ENDOGENOUS DEVELOPMENT OF NATURAL RESOURCE MANAGEMENT IN THE COMMUNAL AREAS OF SOUTHERN ZIMBABWE: A CASE STUDY APPROACH

by

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ABSTRACT

Despite decades of development efforts to combat desertification processes in southern Zimbabwe, a development deadlock occurs. Using the local knowledge systems as a basis, and making an effort to strategically facilitate the revival of their capacity for checks and balances as a development approach, endogenous development could become more realistic.

The actor-oriented RAAKS methodology offers relevant tools for a case study in which an insight into the processes of innovation is obtained in order to confirm this.

The Charumbira case study shows that many local interfaces hinder development. Although the facilitation of platform processes could enhance endogenous development, the external environment provides a serious constraint. The method employed did not permit broad conclusions, but a deeper examination of recent experiences suggested that by giving local people a greater say in natural resource use, local knowledge could be utilized more effectively and better use could be made of traditional management structures.

Key terms: Southern Zimbabwe; Endogenous development; Natural resource management; Soft systems research; Local knowledge systems; Platform processes; Actor oriented approach; Traditional management structures; Adaptive management; Worldview

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GLOSSARY

AEW: Agritex Extension Worker.

AGRITEX: Department of Agriculture, Technical and Extension Services

AZTREC: There are two organizations called Aztrec in Masvingo. The oldest one forms part of Zirrcon (see below), where the Association of Zimbabwean Traditional Ecologists (Aztrec) represents the grouping of chiefs and head men (Daneel, 1997: 114). In 1991, a schism occurred in Aztrec (described in Appendix III of Daneel, 1997: 297-300), whereby a limited number of Aztrec members created 1992 an alternative Aztrec. This latter Aztrec is registered under the slightly different name: Association of Zimbabwean Traditional Environmental Conservationists. When mentioned in the text, "Aztrec" refers to the latter organization.

Convergences: A situation whereby ideas and perceptions concerning natural resource management are partly similar between actors.

Development deadlock: A situation involving different levels of aggregations, esp. community level and higher institutional level aimed at development, in which no progress in development can be made. In other terms: local communities are not able to help themselves in sustaining the use of renewable natural resources, and development institutions are not able to help local people to help themselves.

Endogenous development: Development initiatives based on the perceptions and knowledge systems of a local community and on the available resources in their area.

ESAP: Economic Structural Adjustment Programme.

ETC: A Dutch foundation originally called Ecology Training Centre. This NGO is involved in research in the field of sustainable agriculture.

FC: Forestry Commission.

FEO: Field Extension Officer.

Globalization: Globalization is the gradual autonomy of social and cultural units as a result of global flows of information, technology, people, finances, products, images and symbolic representations.

IDS: Institute of Development Studies (UK).

IES: Institute of Environmental Studies (Zimbabwe).

IIED: International Institute for Environment and Development (UK).

Innovation configuration: A typical arrangement of actors that collaborate in order to achieve innovation.

INRA: Institute National de Recherche Agricole, (Burkina Faso).

Interface: Also referred to as "social interface", is a critical point of intersection between different social systems, fields or levels of social order where structural discontinuities, based upon differences of normative value and social interests, are most likely to be found.

Kraal head: This term is generally used in Zimbabwe for the head of an extended family.

Linkages: Connections between actors within a local knowledge system which permit the exchange of information and other resources.

Local knowledge system: A dynamic notion of local (geographically) knowledge conceptualized as a system of relatively stable chains of interaction and communication by which knowledge is exchanged or generated.

Localization: With localization is meant the localized management of available resources, accommodated to specific endowments, in accordance with local and regional knowledge, potential and restrictions.

Mission statement: In the context of this research, a mission statement is defined as a short concise statement setting out the objectives, strategy and beneficiaries of an actor regarding natural resource management.

MP: Member of Parliament.

N'anga: Traditional healer.

Natural resource management: The management of natural living organisms, forming a biotic community in a certain area, in such a way that the use of renewable resources does not lead to the loss of its natural, spiritual and human functions for future generations.

NGO: Non Governmental Organization.

NO: The NRB Officer.

NRB: Natural Resource Board.

Platform processes: A 'participatory approach' that focuses on creating 'rich pictures' of the diversity of interests of lifeworlds of the stake holders, fostering shared problem appreciation, creating an information system about the natural resource for decision support, facilitating negotiation and accommodation between stake holders (Röling, 1994: 130).

PRA: Participatory Rural Appraisal.

RAAKS: RAAKS stands for "Rapid Appraisal of Agricultural Knowledge Systems" and is a method for participatory research and action from a social constructivist perspective. It is comparable with participatory methods like PRA. Both are context specific, geared at investigating multiple lifeworlds through group inquiry, including inside and outside experts,

and have a built-in learning process. RAAKS has however a more specific focus on innovation as a result of social processes of communication and organization. RAAKS aims at identifying common ground between different actors and seeking synergy through collective knowledge management.

RDC: Rural District Council.

Resilience: The capacity of an ecosystem to recover to average values after major disturbance.

RRA: Rapid Rural Appraisal.

SEA: A research methodology called Strategic Environmental Analysis, developed by the Dutch organization AIDEnvironment (Amsterdam).

SNV: Netherlands Development Organization (original name: SNV-Nederlandse ontwikkelingsorganisatie).

Social actor: A social actor is a social-cultural construction representing one or more individuals or institutions that are relevant to a local knowledge system.

Traditional biodiversity practitioner: An actor defined in this case study representing individuals that are concerned with increasing the diversity of the local ecosystem based on and relevant to traditional values and knowledge.

VIDCO: Village Development Committee.

WADCO: Ward Development Committee.

Window: In the RAAKS methodology, a window is an analytical perspective that focuses on particular issues relevant to the understanding of a problem situation.

Zirrcon: Zimbabwean Institute of Religious Research and Ecological Conservation.

ZRP: Zimbabwe Republic Police.

CHAPTER I PROBLEM, THEORY AND DESIGN OF THE RESEARCH

1.1 Development and natural resources in Zimbabwe

Development and natural resource management are two issues that are intrinsically related. Most rural people in developing countries depend on natural resources for their existence, a relationship that has gradually come under pressure for several reasons including increased population pressure and advanced technology. The UN commission for Africa concluded, for instance, that the weight of population growth will end up as another burden on the shoulders of the poor and their environment, thereby contributing to an increasing inequity and an ongoing underdevelopment of the rural masses (Adedeji, 1985).

In Zimbabwe, natural resource management is generally recognized as a pressing development issue. The renewable natural resource base, which as a result of the population growth has already declined, is decreasing disproportionally because of irreversible degradation. These problems are most pressing in the communal areas and have been partly caused by inequitable land tenure, a heritage of the colonial past. Although the country as a whole still has a 53% cover of woodland and a 13% cover of bushland, these resources are unevenly distributed. Nhira et al (1998: 16-20) estimate that 74% of the rural population is located on 42% of the land. This land is generally of a lower agricultural potential than the so called commercial farming areas, and contains almost half of all natural resources in terms of area covered by woodlands, bushland and forests.

According to the FAO (in Nhira et al., 1998: 18) Zimbabwe's total forest area declined at a rate of 0.6% per annum between 1990 and 1995[1]. However, Gondo and Mkwanda (in Nhira et al., 1998: 18) estimate that the annual rate of deforestation in Zimbabwe is 1.5% of the total woodland area. This latter figure is likely to be more relevant for the communal areas, where dense forests are rare. The pattern of deforestation, however, differs within the country. The high potential zones of natural regions II and III[2], in the central and northern part of the country, are increasingly subjected to rapid clearing. This is mainly caused by the eradication of the tsetse-fly in the late 1980s, followed by rapid

[1] In this research the definitions of the Zimbabwean Forestry Commission are used. Forest is generally reserved for areas with an almost complete canopy cover (80-100%), whilst the term woodland refers to a canopy cover of over 20%. Bushland has a canopy cover of less than 20% (Forestry Commission, 1997).

[2] Natural region II is found mainly in the North-East of Zimbabwe. It has a moderate high rainfall (750-1000 mm) and is intensively farmed for crops and livestock. Natural region III is characterized by erratic rainfall (650-800 mm) with severe mid-summer dry spells. The zone is mainly situated in the centre of the country and is suitable for semi-intensive farming.

and extensive settlement and clearance for livestock rearing. In the southern part of Zimbabwe, most communal lands are situated in natural regions IV and V[3]. The clearing of woodlands for agriculture, livestock and domestic use has been an ongoing and gradual process over many decades. The annual rate of clearance is considerably lower than in the "recent clearance areas" of natural regions II and III. However, it can be expected that, because of high and continuous pressure on selective natural resources, the continual erosion of traditional management practices and the lower carrying capacity, the management of the natural resources in the South need a different approach as compared with those used in natural regions II and III.

The development strategies to address the loss of renewable natural resources has been subject to considerable discussion. The "reductionist" scientific thinking which initially was the basis of most development design led to stereotyped and simplified diagnoses by external institutions that hardly matched the diverse and contextual knowledge systems based on the objectives of the grassroots. "Environment" was considered a value-free issue. Analyses were based mostly on a mechanical interpretation of central principles and trends as population growth predictions, "tragedy of the commons" assumptions[4] and technocratic, standardized solutions. Solutions as conceived by outside specialists were implemented in a top-down manner. This approach is also called the "blueprint model".

The new development paradigm that emerged during the last two decades aims at a bottom-up approach. Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) are examples of well known methodological components of that development paradigm, that can be characterized by one-liners such as "handing over the stick" and "putting farmers first". Since the emergence of this bottom-up paradigm in rural development research it is increasingly recognized that the environment, with its diversity of functions and forms of life, often is the basis of the traditional culture and knowledge systems of rural populations. Heyneman (1984), for instance, supports the idea that the essence of the cultural and behavioural expression in pre-industrial, indigenous societies is in their variety and local

[3]Natural region IV has an annual rainfall of between 450 and 650 mm with periodic seasonal droughts. The predominant farming practice is livestock production. Natural region V has a low erratic rainfall, below 500 mm, making it best suited to cattle and game ranching.

[4]This much cited phrase inspired a lot of research. It comes from an essay of Garrett Hardin (1968) titled "The Tragedy of the Commons". The prime aim of the essay was to discuss social problems that have no technical solution. Concerning natural resource management he argued that the long term effects of unrestrained individual maximizing behaviour on a finite resource is one such problem, and that without outside (e.g. by the State) intervention, there is no solution to this "tragic" problem of common property management.

adaptation to a specific habitat. The variety of human social forms is thus seen as a response to an equal variety of habitats. A growing number of more recent publications (to mention but a few: Chambers, 1994; Clarke, 1994; Alcorn,1995; Long, 1992, 1997; Borrini-Feyerabend & Buchman,1997; Engel, 1997; Donnelly-Roark, 1998; Haverkort & Hiemstra, 1998) are partly based on this concept. In order to link development to local knowledge of natural resource management, the outsiders have now set themselves the task of participating in the ongoing development processes of the local populations, rather than by seeking the participation of rural people in the development processes as designed by outsiders. Through the application of participatory analysis tools, it is assumed that rural populations are in a better position to assess their own problems and develop their own action plans. They are no longer targets or beneficiaries, but rather knowledgeable subjects of their own development, empowered by assisting agencies (Umans, 1998: 2). This last statement alludes to the role as generally perceived for the development enterprise, i.e. to help local communities in helping themselves, banking on local knowledge systems that can be enriched with outside technical knowledge. This approach is based on the "process model". A more detailed comparison between the process model and the blueprint model is contained in Annexure IV.

1.2 Analysis and statement of the problem

Although there is a broad consensus about the importance of participatory approaches as a means to empower local communities and make use of local knowledge, their implementation has not led yet to many tangible results (Halsema, 1998: 9). This situation partly results from the public administration and development institutes failing to manage to implement the participatory approaches in an organized manner. However, even if the participatory approaches would have been implemented more systematically, this would not necessarily mean that contemporary natural resource management issues would have been addressed sufficiently. Too often participatory developmental approaches result in extensive "shopping lists" that do not guide the development of natural resource management to more sustainable levels.

The aspect of local people not automatically being able to address relevant development issues by themselves is explained by several leading development researchers from a historical perspective. There is a certain understanding that historical events and influences in Zimbabwe caused by colonial rule, westernization and externalization (e.g. the introduction of cash crops agriculture), have disturbed the balance of the relationship between local people and their environment (Dr. Matuwanyika in Larson, 1998: 31). Modern norms and values were gradually imposed and traditional practices

subordinated. In a recent document, Haverkort & Hiemstra (1998: 1-6) describe the possible effects of these historical processes. They argue that local knowledge systems often went "underground" to avoid confrontation with ruling political, commercial and religious powers. Instead, modern development measures were introduced. The juxtaposed traditional local knowledge systems thereby lost their mechanisms to ensure that the necessary checks and balances kept them up to date. In other words, local knowledge systems lost their full relationship with the present social, economical and ecological realities caused by for example urbanization, environmental degradation and over-population. Because the modern practices were often not sustainable in ecological, economic and social sense, local people continued to depend on those "sterilized" local knowledge systems without being able any longer to adapt them to contemporary problems. With the growing pressure on natural resources, their use resulted increasingly in social conflicts, which led to people developing individualized, often poverty driven strategies, to get "their share".

At the other end, the failure of the successful implementation of participatory developmental approaches can also be viewed from both conceptual and institutional viewpoints. There is a general lack of focus with implementing bodies as to what could be expected from participatory approaches. The dominant school of thought in participatory development research focuses on the process of participation as an end in itself. As long as enough exercises of participatory development action are being conducted, bottom-up development will take place. However, in order to conduct participatory exercises in a proper manner and to train local facilitators, highly skilled and mature development personnel are needed. These professionals are hardly available in rural areas, often for personal reasons such as the lack of status to work there and the lack of facilities. However, even if there were enough professionals in the rural areas, their impact would probably be limited. For financial reasons alone it would be impossible to facilitate each and every individual village in Africa for their own development. Robert Chambers, who is a leading figure in the development of participatory approaches, argued (1994: 1440) that the process of PRA has the potential to spread autonomously once it has been initiated properly. Local people would then see the benefits and would be prepared to sacrifice scarce financial resources to have the approach implemented at their level by locally trained facilitators from other villages. Although it is an attractive perspective, it is highly hypothetical, as it has not been substantiated by a critical amount of relevant observations outside a subsidized project environment. With the lack of focus, the automatic spread of PRA being questionable and the limited feasibility of applying participatory development efforts in enough areas, many participatory development projects lead to what IDS (1998) calls a "laissez-faire" situation at grassroots level.

The institutional dimension of the failing implementation of participatory approaches is that the public administration and the larger implementing NGOs in Zimbabwe are often ambivalent. There is a general acceptance of and much rhetoric about the relevance of participatory approaches and contextual knowledge at grassroots level. At policy level though, the prevailing scientific concepts and assumptions in which debates about environmental change are framed are often hardly related to this and are often interpreted in an absolutist manner. In particular, in the field of natural resource management, the inconsistency between inappropriate and stagnant policies and the "laissez-faire" at field level has contributed to a deadlock in development. Donnelly-Roark (1998: 35) refers to this as "expanding levels of disconnection at all formal institutional levels and African civil society" that are often unwittingly compounded. Other recent publications (Haverkort, 1998; Long, 1997; IDS, 1998) describe in various ways this fixation on local level participatory research and development activities without explicitly eschewing external change models at both micro and macro levels.

In summary, the above analysed situation can be captured in the following problem statement that inspired this research:

Local knowledge systems in the communal areas of southern Zimbabwe do no longer provide a consistent platform to use natural resources in a sustainable manner. This combined with the incapacity of higher level institutions to formulate and implement effective policies to address that problem, has led to a "development deadlock" in natural resource management.

1.3 Aim of the research

In order to address the stated problem, this research will focus on breaking out of the self-reinforcing cycle of the abovementioned development deadlock. Part of the problem is related to established power relations within government structures, for instance because empowerment of the grassroots challenges central government control. However, also within the scientific world there seems to exist an interest in maintaining the status quo. IDS (1998: 6) argued that their research is beginning to expose the power relations inherent to global environmental policy making, whereby the role of specialists, bureaucrats, research institutes and consultants can be conservative because of established interests. In Zimbabwe for example, scientists are accused of being manipulative because "... to some extent arguments for "sustainable development" have been used to legitimise the existing inequitable land distribution and approach to land use, and to avoid the core dilemmas in land reform..." (Nhira et al., 1998: 34).

The importance, however, of the role of centralized public administration and research institutions is

unavoidably diminishing due to the ongoing processes of *globalization*[5] (Long, 1997). Local governance processes[6] will become increasingly important, both from a grassroots and central government point of view. Furthermore, central government is tied by ESAP[7], other international (donor) pressures, limited funds and a better educated and more vocal population. These developments suggest that "influence" instead of "control" will become relatively more important. This influence has to compete, however, with other (regional and global) forces. For this reason, in order to be able to exert influence, the focus must be increasingly on adequate policy formulation regarding natural resource management based on local people's view and aspirations. In the long run, public administrative structures and other macro level interventions will thus have an interest in an institutional and conceptual reform process which will make them more supportive of local development. It follows that part of the problem for higher level institutions is, or will be, the stagnant policies that do not practically relate to the aspirations at grassroots level: a development deadlock. What is probably lacking in order to break out of this deadlock, is enough evidence that endogenous local development can effectively address development problems in natural resource management, and a viable approach to support this.

The concept of a local knowledge system and its lost rapport with contemporary problems is an interesting view that could open new roads for development once it proves to be consistent. It suggests that if it is possible to reinstall this capacity for checks and balances, a local knowledge system could become the motor for endogenous development of natural resource management systems that could address contemporary environmental problems without intensive and perpetual involvement of higher level development institutions.

Therefore, this research has a dual focus:

1. The potential for "reviving" local knowledge systems will be examined, with a focus on a more effective form of "*endogenous development*" of natural resource management, i.e. development based on the perceptions and knowledge systems of the local community which is as much as possible self-driven.

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[5] Globalization is defined here as the gradual autonomy of social and cultural units as a result of global flows of information, technology, people, finances, products, images and symbolic representations.

[6] Local governance processes refer to management processes performed by local institutions such as local government, interest associations, farmer groups or traditional leadership.

[7] Economic Structural Adjustment Programme that forces central governments to cut down on their expenditures and is thus reducing the power basis of central government.

2. Basic system features with a more general bearing and with relevance for policy level should be highlighted when conducting the research. This will provide a contribution to new thinking that has to be generated at the level of policy making, legislation and administration, particularly on how environmental matters could relate more with local realities and become more responsive to different views, theories and interests. For this reason, the examination of local knowledge systems should not only focus on the (often highly contextual) *output* and development options of these particular systems, but also on the complexities of *process* and *values* which transcend the micro focus and necessarily connect local natural resource management systems to macro level program and policy concerns.

In summary, the aim of this research can be formulated as follows:
Examine a case study in order to obtain a greater understanding of how local communities can endogenously address natural resource management development issues and how this process could be structurally supported by external institutions.

1.4 Research objectives and research questions

Research objectives

In order to address the aim of this research, the following objectives will be pursued for the area under investigation:

1- *Highlight the contextual elements that shape the present local knowledge system for natural resource management.*

2- *Examine innovation processes and the potential for improvement.*

3- *Identify the conditions that legislators and policy makers could generally aim at to facilitate this.*

Research questions

To achieve the stated objectives, the following research questions have to be answered:

Q1. *What are the elements that explain the present relationship of the local people of the research area and their natural resources?*

Q2. *How do primary actors apply and adapt relevant knowledge to solve their natural resource management problems?*

Q3. *What innovative configurations currently exist or could be developed within the local knowledge system that could make the local knowledge system match better with contemporary natural resource management problems?*

Q4. *What conditions should be met to revitalize local knowledge systems of a similar nature?*

1.5 The method used and research process followed

1.5.1 The identification of a case study

The research that has been conducted was primarily of a qualitative nature. The research issue is relatively new for the Zimbabwean situation, and there is little knowledge about adequate parameters that could be measured in a more quantitative research that could address the stated research problem. Because of the contextual nature of local knowledge systems and the qualitative character of this research, a case study was considered the most appropriate methodological approach. It is recognized that a case study is only a "time exposure", but through a focus on *processes* instead of "facts" or "system products", more general conclusions could be drawn which possibly could also apply to similar cases.

The choice of the case study and its boundaries was determined by the following criteria:

- It was argued in the first section that the situation in natural regions IV and V is quite different from natural regions II and III as far as natural resource management is concerned. Contextual knowledge about natural resource management is probably more relevant in the earlier occupations in natural regions IV and V in southern Zimbabwe.
- The research area is a traditional (Chieftainship) and administrative (ward) unit.
- There is an established development relationship between a local NGO (Aztrec) and the local community, which increases the reliability of participatory research data obtained through those channels.
- Logistics related to the distance to and accessibility of the area were taken into account.
- The area is similar to other wards in this and the surrounding districts. In these areas, several surveys were carried out that can provide material for comparison in order to increase the

validity of some findings[8].

- The criterion of "representativeness", as is often used in farming systems research, was not considered appropriate here. The fact that two areas look the same in physical or ethnical terms is no guarantee that the local knowledge systems, and, in particular, their processes of innovation, are equal. At a later stage, sampling could perhaps become a more realistic option once this and possible further research reveals critical parameters for the revitalization of local knowledge systems.

1.5.2 RAAKS: an actor oriented methodology for soft systems research

The farming systems research has nowadays a well established research tradition that is participatory, holistic and focussed on the improvement of local farming knowledge, including natural resource management. Although there are several elements of farming systems research that could be useful to the investigation of our research objectives, another methodology has been opted for. Farming systems research, as will be argued in sub-section 1.7.3, is a "hard systems" approach that, for the purpose of this investigation, is too focussed on the output of the system and not as much on the processes of knowledge development and adaptation. Farming systems research is based on the (participatory) examination of case studies, where a sequence of problem diagnosis, solution design, testing and extension of the "new message" is being executed in order to obtain a greater impact. Farmers that are supposed to benefit from the results of farming systems research are confronted with externally developed messages for "their" externally identified problems.

For the investigation of the problem, a research method focussed on social actors, as dynamic and sense giving "units" that are at the basis of a soft system, is thought to be more appropriate. An important generic approach for participatory development is the Soft Systems Methodology, originally developed in the corporate context (Röling, 1994: 131). It has later been applied to agriculture at the Wageningen Agricultural University in The Netherlands. Over the last five to ten years, a method called RAAKS, which stands for Rapid Appraisal of Agricultural Knowledge Systems, has been developed and tested in various parts of the world. RAAKS has "the potential to combine and even integrate macro and micro perspectives" (Engel, 1997:23). This would make the methodology suitable for natural resource management problems, which need to be considered in different dimensions and have implications at

[8] The most important surveys that can be mentioned were done in Chivi, Zimuto, Zvishavane and Shindi. They are documented in Scoones et al. (1991); Bussink (1993); Clarke (1994); VU (1995); Campbell (1996) and Nhira et al (1998). Other data are available from "grey" literature as project and progress reports, government policy documents, etc.

different levels. It is a method for participatory research and action from a social constructivist perspective. It is comparable with participatory methods like PRA. Both are context specific, orientated at investigating multiple lifeworlds through group inquiry, both involve inside and outside experts and have a built-in learning process. RAAKS has, however, a more specific focus on innovation as a result of social processes of communication and organization. RAAKS aims at identifying common ground between different actors and seeking synergy through collective knowledge management. This makes it a suitable method for this research, aiming at reviving local knowledge systems in order to capacitate rural people to deal effectively with contemporary problems in natural resource management.

The RAAKS methodology is described thoroughly in Engel (1997) and in Salomon and Engel (1997). An important characteristic of the method is that it studies reality from multiple perspectives in a systematic way. Each perspective or, in RAAKS jargon, "window", focuses on an aspect of the multiple dimensional reality of the local knowledge system or represents a study focus in a certain stage of the research. The windows have the potential to bring forward relevant ideas, actors, activities and relationships gathered from different perspectives, thus creating a more "complete" picture. In practical terms, this is done by having the actors defining a specific *mission statement* for their group. This is a way of characterizing actors in a short and concise manner by referring to their objectives as regards natural resource management, their strategies and the beneficiaries of their practices. It is assumed that what actors see as their mission statement, affects their expectations, the way they perceive problems and solutions and the way they innovate. The mission statement is a simplified explanation of the way in which an actor acts. With data gathered during several RAAKS exercises, this mission statement is further examined and enriched. One or more participatory tools are attached to each RAAKS-window. This permits the practical exploration of the knowledge system from that specific angle with inputs from all relevant actors. These tools can be adapted according to specific circumstances.

Whilst this flexibility is an important quality, the method also has some limitations for application in this type of research. RAAKS operates from the functionalist perspective in which the knowledge system as a whole is looking for innovation and by which the stakeholders are prepared for joint action to overcome commonly perceived problems. This limits the applicability of RAAKS to areas where natural resource management has become a social problem because of the scarcity of resources and where there is enough social cohesion to engage in the "platform processes" of RAAKS, as is found in natural regions IV/V, where this research is centred. Therefore this limitation is not a major obstacle. Another limitation of RAAKS is that it is primarily developed for agricultural knowledge systems and

not specifically for knowledge related to natural resource management (for a brief discussion about the findings concerning this fact, see Section 5.2). The tools offered for environmental analysis in the standard version of RAAKS (Salomon and Engel, 1997) are no more than a checklist that the research team can use to identify environmental factors and the extent to which these can be influenced by the social actors. In order to enrich the methodology for this specific application, several PRA tools have been added to the RAAKS research frames (see Annexure I). Because the fieldwork was to be carried out in combination with the programme of the NGO Aztrec, a practical limitation is that a certain bias in conducting the research is likely to occur as far as the role of secondary actors is concerned. However, awareness of this possible bias makes it possible to be critical about this aspect and triangulate specific findings.

The research frames in Annexure I consist of several elements. Each frame starts with a window, where the particular perspective of that part of the field research is explained. Each window is related to one or more tools, including the expected output from the exercise. Each frame is in fact a short separate research design, but in the field, elements of the different frames were combined in for instance a one week PRA session. The RAAKS exercise follows a step-by-step approach, going through a diagnostic (Phase A), an analytical (B) and a concluding © phase:

A- Initially the socially constructed information is sought - whether it concerns judgements, understanding, preoccupations or perceptions - in order to obtain the local people's understanding of the problem situation and their causative role in it re-assessed. Actor's objectives and their conflicting or shared interests are also being studied. This is contrasted with outsiders' observations, especially the aforementioned environmental analysis derived from the SEA approach. The different windows used are:

- Defining or redefining the objective of the diagnosis
- Identifying relevant primary actors
- Tracing diversity in actor's objectives
- Environmental diagnosis
- Spiritual/cultural diagnosis
- Socio-economic diagnosis
- Identification of secondary key actors and their mission statements
- Clarifying the problem situation and tentatively visualizing the local knowledge system

B- Important elements are the emphasis on the commitment to social learning and social construction of new forms of organization for innovation among actors. In other words,

stakeholders interact with the intention of innovation and synergy in natural resource management, in spite of diverging interests and perceptions. In phase B, the constraints and opportunities to achieve this are being analysed. This is done by investigating relevant knowledge networking practices, task divisions, existing or possible convergences of objectives of different actors and existing or possible resource coalitions. The windows focussed on certain types of analyses:

- Power analysis
- Knowledge and information network analysis
- Integration analysis
- Concluding analysis

Several of these analyses partially duplicate one another, because they approach the network from different angles. This should, however, be seen as an useful method to increase the validity of the data (triangulation).

C- In phase C strategies are being developed to manage the local knowledge system to become more adaptive to the changed requirements in natural resource management. Adjustments can be made to fit trends in local needs, global markets, legislation or environmental change. Potential communication networks and innovation configurations are being explored and stakeholders commit themselves to an action plan or an ethic of natural resource use. This was relevant for the NGO that assisted with the field work, because it required actions to be ongoing. In this context, however, RAAKS is firstly applied as a research methodology in which the aimed results should transcend the in-built objective of developing the knowledge system of the community under investigation. This third phase is thus also meant to synthesize the findings of the analytical phase, based on the input of the actors involved. The windows here are few, and are focussed on the management of the local knowledge system in order to revitalize it:

- Task and mandate analysis within the local knowledge system
- Knowledge management exercises

With these steps, the research questions can be addressed. In order to broaden the basis of this research, the findings from the RAAKS exercise have been complemented with background information obtained from literature and comparable case studies.

1.5.3 The field work carried out

The practical research was done by a team of three people:

- The author of this dissertation, for coordination, monitoring of research procedures, asking critical questions and making the necessary observations.
- A professional assistant, working for the NGO involved (Mr. Mudzingwa of Aztrec). He played a role in the contacts with the local population, translation and the interpretation of information. He has an agricultural background (diploma level) and experience with extension work in the research area.
- A local female research assistant (Mrs. Chabira) who, besides assisting in the field work, also played a facilitating role in the contact with local, in particular female actors. She is the daughter of a local spirit medium and is respected and trusted by the community of the research area.

Formal agreement had previously been obtained from the local Chief and the most important spirit mediums.

Most field work was done in June/July 1998 and in September/October of that same year. Several short visits afterwards completed the observations. In June/July, phase A of the research was carried out. First a meeting was held with the Chief and the most important spirit mediums in order to ask permission and to make practical arrangements. A traditional ceremony was held in June to appease the ancestors about providing traditional knowledge to the research team. It was then decided by the elders that a research board was elected to monitor the process. The chairman pointed to six directions, and in each direction the meeting mentioned a name of one of the elders living in that direction and who, often after a short discussion, was found suitable to take a place on the research board. Special attention was paid to the gender balance. The research team came together for two days at the house of the local assistant in the research area. The research design was discussed and adjusted, after which the first two research frames were completed. Then a community workshop was held on the 8th of July with almost all families represented. During this meeting, actor groups were identified by the local people themselves and an agreement was reached regarding those individuals who would represent these groups in the research (three individuals per group). After this session a one week PRA exercise was carried out by the team in the research area. Frame A4. A5 and A6 (see Annexure I) were addressed and general information gathered for other research frames. The results from the PRA were put down in tables and charts on manilla sheets, and the information was fed back, in the presence of the research board, into the community during another workshop, that took place from the 22nd to the

24th of July. During this workshop, frame A3 and parts of frame A5, A6 and A7 were completed. For these exercises, the people divided themselves into the actor groups (three individuals per group) and did the exercises separately. Over the weekend the information was processed and presented to a full meeting, including all actor groups and the research board. Frame A8 was completed that day.

In September the research board called for another traditional ceremony, this time at Chinhoyi with the national spirit medium of Mbuya Nehanda[9]. She gave her blessing to the next research phase, suggesting that the examination of only one case study gave limited results and there was a need for more case studies (see also Section 1.6). On the 7th and 14th of October 1998, frame B1 to B3 were completed with the diverse actor groups. The research team met several times in between to discuss and process data with the purpose of giving feedback to the community. On the 21st of October this feedback workshop was held in the presence of the research board, and also frame B4 was addressed. Frame C1 was done in the same plenary session on the 21st of October. Frame C2 was done with the research team and discussed afterwards at a plenary community meeting at the end of October, after which a concluding ceremony was conducted.

1.5.4 Justification of the research based on revision of sources

The main libraries consulted were:

- The Unisa library in Pretoria, including their inter library loan service.
- The library of the Agricultural University of Wageningen, The Netherlands
- The libraries of the University of Zimbabwe, mainly those of the Centre of Social Studies (CASS) and the Institute of Environmental Studies (IES)
- Several organizational libraries such as one of the World Bank, the Forestry Commission and GTZ, which are all situated in Harare.

The fact that the research was associated with an institute (Aztrec) which is involved in documenting indigenous knowledge systems (as they call it) proved to be useful. The NGO is on the mailing list of many organisations such as IUCN, FAO and the World Bank, and receives many recent publications on relevant subjects.

The amount of literature about local knowledge systems related to social actors and natural resource management is limited. In Zimbabwe, literature on the loss of natural resources initially focussed on

[9] Although several women claim to be the medium of Nehanda, the woman here referred to is recognized by most Chiefs as the real one.

agriculture related soil degradation such as that resulting from tillage malpractices. More conservation forestry related literature emerged some time after Independence in the mid-eighties, without initially providing much information on the social actors involved. It is only recently that people started playing a more central role in natural resource management research. An important general publication, Warren et al. (1996), described the "cultural dimension of development" from various angles. For the Zimbabwe situation, important studies that addressed this aspect were carried out by IDS/ IIED (e.g. Scoones and Matose, 1993); Forestry Commission (Clarke, 1994; Nhira et al., 1998) IES/Cifor (Campbell, 1996); Zirrcon (Daneel, 1997) and IUCN (Barton et al, 1997; Borrini-Feyerabend& Buchman , 1997). These studies all emphasize the importance of building on local people's knowledge in conservation and document several cases of it. Nevertheless, they do not offer clear suggestions of how to break out of the aforementioned "development deadlock". This loophole is currently being addressed by the Environmental Research Coordinating Committee (ERCC, 1998 : 8), which has marked these issues as Strategic Research Priorities for Zimbabwe. Not only the ERCC, but also IDS in the UK, which regularly conducted research in Zimbabwe, has clear priorities in this direction (IDS, 1998; Scoones, personal communication). In a general sense, the loophole has been subjected to investigation for a number of years. Agrawal (1995) postulated the engagement of local knowledge in development by going beyond the dichotomy of local versus scientific knowledge. Donnelly-Roark (1998) pleaded for a focus on reconnecting the policy level with field level knowledge and development needs. The World Bank intends to address this problem in the near future with literature research and by conducting various case studies.

The organization ETC in The Netherlands is a non-governmental research institute involved in Participatory Technology Development for sustainable, low external input agriculture. Their research reveals that indigenous knowledge, as they refer to it, has limitations because of the limited capacity to cope with volatile external changes resulting from population pressure and globalization (Haverkort & Hiemstra, 1998). Participatory approaches to mobilize and enrich local knowledge (e.g. Robert Chambers, 1994) need more focus than the developed PRA can offer in order to create the aforementioned link with policy level. This idea is topical at Wageningen Agriculture University, The Netherlands, where the soft systems research for application in Third World agriculture, in particular the Actor Oriented Approach, has been well advanced for the last five to ten years (Dusseldorp, 1993: 48-51). The development of the RAAKS methodology is a result of this (Salomon and Engel, 1997; Engel, 1997). The soft systems research related to natural resource management is relatively new, certainly in southern Africa.

Other sources used for this research concerned mainly resource persons from several institutes. In addition to Professor De Beer and some of his colleagues from Unisa, benefit was gained from the network at grassroots and National or International level that is related to the writer's employment with SNV and his temporary attachment to the NGO, Aztrec. It gave the writer an opportunity to consult many resource persons and to crosscheck some findings. For instance, the research design and a summary of the findings were presented and discussed at a workshop in Masvingo, Zimbabwe on the 23th of November 1998. That workshop was attended by a number of specialists from several international research institutions. Representatives were present from IES (B. Campbell), IDS (I. Scoones), IIED (M. Hilhorst), Free University Amsterdam (C. Rey), INRA (F.Hien) and several other organisations. The discussions confirmed the actuality and relevance of the problem and the conducted research.

1.6 Scope of the research

As suggested by Mbuya Nehanda, one case study is insufficient to draw reliable conclusions which can address the research problem in full. More case studies should be conducted in order to obtain a critical mass of evidence. This, however, lies outside the possibilities of this dissertation. Nevertheless, this research must be seen as a contribution to the building of theory concerning the topic, a theory that can mainly be informed by "case study reality". Another achievement of this research will be the refinement of the used methodology.

It would nevertheless be recommendable to extend the research on future occasions in order to benefit from the potential of local knowledge systems, and not just for local development. Local knowledge processes based on local principles and logic, are part of the human experience that globalization processes dominated by western thinking tend to neglect. The study of the potential of local knowledge systems is also important to make this knowledge accessible and convince other members of the scientific community about its applicability. It is important to seek alternative solutions to contemporary problems, solutions that may not be found with thinking based on mechanistic laws or open market principles. To quote Albert Einstein:

> "Problems can often not be solved with the same thinking that created them".

As a general contribution to the development of a more fundamental development theory that in the end is needed to address the problem of disconnection between the different institutional levels, it could be inferred that the research of a local knowledge system is not only relevant because of pragmatic

reasons, but also necessary in order to focus on "what works on the ground". Africa has a rich and distinctive heritage that is part of the human experience, and as such has a right on its own. This notion should not lead to the often observed situation that the established international scientific community is urged to refrain from validating this local (indigenous, African,...) knowledge. There should be an opening from both sides in mutual recognition that the search for knowledge has no conclusions. To end this section, an African proverb is quoted:

> "Knowing is like the flow of water in a river: one drinks from one point in time" (Professor Chavunduka in Larson, 1998).

1.7 Theoretical framework

1.7.1 Perspective

The theoretical perspective of this research can best be explained from the dichotomy between the blueprint model and the process model as mentioned in the first section of this chapter. The Cartesian paradigm of "rationalism", in particular the modernist and structuralist perspective of the blueprint model, is contrasted with the constructivist perspective of the process model.

The *modernist perspective* visualises "development" in terms of progressive change from traditional to modern societies. It assumes that Western Societies are developed and Third World or developing countries just have to catch up. It is in this perspective that local knowledge and development initiatives initially were validated on the basis of western scientific theories and principles and that development was approached in a top-down manner (Bussink, 1993: 5-12; Smelser, Griffin and Turner cited in Hanyani-Mlambo, 1995: 5). Rondinelli (1993: 7) for instance, refers to "technocracies" as a result of pursuing this kind of perspective in development administration. The limitations of this approach have been outlined in Section 1.1. The opposing arguments that African society has its own history, conventions and knowledge and has therefore a right of its own, also has its limitations. The introduction of modern medicines, machines and media, for example, has created a global interdependency that is dominated by western technological thinking. However, the idea of the Third World having to "catch up" with the First World is outdated. There is a strong movement in development thinking that suggests that these modern assets and knowledge systems have to be integrated in an African perspective without wanting to change the cultural basis that might have seemed to preclude people from "catching up".

The *structuralist perspective* postulates that the room for manoeuvre of rural communities in the Third World is determined by the structural context in which they operate. State intervention, for instance, and also the global economy form part of that determining structure (Giddens, 1982). The role that is attached to social factors in building knowledge is in this perspective irrelevant to "reality". It is not said that people are not of central interest under the rationalist paradigm, but they are considered as creatures with in-built objectives or mechanisms, e.g. the objective to optimize utility (Checkland, 1981).

The *constructivist perspective* differs from the structuralist perspective in that it is based on the premise that what was termed as "truth" or "reality", was in fact constructed by social interaction. This is related to the idea of "multiple realities" or "lifeworlds", created by people who are sense-giving (Scoones and Thompson, 1992). People or coherent groups of people create their own realities or lifeworlds as the combined economic, social, cultural and ideological dimensions of their lives. This lifeworld determines the way a social actor perceives the world. An important concept in the constructivist perspective is "heterogeneity", referring to the diversity of actors with their unique perceptions and lifeworlds within apparently homogeneous groups and contexts. This concept does not deny the fact that there is some sort of imposing structure, that is characterized by matters as employment rates, markets, price policies, land tenure and the state of the natural environment as underlying factors explaining the behaviour of social actors. In the constructivist perspective, these structures, however, are causally linked with the local knowledge system only through decision making by the actors who are part of that system. Another important dimension in the constructivist perspective is "human agency". Human agency is based on the idea that people are not just system variables that can be manipulated to achieve certain objectives, but that they form knowledgeable subjects or institutions that are capable of developing social capabilities and emergent organisational forms which both enable and constrain action. In this perspective people are intentional, always subjective, and can exert human agency so that they can make a difference. This perspective makes social systems to a certain extent unpredictable. The constructivist perspective is not limited to lay knowledge of, for instance, rural African citizens, but is also applicable to scientific knowledge. Röling (1994) illustrates this fact by pointing at the failure of the US Supreme Court, at the beginning of the 1990s, to establish once and for all the criteria for what is scientific and what is not. Röling (1994: 126) states that "what is scientific depends on agreement between a group of people who have been given the power, or have taken it, to determine what is scientific". An important operationalization of the constructivist

perspective is the *actor oriented approach*[10]. This approach, that forms the basis for this research, permits an understanding of the dynamic processes of social change vis-à-vis complex social interactions between actors within a social system and between that system and the outside world. This "actor" is a socio-cultural construction representing one or more individuals or institutions that are, so to say, metaphorically transformed into "social actors".

1.7.2 Natural resource management

Social actors can be examined in relation to all aspects of rural life. It is, however, the intention to focus this research on the relationships to natural resource management. The definition of "natural resources" comes close to that of an "ecosystem": *All natural living organisms that together form a biotic community in a certain area*. However, the term "natural resources" is, in this context, used to put emphasis on the products, including goods and services, of that ecosystem for local people. The natural resources are part of an ecosystem that under the right conditions constantly *renews* the natural goods and maintains its services. The ecosystem can therefore be referred to as the "natural resource base". This ecosystem can be viewed as part of the "environment", which includes all the physical aspects of the rural landscape, including for instance the soil of purely agricultural lands. While for practical reasons both terms are defined separately, most environmental theories can be useful to examine natural resource management. The term "natural resource management" is used here presupposing that the management of the natural resource base is guided by objectives of sustainability. This means that the use of the renewable natural resources must not lead to the loss of its natural, economical, cultural and social functions for future generations.

Natural resource management and farming are interrelated, but nevertheless different systems that need, for the sake of management, a different approach. Agriculture is cultivation, while natural resources are mostly utilised on a basis of sustained exploitation of naturally available resources. Agricultural land is often well defined in terms of ownership and user rights. The natural resource area is often common property.

Environmental theory is increasingly based on the premise that local people are part of the ecosystem.

[10] Dusseldorp (1993: 48-52 and 293) describes this approach as trying to "... understand how development takes place as a result of the cooperation between actors, via social networks, to realize their own objectives ".

The introduction of concepts like *carrying capacity, environmental utility space*[11] and *life support system* indicate a change in thinking over the past decade. In addition to the many practical functions of the environment for local people, such as the provision of goods (for example medicines, fodder, wood, foods and fertiliser), there are the services that it provides (Campbell, 1996: 102 & Kessler, 1997: 26). These services can be regulatory, such as fighting pests in agricultural crops, quality control of water, hydrological control and erosion control. The services can also be spiritual. In traditional African society the natural vegetation provides a habitat for ancestral spirits. These spirits will move away once the vegetation is degraded, leaving local people behind in psychological and cultural desolation (Hove & Trojanov, 1996: 80).

In order to capture the integrated nature of natural resource management in relation to development and to other parts of rural life, a distinction can be made between different *levels of aggregation* and between *multiple dimensions*. As far as the levels of aggregation are concerned, the individual farmers can apply a multitude of techniques to improve the sustainability of their farming activities in relation to natural resources. However, this farm level does not always provide sufficient control to limit the effects of unsustainable practices on neighbouring farms or for sustainable management of common property natural resources, on which the farm partly depends. For example, the degradation of woodlands and wetlands affects hydrological control, and free range grazing and the exploitation of forest products affect the availability of products to others. Concerning the management of these problems, natural resource management requires decision making at higher level of aggregation, such as community level. In turn, certain problems in natural resource management might need the consultation at the level of a water catchment area, district administration, national or international entities with influences at local level.

With regard to the multiple dimensions of natural resource management, each could be seen from its own theoretical perspective. The ecological dimension is focussed initially on the physical processes of interdependent growth and regeneration within natural resource areas. This dimension is the area of bio-physical scientists, working from a rationalist perspective. The dominant ecological theories focus on *resistance* (buffer function), *resilience* (the capacity to recover to average values after major

[11] The provision of goods (products) and services by the environment, depending upon interactions in the ecosystem, without impacting upon the capacity to provide such goods and services, or causing irreversible damage (Kessler, 1997: 25). A similar concept is *environmental providing capacity*. This can be the capacity of the environment to provide a certain amount of nitrogen for plant growth, to purify a certain amount of polluted water, the capacity to maintain a constant flow of spring water over the year or the capacity to control undesirable insect populations.

disturbances) and *diversity* (of species, genotypes, landscapes, habitats, and their relationships) - in brief, ecological stability and biodiversity. Important theoretical aspects are the notion that the capacity of resistance is limited and that the capacity for resilience of ecosystems will gradually or suddenly collapse after an irreversible degree of depletion, pollution or decrease of biodiversity. This critical degree of degradation is also called a "threshold". A second dimension is the economic dimension. The environmental economist supposes that people want to satisfy their needs with scarce natural resources and that the management of these resources will (should) be aimed at optimizing utility, a rational perspective. Important parameters that can limit or guide the use of natural resources are productivity, efficiency and optionality. A third dimension can be distinguished on the basis of what people think is important for them. Kessler (1997: 22) distinguishes, besides an ecological and economic dimension of the environment, a socio-institutional dimension. Important aspects of this dimension are autonomy, equity, health and security. Other authors (Dusseldorp, 1993: 39; DGIS, 1992: 54) write about the socio-cultural dimension, thus also alluding to the importance of cultural habits and beliefs as a factor in natural resource management.

Although these distinctions can be helpful in an outsider's analysis and assessment of natural resource management as it takes place in an area, the actor oriented approach looks at it from a social constructivist perspective. People construct their own reality in regard of natural resources which plays a role in how they deal with natural resource management (Röling, 1994:126-127). This subjective reality acknowledges the fact that natural resource management has multiple dimensions, but it places those dimensions in the perspective of the knowledge systems of local people. In other words, social causality is a point of departure and not a statistical analysis that correlates structural and cultural factors. This makes natural resource management a *social process*. Natural resource management at grassroots level under normal circumstances is not only guided by scientifically established ecological limits (thresholds) and economic parameters, but also by socially established norms and values and spiritual taboos that may be partly based on economic and ecological considerations. These norms, values and taboos may include many aspects that also result from scientific investigation. However, what is more relevant is that many determining aspects that do *not* result from a possible scientific investigation are included.

1.7.3 Local knowledge systems

In a situation where natural resource management is perceived to be a (social) problem, the resources could best be managed as a whole, involving all local key actors and also higher levels of aggregation.

For this reason this research has a focus on the local knowledge system as a (historical and/or potential) coherent unit of management that, knowledgeably, seeks to improve and regulate the interventions of different internal and external actors with partly divergent and partly convergent objectives and strategies within a specific area.

"Knowledge" is defined as "the set of concepts, meanings, skills and routines developed over time by individuals or groups as they process information" (Salomon & Engel, 1997: 74). Knowledge is seen as an attribute of the mind, something that cannot be transferred entirely but has certain social roots. Röling (1988: 186) emphasizes the social aspect of local knowledge, stating that it should be seen as "... shared and accumulated knowledge vis-à-vis a collective experience in a shared environment". Particularly the terms "collective" and "shared environment" imply that this knowledge is related to specific local conditions and a consensus about the relevance of knowledge. The social interaction and relationships are important elements to attribute meaning to information, to label and categorize knowledge. Donnelly-Roark (1998: 36) emphasizes this by arguing that not facts, but rather values and ideas determine what could be recognized as knowledge.

Engel (1997:126-133), who can be considered as a leading author in the field of management of agricultural knowledge systems, prefers to refer to "knowing" rather than to "knowledge". "Knowing" is a process, whilst knowledge could easily be characterized as an accumulation of facts. Instead of talking about knowledge as a body of true statements, Engel (1997), referring to Gremmen, argues that the limits of human knowledge through statements are coinciding with the limits of language, whilst an alternative focus on "concepts" as the limit of human knowledge can better express the idea of "knowing" as a dynamic social process.

The process of knowledge development, or rather, of the development of "knowing", has several dimensions:

- There is a practical dimension of "knowing". The "knowing" here referred to is woven in daily practice and is problem oriented. Local farmers, for instance, who have certain objectives towards natural resource management, have developed information acquisition strategies, that may vary with the type of knowledge they are looking for.
- Individual "knowing", determined by the properties of persons that enables them to make inferences from experience, observation and reasoning, is a form of "knowing" practised by many farmers. Individual "knowing" is determined by cognition, i.e. the human capacity of

perceiving and conceiving. Reijntjes et al (1992) argues that in many cases farmers are found to experiment in their field through trial and error. Doing so, they develop individual "knowing" that in some cases set examples;

- communication also plays an important role. It is an important basis for the giving of meaning to experiences and information. It leads to the third dimension of "knowing", the *socially constructed "knowing"*, embedded in the social dynamics of a group. In relation to innovation this dimension puts the focus on networking for innovation (see next sub-section). Most important is the notion that innovation in common property natural resource management is not only the development of new knowledge, but also the diffusion of it. In other words, innovation is an interactive process of "knowing".

"Local knowledge" is locally and culturally internalized knowledge, or "knowing". It is part of local people's identity and they rely on it if they find "outside knowledge" not workable nor acceptable. The term "local" is here used in a geographical sense. The use of the term "indigenous" instead of "local" is avoided here, because it often causes a misunderstanding. Indigenous knowledge is often seen as "that what was there before westernization" and, certainly in southern Africa, is given a political connotation. It is, however, assumed that the degree of influence of original indigenous knowledge by western (and other) cultures is often considerable. These influences are almost impossible to trace, if this would indeed be desirable.

"Local knowledge system" is a dynamic notion of the term "local knowledge". It is intrinsically related to the socio-economic and cultural practice of local people and is here conceptualized as a system of relatively stable chains of interaction and communication by which knowledge is exchanged or generated. This exchange is focussed on particular objects or subjects of common concern and articulated through particular actors.

For analytical purposes it is important to know how a system should be perceived. According to Kramer & Smit (in Engel, 1997: 28) a system must be defined on the basis of the following distinction: the entities that are part of "something"; the entities that are not part of it but influence it; how the entities within the system relate to each other and the relationships of the entities outside the system. On the basis of this definition, this research makes a distinction between *primary local actors* (part of the local knowledge system) and *secondary local actors* (not part of the local knowledge system, but having a direct influence). Their relationships are subjected to investigation in this research. From the

aforementioned rationalist perspective, a system can also be seen as a model representing real processes or mechanisms, but also as an "image" for studying part of reality. A well known example of the first way of thinking in "systems" is farming systems research. It emerged in the seventies as a reaction to sectorial approaches. By conceiving rural realities as a system, an attempt was made to study the whole of the rural environment and the relationships between its elements. This led to the development of, for instance, the aforementioned Rapid Rural Appraisal as a set of participatory tools to "harvest" the products of local knowledge. This initial concept of farming systems pursued the "hard systems thinking", mostly referring to a materialistic-mechanic "Cartesian" image of a system as a machine. The "hard systems investigation" is characterized as a research whereby reality is simplified and reduced to elements that fit together in a logical model that processes (throughput) a certain input to a predetermined output.

Although the "hard" approach of studying complex situations is sometimes labelled as "scientific" or "western", the same western science formulated a contrary way of thinking about systems: "soft systems thinking" (Engel, 1997: 25). This thinking has increasingly been accepted in developmental research, where it led to methods such as Participatory Learning and Action. Soft systems thinking is based on the premise that phenomena do not have a meaning in themselves but are attributed with one. In other words, it is systems thinking derived from the social constructivist perspective. All actors have only a partial perception of "reality" because of their unique lifeworld. At individual and social actor level, other knowledge systems or networks exist. Individuals or groups are not only influencing or being influenced by the system that is being analysed, but also by the networks at other hierarchic levels that cut across and partly overlap the one being analysed. However, since social actors that are part of a local knowledge system share the same context (e.g. physical environment or common history), they also share a partly common reality. This comparison between hard and soft systems thinking is similar to that between the blueprint and process model (see Annexure IV).

What makes the local knowledge system a system is the fact that there are "linkage mechanisms". Salomon & Engel (1997: 75) define linkages as "connections between actors that allow the exchange of resources such as information, money, labour and other material or immaterial assets, such as power, status, or "goodwill"." The linkage mechanisms are the organizational arrangements that help to link up the parts of the systems. These are relevant for this research, because they provide a possibility for influencing a local knowledge system vis-à-vis common property natural resource management.

Defining the boundaries of a local knowledge system can be seen as a matter of choice for the level of analysis. In order to make any research of a knowledge system meaningful, the identification of its boundaries should be related to the relevance of that identification. In this research, that relevance is the management of natural resources that are partly common property to the community under examination. Although initially the distinction of such a boundary might seem artificial, it can be expected that continued interaction driven by objectives of innovation of specific practices within such a system encourages the development of shared expectations that confirm the boundaries and regulate interactions in an organized way. Salomon and Engel (1997:72-77) refers to this as "the social organization of innovation" ,"actor arrangements" or "innovation configurations", whereby the boundaries of a knowledge system are such that "...they assemble actors and their relationships that are relevant to the mission(s) attributed to the whole".

A practical way of examining a local knowledge system is through the analysis of *social interfaces* that emerge from the definition and discussion of actors' mission statements. The concept of social interfaces captures not only the differences between lifeworlds or perceptions, but also has the potential to reveal the shared boundary where synergy through interaction (links) may occur between social actors, or even between the local knowledge system as a social system on the one hand and external actors on the other hand. This type of analysis attempts to reach understanding of the dynamic processes of social change vis-à-vis internal and external influences. Long (in Hanyani-Mlambo, 1995: 8) provides a useful definition:

> "Social interface is a critical point of intersection between different social systems, fields or levels of social order where structural discontinuities, based upon differences of normative value and social interest, are most likely to be found.... Such discontinuities are characterised by discrepancies in values, interests, knowledge and power. Interfaces typically occur at points where different, and often conflicting, lifeworlds or social fields intersect."

The study of interfaces does not only shed light on the internal constraints of the local knowledge system to endogenously address natural resource management problems. Those interfaces among all local actors, particularly the primary and the secondary actors, need also to be studied in order to provide a basis for understanding the processes by which planned interventions enter the lifeworlds of primary actors and become part of the resources and constraints of social strategies that local people develop.

1.7.4 Social actors networking for innovation

When describing the dynamics in local development from a "soft systems perspective", the metaphor of an "arena" is generally used. In this arena, individual actors, driven by their own objectives and activities, not only struggle for scarce natural resources, but also other resources such as power, ideas, images, finances and instruments. In order to avoid the suggestion of an ongoing struggle, Engel (1997:14) prefers to talk about "theatres of innovation" as a metaphor to better accommodate concepts such as knowing; human agency; sense-giving; diversity; social interface; multiplicity and interdependency. These theatres are seen as places where planned and unplanned actions by social actors are performed and knowledge is developed. In this research the term "arena" is maintained because it is more common English.

The term "innovation" refers to the objective of the study of a soft system, namely that through social interaction for innovation of a local knowledge system, solutions to and common understanding of natural resource management problems can best be reached. In more practical terms, these "arenas" represent the idea of "social actors networking for innovation". A more comprehensive theoretical reflection on innovation will be included in Section 4.3. "Networking" means that social actors are actively seeking relationships that will allow them to learn and to make changes in their practices in order to address problems related to the management of scarce natural resources. This should result in either developing new methods or in adapting ideas and practices developed by others. Since actors have their own ideas about what direction the development of natural resource management should take for their needs, they will build networks with those whom they consider to be relevant to their cause. In this way innovation cannot merely be seen as a technical process. It is a diffuse social process in which the involved actors pursue their own objectives but are also prepared to sacrifice personal benefit for the perceived advantage of joint action.

The potential of a local knowledge system to endogenously address problems in natural resource management lies in the possible renewed coalitions of actors and their resources (including their specific knowledge or "knowing"). The evolving networking within a local knowledge system affects communication and resource linkages, and as such affects their availability. It also affects the extent to which the local knowledge system as a whole achieves its common objective of aiming for innovation in order to address problems in natural resource management.

Perhaps the most important output of development based on the actor oriented approach is captured

by the concept of "collective agency", i.e. the organized accommodation and cooperation between actors to reach contextually desirable and culturally feasible solution formulation (Gubbels, 1992). Through joint effort people can make a difference and escape the deterministic structures that, from the rationalist perspective, are imposed on them. Through social organization for innovation, including an effective linkage with outside actors, it is assumed that a local knowledge system can regain its capacity for checks and balances in order to restore a full relationship with changing local realities and development needs.

1.8 Format of the dissertation

Chapter I

This first chapter introduces the research in the way it was designed; the problem it addresses; the objectives it pursues; the theoretical background of the problem; the chosen methodology and the way the research was carried out.

Chapter II

Chapter II highlights, from different perspectives and historical dimensions, the relationship that exists between local people of the research area and their natural resources, forming the backdrop of the local knowledge system. In this chapter, the first research question (see Section 1.5) is addressed.
This includes a description of the physical and biotic environment, a historical analysis of the socio-economic features that explain the current relationship with natural resources; the impact that secondary actors have on local people's ability to manage and apply their knowledge of natural resources, and a short analysis how all this currently impacts on the natural resources of the research area, both from an insider's (locally perceived state of the environment) and an outsider's (professional observations) point of view.

Chapter III

This chapter outlines the features of the local knowledge system in terms of problems and solutions at primary actor level. It addresses research question 2.
First the different primary actors are distinguished and described. Their perceptions and problems related to natural resource use are highlighted, as is the way they try to find solutions for those problems. This includes the application of their knowledge and the sources of information they use (both inside and outside the local community). In Chapter III the most relevant secondary actors are also described in more general terms. The paradox between the "labelled" image and the self image

is highlighted in relevant cases.

Chapter IV

In Chapter IV, the potential for endogenous development of improved natural resource management systems is assessed and analysed. In this chapter, the last two research questions are addressed. This is done by grouping the actors in knowledge clusters on the basis of their mission statements and linkages within the local knowledge system. After some additional theoretical reflections, processes of innovation are analysed and an innovation configuration proposed. The possible enabling role that the external environment (secondary actors, administration and legislation) can play is examined and recommendations are made to this effect.

Chapter V

This concluding chapter contains an executive summary. The results and the adequacy of the research methods employed are discussed. The extent to which the research objectives have been met will also be highlighted. Finally, a discussion will take place on the problem statement and its underlying assumptions, after which further recommendations will be formulated.

CHAPTER II THE RESEARCH CONTEXT OF THE CHARUMBIRA CASE STUDY

2.1 Introduction

In order to investigate the way in which local people apply and adapt knowledge concerning natural resource management, there is a need to understand the relationship between the local people and their environment. This relationship is determined by the given physical and biotic situation. Furthermore it is relevant to examine the socio-economic situation in the area and to put these in an historic perspective. Engel (1997:147) refers to this as the "context of the social organization of innovation", meaning " the socially constructed as well as the natural conditions that reduce the degrees of freedom actors have to create or choose among volitions and propositions". The socio-economic trends in this particular physical environment partly explain people's view and expectations vis-à-vis natural resource management and the strategies and specific knowledge that they, individually or together, might have developed. Together, these elements should provide an explanation for the current perceived and observed state of the environment, with a special focus on the renewable natural resources. This is not only relevant because it forms the backdrop of the local knowledge system, but it also gives insight into the potential to apply or innovate local knowledge.

Most findings in this chapter result from the first PRA week mentioned in sub-section 1.5.3. Findings from a PRA session that was performed in the same area several years ago (Aztrec, 1995) were crosschecked and expanded on. During the PRA week, several group exercises such as retrospective mapping and transects, were conducted. Also some of the RAAKS frames were completed. In the second section of this chapter, the physical and biotic environment and the use that local people make of those specific resources are briefly outlined. In the third section, socio-economic trends and their influence on natural resource management are outlined. To be more specific, the land use and tenure since the 19th century, the health and nutrition situation, education, religion and traditional beliefs, historical trends in farming methods, non-agrarian economic activities and the relation between economic wealth and natural resource use will be reviewed. In the fourth section, trends in the provisional capacity of the natural resources, both from a "scientific" point of view (own observations and measurements) and from a locally perceived perspective will be analysed.

2.2 The environment of Charumbira and its use for local people

The case study area coincides with the boundaries of Ward 12 in Masvingo District, Masvingo Province in southern Zimbabwe. It is situated some 30 km south of Masvingo town, near the national

monument "Great Zimbabwe", and forms part of the "Masvingo Communal Land". The area, also called "Charumbira", falls under the traditional leadership of Chief Charumbira, who resides in the area (see Annexure II: Topographical map of Charumbira). According to a report of a PRA session conducted by Aztrec in a part of the research area in early 1995, the main tribal group is the Karanga tribe, others belong to the Nemanwa tribe. There are, however, no major cultural differences between the different tribes.

The area covers some 65 square kilometres and is inhabited by approximately 3,300 people. This makes the population density (of about 20/km^2) nearly the same as the average for Zimbabwe (21.6 inhabitants/km^2). Although formal figures indicate a population growth of more than 3% per year, the effect of AIDS and migration will certainly reduce this growth rate[12]. The migration of male adults to urban centres results in a majority of women in the adult age group in the area. In common with many other communal areas, about 50% of the population is below the age of 15 years.

The eastern part of the research area is situated in natural region III, with an average annual rainfall of 700 mm per annum. Because of the presence of several wetlands and streams, water is available throughout most of the year. The rest of the area must be classified in natural region IV, with a rainfall of about 600 mm. The annual rainfall in the study area is, however, highly variable, giving rise to frequent droughts and crop failures. This difference in average rainfall over a small distance is caused by the geomorphology. A mountain chain that causes more precipitation, stretches from Bikita via Ndanga and Morgenster into the Eastern part of the research area. Rainfall mainly occurs from November to March under relatively cool conditions. A dry spell may occur in January or February. April and May are often sunny. From May to September frost may occur. September and October are generally hot and dry.

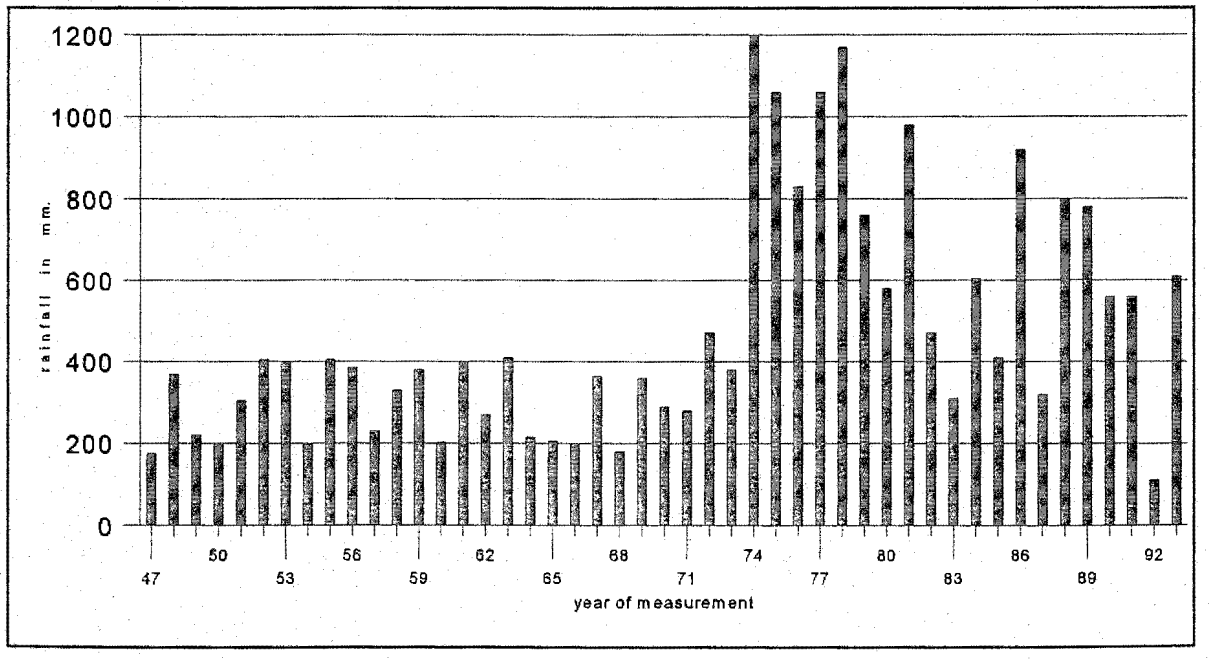
The general perception in the area is that the seasons have become less predictable. According to the farmers, in the past the first rains (these rains all have a definite name in the local language, e.g. this one is called "Gukurahindi" in Shona) occurred in August, while the second rains (Bvumiramutondo) fell in October, the beginning of the planting season. The last rains (Dzoraivhu and Nhimuramwaka) were in April and May, introducing a generally severe winter. Years of drought were rare. According

[12] In a statement made by Dr. Stamps, Zimbabwean Minister of Health, at the *The Hague Forum on Global Population* on 8 February 1999, he said that the life expectancy of Zimbabweans has decreased from 62 to 45 because of HIV/Aids. He expects that by the year 2020 the life expectancy in Zimbabwe will have further dropped to 35 years.

to some elders 1925, 1947 and 1965 were drought years. However, droughts are perceived to have become common since the mid 1980s and the temperature has increased. These climatological developments are attributed to a loss of respect for traditional values, norms and taboos. Some mentioned were the lack of traditional ceremonies (Mbira and Mukwerere), the failure to recognize bathing areas, the cutting down of rain trees (e.g. Mukute), diminishing respect for sacred forests and shrines and a lack of protection of rivers and specific drinking areas for livestock.

Annual rainfall data since 1947 are available from the weather Station at Zaka, some 30 km. away from the research area (Figure 2.1). The exact data at Charumbira will be different because of local variability in rainfall. The trends, however, are more or less the same for the whole district and some adjacent areas. The data, presented in Figure 2.1, show that it has become drier since the mid seventies, but also that the rainfall in the seventies was far higher than the thirty years before, and that the situation is now returning to normal again. The difference, however, is the degree of variation in annual rainfall. Since the seventies there have been more extreme high and low rainfall years, a fact which makes subsistence farming more risky and complicated.

Figure 2.1: Annual Rainfall 1947-1993 (in mm.) at Zaka Weather Station



Source: Twomlow et al., 1995.

The research area is situated on geological formations of intrusive granite, gramodorite, adamellite and tonalite. Here an outlier of the highveld occurs as a fairly pronounced ridge. Approximately 30% of

the area is dominated by rock outcrops of the ancient granitic shield, generally covered by natural vegetation (Miombo woodlands mostly). Most soils in the area consist of the greyish brown granitic sand with medium textured red dolerite intrusions, and can be classified as fersiallitic with appreciable reserves of weatherable minerals. In the eastern and south eastern part of the research area, where most rock outcrops are found, highly porous ferrallitic soils with very little or no reserves of weatherable minerals are found (Republic of Zimbabwe, 1995). They are prone to erosion unless correctly managed. Sandy and loamy clay soils are generally dominant. Dambo soils (alluvial soils in wetlands, generally along rivers and small ephemeral waterways) can have a similar structure, but generally contain a larger loam component gradually increasing downstream. The research area has many wetlands that are not connected to a river. They are fed by aquifers, i.e. a clay sub-surface band that retains water upstream. They are especially found in the neighbourhood of the granitic outcrops that are characteristic of this area. The sandy and loamy clay soils are used for permanent settlement and continuous crop production, sustained by the use of kraal manure, organic matter, ant heap soil and chemical fertilizer. The loamy clay soils (different clays also have definitive names, for example this one is called "Gan'a" in Shona), are considered the most fertile soils.

Certain types of clay (Chinamwe in Shona, a type of clay dominant on dambos, anthills and gully beds) are used for pottery and the building of cattle troughs. Other clays (Dongo) are used for plastering. Churu is a clay type found on scattered anthills and is used for flooring, soil fertility improvement, plastering and pottery. Chivhurwe is a clay from anthill found in open grasslands and is used as a medicine for expectant mothers. A more sandy type of clay (Musheche) is suitable for construction.

Water is a valuable resource, as in most areas, and is often the basis of many traditional beliefs. The research area has many springs that feed perennial rivers. These springs serve many domestic purposes and are considered to be the habitat of mermaids (water spirits). Sponges are a valuable habitat for wildlife and are used for hunting and the burial of expectant mothers who have died. Several rivers flow in the area. These are the Muziro, the Chembenyana, the Chirukutu, the Dobota, the Musuka and the Masvingise. Many of these rivers were perennial, but have now become silted and no longer flow throughout the year. These river areas are mostly used for irrigation, livestock, fishing, swimming and the burial of infants. Water which has accumulated in hallowed trees in mountains and larger forests has medicinal use. Water accumulated on rocky outcrops is used to soak small grains in preparation for traditional beer brewing. Wells dug by people who have no alternative source of water is used for drinking and cooking. Isolated pools in river beds and other low points are often also considered to be

a habitat for mermaids. The use of such water is therefore limited by local laws and taboos.

Due to an increasing scarcity of surface water, several boreholes have been drilled and equipped with hand pumps. They are in high demand, and are used for domestic purposes, gardening and livestock. The main causes of the reduction of water availability is believed to be the dry climate and increased demand, as well as the loss of respect for traditional norms and values. Also colonial legislation was mentioned as a cause, because it disregarded local rules and regulations based on cultural values attached to the water sources. Observation of wetland vegetation indicates that several water loving plants (e.g. the fern tree) have died over the last few years. This might, however, be caused by one single dry season (the 1991-1992 season had almost no precipitation).

The area still has considerable natural (biotic) resources. About 15% is covered by natural vegetation, mainly in the vicinity of mountains and hills. This vegetation consists of woodland of the Miombo type, dominated by deciduous tree species such as Julbernardia globiflora (Mutondo/Mnondo) and Brachystechia spiciformis (Msasa in Shona). Patches of thick forest exist in some areas. These are generally sacred forests that enjoy a long tradition of conservation. More open, degraded or secondary woodland covers another 10% of the area. The Miombo woodlands are a general vegetation type that can be found in many southern African countries. The woodlands of the research area are classified as dry Miombo woodlands. In a climax situation, as is found in the patches of thick forest, the canopy height is around 15 metres. The structure has three layers. Besides the canopy, there is a shrub layer of mainly legumes such as Sphenostylis, Eriosema and Dolichos, mixed with suppressed saplings of canopy trees. The ground layer is generally composed of herbs and grasses of Andropogon spp., Eragrostis spp. and Digitaria spp. Another type of vegetation is the Hyportheria grassland (thatching grass), found on the higher plains and between the fields, and the dambos. In the dambo wetlands the vegetation is dominated by water loving trees and grasses. On heavy clay soils, thorn savanna and thickets are found.

In terms of wildlife, the following species frequent the area: baboon, wild cat, squirrel, warthog, vervet monkey, jackal, kudu, impala, hare, rock rabbit, duiker and several species of reptiles and birds.

The vegetation is used for various crafts, fuel wood, grazing, wildlife conservation, medicines, construction timber and thatching. Some products are currently being commercialized, i.e. fuel wood, timber and medicines. A more detailed overview of vegetation species and use (Aztrec, 1995) can be

found in Annexure III. It shows how varied and close the relationship of the local community is with the natural environment, and how cultural aspects are part and parcel of the benefit local people derive from it.

2.3 Socio-economic situation and trends

2.3.1 Land use and tenure since the 19th century

The people of the Charumbira area originate from Mozambique, Zambia and Malawi. The first Karanga settlers in the research area arrived from the Mbire mountain near the present capital Harare. They were three hunters named Chainda, Nyakunuhwa and Chioi. They requested permission to hunt from the traditional leader of the region, called Nemanwa. They were allowed to kill an elephant in the research area. When they had killed the elephant, Chainda gave a piece of meat to Nemanwa to show that he managed to kill it and out of respect for the traditional leader. Nemanwa then gave him land that includes the present Charumbira area. Chainda went back to Mbire mountain to call his relatives, and he came back with Musakadongo, Matukununu, Sinamano and Chikono. The first place where Chainda slept in the area was where he communicated with the spirits to confirm whether or not the land was suitable for their settlement. This became the first sacred place. Places that followed were some of the mountains that were used for burial and some of the wetlands, where the water sprites (Njuzu, who manifest themselves as mermaids) used to communicate to spirit mediums. According to the elders of Charumbira, who are the source of this short settlement history, this took place in the period when the first whites had arrived, which was in the last decade of the 19th century.

During most of the 19th century, the Chief's homestead was generally at the centre of the settlement, immediately surrounded by the homesteads of his sentinels. This was for security, because of the regular raids of the Ndebele. Traditionally the allocation of land was determined by the Chief, who settled the people according to their clans. In other words, individual male heads of families could gain access to land through a patrilineal kinship system according to their need and their capacity to use it. They were not entitled to own the land, but they could control and use the land and the natural resources on it (right of avail). The role of the spirit mediums was important. They advised the Chief in regard to the use of specific areas. The spirit medium was the custodian of the land, advised by the spirits, while the Chief was the administrator. In early colonial times, when the people were protected from raiders by the colonial regime, the settlements became less permanent and were rotated, leaving fields in fallow to regenerate (shifting cultivation, see sub-section 2.3.5). It was during this period that

migration took place everywhere in Zimbabwe (Scoones and Cousins, 1991), as in the case of Charumbira described above. The splitting of ruling lineages as a consequence of the inmigration of new family groups meant a loss of the total monopoly of control by the polygamist Chiefs with their loyal descendants.

Reallocation of land by the colonial regime introduced radical changes in power relations and land rights. There were the forced removals to the Tribal Trust Lands (TTLs), now called "Communal Lands". These TTLs were generally located in the more marginal areas in terms of soil, vegetation, rainfall and irrigation potential. In the whole of Zimbabwe, this process, which reached a climax after the 1930 Land Appropriation Act, concentrated an estimated 530 000 of the indigenous population on 8.4 million hectares of relatively marginal land, leaving the larger part of the country in the hands of a few thousand European large scale farmers. Landless people were no longer able to access land, because the Act had made tenancy for Africans illegal. Chief Charumbira claims that before the forced removals, the present State Land and a former commercial cattle farm North of the research area belonged to the Charumbira community. Up to the 1950s, the traditional institutions were accepted by the colonial authorities as resource managers in the communal lands. These functions were, however, temporarily transferred to the government in the 1950s by the introduction of a new Act, the Native Land Husbandry Act. The "independent" Rhodesia, however, returned the powers to the Chiefs with the Land Tenure Act of 1970. Nevertheless, the authority of the Chiefs[13] was seriously undermined, because the Chiefs were regarded as colonial stooges during the liberation struggle. This led to a power vacuum at local level, which caused extensive expansion of cropping into the natural resources of grazing and woodland areas (Matose and Wily in Campbell, 1996: 206).

After independence in 1980, when Rhodesia became Zimbabwe, the resource control powers were again given back to the State. The Communal Land Act of 1982 and the Rural District Councils Act of 1988 assigned power to elected VIDCOs and WADCOs[14] rather than lineage leaders. In theory this gives opportunity for decentralized mandate for resource management. However, councillors are often involved in power struggles in the national political party (Zanu-PF) without always considering the interests of local people. In the research area the councillors as well as the Vidco and Wadco chairmen

[13] When referring to the "Chief", the research connotes to "the Chief and his head men". The head men generally represent a clan, and have to be seen as the assistants and counsellors of the Chief.

[14] VIDCO stands for Village Development Committe. WADCO stands for Ward Development Committee. Representatives from the WADCOs form the council at district level.

are often regarded with scepticism.

In reality, formal control over natural resources is still concentrated at District Council level. Nevertheless, the customary land distribution system is often still existent in the communal areas, especially for agricultural land. According to customary law, the natural resources of the Miombo woodlands are communal property, meaning that outsiders to the Charumbira community who have no explicit permission are excluded from the use of the resources. The use within the community is, in principle, regulated by traditional norms and leadership. This paradoxical situation is referred to as *tenurial niches* (Bruce et al., 1993). This concept is based on the fact that in many countries in sub-Saharan Africa, traditional tenure systems operate side by side with modern concepts, often introduced by colonial regimes and maintained afterwards by indigenous regimes for various reasons. In the Zimbabwean context it often means that the traditional system is allowed, but when conflict arises, statutory law tends to supersede customary law (Pitblado in Campbell, 1996; 73-84). However, for several other reasons local government sometimes intervenes. In the Zimbabwean press (1996-1999) several cases were reported whereby Rural District Councils gave concessions to commercial timber companies to cut trees in communal areas. This and other examples indicate that the powers of the traditional leadership are limited and often undermined by formal authorities. This "eroded local leadership" is one of the reasons why local people often develop alternative strategies for land tenure. Claims on land can for instance be supported by arguments of a religious-political nature. Some wetlands in the research area are said to be the ancestral home of the Karanga clan, but the same claim is made by members of the Nemanwa clan. One wetland in the area had been fenced off by members of the Charumbira community. According to the initiator, Mr. Makasi, this is done to reinstate the original habitat of the spirits, who have a clear preference to "speak" through certain plants and animals. That his initiative might also have more secular, political motives is illustrated in Scoones and Cousins (1991: 8-9). They found that there are cases of protected wetlands in southern Zimbabwe, where originally only a small spring in the centre of the wetland was sacred. In these cases the "sacredness was extended" over a larger area for pragmatic reasons, to oppose the threats of claims over that wetland by other lineage groups and to prevent others from cultivating the area, using the water or exploiting the natural renewable resources.

Population growth within the research area has progressively reduced the average area and resources available per family, as is generally the case in the communal lands of southern Zimbabwe. Holdings of less than 3 hectares of arable land are now common, increasing the pressure on all natural resources.

In the eastern part of the research area, several kraal heads[15] said that the land was still sufficient for present use, but that there was not enough to divide between their children and their future families. The Chief is aware of this problem and has set up a strategy to occupy land outside his present territory. The State forest and former commercial cattle farm north of Charumbira is deliberately being invaded by squatters from Charumbira to halt the invasion of squatters from Chivi (West of the research area) and to make a statement that the Charumbira community has traditional rights there.

2.3.2 Health and nutrition

There is a basic public health facility in the research area (clinic with nurse). However, at Morgenster mission, about 10 km. away, there is a mission hospital with several medical doctors. Not everyone can afford to go there, let alone buy the prescribed medicines. There is a downward trend in the number of people seeking a doctor's consultation over the last year (personal communication Dr. Bollemeyer of Morgenster Hospital). This is ascribed to the steep increase in the cost of living and transport. Traditionally people depended entirely on their environment for medicines, and diagnosis was made by local herbal doctors (the n'angas). The research area has several n'angas, amongst whom are some with a national reputation. According to some of the consulted n'angas, people from as far as Harare and Bulawayo come to visit the area seeking cures. These n'angas experience an increasing number of consultations, not only because of the high incidence of incurable diseases such as Aids (people seem to visit local doctors if modern medicine does not provide a solution), but also because they are more affordable to the rural poor.

During the PRA exercise a comparison was made between the past and present situation concerning mortality rate, birthing, family planning and food and nutrition. The discussions were repeated in three different homogeneous (elderly men, women and youth) groups on different days during the PRA week. Individual discussions with n'angas, the Provincial health department and a professional medical doctor at Morgenster added perspective. The mortality rate is said to have increased considerably over the last fifty years. This was explained as follows. Traditionally the people of the research area set life traps (Kuteya mariva) in strategic places such as caves, protecting them from diseases. The way of life

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15 Although in countries like South Africa the use of the word "kraal" in association with a rural homestead is sometimes a sensitive matter, in Zimbabwe the word is generally used by all classes and races and has a positive connotation. The ownership of cattle is something that gives status and is associated with wealth and success. A cattle kraal is traditionally centrally positioned in a village. The head of a number of those villages is called the kraal head, the head of the extended family that traditionally live in their houses close to their cattle kraal.

was also considered more healthy at that time. Traditional medicines were said to be abundant, as was the availability of healthy natural foods (fruits, wild vegetables, game meat...). Children were fed with traditional porridge and enjoyed prolonged breast feeding. Men were said to have more physical exercise because of activities such as hunting, swimming and wrestling.

Nowadays, traditional practices and medicines have a limited use or have completely disappeared because of modern health care. This modern health care is not always considered good, because "even at the hospital many people die". This is most probably related to the high incidence of Aids. An estimated 20-35% of the sexually active age group is believed to be infected with the HIV-virus. Local people, although acknowledging the occurrence of Aids, tend to look for the causes on a secondary level, such as "increased prostitution due to foreign influences, mixing of people from different areas and modern education leading to a loss of moral behaviour". There is also the deeply rooted traditional belief that people who suffer from "strange" diseases like Aids, have committed secret sins, and are now being punished by God (Mwari).

Most prospective mothers are sent to the hospital these days to give birth. However, several elder women say they are midwives who are still performing considerable numbers of deliveries. They use traditional medicines (mentioned were mutohwe, chiwamhango, ruredzo, ivhu renhukusa) in preparation for delivery. After delivery they cover the placenta with ashes. For certain infant diseases, monkey's intestines are used to prepare medicines. As far as family planning is concerned, the most significant change over time is the reduction of the breast feeding period, during which women are not sexually active. The polygamous marriages of the past made this possible. These days, "men spend more time with their wives". Most people are aware of modern methods of family planning, but condoms and pills are costly and "not culturally friendly". Several members of the community believe that condoms are bewitched and carry the HIV-virus.

Modern food is said to be less nutritious than before. The availability of food resources in the forests and woodlands has decreased due to over exploitation. Traditionally, cooking oil was extracted from livestock and wild fruits. Staple foods were prepared from rapoko (finger millet) and indigenous rice, whilst traditional methods were used for food processing (kukuya, kutswa). It is believed that the modern grinding and refining of hybrid maize, mostly grown with the help of artificial fertilizer, and the loss of natural food resources, has limited the food variety and its quality. The rural poor especially, who cannot even afford the products that have to be bought these days, have less nutritious meals

because of the change in crops. There is a dependency on food hand outs in drought years. Even at the end of 1998, which was an average agricultural year in terms of crop yield, food was handed out.

2.3.3 Education

Education is an important element of the local knowledge system. In the research area there are both a primary and a secondary school. Close by, at Nemanwa and Morgenster, there are more schools that receive pupils from the research area. There is also a teachers college at Morgenster.
Schools are generally well attended, but there have been a lot of drop-outs lately. Because of the relatively poor harvests of the 1998 season, many parents cannot afford the school fees and cost of uniforms. In almost every family there were children that passed several O-level subjects but did not manage to find employment. They stay at home and help, or they go to Masvingo on an irregular basis to look for work. Nation wide it is estimated that about 75% of the youngsters that accomplish secondary education remain without a formal job (Central Statistical Office, 1995). Some elders complain that these youngsters are spoiled by modern education, are lazy, do not have relevant knowledge and do not respect local codes. Others who migrated return with "poor morals". Mentioned for instance was the fact that traditional education deterred early sex, divorce, extra marital relations and early pregnancy. In the eyes of most elders, formal education has failed to address these issues and is therefore irrelevant from a socio-cultural point of view. The economic significance of formal education is, however, widely recognized. It is seen as an important step towards remunerated employment and financial support of those members of the family who remain at home.

Traditionally education was informal and imparted within the community. The approach was holistic, taking into account all aspects of rural life and the environment. There were different approaches for boys and girls. Boys were educated by their grand fathers at informal gatherings known as "matare". They received education on hunting, crafts, marriage, discipline, administration and other issues. Girls were educated by aunts and grandmothers. The aunts also played a role as marriage counsellors. Folklore, proverbs and demonstrations were used as vehicles to transfer knowledge and skills.
The education system did not only focus on young children, but was spread across all age groups in every administrative set up. Older women for instance were taught midwifery and fertility techniques. Traditional healers and spirit mediums transferred their knowledge to successors at a later age. This concerned knowledge about the use of specific plants, but also knowledge about rituals and secrecy concerning important issues.

According to the elders in the research area, both systems exist in parallel with each other. The younger generation, however, seem to be sceptical about traditional education: "It does not provide them with perspective". During the research an attempt has been made to understand this aspect via discussions with elders, youngsters and other resource persons (i,e, teachers and extension workers).

The deliberate transmission of traditional knowledge seems generally to have ceased, or does not seem to be effective anymore. Younger people and their parents, feel that traditional culture, especially the meaning of rites and other cultural expressions or knowledge about local history, does not help them in life. It seems for instance to be more important to know about the First World War than about the Shona-Ndbele wars of the 19th century. Traditional explanations of the world and understanding of the meaning of taboos and rites is not considered relevant, because in a later career, probably only scientific explanations will be valid. This leads to a situation where local worldview and the explanation of it, including the eco-ethics that traditionally might have preserved much of the natural resources, is becoming folklore. The expressions of local culture are sometimes appreciated because they underscore an African identity, but they are mostly not understood or seen as functional, and therefore not taken as guiding principles. Or as Mr. Zimunya, a spirit medium from the nearby Nemanwa growth point described (documented in Hove and Trojanov,1996) :

> "Life has changed. The new education and wisdom have brought strange ways and learning. The ancestors are not fools. So, they said: you have brought your *own* (italics WvH) ways and new wisdom, we are going to withhold our own ways and wisdom".

2.3.4 Beliefs and traditional institutions

The worldview of most people at Charumbira is strongly eco-centric, based on an integral relationship of symbolical and material life. This eco-centric worldview, whereby humans and the rest of nature are bound with the same umbilical cord, is widespread in sub-Saharan Africa (Kalu, 1998:1-2). Local spirit mediums emphasize that the loss of natural resources occurs because people do not listen to the spirits of the ancestors and to God, in particular to the messages that they send through the spirit mediums and other signs in nature concerning taboos and prescribed natural resource management. People do not respect these signs and taboos, and therefore the spirits stop speaking...

Taboos are traditionally an important tool in controlling the use of natural resources, because they limit the behaviour of local people. Certain kind of spirits are believed to reside in specific trees, and certain areas are preserved for God and the ancestors. The soil is intrinsically connected to the living and the

dead according to the local worldview, because the bodies of the ancestors are given their place there. Their spirits remain amongst the living and warn or advise them whenever they are needed. Therefore the soil is sacred and has become the law and source of wisdom. However, the fact that even the respect for taboos does not necessarily save a tree is illustrated by Kalu (1998: 11) when he writes about a situation somewhere in sub-Sahara Africa (probably Nigeria):

> "The dominant attitude was that nature was out there to be used. For instance, if one wanted to use a satin wood, one would go to the tree with a pot of palm oil and entice the spirit inhabiting the tree to come down for a meal. During the interval the tricky man would fell the tree."

The non-respect of certain trees, the modern methods of agriculture which lead to soil erosion (i.e. ploughing and applying chemical fertilizer) and the disturbance of sacred places is believed to have led to the spirits' silence.

The traditional belief system knows several categories of spirit mediums, who contact the spirits and inform the Chief and other members of the community. There are national spirit mediums[16] that communicate with the spirits of the earliest Shona settlers in Zimbabwe. These early ancestors are closest to God, and their spirit mediums are therefore highest in rank. Every region has its own spirit mediums that communicate with the early ancestors that settled in that particular region, and are therefore higher in rank than the family spirit mediums, who are found in most villages. Figure 4.4 contains a chart that illustrates this aspect. Daneel (1997) conducted a comprehensive study about what he refers to as the "Mwari cult" and about its significance during the liberation struggle. He makes an interesting link to what he refers to as the "war of the trees", whereby religious (traditional and Christian) motives and rites are guiding the revegetation of eroded land.

The people of Charumbira distinguish three dimensions, or "worlds". Spirit mediums, who communicate with their ancestors at certain sacred places, are knowledgeable about signs in the *natural world* through which the *spiritual world* communicates with the *human world.* The spirits can also possess the spirit medium (often a woman) herself, when she is in trance or in a dream. As such they are able to foretell disasters, epidemics, droughts, etc. and advise on the necessary arrangements to appease the spirits.

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[16] An example is a spirit medium living in Chinhoyi, who is believed to be possessed by the spirit of Mbuya Nehanda who died in the first Chimurenga (liberation war) in 1897. She herself is now called Mbuya Nehanda. However, all over the country there are spirit mediums who claim to be possessed by that spirit, perhaps because it gives national status.

These beliefs are still existent and adhered to, more explicitly by the elders. The younger generations seem to be more sceptical about them or are not explicitly aware of them, as was argued before. They learnt about them unconsciously, because they are anchored in the local culture. However, many of the youngsters often reject them as backward, something for elders or unsuccessful rural poor that cannot cope with modern society. The spirit mediums of the area seek the causes for these developments in the influence of colonialism, church and western life style. In the pre-colonial era, the spirit mediums had legislative powers, for instance through the imposition of sacred rules. The Chief was merely an executive. However, when the colonials arrived in the last decade of the 19th century, the spirit mediums fell out of favour, partly because they played an important role in the first Chimurenga (uprising) against the British in 1893-1896. The powers of the Chiefs were taken over by the Native Commissioners, and these colonial administrators generally did not bother to listen to the advice of the spirit mediums. Even the power of the spirit mediums to install Chiefs was taken over by Europeans. In the 1960s, with African nationalism commencing, the traditional rights of the Chiefs were given back to them, without, however, recognizing the role of spirit mediums. These spirit mediums became active in the liberation struggle, as was the case in the first Chimurenga (Daneel, 1997: 42-73). However, after independence, traditional leaders fell out of favour with the new African administration because they were seen as a tool of the colonial administration. New administrative and development institutions such as the Vidco and Wadco and Rural District Councils were installed, employing mostly ex-combatants, disregarding their leadership qualities and representativeness of the local communities. This marginalized the role of spirit mediums even more, because they no longer had effective executives at their side. Christian churches declared, and often still declare, the traditional beliefs as paganism and urged local people to abandon them. The colonial administration also imposed a rationalisation and commoditization of land use practices that was aimed at the rejection by local people of agricultural and natural resource management systems that were founded on traditional beliefs (see next chapter). It must be concluded that these developments in religious and traditional institutions had a bearing on natural resource management. Local people felt less responsible for some of their natural resources. Many of the regulations that were imposed from outside were ignored or even led to increased over exploitation, and were thus counter-productive.

Christianity is now a well developed religion in the research area. The main churches are the Seventh-Day Adventists and the Dutch Reformed Church. Despite the aforementioned impact of colonial administration and religion, the people of Charumbira expressed the view that their traditional beliefs and the Christian belief can co-exist quite harmoniously.

2.3.5 Farming methods

Farming is the most widespread and most important socio-economic activity in the area. It is intrinsically related to natural resource management and to other aspects of rural life.
Farming in Zimbabwe has been subject to many changes. These changes have significantly influenced local knowledge systems, also the knowledge system vis à vis natural resource management. In order to understand the relationship of local people and their environment, it is necessary to consider local farming in an historic perspective.

In discussions with the elders it became clear that in the past people in the research area applied shifting cultivation, whereby crops such as rapoko, maize, groundnuts and pumpkins were combined. This "Pyro culture" system had the advantage of reducing the phosphorus deficiency in the soils, thus improving them for the cultivation of several subsequent crops. A period of fallow was needed afterwards to reestablish fertility and allow the vegetation to be burnt again before starting a new period of cultivation. The period of fallow was at least eight years, leaving 90% of the biomass to regenerate (Campbell, 1996: 78). The burning of the vegetation of cleared fields also assisted in pest control (Page et al, 1985: 10) by the reduction of, for instance, cutworms and armoured crickets. In the slash, trees were felled only at breast height, so a rapid regeneration was possible and minerals from deeper ground, near the weathering rock layers, were "pumped up" because the deeper root systems were maintained. The seeds were selected in the fields, improving the plant varieties for those particular circumstances. Farmers used locally manufactured tools (hoes and picks) for seeding. There was practically no tillage, and fertilization was done by burning of woodland and fallow in the agricultural areas. Some enrichment techniques such as the application of anthill soil and humus from the mountains were common.

Another practice combined with Pyro-culture was zero or minimum tillage, which meant that the soil was not ploughed but planting was done directly into the ashes, with no or only a minimum of tillage with a hoe to ensure that the seeds were covered by soil. Zero or minimum tillage ensures the maintenance of a good soil structure and composition (the humus fraction especially is relatively high, which improves structure and moisture).

Traditionally, crops were mixed. This "mixed cropping system" can still be found in some smaller fields in the research area. Seeds were broadcast directly into the ash. Gaps were later filled with transplanted millet or other crops. It is generally recognized that this mixed cropping system is a

sustainable method of raising the level of agricultural production. It allows a better use of space and light, moisture and minerals, and it allows a better control of pests because natural predators of insects and other pests are more likely to find a suitable habitat.

The dryland cropping system practised at the beginning of the 20th century, needed intensification at a certain stage because of increased population pressure (Scoones and Cousins, 1991:3-6). More and more farmers cleared the low, wet dambo[17] soils and installed a ridge cultivation system, whereby the wetlands could be cultivated both in the dry and in the wet season. During the dry season, a simple micro-irrigation method from shallow wells was (and still is) practised. Because of these water resources, the dambos became important in the agricultural system as a whole. In the colonial time, the dambo cultivation became rare because it was limited by law.

The pre-colonial agrarian system was sometimes called "dangerously static" (Beach, 1984). Although people had enough food in the form of cultivated grains and vegetables, livestock, game meat, collected fruits and other edibles from the woodlands and forests, the agrarian system was under constant threat of drought and limited variety in crop production. This observation questions a perhaps romanticized image that early agrarian systems were always sustainable. It might have been optimal and efficient as an extensive system, with a limited population pressure. Other sources are more balanced in their assessment of the pre-colonial agrarian system. Iliffe (1990: 10-17) for instance agrees on the occurrence of food shortages, but underpins the fact that farmers had all sorts of strategies to deal with the risks. The use of well adapted seed varieties of bullrush millet and sorghum and small fields in different micro-climatological areas of for instance the alluvial soils of wetlands and the dryer sandy clay soils near hills, were useful strategies to spread the risk of droughts and diseases.

The fact that the colonial administration did not favour traditional African agricultural systems has become clear in their intensive and successful agricultural modernization programmes. Someone who had a major influence on shaping modern farming in Zimbabwe was Emery Delmont Alvord (1889-1959). He is cited in Twomlow (1995) by B. Madondo, reflecting Alvord's opinion of Africans as "... inordinate beer drinkers and heathens who were grossly immoral and incredibly steeped in superstition

[17] Dambo is defined by Rattray (in Scoones and Cousins, 1991) as "... *a low lying, gently sloping treeless tract of country which is seasonally waterlogged by seepage from the surrounding high ground assisted by rainfall and frequently contains the natural drainage channel for the removal of excess run-off from this surrounding high ground*".

- practising wasteful, slovenly, ineffective and ruinous methods to the future interests of Rhodesia[18]". With these "methods" Alvord referred to traditional agriculture, which he characterized as "... a premature agriculture that wastes and destroys". He saw his role as that of "...civilizing and developing natives along European lines by entering the cash economy through a system of intensive crop production in native reserves so that more land could be released to Europeans". He managed to initiate the installation of one of the most effective agricultural extension systems in sub-Sahara Africa that thoroughly changed small scale agriculture in Zimbabwe.

Two principles guided the revolution in native agriculture, namely *commoditization* and *intensification* (Bussink, 1993: 5-9). Cash crops were promoted, taking precedence over local food production. This intensification was only possible with permanent high external input agriculture. An example of the influence this had on natural resource management is the tree removal programme in the late forties. In order to create a "parkland" that would provide more grasses for grazing, African farmers were urged to cut all trees in their fields and prevent their regrowth. Also, for mechanization purposes, it was thought necessary to remove trees in all agricultural fields. Another priority of colonial agricultural extension was the introduction of the plough. Approximately 80% of farmers in the research area own this equipment today. From a conservation point of view, ploughing has many drawbacks. Humus is mineralized rapidly, making the soil lose its fertility and structure. Other effects are that soil is compacted below plough-depth, creating an impermeable soil stratum at 30 to 50 cm below surface. Another policy was to discourage the mixed cropping system and have African farmers practise monoculture of mainly hybrid maize. Not only did this make the farmer dependant on external inputs, but the use of chemical fertilizer, especially on the poor sandy soils of most communal lands also caused the rapid mineralization of humus and water logging of soils.

An important aspect of Alvord's agricultural extension was that he tried to promote it together with the promotion of Christianity at rural schools and churches, as was believed to be the morally right thing at the time. An active policy of "civilizing" resistant farmers helped to enforce control over native agriculture (Twomlow et al, 1995), creating a strong sense of backwardness regarding traditional methods and beliefs. Another important element of colonial (and post-colonial) agricultural extension was the creation of a native agricultural elite, the Master Farmers. These were farmers who managed to renounce their traditional practices and were officially recognized as small scale commercial farmers

[18] This statement dates back to the 1920s

according to the principles of intensified, market oriented, modern agriculture.

The nature of the agricultural extension has not changed much since independence. The research area has several Master Farmers. Most farmers in the area, however, practise subsistence farming, with only a minor focus on market crops and with a mix of small scale agriculture and animal husbandry. What changed for them over the last fifty years, as they perceive it, was that the planting time became less predictable and farmers had to develop new strategies to have food security. According to the elders in the area, the forced removal leading to an influx of farmers from adjacent areas to the present area of Charumbira, caused a serious economic set-back, because there were many people and few resources. The artificially increased population pressure obliged men to find remunerated jobs on commercial farms and in town, leaving women, children and older men behind to farm. This situation has not changed much since then, only it has become more difficult to find jobs.

Cattle, goats and sheep are as common as before. They have an important "bank function" to invest financial surplus or to sell in times of scarcity. One can also pay directly with animals, e.g. an offence to the Chief is paid in goats, a bride price (lobola) in cattle. Owning large numbers of domestic animals is and was a sign of wealth. It is also an important asset for the production of hides, meat and manure or the provision of draught power.

A specific utilization of natural resources for subsistence farming is the cutting of poles and branches for fencing gardens and constructing cattle kraals. In the more degraded parts of the research area, cattle kraals are often made out of stones. Other wood saving construction methods are applied, such as reducing the length of fences by making cattle kraals against rocks. Wood is also used to make granaries for seed storage and handles for tools. Many farmers, especially the more resource poor, use leaf litter from the woodlands. It is put into the cattle pens, and decomposes together with the manure. This seems to be unique, as stated by Nyathi and Campbell (in Campbell, 1996: 109). They found no written evidence of the use of Miombo leaf litter in other parts of Zimbabwe or other countries in the region. Another important agricultural function of the woodlands is browse for cattle and small ruminants. Services that the natural resources provide to agriculture include soil retention, i.e. protection from splash and aeolian erosion and siltation of down stream fields and rivers. Streamflow regulation is another important service of woodland vegetation. The source of irrigation water is often protected by Miombo woodlands.

2.3.6 Other economic occupations in the study area

Low (in Campbell, 1996: 88) distinguishes five key services that the communal land in southern African countries provides: a dwelling place; a source of raw materials; land for cultivation; grazing for livestock and a social security net for individuals and dependants. It is a home base from which labour can be allocated to both on-farm and off-farm activities on the basis of its comparative advantages. In practice this often leads to the situation as it exists in the research area, namely that almost every family has at least one or more men working outside the province, either in industry, retail business, for cooperatives or for government. They send money home on a regular basis, and form an important element in the family's strategy to cope with the risks of drought and decreasing productivity of the soils. However, the macro-economic situation in Zimbabwe is declining, leading to migrant men becoming unemployed and school leavers not finding jobs. Also the real average wage is declining[19], which makes migrant labour less attractive.

Those who generally stay at home are women, children, unemployed men and elders. They are active in household, in agriculture, but also in small, often informal sector businesses. For household purposes many products from natural resources are used (see also sub-section 2.3.7). Besides the aforementioned medicines and the like, construction poles, collected food such as berries and mushrooms, and of course, firewood, are indispensable products from natural resources. Preferred species for firewood are Julbernardia globiflora, Colophospermum mopane and Brachystegia boehii. Wood is stockpiled in the dry season for use during the rainy season. Some farmers cut larger areas of woodland for selling purposes. Firewood is also used for brick burning, beer brewing and communal fires during ceremonies and parties. Other products from natural resources applied in the household are tannins, dyes, gums, resins and oils.

Non-agricultural economic activities, taking place in or close to the research area, are focussed on local needs or related to tourism. Examples of the former are professional carpenters, builders, brick moulders, beer brewers, soap makers, oil pressers, dress makers, shop keepers, traditional healers, fortune tellers, musicians and dancers. Most of these are self employed. Tourism also provides income. The area is close to the Great Zimbabwe national monument, which receives many foreign visitors.

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[19] According to Government Statistics, the proportion of the total population in formal employment has fallen from 15.6% in 1977 to 11.6% in 1993. Presently this figure will most probably be lower. Of all 200 000 pupils that left school in 1998, only 50 000 found employment in the formal sector. An increasing number of people, however, get involved in informal sector business. According to the Central Statistical Office (1995), the real average wage has fallen by 35% during the period between 1985 and 1993. Currently the inflation rate is higher than 50%.

Several men and women of the area are involved in craft production, like sculpturing, basket making, pottery production and the like. They sell their products along the Great Zimbabwe-Masvingo road, some 10 km. away from Charumbira. The influence on natural resources is not always positive, depending on the intensity of the activity. It can be expected that a continuous selective cutting of certain tree species used for craft leads to a drop in the biodiversity.

Quite unique is the commercial exploitation of the aforementioned initiative of Mr. Munyaradzi Makasi. His initiative to fence a sacred wetland led to a kind of exhibition of traditional knowledge, which is even mentioned in Clarke (1994: 43). He planted indigenous tree species that, according to the local perception, have "water drawing capacities". The 1991-1992 drought motivated many in the local community to associate with his initiative and form the Maplan Union. They established contacts with a travel agency in Harare, which directed some six groups of European tourists to the place every year. These tourists contribute to the local economy with small donations to cultural dancing groups, the purchase of local craft products, the purchase of locally prepared foods and through the commission that the union gets from the travel agency. In 1998 they managed to earn 16,000 Zimbabwe dollars, which corresponded to about 40 minimum monthly salaries in that year.
The link with natural resource management can be seen as positive. Local people are confirmed in their eco-centric culture, that is therefore reinforced.

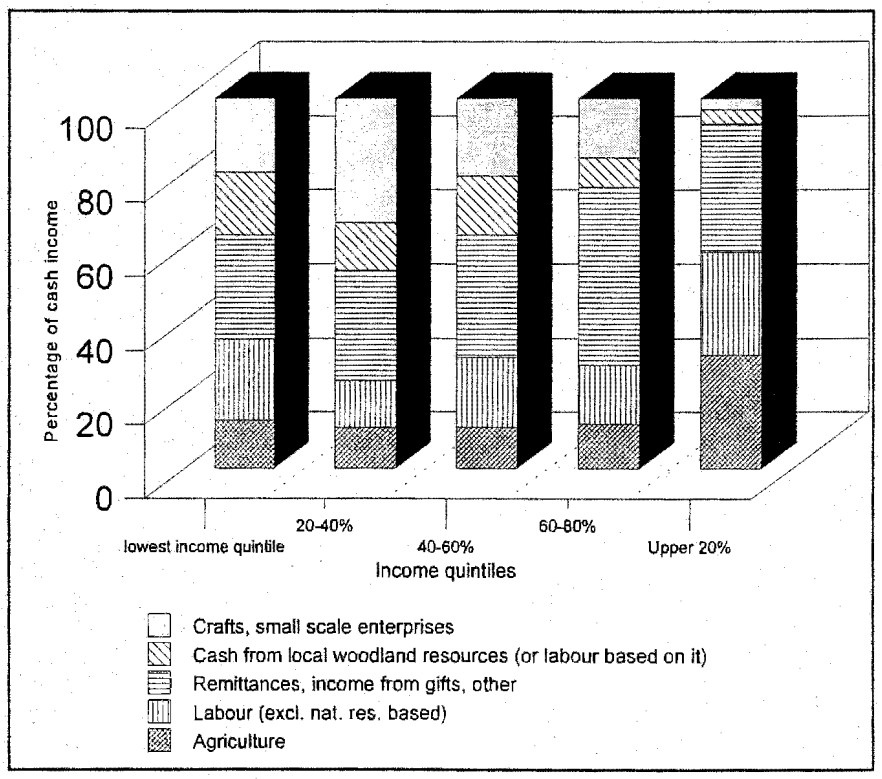
Although not classified as an economic activity, drought relief has to be mentioned. Whenever agricultural production has not provided sufficient staple food, government provides food hand outs to the population. There is a certain negative influence of this drought relief on natural resource management. It allows people to clear the last woodlands and cultivate their marginal soils, because a failing crop will give them the right to drought relief. Drought relief is, besides often being a real humanitarian aid, an important political tool to maintain the loyalty of local leaders and farmers. This is illustrated by the fact that in 1998 Charumbira hardly received any drought relief in time because the Chief was associated with the wrong people in national politics.

2.3.7 Wealth and natural resource use

It became obvious during the research that there is differentiation of natural resource use according to the wealth of different socio-economic categories of people. Master Farmers for instance hardly responded to questions concerning the economic importance of natural resources for them. However, resource poor farmers were found to make use of almost all possibilities that the available natural resources provide them with. This is quite relevant for the investigation of a knowledge system, because different categories of actors have different interests in natural resource management. This indicated that the knowledge about the resources might differ markedly across socio-economic groups within the same community.

Because of the qualitative nature of this research it was difficult to establish the exact relationship between the socio-economic classes and the use of natural resources. This type of research has, however, been executed in Shindi Ward in Chivi Communal Area, some 80 kilometres south of Charumbira (Cavendish, 1996). It must be kept in mind that Cavendish used a broad definition of environment, not only including woodland resources, but also for instance agricultural land. Data on the actual use of environmental goods and services per income quintile, were collected from 213 households across 29 villages over a one-year period. The findings are presented in Figure 2.2.

Figure 2.2: Sources of household cash income in Shindi Ward



Source: Cavendish, 1996

He concluded that at an aggregated level, the contribution of woodland resources to cash income is not large (8.2%). However, whereas the richest 20% of households derive less than 5% of their cash income from the use of woodland, for the poorest quintile this goes up to about 20%. Many more generalized conclusions could be based on these findings. However, this type of classification and generalization is not without risks. Although the income situation is undoubtedly an important factor, the use of natural resources is also determined by other factors that are not necessarily linked to any wealth ranking. The research findings show, however, that there is a clear poverty-environment relationship. It shows that natural resource management is intrinsically related to economic interests. It also indicates that this management can be marked by conflict as different socio-economic groups maintain or impose rules or develop knowledge that benefit their interest, possibly at the expense of others. With the identification of the actors, the socio-economic (wealth) position is thus important to consider. There is no reason to suppose that for the Charumbira area this would be any different.

2.4 Trends in natural resource management

2.4.1 Observed trends in the state and use of natural resources

In sub-section 1.7.2 it was argued that natural resource management has three different dimensions: an ecological, an economical and a socio-institutional dimension. The PRA exercise as well as observations in the area by the author and discussions with relevant government departments revealed that, from an ecological point of view, the state of the environment in the research area is still reasonable as compared to other communal areas in southern Zimbabwe. Although there are many signs of deterioration of soils and natural vegetation, the degradation has not yet reached a state where the process would be irreversible. Observable indicators of environmental degradation were the following:

- Gully erosion in several fields indicates either a poor soil structure due to over exploitation or sudden removal of vegetation, or it indicates an increase in peak flows during heavy rains. This can be due to the felling of trees on hill slopes and mountains, which causes an increased runoff.
- Splash and sheet erosion can be noticed in most fields. The splash erosion is caused by the impact of raindrops on bare soil. It destroys the soil aggregates and causes the finer loam particles to be carried away with flowing water or to form a hard and impermeable crust. This generally happens on soils that are poor in humus, either because of over exploitation or because of a prolonged use of chemical fertilizer. What remains behind is coarse sand, which with heavy rain can also be carried away (sheet erosion) and is deposited in rivers and lakes or on agricultural fields situated down

stream. The deterioration of agricultural land is an indication of the pressure that can exist on remaining woodland, either in the form of new clearings, either in the form of poaching of humus and other woodland products or in the form of increased grazing pressure (in may rural areas people buy goats or other ruminants to complement the loss of agricultural income).

- Comparison of aerial photographs of different years (1953 and 1988) indicates that the cover of forest and woodland diminished at an average annual rate of between 0.5 and 1 %, close to the average annual deforestation rate for the whole country.
- In many woodlands, especially those closer to the villages, the distribution of trees by age class is not balanced. The younger age class (trees of dominant species lower than 1.5 metre) is significantly under represented in comparison to similar woodlands in less populated areas (i.e. the State forests nearby, where limited settlement took place and most remaining woodlands are still more or less in a natural state). In five, for this research randomly marked squares of 10 by 10 metres, the ground cover of the younger age class was 0-5%, whilst on the State land, where the same measurements took place in a comparable woodland type, values between 10 and 20% were found. In addition, the number of different species in the blocks was higher on the State land. Although these measurements are not representative for all woodlands in the research area, these results support the general observation that the woodlands in the research area are less varied in composition and age classes than their natural counterparts on nearby State land. This is an indication of pressure, either because of burning or overgrazing (little regeneration), or because of selective exploitation (poor composition) or a combination of these. It fits the ecological succession theory, whereby the increase of external dynamics usually leads to a set back in the ecological succession, which results in a less varied woodland type. This is because the composition tends to change. Species that survive longest are the pioneer species, that can thrive under the stress in a situation of high external dynamics.

Although IDS (1998) questions the validity of some of the prevailing environmental theories (see first chapter), there are nevertheless evident signs of anthropogenic influences in the research area that affect the environment in general and that limit the availability of the usual goods and services from natural resources in the area. These signs suggest that the resistance and diversity (see sub-section 1.7.2) are a decreasing trend, but the resilience in the area is still relatively good.

From an economic point of view, it must be concluded that trees are seriously undervalued in the research area. Mature Eucalyptus trees of ten metres in hight and a dbh[20] of 20 centimetres are sold for

[20] Dhb stand for Diameter at Breast Heigth. It is a common parameter in Forestry Sciences for measuring stand volume.

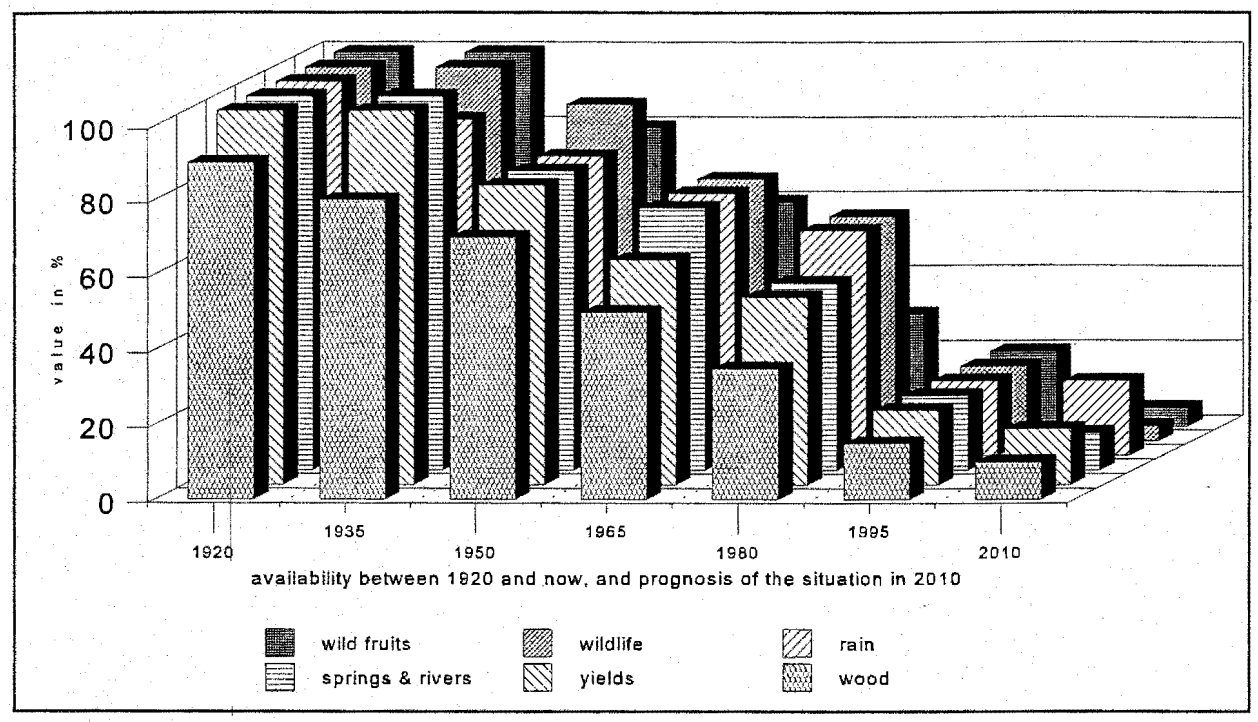
as little as Z$3 each (during the PRA in July 1998 this was about 1 South African Rand). Other commercialized products based on wood (e.g. craft) are also cheap compared to the cost of replacing the tree that has been felled. The observed trend over a period of six months is that the price does not relate to the bench mark (i.e. Forestry Commission). In January 1999 the poles were still Z$3 (with an inflation over those six months of more than 50%), whilst the craft had risen slightly because there are foreign tourists involved. This may lead to a situation whereby natural resources are consumed inefficiently or simply over-utilized. This is partly because costs are not reflecting the true value (Campbell, 1996). For instance, the Forestry Commission (see next chapter) has paid for the planting of most Eucalyptus woodlots and after maturing has handed them over to the community at no costs. Furthermore, the communally owned resources of the woodlands are "open access", which makes the value of natural resources non-existent , in financial terms. From an economic point of view, this makes it rational for local actors to exploit plantations and natural resources to the limit in pursuance of maximum individual benefit. That this has not occurred on a large scale until now can be explained from the socio-institutional dimension, of which the main aspects have been outlined earlier on in this chapter. Many benefits cannot be quantified in financial terms. In practice people's choices are often limited by socio-cultural structures and other factors. This does not remove the fact that the economic dimension can pose a serious threat whenever these structures weaken.

2.4.2 Perceived trends in the natural environment

The people of Charumbira made it clear that the environmental situation was deteriorating (see also Annexure III). In a retrospective mapping exercise, using weight ranking on time charts, the elders especially considered the situation 50 years ago as optimal in terms of the provisional capacity of the environment. Figure 2.3 shows a chart of the perceived decline in availability of several environmental goods and services. Although these trends are highly subjective, they form a socially constructed element of the local knowledge system, and are therefore relevant to this research. Relating these perceived trends to the observed trends, one can notice a discrepancy, as for instance a comparison between the perceived availability of rain in Figure 2.3 and the empirical data of Figure 2.1 might indicate. However, it seems a common tendency to idealize the past.

Some of the perceived causes of the degradation of natural resources have been mentioned before in this chapter. Most striking is the fact that the observance of traditional rules set by the ancestors is seen as an important cause. More direct causes were also mentioned. Besides the population

Figure 2.3: Patterns of perceived environmental changes in Charumbira



pressure, bad practices were highlighted. Examples given were tree cutting without removing the wood, the cutting of young and living trees for firewood for domestic or commercial use, unselective and unspaced cutting[21] and making fire only for hunting purposes.

As later chapters will point out, perception of natural resources can differ considerably per actor group.

2.5 Chapter summary

The research is contextually related to the specific circumstances of the case study area of Charumbira. Therefore, the general research context of this specific case study needed to be outlined. In several parts of this chapter, reference was made to both the providing capacity of the natural resources and the anthropogenic influences on those resources. These influences were explained from a historic, tenurial and socio-economic perspective. Together these descriptions gave a general idea of the trends in the relationship between the local community, their natural resources and the factors that influence this relationship.

[21] Selective cutting is a way of efficient use of goods that the natural resources provide. Trees that have other uses should for instance not be cut for firewood. Spaced cutting is a way to keep the impact on the ecosystem low in terms of sudden light, bare soil prone to erosion, lost micro climate, etc.

In general terms it can be stated that the abovementioned relationship is characterized by a socio-economic and cultural-historical dependency. Although a downwards trend in the major indicators of environmental degradation can be noticed, the setback as perceived by the community is even more "dramatic".

CHAPTER III THE LOCAL ACTORS IN NATURAL RESOURCE MANAGEMENT

3.1 Introduction

In the previous chapter, the emphasis was on providing general research findings on the historic, socio-economic and cultural relationship between the people of the research area and their natural resources. These findings were mainly the outcome of the PRA exercises that were carried out, covering several of the research frames.

In a continuation of the presentation of the overall research findings, Chapter III goes beyond these levels of generality by unravelling the local knowledge system regarding natural resource management into its elements, personified in the custodians of similar types of knowledge, i.e. the actors. It will focus on the ways the primary and secondary actors perceive problems and solutions, and also on the interfaces between, and different perceptions of, each other. This data will be presented in actor specific mission statements and additional descriptions.

In the following section the primary actors will be identified and described briefly. A detailed analysis will be carried out of the actor's perceptions and the way this affects their attitude towards natural resource use. This is done by identifying the actor's specific natural resource related problems and their perception of the cause of these problems. This includes not only external factors, but also their own influence and that of other primary or secondary actors. The actor's practices and resource mobilization to achieve their "mission statement" will also be highlighted, without dwelling on networking for innovation as part of their strategies, which will be the subject of the next chapter. It should be kept in mind that an actor represents a more or less homogeneous group that is attributed with an "average perception" for the sake of identifying the dynamics in the local knowledge system.
In the succeeding section, secondary actors will be described in a slightly different manner. The focus will be more on the nature of their intervention and the so called "information paradox", the way they see themselves and the way they are seen by other local actors.

This analysis allows a better insight into the main forces within the local knowledge system that are partly diverging and partly converging, and in fact are forming the basic limiting or accommodating factors in revitalizing it.

3.2 Primary actors in the research area

3.2.1 Introduction: the process of identification

On the basis of Research Frame A1 and A2 a number of primary actors were identified. This initially led to an extended list of actors, because practically everybody is, often in an individualized way, involved in the use and management of natural resources. The criteria that are mentioned in Research Frame A2 (see Annexure I) were adequate and led to an initial list of actors. Although originally not in the research design, it was considered necessary to have the community make their own categorization and afterwards agree on a jointly agreed differentiation of actors. This proved useful, because some new groups were recognized (i.e. organic farmers, traditional biodiversity practitioners and traditional craftsmen), whilst the differences between others were too minor to consider (particularly the dogmatic differentiation in gender within all the actor groups that were initially established). It also was an effective "starter" to get the community involved in the RAAKS process and make them "own" the successive results, a necessary condition to get more viable results. A choice had to be made to reach a categorization that would neither be too broad nor too detailed. A broad categorization would only lead to a muddled picture that would not provide the required insight into the dynamics within the local knowledge system. A more differentiated categorization, however, would lead to many overlaps and would be inefficient. A balance between a more or less shared lifeworld, perception and strategies of individuals and a "workable" number of actor groups was aimed for.

An important element of the exercises at this stage was the formulation of mission statements for each actor. This proved to be an intensive process where clarification and explanation of methodology and objectives was demanded by the local population. It sometimes took as much as several hours to formulate one mission statement. It, however, turned the participants into specialists of their own RAAKS process and allowed a fruitful continuation of the field research. The mission statements were not only needed to facilitate an effective involvement, but also to characterize every actor in terms of objectives (regarding natural resource management), strategies and beneficiaries. The local actors, labelled as relatively homogeneous groups, but perhaps to a lesser extent also individuals within a group, interact in a constant cycle of cause and effect based on differences in objectives. Reijntjes et al. (1992:30-33) classifies local people's (in their terminology "farmers' ") objectives into four categories: productivity, security, continuity and identity. The variety in these objectives and the variety in power relations and knowledge lead to a constant process of struggle, negotiation and accommodation in the "arena" of common property natural resource management (see Section 1.7).

These elements determine the relevance of certain types of knowledge for individuals or specific groups of people, such as actors, and can therefore also be considered as the backbone of the local knowledge system. Thus a characterization of each actor in the form of a mission statement allows insight into the elements of such a knowledge system.

In the sub-sections below, the primary actors are described using the following format:

- The names of the participating individuals who represented the actor during the field work;
- The most important natural resources for this actor;
- The perception of the actor towards natural resource management problems, his own role in the causes and that of other actors;
- Perception of solutions;
- Specific knowledge of this actor;
- A mission statement, summarizing the actor's objectives, the (intended) beneficiaries and the general strategy to achieve this;
- A critical look at manifestations of the actor's statements.

3.2.2 The Chief

The Chief in the area is Mr. F. Charumbira. He has overall responsibility for his community and is concerned with the problems of all primary actors. He is worried about the state of the natural resources, from a qualitative as well as from a quantitative point of view. He sees soil erosion in the fields as a serious natural resource management related problem, because declining productivity of the soil forces farmers to clear the remaining woodlands for more agricultural land. He mentions deforestation in general as another threat to his community, especially for the ordinary peasant farmers (the lay farmers), who rely mostly on renewable natural resources. This also includes the declining availability of humus, often used as organic fertilizer, in the woodland areas. The drying up of springs, degradation of wetlands and siltation of rivers are another preoccupation of his. The Chief feels that most problems affect all actors, but some are harder hit than others, such as the peasant farmers with lack of resources (see also Chapter II). He also sees threats to other communal interest. The area attracts some eco-tourism because of its proximity to the Great Zimbabwe monument. A declining natural landscape, biodiversity and stock of game could mean the end to this source of income. His greatest concern, however, is for the young men in his village, who are no longer able to farm and earn a decent living from farming. The inability to farm forces them to the town, where they become ill, or lose their morals. When they return they are not always respectful and bring some negative influences and

diseases to the community. It hurts him to see the soil lose its life. There are few resources for his growing community, his powers are restricted by the Council. As a result of this his people sometimes do as they please and he cannot do much about it. It is not only a matter of too many people for too few natural resources, but some people also misuse the resources and do not respect his bye-laws. Traditionally a fruit tree in the woodland is for personal need. People can take as much as they want, because the ancestors intended the tree for that purpose. But now people take more than they need and sell it along the road. Now people come and pick the fruits when they are still immature, because they are afraid that everything will be gone when they come back another time. The same goes for certain tree species where the bark is stripped for ropes or medicines in such a way that it dies. This is greed and jealousy, and especially the youngsters are fearless of the harm that, for instance will result from entering a sacred place alone. The taboos are not respected because the youngsters have no knowledge of them, nor do they take them seriously. He thinks that is why there are so many diseases now, because of their violation of traditional laws. Or they get struck by lightning, like Matonla, Mutsi and Karimanzire[22]. The Chief noticed that this incident brought back some respect for the traditional bye-laws. But people's memories are short.

Chief Charumbira feels that he and his assisting head men can play an important role in natural resource management. He has specific knowledge about the use of different types of land in his area, about sustainable harvesting techniques for forest products and both government and traditional rules for the regulation of the use of natural resources. The Chief instructs, mostly via his head men, his kraal heads to do all in their power to enforce the bye-laws and bring the perpetrators to him to pay fines. But some of the kraal heads are greedy themselves and do not always cooperate. They even allow migrants to come to their area in exchange for money. These new migrants cut many trees for their fences and for building their homesteads. The Chief has managed to convince the authorities to electrify the area. Less wood will be needed, he believes, because people can cook and heat electrically once power has been brought to the area. It should be obvious, however, that only the privileged few will be able to invest in the needed equipment and pay the monthly bill. Mr. Charumbira is also lobbying donors and council to provide him with barbed wire to fence certain woodlands and wetlands. By fencing it, he believes, livestock will stay out and people will not cut trees that easily. His most important strategy, however, is to extend his area to the North to give room to the younger generations for settlement. A

[22] These people were struck by lightning in January 1998 while drinking in a bar at Charumbira. The lightning went through the ventilation grid and killed three people inside the building. It was generally accepted that they violated some traditional law secretly and were now punished.

former commercial farm and the State forest, including one of the highest mountains in the area, once belonged to his ancestors, and they now need the area desperately. He says that, once the area is handed over to him, he will be in full control and will be able to manage the natural resources strictly according to traditional bye-laws. He believes that once people appreciate that they can benefit without destroying the natural resource base, they might approach the remaining woodlands and wetlands in the present Charumbira area more wisely.

His mission statement is as follows:
To administer the use of the natural resources for the benefit of all members of his community by allocating agricultural land and establishing bye-laws for the use of woodlands.

It was difficult to verify the Chief's statements by looking critically at manifestations of it in the field or from the statements of other actors. It is obvious from several examples that were witnessed, that despite his bye-laws, protected trees are being cut. During the field research, a one hectare section of a woodlot had recently been cut down on land not suitable for agriculture. The Chief said he would look into it, but asked months later, there was still no clear answer about how or by whom this clearance was done. Also the fact that kraal heads can apparently sell pieces of land to migrants in a situation where there is not enough land for the local youngsters, indicates that the control of the Chief over the use and management of natural resources is limited.

It is also doubtful whether his statements about the sustainable management according to traditional bye-laws of new settlement areas are genuine, or even feasible. It is an "open secret" in Masvingo that Chief Charumbira has sent several settlers to the forest area North of the research area as a way of pegging out his claim (this was confirmed by several sources in local government). These settlers, or rather squatters, caused a massive change in the area, from forest or dense woodland, to agricultural land in a period of just a year (an estimated 20% was cleared in 1998).

3.2.3 Spirit mediums

In the field research this actor was represented by the following individuals: Mr. Maugara, Mrs. Mudavanhu and Mrs. Marisa. They are all family spirit mediums. It was difficult to separate problem from cause in this group. Time and again it was said that the problem was that local people no longer respected taboos or listened to the ancestors, and that therefore they were punished with drought and disaster. It later on became clear that they see deforestation in general and non respect of sacred

woodlands in particular, and also the drying up of sacred springs and the loss of plant diversity as the main natural resource related problems. These resources form the habitat of the spirits, who will be restless without the right environment. Under these conditions they will not be able to warn or advise the community through spirit mediums or signs in nature.

They recognized soil erosion and the like as problematic, but they are convinced that it is just an indication of a problem elsewhere that should be addressed first. Farmers, for instance, apply chemicals that chase the guardian spirits away and let bad spirits in, causing gullies that will finally undermine the homesteads. Some people, supported by development agencies, use cement in the wetland for shallow wells. The water spirits do not tolerate this and let the springs dry up. Another alienating aspect is the migrants, people that do not belong to the clans of the area. They often do not know the local rules that hold the community together, neither do they respect the taboos. The spirits are against it, and make the life of migrants difficult by taking life (i.e. agricultural production capacity) away from the soil. Those who let the migrants in (kraal heads) will suffer too, as will their extended families. Other causes of the identified natural resource management problems are the cutting of specific trees of specific places, something that was traditionally prevented by taboos. For instance the Muonde (Ficus spp.) and Mukamba (Afzelia quanzensis) are said to keep the water in the wetlands at the surface. The excessive harvesting of natural fruit trees is also seen as a disturbing factor that contributes to the general decline of the environment. People have to leave some fruits in the tree. They should not climb it or shake the stem, but collect only the fallen fruits. And even so they should then only take what they need at that time. Some have to be left for the baboons, which are natural spirit mediums favoured by the ancestors. When they are not honoured, they leave the baboons and evil spirits take their place. A case was reported of baboons raiding a homestead and stealing a human baby.

The spirit mediums see as the only solution that traditional law is reinstalled and that the Chief is being brought in a better position to enforce these laws. This is necessary, because people no longer understand their own culture. "Young people don't know about taboos any more, or about the mischief that will affect them if they do not adhere to traditional rules". They see an important role for educational institutions to teach about traditional culture. There is also the possibility to plant specific trees on important places in order to re-create habitat for spirits. The spirit mediums can help people doing that. In fact, they are the only ones who can help them, because often knowledge about the right species and planting place is their secret. They have specific knowledge about sacred plants and places, about traditional calendars, places and procedures for rain making ceremonies and the use of

ceremonial use of domestic and natural animals.

This actor's mission statement is formulated as follows: *Provide and maintain traditional knowledge of taboos and calendars for the Chief by getting possessed by the spirits and transfer information.*

Manifestations of this actor's lifeworld and strategies were quite difficult to trace. Spirit mediums do get possessed and people do believe their messages and act accordingly. But some critical sounds could also be heard. Some actors, for instance the traditional healers (n'angas) and elders, had some experiences with a spirit medium, who told them to pay 10 dollars to prepare beer for appeasement of some spirits. They did not believe the spirit medium, because they thought she was misusing her position for her own benefit. This was also held against some other traditional leaders, especially some of the kraal heads (always of the other families). The elder women also stated that if a certain plant or animal species was becoming rare in the area, the spirit medium sometimes swopped to another plant or animal as the vehicle for their ancestor's spirits. They thought that because of this flexibility of the spirits (or the spirit medium) some of the community members lost some fear for the taboos.

3.2.4 Kraal heads

In the field research this actor was represented by the following individuals: Mr. Gadzingo, Mr. Mudavosa and Mr. Chibhira. Kraal heads lead an extended family and report to the Chief[23]. Some of the kraal heads are also elected to some of the modern administrative structures like Vidco, Wadco or even Rural District Council. The concerns of this actor with regard to natural resource management are similar to those of the Chief. They have the responsibility to accommodate the members of their extended family with sufficient agricultural land with a possibility to use common property resources such as water, grazing, woodland or individual trees. They are farmers themselves, in a more practical sense than the Chief is, and they are generally concerned about the declining productivity of soil and vegetation, especially that of grazing areas and woodlands. They are also concerned about the changing ecosystem, which no longer provides a suitable environment for ancestral spirits to remain in the area and guide them.

As main cause for these developments they mention the population pressure and the lack of control that they have over their community. Several farmers do what they want and practice unsustainable

[23] Read: the Chief and/or head man, who represent a clan and acts as an executive of the Chief.

agriculture, which includes unsustainable use of natural resources. Even the Rural District Council grants mining concessions to small scale gold diggers from outside[24]. They make deep holes, and although they are obliged to fence those holes, they often do not or do not do it properly. They destroy the natural vegetation and cattle can fall into the holes and sometimes die.

The kraal heads think they can do something about these problems by giving a good example. Several kraal heads have a fenced or otherwise protected area that they manage according to their own insights and traditional knowledge. They are helped by their direct family members. Sometimes when outside organisations like the Forestry Commission or an NGO are involved, more farmers within the extended family are involved. Some of these areas are sacred woodlands that are protected as a reserve. Other areas concern wetlands that are partly used as an irrigated vegetable garden and orchard with, in addition to fruit trees, some Eucalyptus for poles. Within the fields they promote the use of organic fertilizer, manure from the cattle kraals. They discourage the collection of humus from the mountains, because it damages those eco-systems if it is removed excessively. One of the kraal heads introduced the idea of live-fencing. Around the homestead he planted cuttings of Acacia spp. to keep out goats. He also made a paddock by using live poles of Commiphora and Kirkia spp. trees that he also planted as cuttings. Many more detailed examples were given by the kraal heads of possible measures to use natural resources for supporting the farming system or for general livelihood improvement. Some of the examples were taken over by others. At one of the homesteads visited during the field work, a woman even used the idea of sprouted cuttings for support for her washing line.

As indicated above, kraal heads possess much knowledge relevant to natural resource management. Some of the more dynamic ones are also innovative and influence other members of the community. Generally they have knowledge from both sides, the leadership knowledge because of their close relationship with the Chief and spirit mediums, and the practical knowledge of farming and clever use of available natural resources. Because of their leadership role over the extended family, they regularly exchange information with other farmers and learn from their experiences.

This actor's mission statement is formulated as follows: *Promoting the maintenance of big trees and wetlands, the respect for sacred places and sustainable land use to the benefit of the village through*

[24] According to the topographical map (1:250 000) there are no mining concessions in the research area itself. However, the aforementioned nearby State Land that before colonization was part of the Charumbira area, has several mining concessions.

education, encouragement of tree planting and observation of the local bye-laws

The manifestation of statements made was evident, both in a positive and negative sense. Some physical evidence of their activities is already described above. Many more examples could be found in the field. However, the negative role that kraal heads sometimes play has also been mentioned in other sections of this chapter. Some kraal heads are apparently more concerned with their own material well being than with that of their extended family (see Box 3.1). The relationship with the

Box 3.1: a case of land purchase by a migrant (based on a personal interview by the author with Mrs. Chishirhi)

Mrs. Chishirhi is a domestic worker in Masvingo Town where she rents a house for herself and her children. She comes from Zimuto, which is situated about 50 km. north of the research area. In 1998 she bought 0.5 ha. of agricultural land on the Longdale farm, a former "white owned" cattle farm which now belongs to the State and which is situated adjacent to Chief Charumbira's area. Most woodland on the farm has been cleared for agriculture. Homesteads are scattered throughout and trees are scarce. The families are there with Chief Charumbira's permission.

In order to buy the piece of land, Mrs. Chishirhi had to negotiate with the kraal head under Chief Charumbira. She had to invite him to the beer hall and pay Castle beer and cigarettes to him. Then they agreed a price of 400 Zimbabwean dollars (at that time, 1 South African Rand was worth three Zim$). She paid $100 in advance. When she returned a few days later to pay the outstanding amount, the kraal head insisted that this was $400 and not $300. When she had paid this, the kraal head said a further $500 was required in order to see the Chief and have a statement signed. When she had paid, the kraal head went to see the Chief. The next week he notified Mrs. Chishirhi that she had to negotiate with the former occupant of the field, who had built a hut there. She went to see the man, and he charged her $1000. Once that amount was paid, she received a statement signed by the Chief and the kraal head signifying that she was the new owner.

After a month Mrs. Chishirhi discovered that the door of the hut was suddenly missing. She found out that the wife of the former occupant had taken the door. The woman had recently divorced him, and now claimed that the door was part of her share. Mrs. Chishirhi had to buy a new door and fit it.

She now grows maize on the field. About 25% of the field is still covered with trees from the former woodland. However, she declared that she would soon cut down these trees in order to obtain greater benefit from the land she bought.

Chief is not always tight, as was explained from the historic developments described in Chapter II. This apparent lack of control from above leaves the choice of whether he wants to be a good traditional leader or not to the kraal head himself. Some of the kraal heads are also involved in local politics through their role in modern government structures. Some use it to the benefit of their communities, some are less altruistic.

3.2.5 Elders

In the field research this actor was represented by the following individuals: Mr. Muzorodza, Mrs.

Mudavose and Mrs. Muzorora. The elders have a specific place in the community. Elder women have a different role from men[25], but in relation to natural resource management these differences were not sufficient to distinguish the two as separate actors. The resources they need in a direct way are old trees to sit under and hold traditional ceremonies. Some of the elders are involved in craft making and need raw materials like grass or clay.

There were no perceived problems with these specific resources, but there is concern about the general state of the environment along the same lines as described in sections above. The elders are particularly critical about certain spirit mediums and kraal heads who, they say, are corrupt and cause some scepticism and disrespect among the younger generation. The perceived way of solving these problems is through making education more culturally significant. Not only schools should look into this, but also parents should realize the importance and send their children to the elders on a more regular basis. Another possible solution that was mentioned, is to hold a ceremonial meeting where all the spirits, of all the families and clans in the area, can be addressed. This will create more unity among the ancestors and their descendants on earth. Daneel (1997: 130-138) also emphasizes the importance of "mystical union" for "ecological combat" leading to activities such as tree planting. Both the union between the living and the living dead *and* the union among ancestral spirits of different clans will create more focus and concertation in natural resource management practices, as the elders perceive it. The elders themselves are not particularly action oriented. They feel, nevertheless, that spirit mediums should develop strategies to solve the problems and stop being selfish. The Chief should also be generally respected and should be empowered to better control and enforce local regulations. They also feel that secondary actors like the Forestry Commission and Rural District Council should make room for the traditional regulations, perhaps within their own, broader legal limits, and should return certain powers to the Chief and kraal heads.

The knowledge of the elders is without doubt vast and concerns many aspects of daily life. They have both moral, historical and practical knowledge, although sometimes the last seems dated[26]. Their knowledge of plants and ecosystems and the specific use of these is great. They also serve as a communal memory for knowledge about the cultivation of crops that were superceded by hybrid maize and other cash crops over the last century. Especially the lay farmers who sometimes return to those

[25] These differences mainly relate to the fact that old men advise young men and old women advise young women.

[26] Dated in the sense that they do not agree with certain modern techniques and do not wish to discuss them.

traditional crops make use of that knowledge. They have knowledge that is sometimes close to that of spirit mediums and kraal heads, for instance knowledge about sacred places and plants and knowledge about regulations about natural resource use.

This actor's mission statement is formulated as follows: *Educating children and grand children of the family and other members of the community in maintaining norms and values concerning sacred plants, places and practices by proposing bye-laws to the Chief, holding meetings with the youth and spreading traditional lore.*

It seems that this group has a lot of wisdom that is, contrary to the case with traditional leaders, not influenced by any form of self interest or part of political strategies. It also seems that in certain areas the knowledge is neither adequate nor up to date. For instance, in plenary meetings involving elders it emerged that some elders believe that all traditional rules of this area are still in place. Some believed that only a part of them were still valid, whilst others believed they were all overruled by modern administration. There was also dispute about the rules themselves. Some were found to be inadequate and would confuse the people. This was also stated by some of the other actors (i.e. male lay farmers, young entrepreneurs), who sometimes "respectfully disagree" with the elders. These kind of observations were also made during a grassroots research in Chivi, some 40 km away from the research area (Hagmann and Murwira, 1994: 161).

3.2.6 Master Farmers

In the field research this actor was represented by the following individuals: Mrs. Hove, Mr. Matanha and Mr. Mutemachimwe. Most important natural resource for this productive type of small scale commercial farmer are mature trees for use for agricultural implements, timber, poles, roofing and also firewood. Water for irrigation and grazing for cattle are other important resources that are needed by this actor. The Master Farmers have noticed a decline in the availability of natural resources, especially good trees for timber. Also the siltation of rivers and the consequent loss of surface water is a serious concern. They perceive the cause of these problems in the undisciplined manner in which lay farmers use their land and the common property natural resources. "They don't buy anything themselves because they have the wrong priorities. Instead of investing money in fertilizers to get a good crop, they prefer to chop down trees and burn them on their fields, or get humus from the rocks; or just mine the soils, causing erosion and siltation. They prefer to buy beer rather than barbed wire, and fence their gardens with thorn branches, cutting enormous amounts of trees in the immediate vicinity". They are

quite proud of their own achievements. Mr. Matanha even claims to have always had the highest yields per hectare since he started farming on his own. It is obvious that they are doing well. They have bicycles, some even a car, and have nice houses with a corrugated iron roof, with flower gardens and fences.

The only solution they see to the environmental problems is the increase of agricultural productivity and the purchase of wood from outside the area, for instance from the Forestry Commission. Resettlement is another option, but then the lay farmers should not continue with the same destructive practices. Plantation forestry with fast growing exotic species is another solution that the Master Farmers fancy. Most of them have established Eucalyptus plantations themselves, with help from the Forestry Commission, who provide free seedlings and even fencing material in some cases.

Master Farmers have abundant knowledge about modern agricultural techniques and principles. They see an important role for secondary actors like Agritex in providing training and specialist information or financial or organizational assistance. They believe that people should stop being "stubborn and ignorant" and follow their example. They have knowledge about indigenous tree species, especially fruit trees and other trees useful for their cattle. They think that traditional rules are something of the past, or only adhered to by "lazy farmers who do not want to live up to the realities of the present".

This actor's mission statement is formulated as follows: *Maintain productive land for maximum yields for commercial and subsistence family farming by rotating crops, mechanizing cultivation, applying organic and chemical farming inputs and using hybrid seeds.*

Master Farmers are often accused by other farmers that their use of fertilizer and chemical pesticides is declining the soil structure and fertility, but none of this could be observed in the fields of these three Master Farmers. In the 1998-1999 season, crops were beautiful and the soil structure was good. They work hard, take care of their land and even apply organic fertilizer made on their own compost heaps. However, what put this way of life out of reach for many lay farmers, is the huge threshold that exists to become a Master Farmer. One first must have money and a bank account, at least five houses or huts and further requirements before one get official recognition and training. Farming systems research in Chinyika Resettlement Scheme in Eastern Zimbabwe (Hanyani-Mlambo, 1995:92) showed that the better off farmers are generally highly privileged by the government and NGO extension workers. They receive most training and credit facilities and are generally reliable when it comes to repaying loans.

Because of their "social capital" (their good relationship with government services) they gain power and a higher social status and eventually sometimes take positions as local politicians.

These conclusions are supported by observations made at Charumbira. Several "NGO and government projects", often sold to donors as being the wish of "the people", are in fact located on the private land of Master Farmers. The multiple woodlots, boreholes and fenced off vegetable gardens on their land indicate this. Master Farmers may be right in their perception of part of the problems, but the solution seems mainly a solution for a privileged few.

3.2.7 Male lay farmers

The lay farmer actor is so titled, because he generally receives little external knowledge input and depends mainly on his own knowledge and experience (lay knowledge) on the basis of trial and error. They comprise a relatively large and heterogeneous group. This makes it difficult to give a picture as reliable as that of other actors. At the beginning of the field work there seemed to be no criteria that would allow or justify a further subdivision of this actor. However, the male and female lay farmers, though sometimes members of the same family and struggling with the same problems, are separated. This is done because the men and women generally have a different knowledge about, and relationship with, natural resources (Campbell, 1996:117-118). This statement will be further substantiated in the next sub-section.

During the field research this actor was represented by the following individuals: Mr. Mugura, Mr. Madakurebwa and Mr. Mutsago. They are all family farmers, married and with children. Only during the first plenary meeting were all three present. They did not participate in most of the joint RAAKS exercises and had to be visited at their homes and fields to get information. There is little exaggeration in the statement that the resource poor farmers depend almost entirely on most natural resources. This was discussed in Chapter II and supported with findings from a study in a similar area nearby. However, the most precious natural resources mentioned by these farmers were certain tree species that are also used by builders, carpenters and Master Farmers (e.g. Pterocarpus angolensis). Another resource mentioned was humus that is collected in the mountains to fertilize the fields.

It is possible that the field exercises with this group were biased by a possibly perceived donor role of the research team. There was emphasis that their main concern is getting resources for their basic activities. Also the distance to get poles and the like was seen as a problem. "If a cattle kraal breaks at

night, we have a problem because we cannot find any poles nearby". The main underlying problem perceived, was that there are many users of natural resources, which leaves little for each. "Newcomers" especially do not seem to respect local rules, take fruits, humus or wood without leaving sufficient for others. They themselves do not have the power and the status to stop others from cutting in the woodlands. Another problem is that of the burning of grass and sometimes the woodlands. They find it necessary to stimulate early regrowth of grasses for grazing and to clean the area. But some people light a fire and leave. They do not control it, or burn at the wrong time for the wrong purposes, like facilitating their hunting activities.

As a perceived solution, much emphasis was put on external aid and provision of seeds, fertilizer, fencing material and implements (see aforementioned remark on a possible bias here). Better control over all local people by the Chief was believed to be important. Wrongdoers should be brought to him and fined. The number of migrants should also be limited. Another possibility that was mentioned was selective clearance of woodlands when cut for commercialization. In that case everybody has to respect that principle and leave some mature seed trees and other valuable species behind. Their strategy to overcome their natural resource related problems, in particular the scarcity of goods, is to hire out part of their fields or work on other farmers' fields in return for services like ox-ploughing. Commercializing some products from the woodlands was seen as another option. This makes them less dependent on humus from the woodlands, because they are then able to buy fertilizer. Some lay farmers should also be educated not to cut certain indigenous fruit trees in their fields. With trees becoming scarcer in the woodlands, lay farmers should take better care of the trees on their own land, where they can better control their use. They were concerned about competition of trees with their crops, but argued that planting on field boundaries could prevent this. It would also help them to demarcate their fields better from that of others, with hte result that some of the lay farmers would stop secretly annexing portions of woodland and grassland.

They initially were humble about their specific knowledge. In fact they expected the research team to provide them with solutions, because they have "no knowledge that can help them with their problems". However, looking around at their fields and homesteads, several low cost techniques were seen to be practised. For instance fencing poles were not treated with used motor oil, like the Forestry Commission is generally advising, but the part that is burried in the ground is burned lightly to slow down rotting and prevent termite activities. After extensive discussion they acknowledged that this knowledge was partly developed by themselves, but it was because there was no "better alternative".

They have a high consideration of extension workers, because they see what they can do to help Master Farmers and others. On the other hand they feel they have to develop their own solutions, because they do not have funds and are often forgotten or "betrayed" (promises for assistance not kept) by the extension workers.

This actor's mission statement is formulated as follows: *Low external input subsistence farming for the benefit of the family by using lay knowledge and locally available resources.*

Several lay farmers can be found on land that was originally used for grazing and that is of poor agricultural quality. The homesteads generally are situated far from the main roads. When visiting their homesteads there are signs that these farmers are poor. They have only basic agricultural and domestic implements and it is often difficult to find anything that has been purchased. They have a relatively isolated, highly self sufficient life throughout the seasons of the year. Other actors (i.e. Master Farmer, Agritex, Forestry Commission; for a description of the secondary actors, see Section 3.3) blame some of them of illegally harvesting poles and firewood from areas that are demarcated by the Chief or local authorities as either waterways, grazing or community projects like woodlots, and as such identify them as an important cause in the deforestation problem. Agritex states that it is difficult to work with these lay farmers, because they do not listen and are not likely to repay their credits. The Forestry Commission regularly catches farmers cutting trees for commercial fuelwood vendors from Masvingo. "Not always because of poverty, but often because of greed for cash". Another story about these farmers told by the Natural Resource Board is that communal farmers have a peculiar interpretation of being "independent", the reason why they are often perceived as "stubborn and undisciplined". They are said to collect their drought relief hand outs (such as seeds and fertilizer) and sell them to other farmers to get cash. It was, however, discussed in Chapter II that there exists a deeply rooted mistrust between local people and government. In this light these statements should be treated with care.

3.2.8 Female lay farmers

In the field research this actor was represented by the following individuals: Mrs. Zizhou, Mrs. Takaidza and Mrs. Mataruse. It might be suspected that the most important resources for this actor are indigenous fruit trees and trees for firewood at a reasonable distance from home. The two most favoured species for fuelwood are Julbernardia globiflora and Brachystegia boehmii. Also springs and rivers, although not renewable resources, were mentioned as important. Also mentioned was the "Mopane worm", edible caterpillars that can be found in the woodlands. It is eaten as a relish, but in

years of drought it is an important resource to sell, exchange for maize or complement their own diet. The woodlands are also a source of traditional medicines, but most general medicines can also be found near the homestead. For the more complicated diseases they make use of a "muti" (medicine prepared on the basis of plants or animals) from a n'anga or go to a clinic or hospital.

This actor perceived as the most pressing natural resource related problem the decreasing number of trees near the homes, because most of their activities are at home. They do not go to the woodlands as often as the men do. This development is partly caused by the increased number of homesteads in the area, the increased number of small ruminants and the fact that people seem to have lost an interest in conservation over the last few decades. Some men also prefer to have no trees at all near to the homestead because of vermin.

A possible solution is the protection of small patches of natural trees near the homestead. They remember that this used to be a normal practice several decades ago. The women feel that with a meeting of all neighbouring farmers, men and women, they could agree that everybody should create such a small patch of woodland at their homestead and should not touch that of others. They feel that NGOs and the Forestry Commission could help them with indigenous tree seedling and fencing material. The thorny Acacia spp. are especially favoured, because they provide good firewood and fodder and also regenerate easily. Another perceived solution was planting fruit trees, indigenous and exotic, in the vegetable gardens. They have to be pruned, however, in order to reduce competition for light and nutrients. In many areas saplings from valuable trees can be found. By taking care of them, weeding competing grasses and protecting them from goats with thorny branches, these saplings could become strong and useful trees. When this is done and the tree gets bigger, the trees are marked, for instance by carving the bark or attaching a piece of cloth to the main branch in order to claim ownership of that specific tree. This is mostly respected by others, but sometimes wood or fruits are poached. One of the women, however, said that she did not want to plant trees at the homestead, because it was her husband who decides about the kind and use of trees, so it is his property and responsibility.

Like the male lay farmers, these women have abundant traditional knowledge that is barely mingled with the extension messages of the NGOs and government departments, especially in comparison with other farmer groups. Compared to the men they have a more detailed knowledge about the use and sylviculture (pruning and guiding natural regeneration) of specific trees. When asked to list the uses

of a fig tree, they listed seven uses, including medicinal use, food for chickens and a meeting place. Their husbands' knowledge of the use was limited to three: poles, rope and fruits. When confronted with the women's list, they recognized most of them, but they did not consider several of them important enough to mention.

This actor's mission statement is formulated as follows:
To maintain enough wood and plants to support the livelihood of their family by planting and managing trees and woodlots near the homestead.

Female lay farmers are the major residents in the area, because of the aforementioned migration of men to towns and commercial farms. As food producers and processors, they are generally dependant on natural resources. Several manifestations of their statements could be witnessed at the homesteads that the research team visited. The individually protected trees, the marking of ownership and a small patch of protected woodland in one case.

Louise Fortmann (in Campbell, 1996:112-120) did research on gender specific knowledge of trees in two Mhondoro villages in Zimbabwe (and provided this research with the idea of asking men and women to list the use of trees). She found significant differences in knowledge between men and women, whereby the knowledge of women was more diverse and aimed at their gender specific role in the family household. Most gender specific in this research was the knowledge about medicinal use and edible fruits.

3.2.9 N'angas

In the field research this actor was represented by the following individuals: Mrs. Chinomwe, Mrs. Chibhira and Mrs. Kucherera. They said that there were others, but that they were the principal n'angas of the area. The most important natural resources for this actor are parts of specific trees, like leafs, roots and bark. The n'angas have specific methods of harvesting medicines from trees. For instance the bark of the Msasa tree is stripped off only from the southern side. The other sides are not effective, as they say. It also has the practical consequence that trees are not ring barked. Other important natural resources are grasses and herbs. These, or their roots, are usually dried. The active elements are either extracted by boiling, soaking and leaching it, or a poultice is made and applied on certain parts of the body. Other resources that were mentioned are not renewable, but are interesting to illustrate how much the preparation of "mutis" is subject to specifically prescribed methods. The n'angas mentioned several

"types of water" that had to be used for specific medicines. For instance water from specific springs, water from hollow trees, water from holes in the rocks and rain water caught and kept in specific pottery. Also certain types of stone were used, either for grinding the herbs, or to make powder of it to be thrown in the fire, or to heat up, put a liquid medicine on and have the sick inhale the vapour.

For their profession they work in close relationship with spirit mediums. One of those interviewed, Mrs. Chibhira, is in fact a spirit medium herself. The spirit mediums provide for instance calendars for harvesting or may provide new knowledge on alternatives if a certain plant is no longer available. Of special importance are contacts with mermaids, the manifestation of water spirits in the sacred wetlands, who are said to have specific and extended knowledge about medicinal plants and are willing to pass that knowledge to the spirit mediums under the right conditions.

As a general remark: especially with this actor it is obvious that the classification is, like any classification, giving a somewhat "artificial" picture of the situation. As mentioned, one of the n'angas is also a spirit medium, they are all elder women, they are farmers and one of the women is also a traditional craftswoman (pottery). These different roles can exist in one person, or in the whole actor group, and may affect each other. However, it was argued in the first chapter that the RAAKS methodology is merely an approach to study parts of a reality, and the distinction of roles provides more insight into the motives and self images that local people have in relation to natural resource management. The possibility that the role a n'anga performs in a community might have been different if she was not farmer at the same time, is not relevant in this context.

Most serious concern of the n'angas is the disappearance of certain tree species. There are no substitutes for them, and sometimes they have to travel long distances to get what they need. This makes their services more expensive, sometimes as expensive as seeing a doctor at a hospital. They solve this partly by charging people from outside the area more than people from their own community. As a consequence of this loss of biodiversity, they are worried about the future of their profession. They normally transfer their knowledge, which is secret, to their grand daughters once they reach a certain age. But if important plants are missing or can only be purchased in other areas, they cannot transfer knowledge of the plants themselves and their usual locations. They become dependent on the market, where they have no control over the harvesting techniques that were used.
As an important cause of these developments they mention the lack of respect for traditions, in particular taboos, by the farmers. They are particularly critical towards some spirit mediums and kraal

heads. They believe that some spirit mediums, after going to the sacred springs to communicate with the ancestors, do not transfer all the information that they have acquired. They do this allegedly for their own materialistic benefit or to maintain power. They were also critical about certain kraal heads who let in strangers from outside, who often do not know and respect the local rules for natural resource use. Concerning the Chief they note that his way of enforcing bye-laws is not always effective, because farmers are reluctant to comply. They pay the fines, but keep on breaching bye-laws. They believe this is because they have little choice because they have "their backs against the wall" In addition, they often lack knowledge of the personal adversity that can overcome them. They also disagree on the use that is made of wetlands. People just fence them and cut trees to make a vegetable garden, whilst these are the richest ecosystems in the area. They are particularly irritated by women who harvest medicinal products from trees and do not follow the right procedures. In their eyes they spoil these resources, because their "muti" will not work properly. Furthermore, the harvesting techniques are sometimes destructive, killing a whole tree because some bark was stripped all around the stem.

This actor sees the planting of rare tree species in their gardens as a possible solution. They see a role for local organisations supported by NGOs or government departments to raise indigenous tree seedlings and protect wetlands. The spirit medium has to call meetings and advise on strategies for tree planting. The Chief should better control his kraal heads and make them promote good conservation techniques.

Their specific knowledge is secret, but in general it concerns a detailed ecological and physiological knowledge of the local climax vegetation. Other knowledge is cultural, like the numerous rites and specific uses that are prescribed. They only share this knowledge with their successors.

This actor's mission statement is formulated as follows: *Maintain a sufficient variety of medicinal plants to sustain and improve the health status of people from the area and outside, and to maintain the profession by planting sacred plants and practising controlled harvesting.*

The most important manifestation of the statements made was the variety of barks, roots, powders and tonics that were shown to the research team. They had considerable stocks. They admitted that sometimes they harvested more than they needed, because they had to travel far, or were afraid that others might take them before they return again. Others, especially the traditional biodiversity

practitioners, were critical about the harvesting techniques of the n'angas, who are said to sometimes take more roots than is good for a tree, because of competition with others. This could not be verified.

3.2.10 Traditional craftsmen

In the field research this actor was represented by the following individuals: Mr. Kuiparima, Mrs. Makaza and Mr. Chirengarenga. Mrs. Makaza is involved in pottery, Mr. Chirengara in thatching, mat-plaiting and basket making, and Mr. Kuiparima in sculpture. They estimate that about fifteen people in the area are involved in traditional craft, some for own use, other for the tourism industry. It should be obvious that they all had different natural resources that were necessary for their activities: clay, grasses and wood (Mahogany, Microcarpus, Sclerocaria and Kirkia spp.). Of all these resources, only the availability of wood was on the decrease, which was perceived as a problem.

The perceived cause of this problem was, that these days many people started sculpturing. It is taught at schools and even promoted by government and NGOs to stimulate local income generation. These sculptures are sold near Great Zimbabwe, and some are sold to "middlemen" who transport them to the Masvingo-Beitbridge road and sell them to South African tourists. The sculptures are getting bigger, according to Mr. Kuiparima, because South Africans like big sculptures of hippos and eagles. The middlemen sometimes help them with a truck to collect the right wood from distant areas. They also come to cut trees at Charumbira, making the required species scarce. Local farmers sometimes cut these trees because they make long lasting timber. Mr. Kuiparime says he generally does not buy a licence from the Forestry Commission, because he only cuts dead wood.

As a solution, this actor thinks that trees should be planted to replace those that have been cut. Another solution is to stop using wood and focus on the carving of soap stone, although this is seen as a different market.

This actor's mission statement is formulated as follows: *Maintaining enough wood of useful tree species to support the actor's income generating activities through the planting of trees and selective harvesting of dead trees*

Observation of the work of this specific wood carver raised some doubt about his statements. The sculptures that were for sale were clearly cut from fresh wood. Often the indigenous hardwoods cannot be worked once the wood has dried out. Also the cracks in the wood indicated that the tree was felled alive and used soon after that. In a personal communication, Mr. Oliver Braedt, who is studying the

influence of craft making on the environment in certain areas of Masvingo Province for his Phd at the University of Hamburg, said that most sculptures are made from freshly cut wood.

3.2.11 Traditional biodiversity practitioners

In the field research this actor was represented by the following individuals: Mr. Mandishona, Mr. Makasi and Mr. Masvosvere. These people are all associated with the project of Mr. Makasi, described in Chapter II. It is a small group with a relatively isolated project, but the local people insisted on including this actor on the list.

Their most important natural resource is the wetlands in the area, because they contain a wealth of biodiversity. They work closely together with several spirit mediums, who instruct them on the importance of certain tree species and other plants. This guides them in their management practices. They see as the main natural resource related problem the lack of guidance by the ancestral spirits. This is partly because local people lost respect, but also because the habitat of these spirits tend to disappear due to drought and wrong use of the wetlands.
Their solution to this problem is the fencing of sacred areas and the reinstallation of the natural vegetation through protection and planting of indigenous trees. They also want to serve as an example to farmers in the area of how to combine this activity with vegetable growing. This is promoted as a win-win situation both for the spirits and the farmer's family.

Their specific knowledge concerns socio-cultural knowledge of rites, taboos and the significance of plants. Some of this knowledge is obtained via the spirit mediums. They also have knowledge about organic farming techniques, since the use of chemicals is strictly prohibited in their wetlands. They share their knowledge with all interested farmers in and outside the area, and also with tourists who visit the place. They believe that they create awareness of the relevance of traditional African culture and give local people a sense of pride because of the recognition they get.

The actor's mission statement is formulated as follows: *To improve the communication with the spiritual world via spirit mediums for the benefit of the Maplan community through increasing bio diversity in vleis and spring wetlands and the management of sacred woodlands.*

It is doubtful whether the successes they claim can all be ascribed to their activities. The tree production that took place dates from many years ago. The roots went through the plastic pots and are

now firmly rooted in the soil. Whenever tree planting takes place nearby, trees are obtained from elsewhere. Some small fish ponds have been installed that do not contain fish and are too small for their purpose. Most gardening activities are no different from those in any other fenced garden. The grasses that reestablished in the valley of the adjacent river were probably resurrected by the good rains and the fact that the area was hardly accessible for cattle. However, as an exhibition centre to demonstrate the importance of the link with ancestral spirits and the external acknowledgement that this gets, it will probably have a positive impact on the confidence that local people have in their own skills, knowledge and beliefs.

3.2.12 Young entrepreneurs and employees

This actor was represented by Mr. Machipanda, Mr. Maviva and Mrs. Magura. They are all below 35 and have some sort of remunerated activity in or nearby the area. Mr. Machipanda is a local teacher and also has an irrigated agricultural plot. Mr. Maviva has a job in Masvingo and comes back to the area once in a while. Mrs. Magura is involved as a tourist guide in the wetland project of Mr. Makasi. These, like the lay farmers, are a diverse and extensive group, but what binds them together is that they are part of the younger generation. The natural resources they depend on vary. The teacher involved in farming depends on grasses and (as an indirect resource derived from woodlands through cattle grazing) manure for compost making, wood for poles and natural spring water for gravity irrigation. The tourist guide depends on the wetland and the scenery. The town worker does not have any direct dependence on natural resources, but his parents are farmers, and during periods of unemployment he works at home as an assistant farmer.

They express a general concern about the decline in the availability of natural goods and services. They generally do not see much future for the traditional way of life, because there are too many people. Most rural farming activities do not provide the kind of income to which they aspire, even if there were enough land for them to practice it. They see the lack of cash as another cause of the problems. "If people would invest more, they would get more out of it" is a statement that Mr. Machipanda favours. The others confirm the need for extra cash, which is the reason why they are involved in alternative forms of income generation. This actor also looks at the Rural District Council as both a cause and a possible solution of the natural resource related problems. They should perform better, be less corrupt and develop policies that would promote a general economic development in the area. They do not see much future for local leaders. "We respect them, but their hands are tied".

Their knowledge is "modern" compared to that of other actors described above. They all have

secondary education, and Mr. Machipanda has been trained at the Bondolfi Teachers College. He teaches his pupils about agriculture and tree planting. Mrs. Magura has learned a lot about traditional knowledge because of her association with the project of Mr. Makasi. Mr. Maviva has only a superficial knowledge about agriculture and the use of some trees, knowledge that he picked up in his childhood and at school.

The mission statement of this actor can be formulated as follows: *Sustain rural life in the communal area for themselves and their family through additional income generation.*

There was little to be doubted about the statements made. Mr. Machipanda's plot is impressive. He reaches high yields of banana, sugar cane, beans, maize, potatoes and fruits. He applies a certain amount of chemical fertilizer, but also has a big compost pit. The humus content in the soil is good. He uses water that comes down from a nearby hill. He diverts it with pipes, and through the power of gravity this water operates the sprinklers that irrigate the whole plot. He is an exception, but a good example of how with some financial input and a dynamic innovative attitude, farming can still be relatively low-cost and sustainable and produce an attractive amount of cash income. Mrs. Magura is also relatively successful, using the opportunity that tourism offers through association with the initiative of other successful people (Mr. Makasi in this case). However, Mr. Maviva might be more representative of this actor, because there are many like him. He is frequently unemployed and returns home. He seems to be disinterested in agriculture, has little knowledge about traditional natural resource management and is focussed on earning some cash income through a job or otherwise.

3.3 Secondary actors in the research area

3.3.1 Introduction: counter labelling practices

Secondary actors in the research area are those external institutions who through their action can be taken to be in direct contact with and influencing (in both a positive and a negative sense) the lives of the primary actors. This definition excludes institutions who have formal responsibilities or interests in the area but do not have a noticeable influence on the local knowledge system. Secondary actors are often labelled by primary actors as either "bad" or "good" intervening agents (Engel, 1997). Where primary actors might respect "good" secondary actors and take their messages as useful, they often resist the efforts and disregard the messages of the "bad" agents. This concept is referred to as "counter labelling practices", which in fact is one cause of the occurrence of social interfaces. During the field

work, both the formal label (how do secondary actors assess their own influence on the local knowledge system) and the local perception have been examined in order to indicate the existing paradox between images.

3.3.2 Forestry Commission

The Forestry Commission (FC) is a parastatal organisation under the Ministry of Environment and Tourism, responsible for all forests on land outside that held under private tenure (i.e. communal areas and State forests). The FC has both commercial and non-commercial activities, the latter being forest conservation, research and execution of the State initiated rural afforestation programme. This programme aims at the growing of trees in communal areas to provide local people with firewood and timber (Nhira et al., 1998). In the research area this has resulted in numerous plantations of Eucalyptus spp. of several hectares each. Besides implementing plantation forestry projects, the FC has been active in awareness raising on the need for natural resource conservation. This occurs during village workshops and training sessions for farmers. The training sessions also cover management skills for woodlots before they are handed over to the community. The FC, which has an office at Nemanwa Growth Point at the premises of the Masvingo Rural District Council, continues to provide technical and marketing advice concerning these woodlots. Besides this pro-active role towards forestry conservation, the FC also has to enforce the provisions of restrictive legislation such as the Forestry Act[27]. This is a sometimes contradictory situation, similar to that of the NRB (see sub-section 3.3.5).

There is one Forestry Extension Officer (FEO) active in the research area (Mr. Foto). He has been there since 1995 and is known by name by most primary actors. His perception of the natural resource management problems in the area represent a "formal label". According to his view the disappearance of trees must be attributed to clearing for firewood for the Masvingo market, clearing for agriculture, bad harvesting practices and uncontrolled veld fires. He sees reafforestation as the only remedy to this. He sees his role mainly as a facilitator of the farmer's tree production and management activities. He thinks he is successful with some farmers, especially those who have experienced the benefit of matured woodlots for their domestic needs and additional income generation. Other farmers are stubborn, in his view. He thinks they are careless toward the environment and are suspicious towards government. He blames that on the colonial administration that imposed conservation measures. His main problems are transport, insufficient funds for materials and the size of his area (in fact, the whole

[27] The 1982 Forestry Act allows exploitation of certain natural tree species on the basis of a permit that can be obtained at the FC. Without these permits, cutting of trees is illegal and is penalized with a fine or jail sentence.

district). He thinks he solves this problem by working with forestry aiders, member of the community who support his programme and are active in executing it.

The local perception concerning the FC is variable. It became apparent during the field work that the research area also has a forestry aid in the person of Mr. Makasi, who fenced the aforementioned wetland with the help of the FC and first started with tree production before turning the wetland into a traditionalist exhibition site. He is quite positive about the FEO, but at a certain point he became demotivated because promises of material (i.e. fencing, polythene tubes, tools) were not kept. That partly explains his initiative to generate his own income through tourism. However, several of the local actors consider the FEO to be a "bad" agent, because he has no eye for their concerns. The aforementioned nursery for instance was planted in their sacred wetland without consultation of their (spiritual) leaders. What also bothers them is that they are not allowed to cut trees, but for the implementation of Eucalyptus woodlots, many useful trees were cut down to make space for the tree plantations. Some actors even went as far as identifying the FC as the main cause of environmental degradation. Not all farmers benefit from the woodlots. Some women complained that since a specific woodlot of 5 hectares was established, they had to walk much further to get their firewood. They did not benefit from the woodlot, because it was controlled by some of the men. On the remark that they are allowed to cut many tree species but often only after obtaining a permit, most actors answered that only a few farmers go to the FC, especially those who are in favour with the FEO. Others do not go there, because it is far, it costs money and they believe they should not pay for their own trees. There is generally little willingness to pay for permits, because the FEO is said to do nothing for them or does not keep his promises.

3.3.3 Agritex

The Department of Agriculture, Technical and Extension Services (Agritex) is not as thin on the ground as the FC, and is the main extension organ of the Ministry of Lands, Agriculture and Rural Resettlement. Many other organizations, like the FC and NGOs, make use of the extension network of Agritex. In the communal lands, Agritex can therefore be seen as the main secondary actor in natural resource management. Many development agencies have already discovered that, without the consent of the Agritex extension worker, it is difficult to get anything off the ground. There is one specific AEW responsible for Charumbira and surroundings (Mrs. Jaravaza). She is mobile, sharing a car with other AEWs, but is restricted by limitations in the fuel budget that frequently occur in the second half of the year. The AEW sees the main role of Agritex as a system that disseminates knowledge to

farmers. The official national policy at this moment is to focus on village planning, conservation, irrigation, livestock and silvicultural activities. However, the main emphasis is on irrigation (not in the research area). The AEW says that her role used to be to provide farmers with packages of recommendations based on "proven agricultural practices". The AEW also used to work with "contact farmers", who were supposed to pass on the messages and set good examples. The AEW felt that this system was working well for those farmers who wanted to develop themselves. These were or often became Master Farmers. Many other farmers were not interested because, as they were seen by her, are "lazy or undisciplined".

Recently Agritex changed its policy and now operates as a generalist and not a specialist organization. This approach is called the "area approach" (Hanyani-Mlambo, 1995: 90). The AEW now has responsibility for a specific area and is involved in all aspects of the farming system. This also explains the friction that exists between Agritex and other agencies which advised on natural resource management for many years. This AEW, however, says she collaborates well with others.

The AEW sees the "lazy and undisciplined farmers" as the culprits of environmental degradation. They do not come to her training sessions about good agricultural practices and tree planting outside their fields (clearfelling and destumping all natural vegetation *in* the fields to facilitate mechanized tillage is nevertheless promoted). She believes that farmers have a naturally low interest in conservation and it is therefore necessary to encourage them all the time.

Again the perception of the local actors is variable. The Master Farmers are happy with the AEW because she provides them with a lot of useful services and products like fertilizers and fencing material. Other farmer groups say she is a nuisance, because she forces them to apply conservation measures in their fields under threat of reporting them to the NRB (see next section) if they do not listen. The resource poor farmer groups say that the AEW is selective in providing her services and products, and that they hardly benefit. The groups of spirit mediums and traditional biodiversity practitioners were negative about Agritex in general, accusing them of destroying the habitat of the ancestors. Field observations and short discussions with many farmers indicate, however, that Agritex is behind many smaller projects in the research area, especially orchards with mango and orange trees, irrigated vegetable gardens and contour ridges in fields to prevent erosion. This suggests that the influence of Agritex is considerable particularly in the cultivated parts of Charumbira.

3.3.4 Natural Resource Board

The Natural Resource Board (NRB) is the third of the three main statutory bodies that focus on natural resource management in the area. The secretariat of the NRB is called the DNR, Department of Natural Resources. In practice, however, they are often referred to as NRB. The NRB is, like the FC, under the Ministry of Environment and Tourism, and is the public trustee of all natural resources. In this capacity the NRB is engaged in the direct supervision of the usage of natural resources, including enforcement and conservation programmes. The sometimes confusing resemblance of tasks and mandates between the FC and the NRB is probably caused by the fact that both bodies have existed since colonial time[28] and managed to survive in the present government structures. The NRB enforces the Natural Resource Act (1941), the Forestry Produce Act (1981) and the Parks and Wildlife Act (amended in 1982) and the Forestry Act (1948, amended in 1982). It has therefore, more than the FC, an image as "rural police" (Nhira et al., 1998). The quoted Acts are generally based on the assumption that local people are not capable of effective natural resource management. This is in line with Hardin's "tragedy of the commons" theory, disputed by many since the seventies, but never substantially falsified (Knudsen, 1995:1-2). The NRB Officer (NO) in the research area, Mr. Muvusha, declared that most regulations stem from colonial times and have a "keep-out" nature originally meant for conservation areas. This makes them inappropriate for communal areas, where regulations should aim at sustainable use to become more effective. Therefore the people still associate him with the colonial administration and tend to resist[29].

NRB has recently adopted a new approach that is aimed more at awareness raising on sustainable woodland management. However, as in the case of the FC, NRB is thin on the ground, leaving most of the work to the AEW. Even for the follow up of tickets issued, the NO has to rely on the regular police, who generally are unable to render this service.

The primary actors in the research area generally feel that the regulations are too restrictive. However, the NRB does not give them many problems. There is a provision that communal farmers may harvest a limited number of woodland products for their own use. The interpretation of the regulations has been

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[28] The FC was initially a semi commercialized government agency with no overlapping functions with NRB and Agritex.

[29] Most regulations have, however, been amended since independence or were thoroughly rewritten. For instance the Heritage Preservation Ordinance of 1913, that has been reviewed and is now called the Natural Resources (Protection) regulations, stems from 1991. This suggests that, even within the presently almost entirely indigenized NRB the mentality has not changed much since independence, certainly in the eyes of local people.

widened in such a manner, that it is hard to establish a criminal case. Examples were given from neighbouring communal areas where some farmers were said to have cleared large areas of woodland to make a stockpile of firewood for their homestead, but in reality were found to have sold it to people from Masvingo who came to collect it with vehicles. When the regulations are so specific that "deliberate misinterpretation" is not possible, farmers sometimes conceal their activities. Examples were given, again from neighbouring areas, where for instance a woman was found to have dug out the stump after cutting down a protected tree to hide all evidence.

3.3.5 Local Government, NGOs and other secondary actors

In the current local government structure, every ward is represented in the council, the policy making body of local government for the district. These councillors are elected leaders who are sometimes actively involved in party politics at local level. They can be influential in regard to natural resource management because they might be able to mobilize many people in afforestation programmes and suchlike. In the research area this is, however, not the case. The local councillors are looked upon with sceptism. It is obvious that they are often considered as "bad" agencies and that their messages are ignored. This can also be related to the aforementioned lack of timely provision of food hand outs to the area.

There is mainly one NGO actively involved in natural resource management in the research area. The Association of Zimbabwean Traditional Environmental Conservationists (Aztrec: see glossary) aims at environmental conservation and sustainable food production. The NGO claims to be completely bottom-up, achieving a maximum degree of participation of local people. The NGO, which operates on several locations in province, has conducted several wetland conservation projects in the area, whereby the traditional aspects of wetlands are recognized and respected. It was difficult to get the perception of local actors on Aztrec, because this research has been combined with their programme and the researchers were strongly associated with the NGO. Observations over the past three years, however, revealed that, although tree planting has almost reached religious heights because of all the ceremonies and traditionalist meaning attributed to the conservation activities, there is little care for the planted trees afterwards. Most do not survive the competition with grasses or are not protected from goats. This indicates that, although ceremonial tree plantation can lead to a high degree of participation in the activities, the crucial aftercare is probably of a whole different order. Other secondary actors in Charumbira mentioned by the primary actors are seed trade companies. This external agency has some influence in the way some primary actors manage their natural resources. They promote hybrid seeds

and chemical herbicides that affect the environment and sometimes pollute their water sources. This actor was not interviewed separately because it plays the same role as Agritex, and is mainly geared towards Master Farmers. In an indirect way and on a longer term their influence, or that of their companies, can be devastating. The development of hybrid seeds requires increased external inputs. Some companies, mostly from the US or Canada, even develop the so called "suicide seed ", a seed that can only be planted once, so the farmer is increasingly dependant on commercial seed providers. This is, however, a macro-political issue that falls outside the scope of this research. Church leaders (especially the Apostolic Church) were also mentioned as affecting the environment, because they organize sessions in the woodlands and on rocks in the research area. They often cut large amounts of firewood to keep big fires burning for days. It is good to keep this in mind, but also this secondary actor was not considered as a key actor, since it concerns the relatively limited use as a consumer of natural resources on special occasions.

3.4 Chapter summary

This chapter provided insight into the dynamic elements of the local knowledge system summarized in specific mission statements. Local actors, both primary and secondary, were described in terms of their lifeworld, objectives, strategies and intended beneficiaries. Specific knowledge was indicated and the statements were put in the context of the shared or differentiating perceptions of other local actors. It was revealed that there exists some agreement between local actors on natural resource management issues, but there are also mutual accusations of misuse and mismanagement, both between primary actors and between primary and secondary actors. This leads to misunderstanding and in some cases is even used against them by development agencies. This chapter provided an explanation for the fact that, although there is a general perception of environmental degradation, the multitude of interfaces amongst local actors limits the possibilities for a meaningful improvement of natural resource management practices.

CHAPTER IV INNOVATION IN NATURAL RESOURCE MANAGEMENT: POTENTIALS AND CONSTRAINTS

4.1 Introduction

Not only are the differences between local actors as discussed in the previous chapter significant, but so are the existing similarities. Actors whose perception of problems and solutions are similar can work together more effectively or, at least, are more likely to share resources and new knowledge.
It is thus considered relevant to identify these similarities when examining existing and possible processes of innovation of the local knowledge system in respect of natural resource management, and also to establish their influence on the active processes of building and maintaining meaningful interactive relationships between local actors. It is the improved quality of these networks that provides the key to endogenous development of natural resource management.

The findings of the network analyses conducted during the RAAKS exercises, whereby the relevant local networks of primary and secondary actors were examined, are presented in Section 4.2. For analytical purposes, primary actors are clustered using criteria related to convergence of their mission statements, the quality and the frequency of their contacts and the degree to which they share resources. These clusters of primary actors can be considered as smaller networks within the larger local knowledge system. They also can be seen as organizational arrangements of this knowledge system which evolved over time, thereby determining the "knowing" of individuals. The relationships between the primary actors and also between their networks, or clusters, are therefore further expanded in Section 4.2. The networks of secondary actors are then examined, after which the interfaces and linkages between all local actors are analysed. This eventually leads to the design of a chart that depicts the local knowledge system.

Before examining the possibilities for reviving the local knowledge systems so that it can facilitate endogenous development of natural resource management, a brief theoretical discussion of the motives that people in different situations might have in order to strive for innovation, is found in the third section of this chapter. Although the general theoretical basis of this research was outlined in the first chapter, it is thought appropriate to detail a more focussed theoretical discussion after obtaining an insight into the local knowledge system in this case study. An overview of the different "drives for innovation" with a reference to findings of this research together provide the specific forms of innovation which are relevant to this case study and are thus placed into a wider theoretical context.

Concerning the identified "drives for innovation", the concept of innovation configuration and the interplay model are discussed as an introduction to the specific innovation configuration of this case study, which is outlined in the fourth section. This configuration is represented by a chart, based on an analysis of the existing forms of innovation, the conditions for innovative networking and on a possible role for government and development agencies, which is postulated in Section 4.5. This innovation configuration for the Charumbira case study addresses the problem as formulated in the first chapter.

4.2 Network analysis

4.2.1 Competing and converging mission statements

It became clear in Chapter II and III that the degree of unity within the community of Charumbira has deteriorated over time. Some actors are obviously more affluent, whilst others are excluded from the benefits derived from the local community based organizations and the inputs from external agencies. For instance, several Master Farmers are "entitled" to cut poles from the woodlands, but many lay farmers have to illegally cut them from the natural woodlands because they have no other option. This kind of situation is thoroughly described by Chambers (1983). He describes the "deprivation trap", whereby categories of disadvantages that the rural poor experience (i.e. them being poor, physically weak, isolated, vulnerable and powerless) interlock into a vicious circle of poverty. This has to be kept in mind when describing the innovation linkage mechanisms, especially when focussing on possibilities for improvement. A situation of competition exists, whereby certain groups of actors, who may form an important threat to the environment, are disadvantaged and risk being excluded from any effort for a solution.

As indicated in the first chapter, however, actors are not only competing, but also collaborating. Collaboration of a critical mass of individuals is a necessary condition for natural resource management (see the next section). Actors with converging mission statements do tend to collaborate when they perceive a win-win situation. The scarcer natural resources are, the more valid this statement will be. This could suggest that by stimulating platform processes[30] in order to identify this win-win situation, local people could be geared towards endogenous management of their natural resources in a

[30] The term "platform processes"is frequently mentioned by one of the "founding fathers" of knowledge systems research, Niels Röling. Röling (1994: 130) defines platform processes as "*... a 'participatory approach'... that focuses on creating 'rich pictures' of the diversity of interests of lifeworlds of the stake holders..., fostering shared problem appreciation..., creating an information system about the natural resource for decision support, facilitating negotiation and accommodation between stake holders....*"

sustainable manner. A condition is obviously that this win-win situation will indeed be possible. This discussion will be expanded in the next section.

The network is defined as the linkage between local actors which permits the exchange of knowledge, hereby influencing the "knowing" of other actors. It can be seen as a long chain of social relationships through which specific information and knowledge are exchanged and generated. It represents more or less the current situation, the interplay and balance of power and knowledge in the research area. It is related to the household strategies of local people. The assumption is, therefore, that primary and secondary actors are involved in local networks to further their own interests.

Different structural forms emerge as a result of this networking which will be the basis of the analysis in the next sub-section:

- Convergences of mission statements;
- Resource coalitions (not only resources that individuals can combine, but also common property resources, whereby as a result, leadership patterns and constraints become evident);
- Communication networks.

4.2.2 The primary actor network

In terms of convergence of mission statements, four clusters of primary actors have been identified in this research. Each of these clusters has its own characteristics in terms of communication, type of knowledge available and the extent to which resources can be pooled.

Firstly, there is the *traditional leadership*, which is obviously an influential cluster. This cluster involves the Chief, assisted by his head men, as a leader, the (community) spirit mediums as his counsellors and the kraal heads as delegates from the Chief. They have regular contact, almost on a weekly basis. Chief Charumbira is often away during the week, when he is represented by the head men, and holds his meetings mostly on Sunday. These meetings can be attended by anyone who has an important issue to raise. Contacts between the Chief, his head men and the communal spirit mediums are often more informal. The meetings and informal contacts have the nature of both consultations and decision making sessions concerning matters of communal interest. These are relevant to natural resource management because violation of bye-laws is discussed and perpetrators are fined; new situations are analysed; rulings are made and local actors have the opportunity to be heard and explain their problems.

It became evident during the integration analyses (see Figures 4,2 and 4.3) that the importance of the role that this cluster of actors had allocated to themselves regarding the management of natural resources, was not shared by all other actors. The young entrepreneurs saw the Chief as powerful, but not very relevant for natural resource management. That role was allocated to the kraal head, whilst much influence was credited to secondary actors, especially the government departments and NGOs. All actors agreed that the kraal head was influential and actively involved in natural resource management, but his estimated powers varied. The women in the actor group of elders, master or lay farmers in particular, thought that the kraal head was not very powerful. Local actors that were generally seen as powerful but not relevant for or involved in natural resource management, were the modern politicians, councillors and Wadco-representatives. Specific knowledge shared and developed by this cluster of actors concerned land use; sustainable harvesting techniques for forest products; sacred plants and places; traditional calendars; bye-laws related to woodland use; rain making; family trees and community history.

The second identified cluster of actors with their characteristic type of knowledge is the *traditional knowledge cluster*. It involves the elders, the family spirit mediums[31], n'angas and the craftsmen. The traditional biodiversity practitioners could also be included in this cluster, but probably fit better in the professional farmer cluster (see below). Most of the kraal heads can also be classified in this category, because they are also family heads or elders. The overlap of actors in clusters is illustrated in Figure 4.1. In this cluster, the kraal head is considered to be the most powerful and also the most involved in natural resource management. Most actors in this cluster sit together regularly on an informal basis. Much information concerning all aspects of rural life is exchanged. The information exchanged in this cluster includes the specific use of plants for health and nutrition, other practical uses and their spiritual significance. This group of actors also has detailed "knowing" about plants as indicator of soil fertility; the presence of ground water or as indicators for weather forecasting (e.g. the expectation of good rains or not in a forthcoming agricultural season). Specific knowledge about sustainable harvesting techniques is also exchanged in this cluster. Traditional knowledge about crops that are no longer or rarely cultivated these days and seed storage methods are specific to this cluster, although seldom applied. Obviously much information about community history and ancestors can be obtained from these actors. The involvement of this cluster of actors in natural resource management is deep. They

[31] In this research only one spirit medium actor was identified. However, spirit mediums take part in both the traditional leadership cluster and the traditional knowledge system. To highlight the fact that these are mostly not the same individuals, a distinction has been made in this sub-section between family spirit mediums and community spirit mediums. This distinction can also be found back in the chart of the local knowledge system in Figure 4.4.

are all concerned about the environment and the loss of habitat for the spirits.

A third cluster of actors represents the *professional farmers*. This cluster involves both Master Farmers and the traditional biodiversity practitioners. The latter are farmers that apply certain "organic" principles of soil fertilization and pest management in their agricultural practices. Many of these principles are based on traditional knowledge, but there is a positive attitude towards discovering and applying "new" organic techniques. Both are groups that are in the minority in the farming community, but distinguish themselves by the experimental nature of some of their activities. They both have a clear vision of how agriculture should be carried out and the function of natural resources. Although professionally they have a low opinion about each others practices, they interact, not only as members of a community and sometimes as close family members, but also at professional level. Those Master Farmers who were interviewed acknowledged that the ongoing use of artificial fertilizer decreased the humus content of the soils. They looked at the traditional biodiversity practitioner in order to learn more about compost making and limited tillage techniques. The organic farmers in their turn recognized that they sometimes used techniques that were more familiar to Master Farmers, because they needed extra cash income and aimed for a surplus production for the market. Mechanized soil cultivation such as sowing in rows, alternating different crops (inter cropping) were mentioned as examples. Sometimes, light quantities of chemical fertilizer are applied to increase production, especially when there are unexpected good rains, but always in conjunction with organic fertilizer. Regarding natural resource management, the traditional biodiversity practitioners emphasize its importance from a different angle. While the Master Farmer regards, for instance, woodlands as a source of timber and applies management techniques such as pruning and thinning, the traditional biodiversity practitioner is more of an ecologist who resists manipulating nature and only exploits what is needed at the time. However, both look at each other's activities and results, and sometimes adopt and adapt knowledge into their respective practices. Other important sources of innovation are experiences gained elsewhere. Such externally generated knowledge is internalized and transformed to suit local conditions. Shared "knowing" involves bee keeping, specific use of trees, ground water detection, soil and water conservation measures, biological soil improvement, irrigation techniques and grazing quality. Resources are seldom shared, except for the common property natural resources. Most professional farmers have clearly bounded fields and other property and control these resources. They tend to invest in their property, either financially or in the form of intensive labour, and want to assure the benefit from these investments.

The fourth cluster of actors is labelled *the survivors*. This extensive group includes male and female lay farmers, young entrepreneurs and employees, particularly those employed on an irregular basis in town. Although this cluster does not include the kraal head, he can be associated with this group through his capacity as the head of the extended family. He can either be a lay farmer himself, or, as is the case at Charumbira, a traditional biodiversity practitioner. The kraal head, as a leader, is concerned with the survival of these actors and the division of available resources. This group of actors is characterized by their limited resources and by their often economically opportunistic practices. They live relatively isolated lives with their families. The elders and the kraal head are important sources of information for them, but much information is also generated by for instance the farmers themselves through a continuous process of trial and error. Because of a lack of authority and their generally lower rank, they are often not actively involved in natural resource management. They have their mandate to use natural resources, but, in times of scarcity, they can go beyond sustainable levels of exploitation. Some actors in this cluster exploit woodlands to generate quick income through the sale of firewood, timber or fruits.

Of all the actors, only the elders and the female lay farmers mentioned this cluster of actors as influential in natural resource management. Although this cluster of actors make much use of natural resources, there is little control possible over what they actually do. This is considered a valuable observation for this research. Without doubt, these actors have the greatest impact on natural resources because of their numbers and their dependency on these resources, yet they are more difficult to control. The elders thought this cluster of actors was somewhere in the middle, between the kraal head (powerful and involved in natural resource management) and the councillor (powerful but far removed from natural resource management).

These four clusters of actors interrelate, mainly via family ties or via a common actor, such as the kraal head. This aspect of clustering and communication is illustrated in Figure 4.1. Each cluster forms a unit in terms of the criteria enumerated in sub-section 4.2.1 and can be seen as a sub knowledge system in itself, in which more intensive and focused communication takes place. It is assumed that communication between these clusters takes place most effectively through actors who are part of more than one cluster and have inside "knowing" about these different networks. The results summarized in Figure 4.1 indicate that in this case study too, some actors belong to several clusters, and are therefore strategic. This is especially true in the case of the kraal head. Most kraal heads are part of all clusters. The elders are also well represented in most clusters.

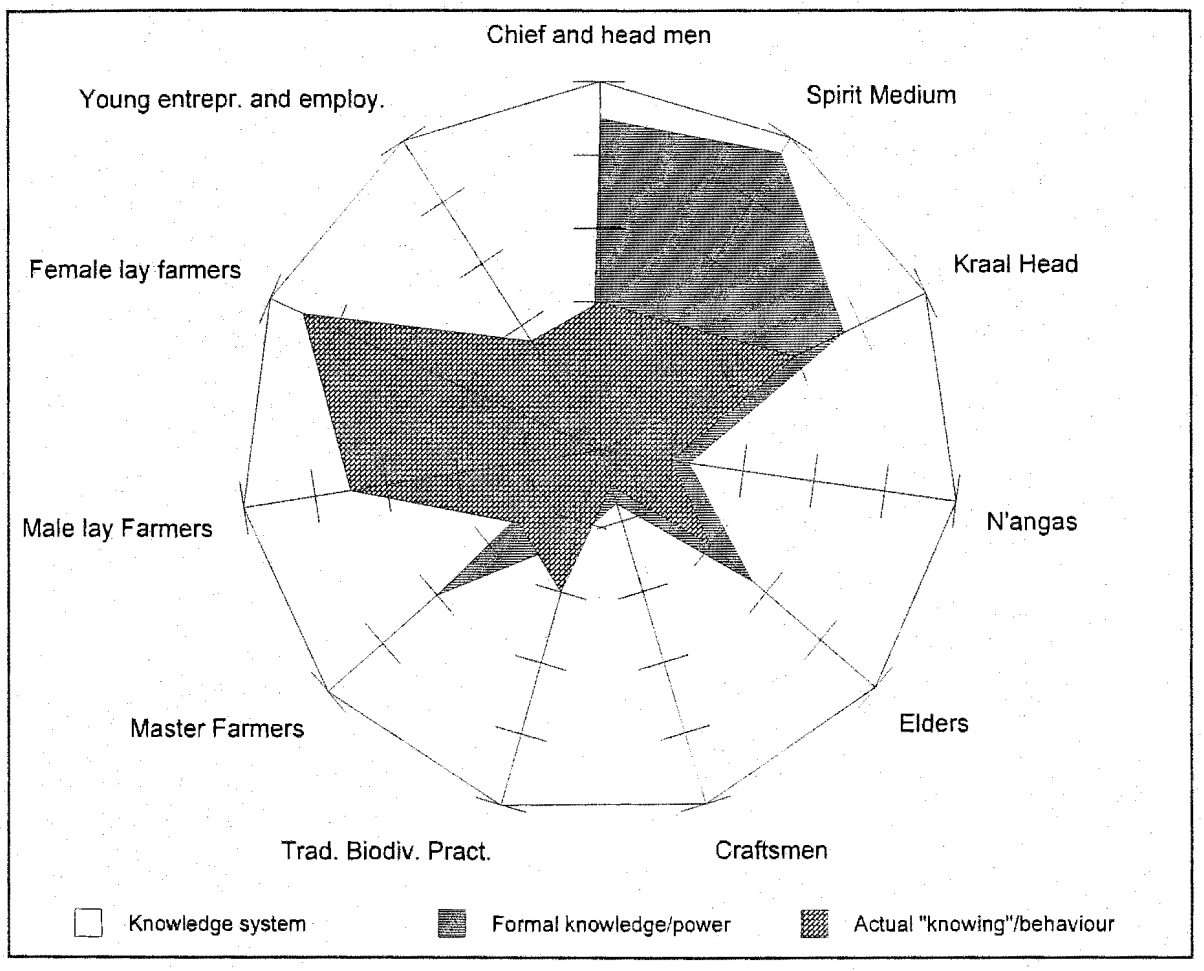
Figure 4.1: Overlap of actors in clusters

Actor → / Cluster ↓	Chief	Kraal Head	Spirit Medium	Elders	N'angas	Craftsmen	Trad.Biod. Pract.	Master Farmer	Young Entrepr. + Employ.	Female Lay Farmers	Male Lay Farmers
Traditional Leadership	▒	▒	▒					▒			
Traditional Knowledge	▒	▒	▒	▒	▒	▒	▒			▒	▒
Professional farmers		▒		▒		▒	▒	▒			
Survivors		▒		▒					▒	▒	▒

Other research findings are summarized in Figure 4.2, in which the local knowledge system and its prime movers (both in terms of power and involvement) are represented graphically. Figure 4.2. is the consolidated output of Research Frame B1 and B3 (see Annexure I). It was presented to and adapted by the primary actors at a plenary meeting. Although it was initially not the intention to put both power and actual influence on the resources in one septagram[32], it proved useful in order to clarify the confusion that existed between the labelled knowledge of actors and the "knowing" that led to the actual behaviour of primary actors. It is this latter category that obviously affects the used natural resources. This septagram indicates the existence of a negative correlation between (formal or traditional) power, including formal knowledge about management, and the influence through actual involvement in and dependency on natural resource management. It suggests that in the current situation, local power and existing knowledge does not necessarily control actual behaviour in natural resource management. It was also remarkable that during separate and intensive discussions with primary actors it was revealed that almost all actors, except the professional farmers, thought they had sufficient knowledge for natural resource management. On several occasions they accused other actors of lacking knowledge and of irresponsible behaviour. For further discussion on this issue, see sub-section 4.3.6.

[32] The septagram as a tool is described in Annexure I, research frame B1.

Figure 4.2: Prime mover septagram: formal knowledge and actual "knowing" in natural resource management in Charumbira



4.2.3 The secondary actor network

Formally, many secondary actors in the area, namely the government departments and the NGOs, form a network of development interventionists. Some institutionalized forms of networking occurred during workshops. Every quarter, representatives from all Departmental services meet at Provincial level. NGOs are also invited to these meetings, but in practice they seldom attend (as was witnessed on several occasions in Masvingo). Also at Departmental level, all heads of departments and NGOs are supposed to meet on a regular basis. These are the main platforms for information exchange concerning the research area and its people. Also thematic workshops, that often have a training component and are initiated by donors, have to be mentioned. It is, however, not the field workers who generally participate. Information gathered by their superiors at workshops is often poorly summarized and communicated to the field workers, if at all.

Government Departments have a hierarchical organisation of knowledge. Policy makers develop policies at National or even International (donor) level. Those policies find their way down through ministerial head offices to their specific Provincial and Departmental offices. In Zimbabwe there exists the paradoxical situation that at Departmental level, the different line ministries are supposed to be coordinated by the Rural District Council. Nevertheless they report "vertically" to their ministry at Provincial level, which in turn reports to National level. This situation can be potentially paralysing as is highlighted by Hanyani-Mlambo (1995:108), who documented an example in Manicaland Province in Zimbabwe. Politicians and councillors were said to frustrate civil servants in their work. Despite earlier instructions or public statements made or despite official policies, politicians and councillors sometimes threatened civil servants if they would pursue their job and would take stern measures against wrongdoers among the electorate or continue with unpopular measures. This kind of complaint was also heard at a meeting of the Provincial Planning Committee in Masvingo on the 6th of November 1998, where heads of technical ministries at Departmental level usually are supposed to coordinate their activities. There are also inter-ministerial committees, but sector ministries tend to resist this kind of integration (Helmsing, 1997: 8). The shrinking budget is another factor that hampers effective coordination of interventions at local level. Occasionally decentralization of power along sectorial lines is enhanced by specific grants. This implies sectorial control, hence there is only limited scope for increasing the autonomy of the Rural District Councils.

NGOs also work in relative isolation from other secondary actors. At their (mostly local) level of intervention, government departments are generally weak and thin on the ground. A combination of narrow resource base, dependency on external funding, the huge financial overhead (the largest part of the budget generally goes to salaries, transport, administrative infrastructures and the like), competition for projects and poor professional skills and attitude makes many NGOs at local level ineffective. The fact that they sometimes dispose of cars and other supporting materials creates jealousy among government departments, whose fuel budgets usually become exhausted after the first six months of the financial year.

In the field there is not generally much collaboration. Most contacts between the various secondary actors are informal and take place outside the working environment. The fact that there is a considerable overlap in duties and responsibilities (see previous chapter) is threatening. Apparently the various institutions attempt to justify their existence by proving that they have a comparative advantage over the others. The only true collaboration observed in the research area was between the NRB and

the ZRP issuing tickets to wrongdoers. Developments within Agritex suggest that government departments tend to broaden their policies and venture into an integrated approach without seeking collaboration with other sector ministries.

Networking, however, occurs occasionally. For instance, on tree planting day (5th of December), the NRB and FC work together with schools and churches to plant trees and increase environmental awareness. Others, like seed traders (e.g. Seedcoop), collaborate closely with Agritex because of the commercial interests involved. All these linkages are too fragile to label them as clusters of actors. Nevertheless, most secondary actors can be seen as having converging mission statements. In reality, however, they compete, and there is hardly any resource coalition. Furthermore, the communication networks are relatively poor.

4.2.4 Interfaces and linkages between primary and secondary actors: the local knowledge system

From the integration analysis (see Figure 4.3) it becomes clear that this local knowledge system depends largely on itself, despite the external and historical influences as described in Chapter II. Contacts with secondary actors mainly take place at the level of traditional leadership and professional farmers. Contacts between traditional leadership and government departments or NGOs are often initiated by those secondary actors. The professional farmers, however, also take the initiative and actively seek technical and financial assistance. Here the information paradox between the secondary and primary actors is minimal. The primary actor sees the role of the secondary actor more or less in the same way as the secondary actor perceives it himself. In other cases this paradox is larger. Many secondary actors, including the NGOs, think they play an important role for all local people, either directly or indirectly. They often use the general term *community* in their objectives and programmes. Figure 4.3, however, indicated that from a primary actor's point of view, many secondary actors rarely meet and are hardly considered relevant vis-à-vis their knowledge about natural resource management. At the level of NGOs, a bias might exist, because the research team was associated with a local NGO. This interface results in encounters between external, so called "expert" knowledge, and local knowledge (see also the previous chapter).

Projects have a different effect on primary actors, depending on whether or not they are involved or not. In the research area, wetland conservation projects attract the participation of only a limited number of groups. In this case, a project installed in the area created a division between participating and non-participating individuals and groups. This division created an indifferent attitude towards the success

of the project and caused derision among the non-participants. In some of the worst cases it may even lead to envy and quarrelling or active sabotage (e.g. stealing fences, letting in animals, pulling out seedlings). This shows that the good intentions of a project can become counter-productive for part of the community in the sense that there is no cross-fertilization of results and the social situation might worsen. Especially with the demonstration approach often used with professional farmers, this phenomenon may lead to a low adoption rate. This could be observed in the case of the NGO Aztrec, where years of maintenance of demonstration plots in the research area and scattered all over the province did not lead to any noticeable adoption of the techniques which had been demonstrated.

Figure 4.3:Integration Analysis: frequency and significance of innovative linkages in the local knowledge system for natural resource management in Charumbira.

	Ch	KH	SM	El	Na	Crm	TPb	Mf	Flf	Mlf	Yee	FC	nrb	Agr	ngo	oth
Ch		++	++	+-	o-	--	o+	o+	--	--	--	-+	-+	o-	o+	++
KH	++		++	++	+-	+-	++	+-	++	++	+-	-+	-+	+-	o+	++
SM	++	+-		+-	++	o+	o+	--	--	--	--	--	--	--	--	-+
El	o+	++	o+		o+	o-	o+	o-	++	++	++	--	-+	--	o+	++
Na	o+	++	++	++		o+	o+	o-	+-	+-	--	--	--	--	--	--
Crm	o+	++	o+	++	-+		-+	--	+-	+-	+-	+-	+-	--	o+	o-
TPb	o+	++	++	++	++	o+		--	o-	o-	+-	+-	--	o-	++	o-
Mf	+-	o-	o-	o-	o-	--	+-		--	--	+-	++	++	++	+-	++
Flf	-+	o+	o+	++	++	o+	--	--		++	++	-+	-+	-+	o+	--
Mlf	-+	++	o+	++	o+	-+	--	--	++		++	--	--	o-	o+	-+
Yee	o-	o+	o-	o-	--	++	o-	o-	++	++		o+	o+	o+	o+	o+

*Clusters: from left to right (and from top to bottom): traditional leadership, traditional knowledge, professional farmers, survivors and secondary actors. The secondary actors are only represented on the X-axis because the integration is seen from a primary actor's perspective.

*Key to the abbreviations used: Ch=Chief; KH=Kraal Head; SM = Spirit Medium; El= Elders; Na= N'anga; Crm= Craftsmen; Tpb= Traditional Biodiversity Practitioner; Mf= Master Farmer; Flf= Female Lay Farmer; Mlf= Male Lay Farmer; Yee= Young Entrepreneurs and Employees; FC= Forestry Commission; NRB= Natural Resource Board; Agr= Agritex; NGO= Non Governmental Organizations; Oth=Other, including churches, traders, Vidco, Wadco, Rural District Council,

*Frequency of contact, mutually influencing knowledge for natural resource use or management:

++ =Regular and important; +- =Regular but not important; o+ =Incidentally, but important;

o- = Incidentally and not important; -+ = Rare but important; -- = Rare and not important

The frequent and relevant contacts with the category "other" occurred mostly with the Chief, his head men and the kraal heads. These were mainly contacts with politicians and with the Rural District Council. These contacts are considered important because they concern a desire for the extension of the territory and mandates for control over the natural resources in the area.
The elders have considerable contact with churches and schools, and they believe that these have an important educational role to play. Master Farmers have regular contacts with the Grain Marketing Board, seed cooperatives, irrigation companies and other agro-businesses. In this linkage there is a focus on exchange of technical information relevant to the farmer's activities. These contacts are, however, not really relevant for natural resource management.

The disconnection between primary actors and secondary actors, mentioned in the first chapter, is also noticeable in the research area. This can be related to the organizational structures of secondary actors as described in the previous chapter, but also to the limited knowledge or understanding about farmers' objectives. Reijntjes et al. (1992: 30-33) describe several objectives that farmers in developing countries may pursue in agriculture (i.e. productivity, security, continuity and identity). Development interventionists focus mainly on productivity and tend to neglect the other objectives. In natural resource management the objectives might be slightly different, but the principle is the same. While FC and NRB may be focussed principally on conservation, primary actors have all sorts of other objectives, as described in the previous chapter. In fact, natural resource management is part of the household strategies of rural folk aimed at generating a level of provisional capacity that satisfies material needs (*productivity*), socio-cultural needs (*identity*) within certain margins of *security* and sustaining the long term resource base (*continuity*). One objective, for instance continuity, may compete with another, such as productivity. Primary actors are therefore looking for an optimum balance. This is the reason why a farmer may decide to sacrifice maximum productivity and maintain several trees in his field that permit to maintain some of the soil fertility. However, in certain situation, this striving for a balance can make a decision to over-exploit a woodland, a rational one. The fact that the farmer risks depletion and a reduced continuity for his (and others') farming activities is for him in balance with being on the safe side and having enough food, for the time being. This is especially true in a situation of scarcity, dependency on natural resources and a limited control over the use of it.

As an output of Research Frame A8 and B4, a final Graphical Approximation Model of the local knowledge system has been made (see Figure 4.4). This model has been used to feed back results to

the plenary meeting of local actors. Although there were initial doubts about the assimilation of this information by the primary actors and despite the fact that they were all communicated in the local language, Shona, the chart provoked lively debates. This led eventually to the adoption of the information and increased the validity of the findings. The translated version of the final Graphical Approximation Model as adopted by the plenary meeting is shown in Figure 4.4. It can be considered as a graphical representation of the local knowledge system, including the most important linkage mechanisms and nature of information exchange[33]. Together with the descriptions in this sub-section it shows that development agencies mainly influence the knowledge of the professional farmers cluster, who in fact have a limited impact on natural resource practices because of the nature of their activity or their limited numbers (see also Figure 4.2). The large group that has a more determining relationship with natural resources, the lay farmers, are hardly reached by NGOs and government departments. They are only slightly influenced by development agencies, but the difference between their objectives and those of development agencies is likely to be large. The lay farmers are fed with traditional knowledge by elders and kraal heads. They develop this into well adapted "knowing" through a process of trial and error, making use of opportunities that markets and a weakened control over natural resources offer.

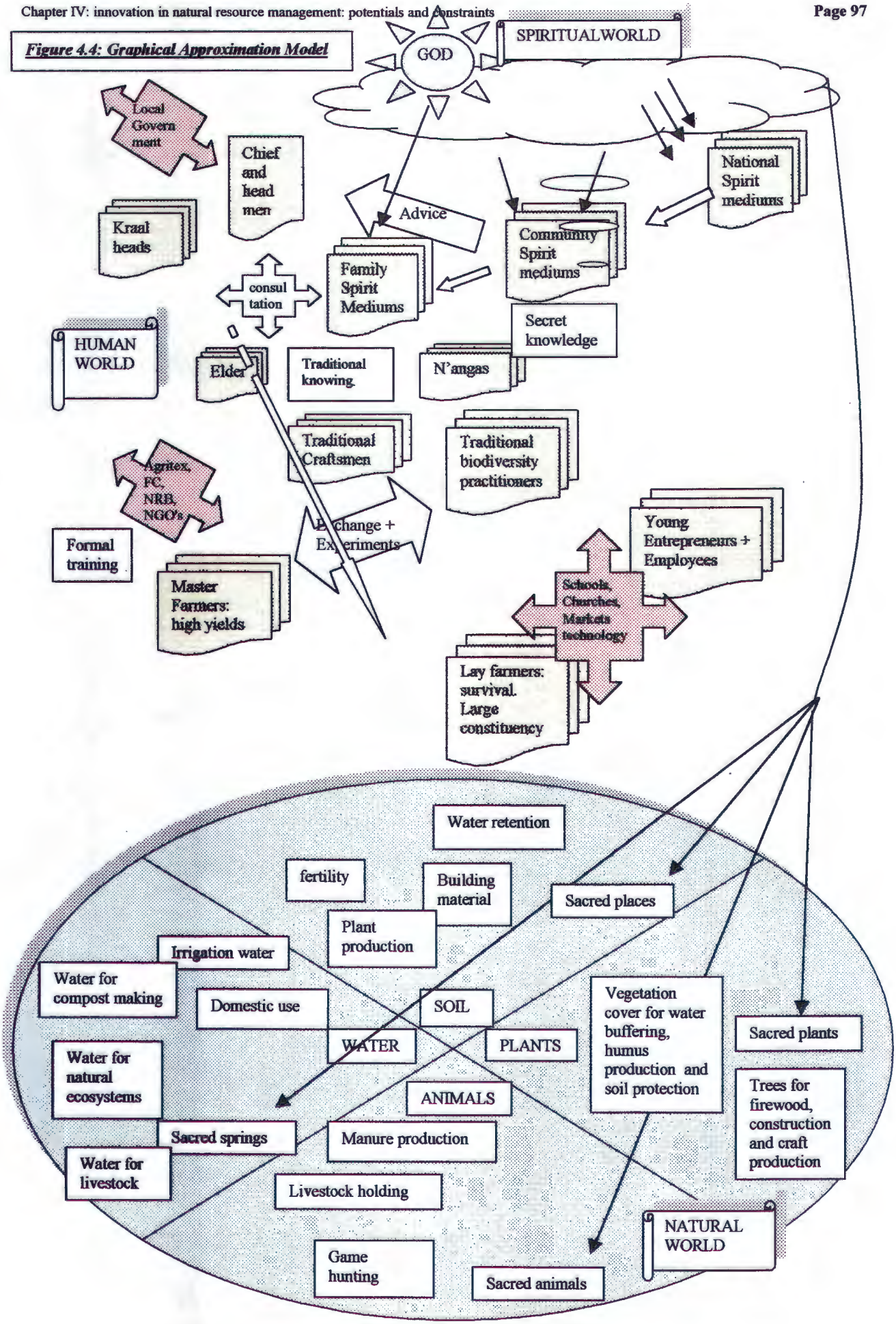
4.3 Different types of innovation and the interplay model

4.3.1 Introduction

In order to analyse the findings in a way that they can contribute to a better understanding of how the local knowledge system can be revived, it is useful to discuss relevant theory about innovation that forms a part of the theory on which RAAKS is founded. As a consequence of the concept of "knowing" described in sub-section 1.7.3, innovation is approached holistically, as a process from invention to diffusion. Innovation is therefore not only determined by the development of the different dimensions of "knowing", but also by the common volition or intentionality of the local actors. The RAAKS methodology is based on the assumption that this volition vis-à-vis innovation exists. This is often the case in agriculture, especially in high external input agriculture where financial risks can be high and the benefits of cooperation are more evident.

[33] It should be kept in mind that the innovation linkages demonstrated in Figure 4.4 are constantly being reinterpreted renegotiated and reconstructed. This fact is directly related to the balance of power constantly being reconstructed (Engel, 1997: 103), even though institutions themselves might remain unchanged.

Figure 4.4: Graphical Approximation Model



The research findings described in the previous chapter make clear, however, that an in-built drive for innovation does not necessarily exist for a knowledge system as a whole. In the case of Charumbira, the RAAKS exercises led to a certain common volition. But in similar cases where RAAKS has not been applied it is important to examine what the drives for innovation are or can potentially be if an understanding of the potential for endogenous development of this category of cases in general is to be evaluated. Natural resources have become relatively scarce in many areas, leading to a situation where there is an internal competition for resources. Without the exercise of some form of pressure, generated internally or externally, it will be difficult to develop natural resource management in an effective manner.

Engel (1997: 79-108) distinguishes several forms of innovation, each led by a specific "driving force". Most of these forces are generated by the markets, by policies, by the primary actors themselves and by donors. Below, each driving force is described separately, whereby theoretical aspects are as much as possible specified for this particular case study.

4.3.2 Market led innovation

Market led innovation is the kind of innovation in which the success or failure of innovation processes regarding natural resource management is determined by the market. Relevant markets include those for natural medicines, firewood and timber, craft and other wood based products, but also the market for agricultural products. Management practices are geared towards producing and/or harvesting raw materials for products that correspond to market standards. In the case of agricultural knowledge systems, this type of innovation is mostly well organized through cooperative agreements, technological packages and clearly and efficiently institutionalized linkages. Market requirements in commodity agriculture are the most important driving force behind innovation. The Master Farmer provides a good example of this. The rationale for his practices is dominated by market principles.

In the case of natural resource management in general, however, the market led innovation seems to be less prevalent. It can even be stated that the market for products such as firewood and wild fruits, has a negative effect on the resource base, because it is considered as common property. Some actors tend to harvest without considering regrowth, because they don't control the resources are not assured of the benefits of good management practices. Some other actors may develop strategies to secure a resource base, such as planting tree species in their gardens, creating plantations of fast growing exotic tree species or looking for alternative resources. The craftsmen beginning to use soapstone instead of

wood for their sculpting is a good example of this. In fact, remuneration can create a significant impulse to innovate on an individual (or family) basis. This, however, is limited to those actors wherefore good alternatives exist; who can afford it; who have land and water or who have the right connections with extension services (e.g. in Chapter III it became clear that many woodlots are controlled by the more affluent farmers). Regarding the management of common property natural resources, this type of innovation is, however, marginal in terms of impact. It seldom leads to innovative management practices in order to secure the resource base for future generations. In addition it can be stated that some forms of market led innovations, like woodlots of Eucalyptus trees, damage ecologically sensitive areas, as was mentioned by one of the elders. The planting of exotic tree species often involves the clearing of natural woodland.

4.3.3 Policy driven innovation

Innovation stimulated by government departments and NGOs active in the area can be seen as policy driven. This type of innovation is traditionally associated with assumptions regarding the generation of adequate information that only has to be communicated to local actors in order for it to lead to innovation. In those cases, the innovation takes place outside the local community. One objective of this research is, however, to assist in developing policies that permit innovation within the community.

Currently, most of the secondary actors described in the previous chapter have an influence on the management of natural resources through regulations, development programmes or projects. The question is, however, whether this influence creates a driving force for innovation in natural resource management among the primary actors or not. Chapter I describes how part of the problem investigated is the disconnection between policy level and grassroots level. Chapter II describes the often confusing role that government historically played and obviously still plays. In Chapter III it becomes evident that policies and regulations can, in the case of certain primary actors, stimulate illegal and destructive behaviour. In addition, several secondary actors are seriously limited by a lack of capacity and even have contradicting and competing roles.

This type of innovation is, however, important, because it should create an incentive to revive local knowledge systems (see next sub-section) that can more effectively address contemporary natural resource management problems. This aspect will be further elaborated on in Section 4.5.

4.3.4 Primary actor led innovation

This type of innovation is obviously most relevant in the context of this research. The findings described in Chapter III indicate that this type of innovation is presently undertaken on a mainly individual basis, and that some actors are more innovative than others. For instance, certain individual farmers started using cuttings for live-fencing and some kraal heads were able to protect a woodland because they have traditional powers. However, in the case of common property natural resource management, there is often need for a mutual agreement and understanding. The female farmers agreed that individual trees could be claimed and that this should be respected, and that farmers should limit their fields to the original boundaries allocated to them by the kraal head. These management agreements are less functional when certain individuals (Knudsen (1995) refers to them as "free riders") do not respect these decisions and, for various reasons, ignore them. The quality of primary actor led innovation is often determined by the quality of the local organizations, their capacity for effective decision making, the capacity for effective control and the degree to which the local decision making structures represent the different interests in the area. Master Farmers, for instance, are innovative, not only to meet market demands, but also to pursue their personal objectives. However, lay farmers do not tend to adopt these innovations because they have different interests to which these innovations may not be relevant. Because of the close relationship between Master Farmers and the modern and traditional leadership (social capital), management agreements are sometimes not in favour of the latter actor, who then tends to ignore them. In other words, primary actor led innovation includes the risk that innovation is led by somewhat affluent and influential members of the community who do not always meet the interest of other actors, and therefore lack influence on the local knowledge system as a whole..

4.3.5 Donor led innovation

The availability of funds for development can create a driving force for innovation. Through external funding, innovation cannot only be developed, but new needs for innovation are also created. This can be seen as both a threat and as an opportunity. The threat is, once again, that only those primary actors with good formal linkages are privileged. Another threat is that the drive for innovation might only exist as long as the funds are still available. The opportunity is that selective funding of promising initiatives can bring innovation to a higher level, and, as such, could also stimulate more impact. In the research area, only the NGO Aztrec is involved in funding of innovative initiatives. They provided for instance fencing materials to some local groups to protect wetlands and allow planting of water resistant tree species. The external recognition of these local initiatives certainly means a boost to

innovation. However, it also excludes certain groups, as was demonstrated before.

Donor funding can not only have a direct effect on primary actors, but also affect the policy of secondary actors, such as government departments, leading to the ideal situation whereby policy led innovation can take place at grassroots level.

4.3.6 Innovation configurations and the Interplay Model

It may be clear that the driving forces behind innovation at local level are equivocal. The innovation arena is complex, not only technically, but also from an institutional and organizational point of view. The different driving forces behind innovation in practice lead to specific patterns of relationships between social actors who perceive each other as relevant to their commonly perceived problems and strategies. Engel (1997: 99-103) prefers to distinguish ideal types in these patterns as a tool for studying leadership and coordination in complex innovation situations. He refers to this as "innovation configurations" , reflecting accepted models and ground rules for collective behaviour with respect to innovation. Each form of innovation described therefore can also be described in terms of a specific innovation configuration.

Policy driven configurations, for instance, can be characterized by the following arrangement: extension workers who transmit, in off-farm situations developed research findings to farmers by selecting and working with demonstration farmers. These run a tree nursery, for example, and mobilize other farmers to plant trees in their fields. These demonstration farmers represent a wider community of indirect programme participants who are supposed to benefit from the policy made operational in a programme or project. Coordination is mainly effected by technicians and administrators. Technological packages and the level of field staff performance are standardized.

The primary actor driven configuration of innovation is often characterized by strong local leaders that represent a wider community of primary actors. In agriculture, effective farmer driven configurations generally emerge around economically strong crops, like tobacco or paprika. Farmers themselves can be organized into unions, cooperatives or functional groups that are capable of influencing other primary and secondary actors. Coordination is often reached through standardization of interests in order to encourage other actors to adjust their activities. Standardization of norms is another approach in situations where ideological aspects are more prevalent, such as in the case of a local knowledge system related to natural resource management. Engel (1997: 294) referred to Mintzberg's

"missionary approach" as a useful concept of innovation based on the strength of local knowledge and local management capacity. There is, however, the risk of over-emphasizing immediate innovative results and of focusing on the most active members of a community. Resource poor farmers do not often participate readily, even though it involves community initiatives without any outside involvement.

Innovation is conceived here as the development of "knowing". There are different players and different types of "knowing" in the local "arena" of development that "interplay". This embodies a situation of two-way communication, the creation of a win-win-situation[34], of networking for innovation, involving the whole process from conception to diffusion. In other words, the development of "knowing" involves both, conception and interaction. This idea has been preconceived in a model described by Gremmen (in Engel, 1997:134). This "interplay model" is based on the idea that practices, in this case in natural resource management, partly evolve autonomously but at the same time interact with each other. These practices evolve from experience-based rules that are constantly re-created amongst the participants . They are not necessarily of a "technical"nature, but involve any set of performances that affect natural resources. Engel (1997: 134) prefers to use the term "social practices" that can be defined as "... a discernible set of social actors who define and uphold performance through some form of social interaction".

In the interplay model, improvement of practices is considered an internal achievement of the practices themselves through a process of "reflection-in-action" or "indigenous rationalization" (Gremmen in Engel, 1997: 133). The external institutional environment (including secondary actors) can thereby either accelerate or slow down the process. This model implies a diversity in "knowing" and "drives for innovation" without suggesting any superiority of either of them. The improvement of social practices in natural resource management can be attained by defining experiences and recognizing rules amongst the key actors involved. The role of secondary actors can only be positive if these social practices are recognized in their own right. This is important, because the practices of primary actors often respond to a different logic than the set of rules followed by formal research and extension agencies, thus forming an important reason for failure when the policy is implemented at grassroots level, thereby resulting in a "development deadlock". This element will be discussed

[34] This term is described by Wissema and Euser (1988) as: " situations in which cooperation can yield advantages for both sides". This is not to be confused with "consensus". A win-win-situation is about a shared understanding of the general problem situation and about the possible gain for each of the participants in the partnership.

further in Section 4.5.

Consequently, innovation appears to be an unplanned, diffuse process of networking by local actors. However, it also implies that some form of coordination is required in order to achieve sufficient impact of the innovative practices, which will eventually lead to a sustainable management of the available natural resources. As mentioned before, this coordination could, in this case, be achieved through standardization of norms (for instance,"it is important to protect all wetlands...."), mutual adjustment between practices (".... by limiting stream bank cultivation to post rainy season agriculture") and direct supervision. As such, coordination should be based on shared local knowledge and perception of problems and solutions or benefits. It follows from the first chapter that direct supervision can only be considered feasible (if only for the costs involved) if it is principally exercised by the primary actors themselves. This suggests an important role for local leadership (see also the next sub-section). Lindblom (in Engel, 1997: 250-251) argues that centralism is not a necessary condition for this type of coordination. Whenever there is shared understanding of problems and benefits, there will be an effort to remove obstacles to new achievements. To expect all innovative actors to operate like a well motivated football team is not always realistic. A kraal head stated after one of the meetings: "poverty always creates division and misunderstanding among people".

Under certain conditions, however, the concept of social control over free riders, as described by Knudsen (1995:10-16) in the "game theory" might offer a solution. This theory complies with the principles of the interplay model, but focuses on the control aspect of the processes. It is based on the view that players in the local "arena" are competing for scarce resources (which is often the case in Charumbira), whereby the natural resources related activities of one person affect, whether in reality or perceptually, the possible benefits of the other. This "game" between players can have both a cooperative and a non-cooperative nature. In this context, those who are willing to cooperate in natural resource management are losing out to the free riders in the long run. Another aspect of this free-riding concept is that no investment takes place in the resources exploited. Sustainable management is, as defined by Watson (in: Knudsen, 1995:4), based on a "... balancing of labour and material inputs to a natural system in order to enhance its carrying capacity and achieve a profitable and sustainable level of production". Thus for the community as a whole, which is critically dependent upon their natural resources, free riding is a threat in a situation where natural resources are becoming scarce. This is an incentive for sustainable management, and there is a need for other incentives to prevent free riding, such as penalties imposed by the Chief. The choice at individual

level between cooperation for sustainable natural resource management and non-cooperation for maximum personal benefit, can only favour the former if the individual is assured that the others are also adhering to local rules. This situation is only possible when local actors understand the options others have and the factors that influence their decisions. Effective local institutions are crucial to this if they provide *assurance* that rules are adhered to. Once sufficient individuals (the critical mass is estimated at 50% of the population) decide that cooperation in natural resource management is to their advantage, the rest will be incited to follow (Knudsen, 1995: 96).

4.4 Reviving the local knowledge system

4.4.1 Constraints of the emerging drives for innovation

The field research (more specifically, Research Frame B3 and C1) revealed that innovation is recognized as necessary, but people sometimes fear it. What they actually fear is being laughed at if, for instance, an agricultural experiment fails. This tense social atmosphere acting as a brake on progress was also identified during other PRA exercises in the Province and which are documented in Hagmann et al.(1997). Local people were found to have a negative attitude to the success of other members of their community, because "... people prefer to prove that things [innovations by other members of the community (WvH)] do not work rather than try to make them succeed. A general apathy and reluctance to experiment is the result "(Hagmann et al., 1997:161). It was also revealed in the integration analysis (see Figure 4.3) that Master Farmers have little information exchange with other farmers. Only limited exchange takes place with traditional biodiversity practitioners. The Master Farmers are accused by the lay farmers of being reluctant to share their success and resources with others, and they are therefore reluctant to share information.

The communication systems within the Charumbira community are relatively weak. Within several actor groups there is doubt about the trust that they place in some of the traditional leaders. This mistrust is substantiated by the case described in Box 3.1. Although this phenomenon (selling land to outsiders) has not been quantified yet, and its physical impact on natural resources has not been established, it can be concluded that this kind of examples undermines the public moral to invest in the conservation of natural resources. In the power analysis it became clear that the younger generation, and also the Master Farmers, do not regard their traditional leaders as influential in natural resource management. The flow of information is seen as top-down. The authoritarian approach of some traditional leaders is frustrating for some farmers, but they have to remain respectful. They do

not feel that their interests are always properly represented by their leaders.

It appears that power is not clearly defined or divided between traditional and modern leadership. It seems that the elders place their trust in traditional leaders, and that younger or more modernized (e.g. the Master Farmers) people see the modern administrative structures as more relevant. This division seems to exist, not just as something that local actors became aware of in the participatory RAAKS-analyses, but also as a dormant but dominant factor in the minds of people. In the view of many of the local actors, the community of Charumbira has been split into two groups - those who adhere to traditional values and those who dissociate themselves from them. Regarding the leadership structures themselves, it was argued in Chapter II that modern and traditional structures are involved in a permanent power struggle. This is undoubtedly hampering the development of new knowledge and/or the adaptation of successful existing knowledge to the changed circumstances. Innovative farmers who receive much attention from development agencies are often seen as privileged. In their turn farmers fear victimization if they practise other techniques and methods, especially if they become successful. Relatives and other community members are said to abuse the customary laws for material benefits from the better-off innovator. This happens, for example in the case of successful farming, by claiming money or by the family taking implements away from the widow when a farmer has died. These and other examples were noticed in the research area. Accusations of witchcraft (although formally forbidden by law) are another innovation-related aspect that can antagonize relationships within the community. These phenomena can lead to a general sense of fatalism and apathy that is sometimes experienced by development agencies. Innovation implies a certain social risk. People do what they are accustomed to do, and hope that the gods will favour of them. Nevertheless, it was revealed during the field exercises that people think that innovation in natural resource management is needed to address the perceived problems. At an individual level, some farmers already experiment in agriculture. Several examples were witnessed in the research area where farmers showed their "experiment", often no more than a trial in the corner of a field (e.g. with a new crop, new spacing, different combinations of fertilizer or a new form of inter-cropping).

These attitudes indicate that innovations do take place, but only at a slow pace. Especially the more influential actors, such as the kraal heads, who do have some authority and who will not be immediately socially excluded in cases of deviationist behaviour, show initiative to be innovative in natural resource management. This highlights the importance of a community approach (which the local knowledge approach in fact is) and a specific focus on coordination mechanisms.

4.4.2 Potential for revival

4.4.2.1 Conditions for innovative networking

Engel (1997: 137-152) describes the conditions for innovative networking that communities have to comply with in order for the RAAKS method to be eventually successful as a development tool. In innovation, whether community driven or stimulated by the market and/or other forces, the actors involved have to share three precepts:

- A relative but critical lack of knowledge which hampers competent individual performance, has to exist.
- There has to be a need to create a common and comprehensive understanding of the problem.
- There has to be a desire to cooperate on the basis of alternative development proposals which are generated, compared and debated openly amongst local actors.

Concerning the first precept, the primary actors were initially almost without exception concerned about the lack of knowledge of other primary actors but generally not about their own lack of knowledge. Through debate and the field exercises, it was recognized that what is good or bad for one actor is not necessarily good or bad for the other actor. It is often argued in the literature that development agencies have to accept local values and norms in their own right. The same can be argued about the situation amongst the local people in Charumbira. The acceptance and understanding of diversity was the first and most important step towards concerted innovation efforts, leading to compliance with the rest of the conditions mentioned above. Long (1992:24) argues that the development of human agency and joint innovation also "...depend crucially upon the emergence of a network of actors who become partially , though hardly ever completely, enrolled in the "project" of some other persons". This view is positively confirmed by certain examples in the research area. These include Mr. Makasi (see sub-sections 2.3.1; 2.3.6 and 3.2.11) with his wetland conservation and traditional practice of biodiversity and certain kraal heads who took the initiative of managing woodlands by restricting their use and promoting biodiversity.

In order to achieve a social organization for innovation, a pattern of durable relationships amongst a number of critical local actors has to evolve. In sub-section 4.3.6 this pattern has been called the "innovation configuration". Since innovation is an ongoing process, several innovation configurations already may exist. An obvious one in this case study is the Master Farmer, who is subject to a policy and a market driven form of innovation. Another example is seen in the lay farmers who experiment on their own but hardly ever spread the results. Their objectives include avoidance of too many risks.

Investment increases the risk, because the lay farmers have to borrow and pay back. For this they need a minimum level of annual production, and this is where the risk lies. One bad year would give them financial problems for many years to follow, not just for one season. They do not resist adopting selective parts of formal knowledge, but only those parts which fit into their objectives concerning food security and risk minimization[35].

However, what is lacking according to the theory of RAAKS, is common consent. What is required is the "construction of soft platforms[36] " which will generally entail either the merging of existing configurations such as the aforementioned into a larger whole, or the revision of existing configurations to build a new one that is more relevant for the purpose. Although it was argued that the interplay model implies spontaneous and diffuse processes of innovation, it is not unreasonable to assume that a well established configuration of innovation facilitates and guides those processes.

4.4.2.2 The innovation configuration at Charumbira

The last phase of the RAAKS exercise concerned the presentation and discussion of policies and action (Research Frame C1 and C2; See Annexure I). The operational question was *"What can be done to enhance performance related to innovation in natural resource management without relying on external institutions and persons*"?

Two kinds of innovation were formulated as crucial: a technical innovation and a management innovation. Firstly the existing local knowledge system was assessed for its suitability to solve the diagnosed problems in natural resource management through, for instance, improved linkages or other networking practices. It was concluded that this would only be possible for some of the problems. These would consist of the categories of problems that concern the production and application of products from natural resources in order to make a more efficient and sustainable use of them. The kind of innovation needed here is mainly *technical innovation,* examples of which were sustainable harvesting techniques for woodlands and specific tree products, the planting of tree seedlings or cuttings on field boundaries, wood saving techniques such as improved wood stoves, the use of stones

[35] For those able to read Dutch, Bussink (1993: 87-93) provides a comprehensive description of farmers' strategies between food security, ecosystem and markets in Zimbabwe, explaining the only partial and often opportunistic use that lay farmers make of formal knowledge such as that of the government departments.

[36] The term "platform" is used by several "soft system authors", e.g. Engel (1997); Röling (1994). It refers to soft systems as described in the first chapter of this dissertation, which have a function for interaction among actors in order to synchronize perceptions of problems and solutions. Röling (1994) even mentions "platform processes".

for cattle kraals and the treatment of fencing poles. There was a general consensus that many more techniques were readily available in the local knowledge system, but that their diffusion and relevance for some individuals have been a problem up till now.

Another area of innovation should address the specific management related problems, i.e. the *management innovation*. It was agreed that this category of problems, mainly related to competition for resources and "free riders" attitudes, was not a matter of lack of knowledge, but of law and order. It was acknowledged, however, that some form of understanding of the background of the "law and order"problem was needed in order to design a feasible configuration for innovative management of natural resources. Some of the actors are driven by poverty, but the unsustainable use of natural resources would only solve their problems in the short term, dragging others into the same kind of problematic situation because of the insufficient natural resource base. It was also realized that if the community wanted to limit the use of natural resources, it had the obligation to accommodate the needy of their community. The idea of reinstalling the traditional "zunde"[37] system was suggested. The Chief wanted to lobby the government for more land to increase agricultural production and dispose of more natural resources. He admitted, however, that this would only be a temporary solution, and that other forms of management were needed in addition.

The innovation configuration to attain these two kinds of innovation is thus directed towards improved linkages and restructuring of the management arrangements. The potential of various primary and secondary actors to carry out tasks or play certain roles were discussed.
Aware of the need for increased synergy between the four described clusters of "knowing", the recognition of the equal value of all these clusters for the Charumbira community and the need for new management arrangements, the following principles were introduced, discussed, adapted and adopted:

- The traditional leadership should be empowered by the modern administration to become the main authority in local natural resource management.
- All local actors should respect the traditional leadership, but the leadership should be receptive to the needs and ideas of the community.
- This "open minded" attitude should also exist between the clusters of traditional knowledge,

[37] Zunde is a Shona word for a system that is known in many parts of Africa, whereby local people contribute with labour to an agricultural field of the Chief for the benefit of the needy in their community. The system still exists in other parts of Masvingo Province, e.g. in Bikita under Chief Mazungunye.

professional farmers and survivors. All actors in these clusters develop "knowing" that could be mutually beneficial.

- All primary actors should adhere to the rules and they should all be involved in the control and, to a limited extent, in their formulation.
- Modern administration should be involved, but only to support the community. After some debate it was agreed that its responsibilities should be accommodated, for instance, by testing the management practices outlined regarding their compatibility with National legislation.

Effective leadership structures should be established, aimed at integrating the different social actors and buffer conflicts. The kraal head could thereby be seen as the leading figure in the innovation configuration for natural resource management, as is illustrated in Figure 4.5. In this innovation configuration, he is allocated the tasks that traditionally belong to him, namely to administer the land of his extended family by mandate from the Chief and his head men. The current practice shows that the kraal head in his position is able to be innovative without too much social risk. He is also capable of allocating several individuals to "his projects" and having new examples implemented in other areas. He is empowered by the Chief, who in turn should be empowered by local government, to administer the natural resources within certain legally determined limits. The Chief is advised by the spirit medium to assure cultural relevance of the management practices. The role of the elders in establishing norms and environmental ethics should be revived. These norms are formulated together with other actors in the traditional knowledge cluster, which sometimes can include most of the actors (e.g. a female lay farmer can also be a n'anga). The inclusion of the kraal head as the leader of the extended family must consider the interests of all actors. All individual members of the community should be involved in the enforcement of these norms via social control, whereby serious wrong doers should be admonished. The kraal head should have the mandate to impose penalties, but should at the same time be subjected to control by the Chief. Figure 4.5 depicts this configuration which partly resulted from the concluding plenary meeting.

The proposed network re-configuration for management innovation could also facilitate technical innovations, as they are both inter-related and have a common social base. Comparing these two kinds of innovation with the classification based on the drives for innovation outlined in Section 4.3, they can at this level be described as "primary actor led innovation". However, because this research is also required to address the problem of disconnection between the grassroots and policy level, it is also seeking some form of "policy led innovation" that will result in the same innovation configurations

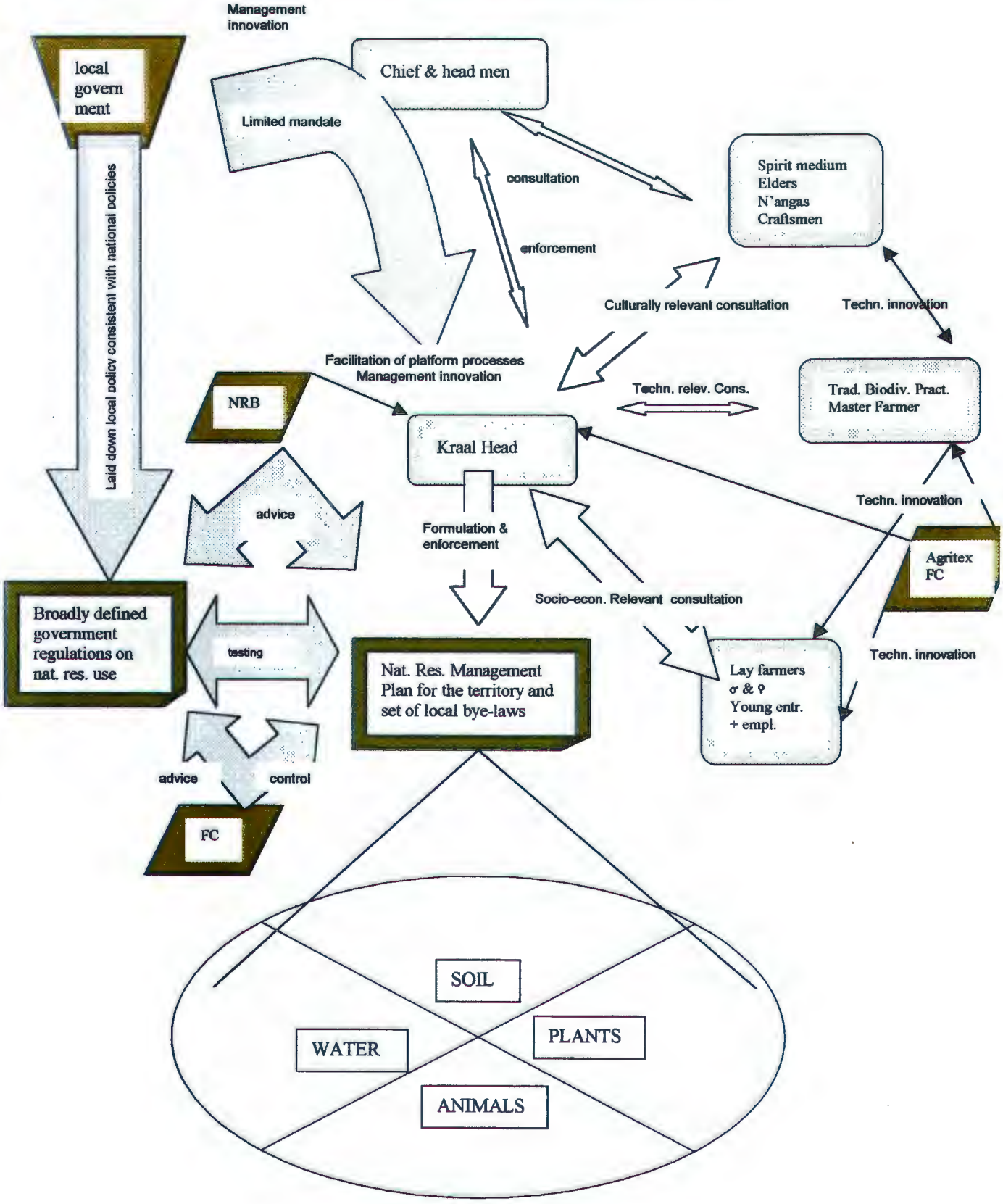
at local level. In the following section this aspect will be further examined.

4.5 A role for government and development agencies

It should be obvious that the aforementioned innovation configuration for Charumbira can only be effective with an appropriate adjustment of the external legal and policy environment. The nature of government, development agencies and donors has been described in the first chapter. Because of their characteristics, there is need for some sort of a blueprint approach. It was on the one hand argued that because of this blueprint approach, development was ineffective, because it did not match with the objectives of the grassroots actors. On the other hand, the common and most obvious move towards a complete bottom-up or process-approach is also problematic because it does not match the characteristics of legislators, administrators and financial institutions. This disconnection can only be solved by exploring a middle ground that meets both sides.

It is interesting in this respect to summarize the discussion by Brinkerhoff and Ingle (1989) concerning the blueprint development model versus the process model. They propose *structured flexibility*, a blend that "... provides the basis for the programmatic and financial accountability that is needed to attract resources from international donor agencies and developing country bureaucracies and, at the same time, facilitates an adaptive management stance that can take into account uncertain and changing task environments and confront the value dimensions of the various actors involved" (Brinkerhoff and Ingle, 1989:490). The structured flexibility approach incorporates the orientation towards analysis, planning and specificity without using these tools to determine "facts". These tools are mentioned to clarify the differing degrees of uncertainty present in a programme or project setting and to develop initial responses that are modified over time through repeated application of the tools. The approach fits in well with this research because it aims at the participation of the key actors and their values, seeking to construct their lifeworlds or, in other words, to influence their local knowledge system. There are many obvious similarities with the principles of soft systems research, in particular the RAAKS method. The structured flexibility approach is also aimed at facilitating an improved management performance of local people, building on their capacity to engage in the design of ongoing solutions to their problems. In terms of

Figure 4.5: Innovation Configuration for the Charumbira Case Study



planning, accumulated knowledge and unexpected circumstances can lead to deviations from the predetermined guidelines that serve as a plan. In this manner, the specific characteristics of local people's lifeworlds and their environment can be taken in consideration without the "laissez-faire" of most bottom-up development approaches. In operational terms, long-term objectives are fused with short-term service and/or product delivery targets in the process of achieving these objectives. By concentrating on short term and measurable targets, planning and accountability are possible, thus accommodating the nature of development agencies. Brinkerhoff and Ingle (1989) designed a table comparing the operational characteristics of the three mentioned approaches. This table is presented in Annexure IV to illustrate the practical implications of the structured flexibility approach. It is also illustrative of the discussion about systems and scientific perspectives that was held in the first chapter, and which is basic to this research.

A related approach called "adaptive administration" is described in Rondinelli (1993). He argues that it is necessary that development administration has to deal with the uncertainty and complexity of development problems. As in industrialized countries, an institutional diversity has similarly to facilitate development by becoming adaptive in order to allow autonomous experimentation, innovation and widespread participation in economic activities. In order to become more adaptive, Rondinelli (1993:154-188) recommends that a development administration has to:

- Adjust procedures of planning and administration to the political dynamics of public policy-making.
- Increase the responsiveness of bureaucracies through a change of organizational structures and the adoption of professional attitudes such as a learning approach and a broader commitment.
- Develop more appropriate forms of administrative capacity, making use of local government's contacts with local (voluntary) groups and relying more on market mechanisms and distribution channels.
- Decentralize not only responsibility, but also resources and authority for development planning and administration to lower administrative levels.
- Build an effective institutional network for service delivery by complementing and integrating the services of other public and private, traditional or modern organizations, and also by linking both horizontally and vertically, in order to connect the different levels of aggregation. Adaptive administrative organizations should also build on locally and culturally accepted arrangements and be open to local participation and leadership.
- Make planning adjunctive and strategic rather than comprehensive and control-oriented. Error

detection and correction should be encouraged rather than suppressing and punishing. Incentives should be created for innovative management.

- Simplify planning and management procedures.

For the case study of Charumbira, these approaches offer a meaningful perspective to positively influence the external environment for similar local knowledge systems in order to facilitate endogenous development of natural resource management without proposing unrealistic levels of intervention. For this purpose, the following conditions should be met:

- Regulations concerning natural resources should be formulated in a broader sense, thereby giving greater autonomy to traditional local authorities to formulate and enforce specific bye-laws that are relevant to the local natural environment and its ecological, economical and socio-cultural dimensions. These regulations could for instance focus on sensitive areas like wetlands or prescribe a minimum area of woodland cover in a locality.
- Local government at the level of the Rural District Council, including the decentralized government departments, should recognize the traditional leadership as the ultimate authority in their domain within the limits of the aforementioned broad regulations. This could, for instance, be instituted by granting a well defined mandate to use natural resources freely. This would, in fact, be an intermediate form of privatization, whereby the local community as a whole owns and is responsible for their natural resources.
- Some control mechanism should be included which would make it possible for decentralized government institutions to effectively sanction local communities if they do not adhere to the broad regulations. It should, for instance, be possible to withdraw the mandate for free natural resource use in case of mismanagement.
- Technical government departments, NGOs and projects that are intended to influence certain technical innovations in natural resource management should focus at kraal head level. Through the kraal head, certain innovative farmers or other community members could, for instance, be organized into groups in order to create a "pull" for service delivery.
- The process of formulating bye-laws and taking an agreed form of responsibility by local communities for their own natural resources, should be facilitated by local government, assisted by relevant development agencies. This is a form of focussed participatory development with a clear target and a well defined method of handing over responsibilities.

These conditions, which are depicted in Figure 4.5, can in fact be seen as both a policy and a donor

driven innovation configuration, but should ultimately lead to a primary actor driven form of innovation. Only by government handing over control over natural resource utilisation to the direct beneficiaries, thereby maintaining a general form of control, can primary actors integrate their social practices with the different dimensions of natural resource management. This is an essential condition to make natural resource use sustainable by encouraging local communities to develop and adapt relevant knowledge without continuous external efforts. Only then will the revival of the local knowledge system become rewarding for local communities.

4.6 Chapter summary

In this chapter, four knowledge clusters related to the primary actors were defined. In the network analysis it was revealed that communication networks in the case study area are relatively weak. Secondary actors relevant to natural resource management have only a limited influence on the actors (i.e. those actors clustered as "survivors") that have most effect on natural resources. In order to design a viable configuration for innovation, some theoretical reflection took place on the driving forces behind innovation and the social organization of innovation. The limits and potentials for innovation as they were discussed in the case study area were highlighted. Thereafter a design for an innovation configuration was described. Primary actors appear to be limited in their possibilities to endogenously develop natural resource management to more sustainable levels, even if a common volition to this effect exists. The main limiting factor is the external institutional environment, which does not support an effective use of traditional structures and knowledge, making a reorganization imperative.

CHAPTER V CONCLUSION

5.1 Executive summary

Research problem...

The crucial relationship that exists between the household strategies of the rural people in southern Zimbabwe and natural resource management has increasingly come under pressure. This is caused by various political, demographic and technological developments. These developments are gradually contributing to the loss rather than the "management" of natural resources. Efforts over the last decades by government and development agencies to solve these problems have had insufficient impact. A major contributory reason for this was the incompatibility between the objectives of grassroots actors and those of development agencies. Another reason was the limited financial and managerial capacity of implementing agencies, hampering an effective top-down implementation of viable natural resource management systems.

The reaction to this situation has been to "preach" bottom-up development based on the objectives of local people. However, because of the output oriented nature of development organizations, which have to be accountable to government and donors, this situation has often led to a "laissez-faire" situation on the ground. Participatory methods are often poorly implemented and unfocussed, leading to scattered projects that can only address isolated and opportunistic local needs. In addition, the transaction costs of a more effective participatory development are often too high. Because of this, a "development deadlock" has occurred. Development organizations appear to have run out of options in respect of natural resource management.

...and objectives

It is assumed, however, that effective building on local people's existing technical and managerial capacity is a prerequisite to the reduction of the transaction costs of development. A more focussed approach to this "endogenous development", particularly in relation to natural resources, needs to be developed. As a contribution, this research is based on the premise that local knowledge systems vis-à-vis natural resource management used to be more effective, context specific and culturally relevant, but have, for various reasons, lost their ability to adapt to contemporary problems. In this dissertation, a case study is examined concerning the possibilities of "reviving" the relevant local knowledge system, in particular its innovative mechanisms. Special attention is paid to how this can be

effectively supported by external institutions, thereby opening avenues for endogenous development of natural resource management in similar cases.

Methodology and theoretical basis

Besides using the case study approach, the research is based on RAAKS (Rapid Appraisal of Agricultural Knowledge Systems) which is an actor oriented methodology. The theoretical basis of RAAKS is centred around a concept that describes people as being sense-giving. Through "human agency" they are capable of the "unexpected" and can make a difference in development. They are not just system variables, but they construct their own soft systems which, to a certain extent, are unpredictable. RAAKS is a systematic participatory process that local actors have to go through in order to create "soft images" of a local knowledge system. They define actor specific problem situations in natural resource management and at the same time understand and appreciate the existing diversity. Their specific perceptions, strategies and beneficiaries of their practices are summarized in a mission statement, which characterizes actors and allows discussion of their differences and similarities. A joint analysis of the local knowledge system follows in a second phase. This "Phase B" of the field research is particularly focussing on the internal and external communication networks and the local power relations. In a concluding phase, innovation configurations are identified that enable endogenous development to take place, thereby facilitating a "revival" of a more effective local knowledge system. RAAKS was developed as a developmental tool, but can also be used as a participatory research tool, whereby the findings of participating local people become research findings at the same time.

Research context of the case study

This case study was undertaken in a so called "communal area" in Masvingo District, in Ward 12 under Chief Charumbira. In the second chapter, *the first research question is addressed by examining the elements that explain the present relationship between the population of the research area and their natural resources*. The area, which is relatively dry and mountainous, still has approximately 15% natural vegetation cover consisting mainly of Miombo woodland. In the 19th century, the local knowledge system was dominated by a polygamist chief who was advised by his spirit medium. The local rules regulating the use of natural resources were determined by these two traditional leaders. The spirit medium communicated messages from the *spiritual world* to the *social world* which were partly related to the management of the resources of the *natural world*. This worldview determined the communal ethics vis-à-vis natural resource management, whereby certain areas were zoned and

specific trees were hedged with taboos, that limited people's behaviour.
Although some sources state that pre-colonial farming, that is considered to have been intrinsically related to the management of natural resources, was static and constantly threatened by natural disasters, other authors support the assumption that has been adopted in this research, i.e. that farmers had contextual relevant strategies to deal with risks and maintain a sustainable land and natural resource use system.

Before Rhodes invaded the country, decades of threat by the Ndebele from the South-East already had changed the land and natural resource use patterns. The colonization by the British initially was a relief to the Shona in that it enabled them to resume their original management practices for farming (pyro-culture) and natural resource use (slash and burn). An active policy for agrarian reform was successfully implemented by the British during the first half on this century, juxtaposed to policies of segregation, which forced the removal of indigenous people from "white farming areas". The agrarian policies were aimed at increasing the productivity of indigenous farming and commercializing the production, thereby breaking the self sustaining nature of traditional management systems.

Currently, the 3300 inhabitants of the Charumbira area are partly depending on traditional knowledge for their existence, because the active government policies before and after independence in 1980 did not match their potential. Socio-economic activities related to natural resource management concern health and nutrition, farming and various other economic activities in the area, such as craft and eco-tourism. A study conducted nearby the research area established a clear relationship between poverty and natural resource use.

Observations and measurements made during the field research indicated a declining natural resource base in the research area. Not only is the area and the diversity of the woodlands diminishing as compared to less disturbed woodlands in the vicinity, but also erosion in the fields and siltation of the rivers indicate a high pressure on natural resources. These observed developments are, however, not as dramatic as the trends perceived by the local people in a retrospective mapping exercise. They expect that in 10 years hence, most natural resources will have become less available by 90% compared to the situation of 80 years ago. This indicates a strong awareness of a problematic situation regarding natural resources amongst the local population.

The lifeworlds of the primary actors

Chapter III addresses the *second research question by describing how the identified primary actors in the research area apply and adapt relevant knowledge to solve the natural resource management problems which they perceive.* This is summarized in the text for each of the eleven primary actors in a mission statement.

1-The *Chief,* together with his head men, is mainly concerned with the decreasing productivity of the fields and the woodlands and the increasing difficulty in allocating land. He sees a solution requiring tighter control and an expansion of the territory.

2-The *spirit mediums* feel that the cause of environmental degradation lies in the erosion of traditional norms and loss of respect for the local culture. Only by regaining respect and reinstalling taboos concerning natural resource use, can the problem be solved.

3-The *kraal heads* have the responsibility for their extended family and have similar concerns as the Chief, i.e. to have enough land and natural resources to allocate to the young generation. They see that the natural resource management problems are partly caused by a general lack of discipline and disrespect for traditional norms. Interference from politicians and other external parties was perceived as another hampering factor. The kraal heads think that a tighter control is needed, but also feel that their good examples are even more important.

4-The *elders* are equally concerned about the loss of traditional values as the spirit mediums. They, however, accuse some of the spirit mediums of being selfish and misuse traditional belief to their own benefit. The elders see an important role for the traditional leadership in maintaining law and order and setting good examples. They consider themselves having an important role in the transfer of traditional knowledge and culture (values and norms).

5-The *Master Farmers* believe that ignorant farmers are the main cause of the problems in natural resource management. They accuse them of performing destructive practices as well as a lack of willingness to plant trees or invest in their farms to obtain higher outputs. These factors would be, they believe, the most important solution to decrease dependency and negative impact on natural resources.

6-The *male lay farmers* are part of the group accused by the Master Farmers. This extensive group is generally resource poor and difficult to access. Their view of the principal causes of depletion of the natural resources is that the users are too numerous and that there is too much competition for resources. They depend on the resources for extra inputs into their farming systems and earning some cash income. They put considerably emphasis on external support as a solution for the natural

resource management problems.

7-The *female lay farmers* have similar concerns as their sons, husbands and fathers, but are specifically concerned about the decreasing availability of trees near the homesteads. Their solution is to plant fruit trees and protect some indigenous trees, while making arrangements with other villagers to that effect.

8-The *n'angas* are close to the spirit mediums in their perception of the causes of natural resources depletion. Their specific concern is that if the vegetative basis for "mutis" disappears in their area, they would have to purchase it from elsewhere, losing control over, in their view, crucial harvesting procedures. They propose the planting of indigenous trees and sustained harvesting techniques.

9-*Traditional craftsmen*, particularly those working with wood, are concerned with the disappearance of the trees which they need. This is caused by the stiff competition in the craft industry and is exacerbated by outsiders who come to cut these trees at Charumbira. The solution they see for this problem is replanting those trees which they need.

10-The *traditional biodiversity practitioners* is a group which experiments with organic farming in combination with efforts to increase biodiversity and reinstall culturally relevant ecosystems. They have a similar view as spirit mediums concerning the causes of the loss of biodiversity and the quantitative decline in natural products and services. They are active in restoring biodiversity in specific areas such as the wetlands and sacred forests in order to create or maintain an habitat for the ancestral spirits.

11-The eleventh primary actor consists of *young entrepreneurs and employees*. This large and diverse group considers the remaining natural resource base in the area too limited to provide a decent living. They put considerable emphasis on job creation in order to provide an alternative source of income and leave the natural resources for the remaining farmers.

Secondary actors

Secondary actors in the research area related to natural resource management are the Forestry Commission (FC), the Natural Resource Board (NRB), Agritex, Local Government, NGOs and some smaller local actors such as churches and commercial firms.

Amongst the secondary actors, *Agritex* appears to be most influential and other secondary actors sometimes make use of their services. They have regular contacts with the more successful Master Farmers and sometimes judge the lay farmers in the same way as the Master Farmers tend to do, i.e. as incapable and unwilling.

The *Forestry Commission* is thin on the ground. They believe that the main cause of the disappearance

of the tree cover results from the clearing of land for agriculture, veld fires and illegal selective cutting. The Forestry Commission is involved in tree nurseries, tree planting and law enforcement as its main approach to combat deforestation. However, some of their projects are mainly controlled by the more affluent section of the population who, in addition, have a relatively limited impact on the environmental degradation.

The *Natural Resource Board* is even thinner on the ground than the Forestry Commission. Both organizations have similar tasks, which appears to prevent them from collaborating. This also applies to Agritex, in spite of the services its field staff sometimes provide for other departments. All these organizations have objectives and approaches that are increasingly similar, namely based on an integrated rural development concept. This, however, did not yet lead to an effective network to support local communities.

NGOs generally operate in isolation and are resented because of the resources they sometimes have at their disposal. Most secondary actors are labelled with a "bad" image by the primary actors, often making their efforts ineffective. Some primary actors, nevertheless, mainly the traditional leadership and the Master Farmers, are more positive about the services of secondary actors.

Interfaces

The focus on specific local actors proved useful to explain why the community as a whole considers natural resource management a serious problem without apparently being able to do much about it. The various local actors have different perceptions of problems and appropriate solutions. These differences are related to the interfaces that exist between actors or even amongst individuals in one category. These interfaces are one reason why there is little joint effort to solve a problematic situation. It also explains why a general approach of secondary development actors is selective in terms of beneficiaries and demonstration models are not generally adopted.

Synergy and clustering of local actors

This constraint to endogenous development of natural resource management could be transformed into a strength by seeking synergy from existing diversity in "knowing". On the basis of this idea, Chapter IV examines the possibilities for innovation. By addressing the *third research question*, *existing or possibly new innovative configurations are investigated to establish their possible contribution to the revival of the relevant local knowledge system.* The *fourth research question* is also addressed by *examining the external enabling environment that should be created to make this possible in similar cases.*

The diversity expressed in actors' mission statements is narrowed down by grouping them into four clusters: *1-the traditional leadership; 2-the traditional knowledge cluster; 3-the professional farmers;4-the survivors.*

Through an integration analysis and a power analysis it was revealed that at present the traditional knowledge cluster links to most actors on a regular basis. The kraal head in particular is an actor that links with all clusters of actors and can therefore be considered as strategic in a possible innovation configuration. At the level of secondary actors not much effective innovative networking takes place despite the efforts of institutes such as the Provincial Planning Committee. In the local knowledge system, that is illustrated in Figure 4.4, the place of the main secondary actors is only on the periphery, close to the professional farmers.

Drives for innovation and current attitudes

In an analysis of different types of innovation in natural resource management currently taking place, it becomes evident that this is mainly led or initiated by certain primary actors which have a respected position in the community, such as the kraal head. Individual farmers tend to consider innovation as a social risk and fear the consequences of jealousy provoked by their deviating behaviour and possible success. Natural resources related innovation driven by policy, donors or markets is rare. Based on the concept of the interplay model, whereby through social interaction a diversity in equally important social practices in natural resource management can change in a coordinated manner, the potential for a revival of the local knowledge system was examined and formulated in a participatory manner.

Innovation configuration: the social organization of change

An important role is reserved for the traditional leadership who, empowered by modern administration, should bear full responsibility for the natural resources in their respective territory. The importance of an open minded attitude towards all actors was emphasized. Each actor can contribute to a common understanding of the natural resource management related problems and solutions. Another emphasis was placed on the respect for the traditional leadership and the culturally relevant knowledge that exists in the local knowledge system.

A role for policy level

In the analyses made for an effective involvement of secondary actors and related hierarchical levels, the approach of structured flexibility is proposed. The role of Local Government should be focussed on starting platform processes in rural areas that will eventually lead to the formulation of local plans

and bye-laws to restore and manage the resistance, resilience and diversity of natural resources. These plans and local rules should fit into a broader set of legal rules formulated by government. These should serve as a reference for "modern" administrative institutions in assessing local plans and bye-laws before providing a mandate for local communities to determine the use of the natural resources according to their own insights.

5.2 Findings and discussion

The case study approach itself proved to be useful. It permitted an in-depth view into the household strategies of a community that, in many respects, has similarities to other communities in the region. In addition, the examination of a community as a whole, their interrelationships, the perceptions and rapport to other factors and actors, was necessary to be able to identify the existing knowledge system. The consequent limitation of this qualitative research was the lack of sufficient quantitative data. More quantitative data would have been particularly interesting because the research also needs to address the problem of disconnection between grassroots level and policy level. However, this was not feasible nor really necessary in the context of this Master's dissertation. The use of literature sources of case studies in the region provided a partial solution to that shortcoming.

Although it was presumed that it would be an advantage to have an established rapport with the local community under investigation, it was at a certain point in time also experienced as a constraint from a scientific point of view. It was sometimes not clear whether the associations and findings made during the participatory field exercises were a product of the methodology used or based on previous experiences in the area. On the one hand, this should be seen as a constraint in that it might result in a bias and limit the replicability of the research. On the other hand, in participatory research it is almost impossible to exclude the subjective element. The specific experience of any participatory research facilitator will be a limiting factor. It might, however, also lead to a more profound and focussed analysis than otherwise would have been the case.

The strong points of the RAAKS methodology experienced in this research are, firstly, that it has a good theoretical basis with validated "windows" and, secondly, that it is flexible. It studies aspects of the agricultural knowledge system from different perspectives and it involves local participants from the start; influences their practices and draws on their findings. The fact that the methodology is designed for a variety of agricultural knowledge systems was no real limitation for the investigation of natural resource management systems, in that the flexible nature of RAAKS permited to adapt the

research frames sufficiently. In addition to being a developmental tool that contributes to innovation in natural resource management practices within a participating community, the RAAKS methodology as it was applied in this case study proved to be a strong analytical tool that contributed significantly to the accumulation of relevant scientific knowledge[38]. It was realized, however, that the distinction between actors is somewhat artificial, and consequently, the description and visualization of the local knowledge system is also artificial to a certain degree. Because one is looking for distinction, one tends to forget the similarities. Master Farmers are described as a "no-nonsense" type of modernized African, but, at the same time, they are traditionalists who respect the Chief and react to messages from the spirit mediums. This, however, is inherent in the soft systems research. A soft system being examined is, as per definition, dynamic and only permits a temporary or partial view on reality.

Although several of the research tools used are obviously derived from participatory methods such as PRA and PLA, the focus on a *system,* more specifically on a system for innovation of a knowledge system, was promising. It provided a possibility for structured inquiry, something that could meet the problem mentioned in Section 1.2 of a "laissez-faire" situation that was associated with PRA. However, the possibilities of RAAKS as a research tool to address a specific research problem that has a wider bearing turned out to be less evident in this case study. Although the research frames had defined standards and outputs (see Annexure I), which in principle permit a good focus and scientific rigour, it was not always possible to comply with them. This was particularly evident in the third phase (strategy and action planning), that was formulated in an action oriented manner. At a certain point in time, the participants were aware of, and appreciated, the diversity in perceptions, and came to a conclusion that joint action and synergy was needed. However, from that point on, it seemed difficult to draw any further conclusion on the basis of this research. The next step was only "action", which of course could be observed in order to find out whether the knowledge system developed as expected. These processes are, nevertheless, highly unpredictable, as may be expected from "soft systems research". As a way forward, technical "standard" activities were proposed by the local actors, such as fencing of wetlands and planting of trees. However, it became clear that, despite the volition, which had been created by the process, the primary actors felt they could do little because of limiting external factors that were perceived as "unchangeable". The local knowledge system in this research has been defined as a rather disjointed construction from wider networks and determining factors, in spite of the influence of the few secondary actors that were examined.

[38] Scientific in the sense that the same observations could be obtained using other methods of inquiry

However, human conduct is also guided, or limited, by a wider context of which the local knowledge system is only a part. These aspects were not sufficiently qualified and quantified in this case study.

In that sense the emphasis at the micro level did not give much opportunity to draw conclusions on macro effects that may determine other local knowledge system, leading to a "micro bias". This conclusion contradicts the statement made in the first chapter (sub-section 1.5.2) about RAAKS having the potential to integrate macro and micro perspectives, a statement which originated from the "founding fathers of RAAKS". In particular, the last "designing" phase is too practical and context specific to be useful as a tool in this research. During the last phase, RAAKS had stopped being a research tool and had become a developmental tool for this particular community only. However, as argued in Section 1.6 (scope), in this type of research, theory has to be informed by case study reality such as the one described in this dissertation.

Consequently, the results concerning the innovation configuration, as described in the previous chapter, do not necessarily follow from this field research. Although, for instance, the findings in sub-section 3.2.5 (elders) gave some strong indications for the shaping of a meaningful innovation configuration, several recommendations result rather from a thorough review of recent literature and from several workshops that the author attended during the period of this research, having this research's problem statement in mind. The ideas were presented to and adapted and confirmed as useful by the participants at a stage where there seemed to be an impasse during the last phase of the RAAKS exercises. This could be characterized as manipulative and invalid from a certain viewpoint. However, the methodology as such did not permit any further analysis. RAAKS revealed in detail a problem situation, and this problem situation was the basis for absorbing relevant experiences and views from elsewhere which could possibly match this and similar situations and create a more conducive environment for innovative natural resource management. In that respect the findings concerning the innovation configurations are not invalid, but were designed by an outsider based on a thorough understanding of the local situation and a reasonable knowledge of the state of the art concepts that are currently being developed in the scientific world. This is a valid attempt to concurrently address the problem of disconnection between the grassroots realities and the policy level and to counterbalance the micro bias of this research. This research demonstrates that, in spite of the main principle of building on local knowledge, there is room, or need, for "outsiders' input". The findings also clearly indicate where this input is needed (see discussion below). In addition, the used methodology, that is, besides act*or* oriented, also act*ion* oriented, and the established links between

the community and the research team via the NGO Aztrec, provided results that would probably not have been achieved by any outsider that did not follow this research process.

The proposed innovation configuration in the previous chapter, whereby, to a large extent, traditional authorities are credited with control over local natural resources, is a way to counterbalance the established dependency on external forces and networks that contribute to regular setbacks and consequent "fatalism". The objection one could make to this type of solution is, that it is so basic and demands so much change, that it is not practical and therefore not a solution. However, decades of attempts to develop sustainable natural resource management systems similarly failed to result in practical solutions. The question remains whether these "practical", intermediate solutions exist indeed. Certain complex problems need fundamental changes, for "one can only jump over a ditch at a single leap"[39].

5.3 Conclusions and recommendations

Linking the results that were obtained from the application of the aforementioned methods to the research aim, it can be concluded that this research managed to give insight into the processes and values that determine innovation processes in natural resource management and the internal and external conditions under which local actors could give those processes momentum. The RAAKS methodology may be a strong development tool, but as a research instrument it is mainly applicable as a participatory tool for contextual research with a strong micro focus. It does not provide a framework to develop general explanations of what is observed in the field situation. However, if applied in a larger number of case studies, the method can provide reliable and viable information in a wider context.

The analysis of the research findings and information from additional sources used in this dissertation sometimes challenged the basic assumptions. The concept of the lost capacity for checks and balances of the local knowledge system appears to remain valid, because the community as a whole does not cope with contemporary problems in natural resource management. Innovativeness, however, takes place, but at a smaller scale, amongst a limited group of farmers or even only at an individual level. Regarding the local knowledge system as a whole, it is thereby a question whether it is the general loss of innovative capacity that restrains development, or whether it is the limiting institutional and

[39] Citing the former German Chancellor Helmut Kohl when he was criticized for his decision to immediately join East and West Germany without a transition period.

political context. It is likely that the loss of control over natural resources has led to individualised or actor specific strategies that over time influenced their perception of interests, problems and solutions in natural resource management and therefore created the many interfaces that were found in this research.

The *first final conclusion* of this research is therefore, that reviving the local knowledge system through platform processes like those emerging from the application of the RAAKS exercises, can only be meaningful if the critical reason for the lack of management capacity is taken away, i.e. the limited say of local people over their natural resources. Neither the present State ownership nor the sometimes promoted private ownership, but a communal ownership based on a clear mandate; on existing management systems; on local knowledge and on a communal ethics, should be the basis of reviving a local knowledge system.

Another basic assumption challenged during this research was the assumption that development has to be endogenous, based on the perceptions and knowledge systems of a local community and on the available resources in their area. In this research it was revealed that "*the*" local community does not exist. Instead it concerns a diverse group of individuals and smaller groups that have many different interests and strategies in natural resource use. Under the current circumstances, these forces are competing, rather than complementing one another in an effort to promote the general interests of "the" community. With the present degree of overpopulation in the communal areas of southern Zimbabwe and the limited possibilities that land reform may offer to sustainably manage natural resources, the removal of the legal restrictions to local natural resource use and the reliance on endogenous development of the management of these resources together, might lead to an accelerated depletion of the natural resource base.

The *second final conclusion* is therefore, that endogenous development has to be seen in the wider perspective of an adequate legal framework that, in broad terms, guides the natural resource management practices. A proactive performance of secondary actors is a prerequisite in order to promote the aforementioned platform processes that are at the basis of the revival of a local knowledge system.

These two conclusions shaped the innovation configuration as described in the previous chapter. They imply a possible solution for the development deadlock mentioned in Section 1.2, because they make

it clear that both, the legislative or policy level and the grassroots level, are interdependent in developing natural resource use to more sustainable levels.

The described innovation configuration in sub-section 4.4.2.2 contains a number of recommendations. In addition, the following can also be proposed:

- The need for a concerted approach does not only exist at grassroots level, but also at secondary actors' level. Only if local government can effectively influence the interventions of secondary actors, can the development deadlock be addressed. Local government should therefore get a full coordinative mandate for this purpose from central government.
- In order to bring the potentials and limitations of natural resource management based on local knowledge systems to the attention of policy makers, legislators and development agencies, links should be institutionalized between the different levels of aggregation. These links should permit a two-way learning process, in order to generate and document information about local knowledge systems, including local bye-laws, but also to provide information about policies and legislative issues. In particular, a greater awareness of conflicting interests and perceptions within communities should be created.

In conclusion: a local knowledge system with many of its internal and external ties has been studied in a particular and isolated case. However, a knowledge system, that can be actively reorientated from within, is of a different order. It needs a capacity for local management and at the same time a mandate to do so, within certain legal parameters. These prerequisites were absent in this case study. A larger local mandate under well defined, generally restricting conditions, provides a key to breaking out of the current development deadlock in natural resource management.

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ANNEXURE I: RESEARCH FRAMES

The RAAKS methodology developed and described by Engel and Salomon (1997) comprises three phases:
phase A: defining the relevant system and its problems;
phase B: analysis of constraints and opportunities;
phase C: articulating policy and strategy/planning for action.
During each phase, a number of research frames were followed during the field work. These frames consist of three sections: a window, tools and expected outputs. The window is the specific perspective that receives attention in the frame, the tools are the operationalization of it, and the expected outputs are the concrete contribution to the overall findings that are laid down in this dissertation. Each frame covers part of the "local reality", sometimes with a considerable overlap, allowing for cross checking and insight into existing paradoxes. In this respect the whole provided more information than the sum of the outputs of all the research frames.
The RAAKS resource box (Engel and Salomon, 1997) that was used for this fieldwork, contains a set of windows and tools. As the authors explain, these were prepared for a general situation in agriculture, and any applicant would be free to adapt them to the specific circumstances of the case study. This case study needed such an adaptation, because we are mainly focussed on natural resource management, even though agriculture has an important place in it.
The following research frames are an elaboration for the Charumbira case study, and were applied by a research team (see chapter I) during the winter (southern hemisphere) of 1998.

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Frame A1

WINDOW: Defining or redefining the objective of the diagnosis
It is important that the team members all agree that the diagnostic objective of this first phase is workable for them considering the area and the actors that can be identified in advance. It allows extra input to make the problem definition and objectives more consistent. It also forms the basis for the identification of relevant actors and their perspectives/goals.
TOOLS: Problem redefinition exercise: Brainstorm session during a team workshop
-In a brainstorm session during the first team workshop, the team identifies (possible) problems related to natural resource management in the pilot area. All the team members have experience in the pilot area related to this issue. -Each problem is explored in more detail by the team. The questions are asked: -What is the history of the problem? -What is it caused by (by what phenomenon or actor)? -Who is affected by the problem (which actors)? -What other actors are concerned by the problem and how urgent is it for them? - Problems are grouped and ranked (problem tree) -This exercise provides a quantity of data that has to support an overall diagnostic objective (towards natural resource management) that should be workable for all possible actors that are going to be approached.
Expected output- 1. A preliminary listing of (possible) system actors 2. A more workable (and valid) diagnostic objective based on (presupposed) multiple perspectives of the (possible) actors on the identified area of human activity in the pilot area.

Frame A2

WINDOW: Identifying relevant primary actors

This is a systematic follow- up of the previous frame. By discussing the relevance of the actors identified during the brainstorm and problem ranking exercise, and by assessing the possible contributions of these actors in relation to innovation of the local knowledge system and the diagnostic objective more extensively and systematically, actors can be included or excluded.
This is important, because the longer the list, the more (unnecessarily) extended and complicated (let alone expensive) the research will be. Excluding actors at a later stage might also be offensive and jeopardise future cooperation.
The actors which are selected during this stage are a category of individuals or an institution.

TOOLS: Actor assessment exercise: Team workshop

An Actor Assessment Sheet will be completed for every actor identified during the first exercises as described under A1. In the sheet every actor is mentioned by name, and they are qualified (key actor or not). In a third column the reason for this qualification is stated.

During this exercise, the following questions are answered for every actor:
- Does the actor represent a significant group or institution with regard to the stated problem (number of people/geographical location, nature of the activities)?
- Does the actor play a significant role in the local knowledge system, i.e. does the actor have a significant influence on the way local people act in relation to natural resource management?
- Does the actor have a potential role in the local knowledge system, i.e. can the actor possibly play a significant role in technological innovation, effective policy making, research, or exchange and utilisation of new or existing knowledge?

When either of these questions can be answered positively, the actor can be considered as a key-actor. In the third column, the (potential) contribution of the actor is described.

At the end of this exercise a new brainstorming session takes place to find out whether there are any key actors being left out. This is because this exercise might broaden the scope of the team.

N.B. Also at later stages it might seem relevant for the team to include more key actors.

Expected output- - A list of key actors (still to be adapted during the community meeting).
- A first general diagnosis of the importance of each actor for the functioning of the local knowledge system (see Annexure II).
- A list of arguments to support this diagnosis.

Frame A3

WINDOW: Tracing diversity in actor's objectives

In the local knowledge system, the different actors have their own motives which influence the network or cause them to act as they do. They may also have their own view on what must be achieved between which actors and how. These objectives could be summarised in a *mission statement* for each actor. What do they stand for, who benefits and what/how do they want to achieve? These mission statements can differ (divergence) or there can be a partial consensus (convergence of objectives). The study of mission statements is the basis of examining the dynamics in the network. This is important to be able to understand and document the system and to draw a plan for effective innovation of certain practices.

TOOLS: Actor objective sheet; Team workshop

At this stage of the research, most of the identification of mission statements will be done by the team. Based on their experience with the actors in the pilot area and their perception of the knowledge system/network, enhanced by documentation and/or preliminary discussions with the relevant actors, an overview will be made. In a later stage of the research the key actors will formulate their own mission statement.
The following questions will be answered for each actor:
1- What does the actor supposedly see as his (read his/her) objective(s)?
2- Is it converging or diverging with the objectives of other actors in the network (which)?
3- How does he see his role/contribution to the knowledge system and which other actors are crucial to this effect?
4- What activities/technologies are being implemented as a result of these objectives?
5- Who are the real (according to the team) beneficiaries of these objectives?
This information will be used to better focus the field work and develop a list of issues to be cross-checked.

N.B. It is crucial that mission statements are specific so that they clarify the intentions of an actor, the favoured technologies and target groups. In the process the team will be able to reformulate and improve mission statements and get a better idea of the scope of the different objectives in the knowledge system.

Expected output- - First overview of (preliminary) mission statements and objectives of all actors as seen by the team.
- A breakdown of the elements of the knowledge systems (actors) and insight into the driving forces behind actors.
- A better insight into the relationship between actors and natural resource management.

Frame A4

WINDOW: Environmental diagnosis

Environmental factors can comprise the agricultural potential of the zone, the availability of natural resources and agroecological limitations. These factors not only impose themselves on people, but they can also be created by these very people (e.g. erosion decreases agricultural potential) or solved (e.g. organic agriculture improves the soil) in the longer term.
This is the crux of this research. On one hand explanations for what local communities do in natural resource management are looked for, on the other hand it is necessary to assess whether what they do is sufficient to address the agroecological problem or potential, and if not, how the knowledge system can be improved (building on the available, local knowledge and aiming at endogenous development) to address the development issue effectively.
In order to establish a clear notion on what *has* to be done and what *can* be done, there is need for two types of environmental diagnosis: one based on a more objective/empirical analysis, and one based on a participatory, actor oriented analysis.

TOOLS: Desk study, Rapid Rural Appraisal, team workshop

The data collection for both diagnoses can be done in a participatory exercise (RRA), examination of available literature and interviews with key-persons. In addition, several measurements will be done in adjacent woodlands (State land) to assess the difference between the reasonably natural state woodlands and the woodlands in the research area.
The RRA-exercise is done by the research team, in which there is a professional environmentalist, an agriculturalist and a traditionalist. It is meant as a rapid exercise to get an overall picture of the physical environment. It is combined with an appraisal of other factors (see next two windows). This whole exercise, which for reasons of convenience is called PRA, takes five days. The PRA is preceded by a traditional meeting to obtain the blessing of the traditional leadership.
During the RRA-exercise the area is mapped by the local people assisted by the team, which provides a basis for discussion. Transect walks allow adequate mapping and at the same time permit more objective observations and crosschecking of statements made. In a participatory historical analysis (partly during the transect walks, partly during gatherings), use and trends in the development of the environment will be identified. This will possibly (depending on the availability) be preceded by a desk study of aerial photographs from different periods in time.
This preliminary desk study facilitates an examination of the trends in land use and the quality of natural vegetation
Literature available comprises policy documents, studies in the area and technical reports with relevance to the problem.
Key persons are responsible technical agents in the area, mainly those of the Forestry Commission, the Department of Natural Resources and Agritex (agricultural extension service) and the Ministry of Health.
The data is presented in tables, in which dominant trees species, grasses and herbs, soil types, water sources, climate conditions and forms of land degradation are listed. In each the use by local people and trends are described in brief. An assessment is made of the main functions and services of the environment, i.e. resistance, resilience and (bio)diversity.
During and after the RRA, the team ensures that it has answers to the following questions:
1. What are the critical environmental factors for each actor?
2. Which (primary and secondary) actors can influence such factors?
3. What are the roles of the secondary actors involved (what is it that they want according to the primary actors)?
4. How do they perform?
5. Does the environmental factor and the relationship with other actors in the knowledge system provide an adequate environment for innovation to the actor in question (developing activities, technologies and/or services)?

Expected output: -A profile of the environmental trends and dynamics in the pilot area.
- Identification of development issues with regard to natural resource management.
- Identification of secondary key actors and their perceived mission statements.
-An image of the connections between the knowledge system and the environment and an understanding of the extent to which and by whom these connections can be influenced.
-A clearer distinction between the role of primary actors and secondary actors and contextual factors.

Frame A5

WINDOW: Spiritual/cultural diagnosis

Spiritual factors, certainly in a traditional African setting, play an important role in local knowledge systems. They can on one hand limit the capacity for innovation, but on the other hand, with the right approach of the proper actors, they can create a driving force behind it. Of special importance is the relationship between the spiritual world and the area of this research, natural resource management.

TOOLS: PRA and participant-observation

This concerns a world of many secrets. One cannot aim for a full exposure of traditional worldviews in a short period. However, given the good relationships between the team and the local community and one inside team member, there is a considerable degree of access.
During several traditional meetings, the team assists and observes. This method of participant-observation leads to an identification and qualitative assessment of spiritual factors.
Another way of determining spiritual factors is during the PRA-exercise mentioned in the previous frame. During field observations and discussions participants are asked about spiritual motives behind their acting or goals. Semi-structured interviews are held with a spirit medium.

During and after the PRA, the team ensures that it has answers to the following questions:
1. How important are the spiritual aspects for each actor, especially as regards natural resources?
2. Which local actors can influence the spiritual aspects?
3. How is that achieved (directly or indirectly: partly with reference to the mission statements of other actors)?
4. Does the spiritual/cultural factor and the relationship with other actors in the knowledge system allow adequate preconditions for innovation to the actor in question (developing activities, technologies and/or services)?

Expected output:
- Identification of spiritual/cultural factors, their scope in the knowledge system and the way they can (or cannot) be influenced in the long term.
- Identification of secondary key actors and their perceived intentions.
- A clearer picture of how the spiritual world relates to the natural and social world.

Frame A6

WINDOW: Socio-economic diagnosis
Socio-economic factors are partially context related aspects that shape and determine the local knowledge system. External markets determine the goals of actors who produce cash crops, formal education changes views and aspirations, the presence of modern health care affects the importance people attach to traditional medicines extracted from the environment, but a poor financial situation might cause people ignore modern clinics and go to traditional healers. National politics might affect the mission statements of local councillors. Donor drought relief and migration for urban employment might diminish the significance of the threat of environmental degradation to a local farmers' family. Socio-economic factors are considerably more subject to rapid change than the aforementioned issues. It is therefore necessary to get an idea of the nature of that change.
TOOLS: Team workshop, desk study, PRA
During a brainstorm session the team makes a first assessment. Through the desk study and the PRA exercise, socio-economic activities are identified. They are further investigated through interviews and group discussion in order to expand or crosscheck the acquired information. Issues that are looked at are: health, education, settlement and land tenure, recreation, farming methods, domestic and wild animals, occupation and infrastructure. For each an historical perspective is presented in order to recognise trends. The following questions must be answered: 1. What are the main socio-economical issues in the research area? 2. What is the general strategy to anticipate changing circumstances? 3. Which (primary and secondary) actors can influence such factors (in what time perspective)? 4. What are the roles of the secondary actors involved (what is it that they want according to the primary actors)? 5. Does the socio-economic situation provide an adequate environment for innovation to the actor in question (developing activities, technologies and/or services related to SA and NRM)?
Expected output: -Information regarding trends in the most important socio-economic contextual issues. - Identification of development issues with regard to natural resource management. - Identification of secondary key actors and their perceived roles. -A better understanding of the relation between socio-economic factors and the local knowledge system.

Frame A7

WINDOW: Identification of secondary key actors and their mission statement
Secondary actors are identified during the PRA exercise. Their role/intentions as perceived by the primary actors are examined. By investigating their role as seen by the secondary actors themselves and the kind of services/information they provide to the local community, an idea can be obtained concerning the information paradox (information being interpreted differently than intended, and therefore contributing to the local knowledge system in an uncontrolled manner). Their view of the problem situation is examined.
TOOLS: Semi-structured interviews
Each secondary key actor is visited and interviewed in a semi-structured manner. At the end they are confronted with the mission statement that they are attributed with by the primary actors. The following guide lines apply for the semi-structured interviews: 1. What do they see as their mission statement specifically related to the pilot community? 2. Are they successful in their achievements (what impact do they have)? 3. What are limiting factors or unused potentialities? 4. What strategies do they have for possible improvement and what conditions have to be met for that? 5. How do they explain the possible deviation of their mission statement from that attributed to them by the primary actors? 6. How do they see the defined problem situation? 7. In what way do they collaborate with the other secondary actors?
Expected output: -Insight into the effects of secondary key actors. -Insight into the unintended effects of their interventions. -External ideas about potential for innovation of the local knowledge system.

Frame A8

WINDOW: Clarifying the problem situation and tentatively visualising the local knowledge system
After the diagnostic phase, a first approximation of the current local knowledge system and its performance in relation to natural resource management can be made. There is insight into the elements determining the system internally and in relation to the outside world. The different items of information have to fit together, leading to a tentative image of the local knowledge system in relation to the contextual factors. In an attempt to structure this image strategically (in the end recommendations have to be made to manage it), a first attempt is made to identify influential actors and coalitions of actors related to resources. The validity of the proposal that there is a general lack of knowledge regarding natural resource management is reassessed in the light of the new information acquired during the field work. The assumption that the present knowledge systems does not adequately address the need for sustainable natural resources management is discussed to see whether it is true or not.
TOOLS: Team workshops, approximation exercises, actor workshop
I* Graphical modelling exercise of the knowledge system (preliminary version). On the basis of the available data, the team can design a model of the knowledge system with its surrounding influencing secondary key actors and most important contextual factors. Relationships are qualified (degree of influence or determination) in the form of different types of lines. The different actors can also be qualified by using different shapes and sizes (e.g. a big square represents a large constituency of a specific actor). Actors with similar mission statements are grouped together. II* During a primary actor workshop the graphical model is presented. The aim is to cross check information, to increase ownership of the intermediate results by the actors and to obtain additional information. A concluding discussion with all representatives of actor groups is held to answer the question whether the local knowledge system as a whole is currently addressing the environmental development issues. This is necessary to achieve a common understanding of the problem. This again is the basis of the identification of innovative configurations, that will be examined in the following phases of the research.
Expected output: - Graphical approximation models of the local knowledge system. - Common understanding of the impact that the current local knowledge system makes regarding the environmental development issues.

PHASE B

This is an analytical phase, in which the internal potentials and limitations for innovation of the local knowledge system regarding the identified development issues is investigated. Actors that have been examined individually are now grouped and existing networks are looked at from several angles.

Frame B1

WINDOW: Power and influence analysis
In order to be able to recommend how to intervene strategically in a local knowledge system, it is necessary to have an insight into the spheres of influence that exist in the system and in relation to the outside world. This influence is put on a par with "power relations". This power can be determined by matters such as (traditional and/or formal) authority, specific knowledge, constituency of an actor and coalitions of actors. Because during the field research it became clear that there exists a discrepancy between "formal knowledge" and "the knowing that guides actual behaviour in natural resource management", both aspects have been involved.
TOOLS: Prime mover septagram
I* A way to create an image of the influential relationships within the social network is by making a septagram based on the views of all primary actors. This is a graphical image of a circle and one radial line for every actor. Every individual (representative of an) actor fills in a blank septagram sheet with primary and secondary actors. Whenever actors form coalitions, they must be put next to each other. Before filling in the septagram sheets, every actor has to answer the following questions: 1- Who does he see as the prime movers in the network (with regard to the stated problem)? 2- Quantify the influence on a scale of one to five. During this exercise, most participants filled in the socially correct answers, such as "the Chief is very powerful, thus very knowledgeable". In order to discover the "knowing" that guides actual behaviour in natural resource management, a new septagram was filled in by all actors, but now answering the following questions: a- Who depends most on natural resources? b- Who is involved in the use of natural resources on a daily basis? c- Of which actors does their knowledge about natural resource management have an important impact on the way they are used? d- Quantify the influence on a scale of one to five. Individual actors may come to wholly different septagrams. Related to their own position in the network this might give interesting information. However, the challenge is to achieve one prime mover septagram at the end that reflects, as far as possible, the power relations in the knowledge system, both through formal knowledge and "knowing that leads to actual behaviour". This can be done in a team workshop, but whenever there are no clear conclusions possible, the differences can be discussed in a meeting between actors in order to reach more consensus or at least get more clarity on the nature of the differences. Here, however, the team has to be aware that certain influential people who cannot be publically contradicted, might dominate the outcome and therefore create a bias.
Expected output: - Septagrams that visualize overall power relations within the local knowledge system.

Frame B2

WINDOW: Knowledge and information network analysis
To determine how information reaches primary actors and how information is generated, used, accepted or rejected (how information becomes knowledge), the internal communication and information network has to be examined, including its outside relationships to secondary actors.
TOOLS: Info-source-use exercise, Communication network sheet,
I* During the Info-source-use exercise, each primary actor is interviewed concerning the following items: 1. What sources of information are used regularly (what carriers or actors) for which purposes (for what type of information,)? Are these direct sources or intermediate sources? Who is behind the intermediate source? 2. Which five sources are used most or are considered most important (why)? 3. How do they apply the information? 4. Which actors do they think should be included in the network? 5. Is the actor himself a source of information for other actors? What type of information, which actors, how important is it for those actors? II* This is a follow up on the exercise described above. A communication network sheet describes the actors' relevance to each other. It can be drawn by the team on the basis of the acquired information. It consists of concentric circles, where the distance from the centre indicates "closeness". The five most important sources appear in the first ring. Those of lesser importance or those behind the most important ones in the second ring, etc. For each actor two sheets are filled in, - one with himself in the middle and the sources that are important to him. - one with himself in the middle and the sources for whom he thinks he is important
Expected output: -The data is presented in tables and graphs which presents qualitative and quantitative information regarding the sources related to the actors. It also gives an idea of the perceived informative role that each actor plays according to himself, which is contrasted with how others perceive it.

Frame B3

WINDOW: Integration analysis
This window provides information that partly duplicated the information obtained in frame B2. However, the integration analysis is not about information, but about actual linkages. Obtaining information from different angles in different exercises increases the validity of the data. This window is about who is in contact with who, what is the nature of the connection (communication, shared resources, control...?) It provides insight into (missing) links, clusters of actors, flow of information and power relations (degree of influence). In fact, the degree of integration in the local knowledge system and the impact of each actor is investigated.
TOOLS: Semi-structured interview, Linkage matrix
I* Each actor is asked a number of questions to find out about the linking mechanisms. This is not necessarily during one single interview, but during the different exercises and interviews that also have other purposes. Observations by the team will support this investigation. Insight must be gained into the following issues: -What contacts are there between actors, during which occasions and who initiates the contact? -What is the frequency and intensity? - What is the value in relation to natural resource management? And for other purposes? -Are these formal or informal contacts? How sustainable are they? - Do the contacts involve exchange of resources? Who controls/provides these resources? - What is the relative importance (as regards natural resource management) of this exchange? II* Three linkage matrixes will be completed by every actor. This is a group exercise whereby each single matrix on a Manilla board is completed by every primary actor about all the other (primary and secondary) actors. In the cells of the matrix a qualification that characterizes the relationship is completed on the basis of a pre defined scale.
Expected output: -Insight into linkage mechanisms. -Linkage Matrixes that provide an overview of the character of the relationships.

Frame B4

WINDOW: Concluding analysis
Similar to at the end of phase A, this analysis phase is evaluated in order to create common agreement or get more clarity about differences. The results from both phases A and B are synthesized, conclusions are drawn on the network in general, opportunities and constraints for innovation are identified and possible solutions are preliminarily formulated.
TOOLS: Team workshops, approximation exercise, actors workshop
I* In a team workshop the information is collated. II*An approximation exercise as in frame A8 is conducted. The graphic, together with the other, acquired images of elements of the knowledge system are discussed in an actors workshop. There is no necessity for general consensus, but common understanding is sought. Discussing it in a workshop also helps to identify knowledge gaps or biases and clarify divergencies. III* In a final team workshop the findings of the analysis phase are discussed.
Expected output: -Graphical approximation model. -Common understanding of the constraints and potentials for innovation of the local knowledge system.

PHASE C

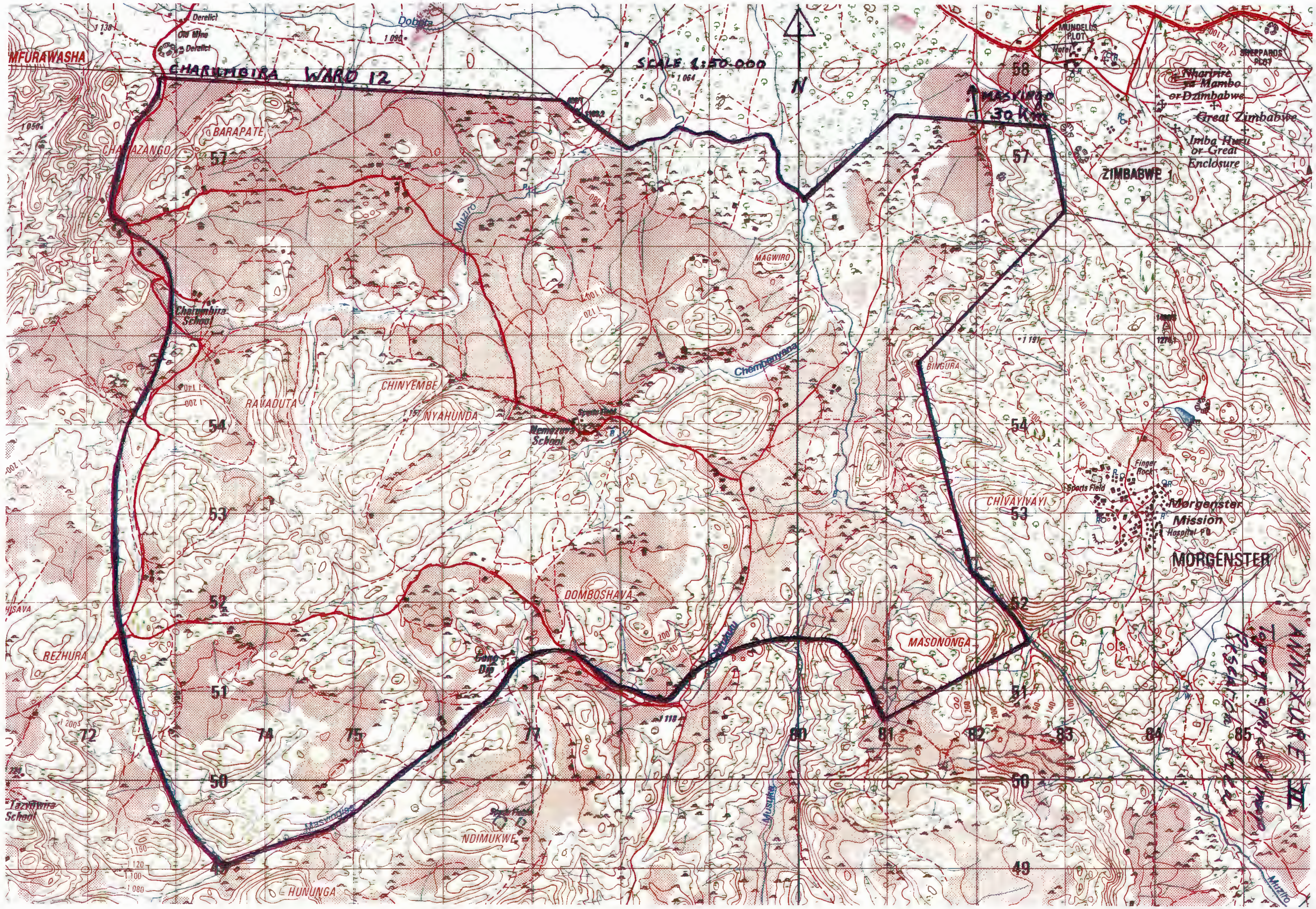
This phase is to reach a conclusion on the possibilities and strategies for reviving the local knowledge system regarding natural resource management. It is partly as a result of the raised awareness during the first two phases and the perceptions of local actors themselves as regards useful and feasible strategies to mobilize and improve local knowledge.

Frame C1.

WINDOW: Task and mandate analysis within the local knowledge system
The knowledge network is partly characterized by what people think they and other actors are supposed to do or are allowed to do. Whenever there are formal or functional relationships, they can be assessed regarding their suitability for innovative action and necessary or possible adaptations. Perhaps mandates have to be extended or new formal roles of certain actors defined in order to be able to create an enabling environment for endogenous development and innovation and address the identified environmental development issues. Only primary actors are involved in this exercise because it concerns an internal agreement (community) on possible configurations of innovation.
TOOLS: Task analysis matrix
During a plenary session where representatives of the main primary actors are present, insight must be obtained into the following issues: -Which tasks/functions could be performed by which primary actors to create an enabling environment for innovation? -What activities are related to these tasks and how effective are they? -What are competing tasks? Are there gaps that should be addressed? By which actor? -What coordinative action should be taken within the knowledge system to solve conflicts and make use of new opportunities? -Are there any contextual factors (including secondary actors) which hinder a proper execution of tasks? The data is presented in a matrix where each actor is assigned with different tasks and the importance of those tasks are qualified on a pre-defined scale. This is to allow group discussions and guarantee the participatory nature of the results. Overlap exists with earlier analysis (e.g. the linkage matrix), but this increases the validity of the data.
Expected output: -Insight into gaps and overlaps of formal tasks/roles in the local knowledge system and the potential role that actors could play.

Frame C2.

WINDOW: Local knowledge system management exercises
This window focuses more on coordination and management of new innovation configurations and the role that development agencies could play to support this. The intention is to define possible actions that will eventually remove limitations for key actors to innovate their practices or choose alternative options, making use of unexplored potentialities. The strategic path for this must be clarified(which secondary actor could be involved in knowledge management tasks?) in order to be able to be resource-efficient.
TOOLS: Team workshops, secondary actors workshop, report
In a Team workshop the results of the above research frames are summarized. In a workshop together with secondary actors, the input of development agencies is acquired and processed. Final recommendations are formulated. In a last session these are discussed in a plenary session with all local actors.
Expected output: -Recommendations are formulated and tested on the (primary and secondary) actors for their acceptability and feasibility.


CHARUMBIRA WARD 12
SCALE 1:50 000
N
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Great Zimbabwe
Imba Huru or Great Enclosure
CHIVAYIVAYI
Morgenster Mission
MORGENSTER
DOMBOSHAVA
MASONONGA
REZHURA
NDIMUKWE
HUNUNGA
ANNEXURE

ANNEXURE III Main vegetation, trends in use and their perceived availability. This data consist of results from a PRA exercise in the same area in 1995 (Aztrec, 1995) crosschecked during the PRA in 1998.

A: TREES AND SHRUBS

Common name	Botanical name	Uses	Trends
Marula/Mupfura	Sclerocarya caffra	fruit, wine making, ritual ceremonies, medicine, humus, shade, habitat	getting scarse
Sickle bush/Mupangara	Dichrostachis cinerea	carpentry, fodder, medicine, habitat	still dominant on ant hills
Rain tree/ Mupanda	Lonchocarpus capassa	weather forecasting, water conservation, food, habitat	getting scarce
Chocolate berry/ Mutsvubvu	Vitex payos	fruit, timber, humus, shade	getting scarce
Sweet monkey orange/ Mutamba	Strychnos spinosa	fruit, humus, shade, medicine, musical instruments, handcrafts	used to be dominant, now getting scarcer
African wattle (Muzeze)	Peltophorum africanum	firewood, timber, humus, medicine	used to be dominant, now getting scarcer
Wild castard apple (Muroro)	Anona senegalensis	fruit, medicine for pregnant women	scattered
Waterberry (Mukute)	Syzygium spp.	water conservation, fruit, humus, shade, habitat	used to be a dominant riverine species, is now getting scarce
Cape fig/ Muonde	Ficus spp.	water conservation, fibre, habitat, shade, glue for arrows	getting scarce
Red milkwood/ Muchechete	Mimusops zeyheri	Fruit, habitat, shade, humus	getting scarce
Wild loquat/ Mushuku	Uapaca kirklandia	fruit, weather forecasting, humus	still dominant on gravel soils
Mutondo/Mnondo	Julbernardia globiflora	fibre, firewood, humus, carpentry, weather forecasting, habitat, shade	getting scarcer, but still generally available
Musasa/ Msasa	Brachystegia speciformis	firewood, charcoal, shade, weather forecasting, carpentry, habitat, dye for rock painting	getting scarcer, but still generally available
Hissing tree/ Muchakata	Parinari curatellifolia	humus, weather forecasting, shade, habitat	Is still dominant
Gum tree/ Mupuranga	Eucalyptus spp.	Timber (poals), fire wood (not for roasting)	planted in woodlots since the early 1980's
Guava tree/ Mugwazhava	Psidium guajava	Fruit, bird feed	originally in homestead orchards, but spread into woodlands and forests

B: GRASSES (some English or botanical names could not be traced)

Common name	Botanical name	Uses	Trends
Shanga reeds		Basketry, mats, thatching, fish traps, containers, wistles, habitat	Used to be dominant along rivers and swamps, now getting scarce due to droughts and siltation
Nhokwe	Cyprerus flabeliformis	Mats, basketry, thatching, habitat, trapping termites	Used to be dominant on wetlands, but because of drying up getting scarce
Jekacheka		Medicine for period pains, habitat, fodder	Still dominant on wetlands
Ruredzo		Relish, medicine for pregnant women, shampoo, fodder	Still dominant in dry grasslands
Spear grass/ Mbizi	Heteropogon contortas	Grazing, thatching, small structures	Still dominant in dry grasslands
Rushezhu		Thatching, mice traps, handcrafts	Still dominant on contour ridges (buffer strips in arable land)
Shengezhu	Hyparrhenia filipendula	Thatching, grazing	Still dominant in dry lands
Shavahuru		Thatching	Still dominant in dry lands

ANNEXURE IV A comparison of the blueprint, process and structured flexibility approaches to development management. (Source: Brinkerhoff and Ingle, 1989)

Features	**Development Management Approaches**		
	Blueprint	Process	Structured Flexibility
Operating premise	Optimal solution can be identified *a priori* by planners. Top-down.	Optimal solution can only be identified by beneficiaries during planning and implementation. Bottom-up	Satisfactory solution can be postulated during planning and discovered during implementation by teams of planners and beneficiaries. Top-down and bottom-up
Goals	Effective and efficient attainment of pre-stated goals and targets: solving discrete problems of interest.	Emphasis on being more: creating capacity to solve problems as they occur.	Combination of having more and being more: developing capacity to solve other problems by solving an immediate problem.
Perception of environment	Uncertainty is statistically describable: major events predictable. Components can be isolated: closed system.	High levels of complexity and uncertainty: analytical tests inappropriate. Open system.	Environment contains various types of uncertainty requiring different analyses during design and implementation. Various levels of predictability: multiple, overlapping systems.
Time frame	Emphasis on short term.	Emphasis on long term.	Emphasis on both short and long term: step by step
Problem-solving orientation	Curative: problems can be detected by comparing actual and planned accomplishments; solutions are derived analytically.	Preventive: empowered beneficiaries can prevent problems via participation in design and implementation.	Preventive and curative: some problems can be avoided and others detected/resolved: joint use of analytical tools and human processes.
Dominant view of human behaviour	Mechanistic/economic. People will respond as rational profit-maximisers.	Social/psychological values and informal arrangements affect participation and commitment.	Social/psychological plus politico-bureaucratic. People and organizations are affected by and affect formal/informal structures and processes.
Institutional bias	Pro-bureaucracy: technicians and scientists know best.	Pro-people: communities and beneficiaries know best.	Pro-synergy: all participants have distinctive competencies.
Leadership	Formal leadership based on project organizational structure as pre-planned. Authority follows hierarchy.	Informal leadership evolves during design and implementation. Locally based authority.	Balance of formal and informal, situational authority. Leaders emerge depending on particular task requirements.
Management tools	'Hard' tools: budgets, schedules, networks developed *a priori* and used to control.	'Soft' social and group facilitation techniques; participation and process consultation.	Combined use of analytical tools and team process techniques situationally adapted.
Methods of learning	Audits and formal evaluations, quasi-experimental designs.	Process observation, value clarification and case studies.	Combination of qualitative and quantitative research methods, case comparison.