in Darwin.

Tony Bowland, Batchelor Institute of Indigenous Tertiary Education, December 2nd 2009, phone interview.

Anthony Kerr, NLC, December 07th 2009, interviewed at a coffeehouse in Darwin.

Melodie Bat, Senior Lecture at the Batchelor Institute of Indigenous Tertiary Education, December 08th 2009, interviewed at a coffeehouse in Darwin.

Stephen Garnett, School for Environmental Research, December 16th 2009, interviewed at the CDU Casuarina Campus.

Owen Stanley, School for Environmental Research, December 16th 2009, interviewed at the CDU Casuarina Campus.

John Greatorex, Co-ordinator Yolngu Studies at the Charles Darwin University, December 19th 2009, phone interview.

Glenn James, Carbon Social Programs Officer at NAILSMA, December 23rd 2009, interviewed at CDU Casuarina Campus, Darwin.

9.2 Abstract in English

This thesis explores the relationship between natural resource management (NRM), traditional ecological knowledge (TEK) and sustainable livelihood outcomes and demonstrates how through the payment for environmental services such as fire management, the economic development of remote communities in northern Australia can be improved. Based on an ethnography of the Bininj people of the Arnhem Land plateau and a regional fire management context, the significance and challenges of TEK in Indigenous livelihoods are illustrated. This thesis highlights therefore the social, cultural and environmental role of TEK in contemporary NRM practices such as fire management.

Fire is an important component of the ecology of the tropical savannas of northern Australia and has been used for tens of thousands of years by Aboriginal people to shape the highly flammable landscape. In the last century however fire management has changed dramatically due to a recent change in people's activities, settlement patterns and political and economical implications. This thesis demonstrates how through the integration of traditional fire management practices into a regional fire management strategy, intense wildfires can be reduced. It also shows how through proper resourcing and consideration of Aboriginal perceptions of fire management, needs and skills Aboriginal livelihoods can be improved.

NRM programmes have recognised that rural Indigenous livelihoods are closely intertwined with culture and tradition which is why TEK cannot be disregarded. The relationship between TEK and natural resource management as well as between TEK and Indigenous livelihoods are explored in the second part of the thesis on the basis of the West Arnhem Land Fire Abatement (WALFA) project which has been one of the first natural resource management projects in a carbon trading context. The WALFA project is a partnership between the Aboriginal traditional owners, Indigenous ranger groups of the Arnhem Land plateau, Darwin Liquefied Natural Gas (DLNG), the Northern Territory Government and the Northern Land Council. Through this partnership Indigenous rangers are getting paid each year from the Liquefied Natural Gas plant to carry out strategic fire management across 28,000 sq km of western Arnhem Land for the purpose of offsetting some of the greenhouse gas emissions caused by the plant. A distinctive feature of the WALFA project is that it delivers economic, environmental, social and cultural outcomes at the same time, as it not only tackles contemporary problems related to greenhouse gas

emissions, but also offers careers in the bush and enables local people to practice their culture in a strong and traditional manner. This project also highlights the potential of a collaborative engagement of researchers, Aboriginal people and other stakeholders. The WALFA project is an example of how payment for environmental services can not only abate carbon, but also deliver sustainable on-country development for Indigenous people which matches with local aspirations, whilst providing global and national benefits. For the continuation of the WALFA project it is important that young people are getting back on the country and that TEK is strengthened and maintained. However many challenges are faced in this context, like for example the new released policies to centralise remote Indigenous populations and services into townships as well as to slash down bilingual education.

This thesis is based on research carried out from the beginning of April until the end of December 2009 in the Northern Territory of Australia. Although located in Darwin, my qualitative research included field trips to the Kabulwarnamyo outstation at the Arnhem Land plateau, as well as field trips to the Kakadu and Litchfield National Park. On top of the field trips, the data is derived from my three months voluntary work at the Larrakeyah Primary School. As methodology frameworks for analysing the significance of TEK for fire management as well as the social outcomes of the WALFA project, the knowledge-practice-belief framework following Berkes (1999) and the social impact assessment (SIA) methodology are used. Theoretically, this thesis is influenced by Ingold's theory of direct perception and cognitive anthropology and focuses on the relationship between how people perceive and interpret their environment as well as how they act within it.

Key words: Australia, Northern Territory, West Arnhem Land, Bininj people, WALFA project, traditional ecological knowledge, human-environment interaction, natural resource management, payment for environmental services, fire management, sustainable livelihood and social impact assessment.

9.3 Abstract in German

Die vorliegende Diplomarbeit zeigt den Zusammenhang von Ressourcenmanagement, traditionellen ökologischen Wissen (TEK) und der nachhaltigen Sicherung von indigenen Lebensverhältnissen. Anhand einer Ethnographie der Bininj, einer indigenen Bevölkerung in Westarnhemland, wird die gegenwärtige Rolle und Anwendung von Feuermanagement in Norden Australiens verdeutlicht. Das Hauptaugenmerk liegt dabei insbesondere auf der sozialen, kulturellen und ökologischen Bedeutung von TEK. Traditionelles Feuermanagement, ist eines der wichtigsten und ältesten Landmanagement-Techniken des trockensten Kontinenten der Erde, und so gehören insbesondere im Norden Australiens Buschfeuer seit Millionen von Jahren zur Landschaft. Durch den Rückgang von traditionellen Feuermanagementpraktiken aufgrund von demografischen, politischen und ökonomischen Ursachen, hat sich jedoch die Anzahl von intensiven wilden Buschfeuern in den letzten Jahrzehnten bedenklich erhöht und dadurch ganze Tier- und Pflanzenarten bedroht. Diese Arbeit veranschaulicht, wie durch eine stärkere Implementierung von traditionellen Feuermanagementpraktiken in regionale Landschaftsstrategien gegenwärtige Wildfeuer reduziert sowie traditionelles Wissen und Praktiken gestärkt und aufrechterhalten werden kann.

Nachhaltige Landmanagement-Programme haben erkannt, dass ländliche indigene Lebensweisen aufs Engste mit Kultur und TEK verflochten sind, weshalb diese für eine erfolgreiche Umsetzung berücksichtigt werden müssen. Die Beziehung zwischen TEK und Ressourcenmanagement sowie TEK und indigenen Lebensverhältnissen wird im zweiten Teil dieser Arbeit anhand des West Arnhem Land Fire Abatement (WALFA) Projekt's näher beleuchtet. Das Projekt basiert auf einer Partnerschaft zwischen traditionellen Landbesitzern, Aboriginal Ranger-Gruppen, Darwin Liquefied Natural Gas (US-Ölkonzern ConocoPhillips), der Northern Territory Regierung und des Northern Land Council's. Durch diese Partnerschaft werden indigene Ranger-Gruppen vom Ölkonzern ConocoPhilipps dafür bezahlt, die durch ihm verursachten Treibhausgasemissionen durch strategisches Feuermanagement über eine Fläche von 28,000 km^2 in Westarnhemland, auszugleichen. Um die Vereinbarung zu erfüllen arbeiten traditionelle Landbesitzer und die Aboriginal Ranger-Gruppen eng mit westlichen wissenschaftlichen Partnereinrichtungen zusammen.

Das Besondere am WALFA Projekt ist, dass es gleichzeitig ökonomische, ökologische, soziale und kulturelle Aspekte berücksichtigt, da es nicht nur zur Reduzierung der Treibhausgasemissionen beiträgt, sondern auch Arbeitsplätze in einer der ökonomisch am meisten benachteiligten Region Australiens schafft. Dadurch unterstützt es lokale indigene Gemeinschaften ihre Lebensweise auf ihrem Land fortzuführen, was wiederum zur Stärkung und Aufrechterhaltung von TEK und ihrer Kultur beiträgt. Das WALFA Projekt ist ein Vorzeigebeispiel wie durch die Zahlungen für Umweltleistungen nicht nur CO_2 reduziert, sondern auch eine nachhaltige Entwicklung auf indigener, lokaler Ebene bei gleichzeitigen nationalen und internationalen Nutzen erzielt werden kann. Um den erfolgreichen Fortbestand des Projektes zu gewährleisten, ist es erforderlich, dass junge Leute stärker miteinbezogen werden und auf ihr traditionelles Land zurückkehren, um die Fortführung von Wissen und Praktiken zu sichern. In diesem Kontext stellen sich jedoch einige Herausforderungen wie beispielsweise die kürzlich verabschiedeten Gesetze zur Zentralisierung von abgelegenen indigenen Gemeinschaften sowie die drastische Reduzierung vom bilingualen Unterricht.

Die vorliegende Arbeit basiert auf einen Forschungsaufenthalt, der von April bis Ende Dezember 2009 in Darwin, Northern Territory durchgeführt wurde. Das qualitative Forschungsvorgehen umfasste Feldaufenthalte in der Kabulwarnamyo Outstation in Westarnhemland sowie in den Kakadu und Litchfield National Park. Neben den Feldaufenthalten, wurden die Forschungsdaten von einem 3-monatigen Praktikum an der Larrakeyah Primary School in Darwin gewonnen. Als Methoden zur Analyse der Bedeutung von TEK in Feuermanagementtechniken sowie zur Erhebung der sozialen Auswirkungen des WALFA Projektes, wurde das ‘Knowledge-Practice-Belief Framework’ von Berkes (1999) und die Methode des ‘Social Impact Assessemnt (SIA)’ angewendet. Die Arbeit wird darüber hinaus von Ingold’s Theorie über die Wahrnehmungsformen der Umwelt sowie von der kognitiven Anthropologie beeinflusst und konzentriert sich dabei wie Menschen ihre Umwelt wahrnehmen, diese interpretieren und in dieser handeln.

Key words: Australien, Northern Territory, Westarnhemland, Bininj, WALFA Projekt, traditionelles ökologisches Wissen (TEK), Mensch-Umwelt Beziehung, Ressourcenmanagement, Zahlungen für Umweltleistungen, Feuermanagement, Nachhaltigkeit, Social Impact Assessment.

9.4 Curriculum Vitae

Name:	Anna Davey-Hiesleitner
Date of Birth:	10.06.1983
Place of birth:	Waidhofen/Ybbs, Austria

ACADEMIC EDUCATION

10/2005 – 09/2011	CULTURAL AND SOCIAL ANTHROPOLOGY (Diplomstudium) at the University of Vienna **Main focus:** ▸ Human-environment interaction ▸ Australia, especially northern Australia ▸ Indigenous studies / Indigenous engagement ▸ Ecology / Sustainable ecological development ▸ Resource management ▸ Anthropology of Migration
04/2009 - 12/2009	Thesis field research ▸ Field trips (Arnhem Land plateau, Kakadu and Litchfield National Park) ▸ Three months voluntary work at Larrakeyah Primary School ▸ Anthropological seminars and symposium ▸ Interviews and informal talks
03/2008 – 07/2008	Study abroad semester at the Charles Darwin University ▸ Australian Aboriginal and Islander Societies ▸ Introductory Ecology ▸ Introduction to Yolngu Languages and Culture ▸ Indigenous Engagements: Land and Water
10/2002 - 02/2002	STUDIES OF HISTORY at the University of Vienna

WORK EXPERIENCE

04/2010 - (ONGOING)	Project assistant in the field of integration at the Verein Wirtschaft für Integration, Vienna (see Österreichischer Integrationspreis, Österreichischer Integrationstag, Redewettbewerb 'Sag's Multi').
10/2010 - 01/2012	Teaching assistant in qualitative research methods and eLearning; Department for Social and Cultural Anthropology, University of Vienna.
08/2010 - 12/2010	Project assistance in the field of integration at think difference GmbH, Vienna.
10/2009 - 06/2010	Tutor for the lectures "Introduction into the Anthropology of Nature" and "Introduction into the Anthropology of Myths"; Department of Social and Cultural Anthropology, University of Vienna.
05/2009 - 09/2009	Practical voluntary work at the Larrakeyah Primary School, Darwin, Australia.
06/2003 – 01/2008	Office manager and executive assistant at Die Schule des Sprechens GmbH, Vienna.

LANGUAGE SKILLS

- German: Mother tongue
- English: fluent
- French: intermediate
- Spanish: intermediate
- Yolngu matha: passive skills

SCHOLARSHIPS

01/2010	Scholarship for excellent performance; University of Vienna
02/2009	Scholarship; "Windhag-Stipendienstiftung NÖ"
01/2009	Scholarship for excellent performance; University of Vienna
05/2008	Scholarship for excellent performance; "Windhag-Stipendienstiftung NÖ"
02/2008	Study abroad scholarship NÖ
02/2008	Scholarship for excellent performance; University of Vienna
02/2007	Scholarship for excellent performance; University of Vienna