INITIATIVES
IN LOCAL MANAGEMENT OF DRYLAND FOREST AREAS
OF THE SUDANO-SAHELIAN ZONE

FINAL TECHNICAL REPORT

DFID R6510 Forestry Research Programme

SOS SAHEL UK - FORESTRY RESEARCH PROJECT
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INITIATIVES IN LOCAL MANAGEMENT OF DRYLAND FOREST AREAS OF THE SUDANO-SAHELIAN ZONE

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BACKGROUND

Forest resources in the Sahel are used by some 60 million people. These resources have rapidly diminished in the past era of central control. Policy changes over the last 10 years have been in favour of local governance of forest resources although the implementation leaves something to be desired. Effective engagement of local people is expected to result in more sustainable and equitable forest management. The research project aims at understanding the constraints to scaling up, and ways to overcome these constraints.

Few reviews of dryland forest management exist. In a review of the early 1990s, local community control of the African dryland forests was still exceptional (Shepherd, G.,1992). Much has changed in the meantime, as the examples of an institutional study by CILSS show for the west African Sahel (CILSS, 1997). But many examples are based on the wood energy sector, which has many pitfalls for local governance (Foley, G.,1998). Review of more integrated projects shows that the legal and institutional framework of such projects tends to collapse after project completion (e.g. Arzika, M.S., 1996).

PROJECT PURPOSE

The project addresses the purpose level objectives “Development and promotion of techniques for sustainable management of forest resources through local governance systems”. This was done through action research in three SOS Sahel projects (in Niger, Mali and Sudan), case studies in other areas, and national level studies, over the period 1996-1999.

HOW THE PROBLEM WAS IDENTIFIED

SOS Sahel has been working in the Sahel since 1985, first on tree-planting activities, and later on the management of forests and natural resources with local people. The research was conceived as a way of doing two things:

Firstly, it was felt that, after a long period of implementation, particularly in the Sudan, it was timely to try to draw together lessons learned. Project staff involved in day-to-day implementation lack the time and resources to conduct such an analysis in their own area and country, and thus a research project with an researcher was deemed the best way forward. For SOS Sahel programme staff, an analysis of its own experience, and of that of other projects in the same country was an incentive for support to the research project.

Secondly the comparative approach essayed here, pulling together not only the diverse experience of each of the participating countries, but also the contrasting

institutional context in each, was of particular interest to the SOS Sahel management team and board. Comparative understanding of the Francophone and Anglophone context was of special concern.

RESEARCH PROCESSES AND OBJECTIVES, AND THEIR CLARIFICATION WITH COLLABORATORS AND TARGET INSTITUTIONS

The research emphasis was on action research in three sites through fifteen visits over a three year period. Local stakeholders and extension staff were actively involved in monitoring and research, with a focus on ecological, socio-economic and institutional aspects. Study of national level institutions and legal frameworks was undertaken with the assistance of four national consultants of the three countries. A project maturity workshop, in Bamako Mali in 1999, put together and discussed 20 studies of 30 participating researchers. The project produced 16 internal reports and 18 publications.

Action research in the three projects involved repeated fieldwork by the researcher along with project staff and villagers, the latter being involved on a more permanent basis. The very nature of action research accompanying and drawing lessons from project implementation necessitated ecological, economic and sociological or institutional enquiry. In total, 15 visits were made to the three countries. Action research also required adjustment of the research agenda to local needs and opportunities, i.e. those of the projects and those of the local communities.

Other projects were also studied and a wide range of documents, especially grey literature, was collected and analysed, some of which required visits to other Sahelian countries. Relevant national and regional institutions were analysed in the three countries with an emphasis on the forest service. Researchers from 6 Sahelian countries gave their inputs at the synthesis workshop which aimed to draw conclusions pertinent to the Sahel zone.

The expertise in the research project included extension staff who did most of the village level research, market surveys, and wild foods data collection, etc. The research process at this level was largely determined by local capacity, which was therefore a test of the applicability of research results. For the higher level institutional studies, 4 national consultants were engaged. National lawyers specialised in environmental management were engaged to analyse the legal framework.

The implementation of the research project differs from that initially planned in several ways. One of the four countries selected for research, Eritrea, could not be included for reasons of security. On the other hand, the scope of the research has been broadened by the national level research, and by the employment of national researchers. (The programme of activities in the project document was limited to field level research.)

RESEARCH RESULTS AND OUTPUTS

The full report of the research follows upon this summary technical report and upon the 'policy implications' executive summary. The chief outputs from the research include the following.

1. Thirteen case studies of local governance and of projects supporting local governance have been prepared and reported in various ways (see dissemination outputs below). The details are in the following table:

TYPE OF CASE STUDY	NUMBER OF CASE STUDIES
project case studies	7 studies in 4 countries
cases of local governance at village level based on fieldwork by researcher or national consultant	3 studies covering 16 villages in 3 countries
other cases of such governance based on grey literature and staff interviews	3 cases in 3 countries

2. The research has drawn conclusions on appropriate forest management structures for local governance in the Sahel, with emphasis on the following elements:

forest appropriation and guarding	Kerkhof, P., in prep.; and Kerkhof, p.,1999g
rule making	
enforcement	
zoning and codification of management plans	
unions of local institutions	
monitoring	Aziz, R.A. and Kerkhof, P,1998; Kerkhof, P.,1996a; Kerkhof, P.,1997b; Kerkhof, P.,1999g

3. Participatory resource monitoring methods have been developed by the research project in two countries. Due to the nature of the Sahelian woodland, the emphasis was given to ecological monitoring instead of wood volume monitoring. Simplified forest management tools have been developed through the research, such as panoramic photography which is used as a participatory environmental monitoring tool. This has contributed to the project toolbox, but it should be noted that such technical innovations are of secondary importance to successful local governance.

Two methods are different from usual practice in the Sahel:

Panoramic photography by local people, which includes the preparation, documentation and storage of the panoramas by local communities (Aziz, R.A. and Kerkhof, p.,1998; Kerkhof, p.,1998; Kerkhof P.,1999b).

Ecological and forestry management research included simplified woodland inventories with methodological development in tune with local capacity. Forest resource inventory was of locally relevant forest products rather than cubic metres of wood (Aziz, R.A. and Kerkhof, p.,1998 and Kerkhof, P.1999b). Some methodological development was pursued in economic monitoring of marketed and subsistence forest exploitation, such as wild food production by women and exploitation of minor forest products by artisans (Kerkhof et al.,1998; Kerkhof, p. and Siddiq, F.,1998; Kerkhof, p.,1999g). This economic research included PRAs, market surveys, producer observation and household surveys.

4. Criteria for effective local governance were identified as a combination of local and national criteria. Local criteria those which are broadly under the control of local communities, the most important one being the representativeness of the local management institution vis-à-vis user groups whose livelihoods depend on the resource. However, several important criteria are dependent on the national legal and institutional frameworks which vary from country to country, with certain crosscutting characteristics for the Francophone Sahel. (Appropriate national institutional and legal frameworks are reported in Ali, A.M.,1999; Anon,1999; Bacha, A.K.,1999; Madougou, D.,1999a; Mazgoub, T.,1999, Kerkhof, P.,1999g.)

5. Assessment of local forest management donor strategy prevailing in the Sahel, and especially of the domestic energy strategy of the World Bank. This strategy has been analysed through field study, review of published and unpublished literature and through interviews in Mali and Niger. Concern about the constraints of this strategy and possible negative impacts are being disseminated (Kerkhof, p., Siddiq, f. and Damango, B.,in prep.; Kerkhof, p.,in prep.).

6. Policy dialogue and legal innovations in individual countries. As a follow-up of the Bamako workshop, country delegations notably from Sudan and Burkina Faso have prepared for policy level meetings with an emphasis on law reform. (see Anon, 1999).

7. Most of the dissemination outputs are in both English and French. They include:
scientific and technical papers; two versions of the final report, one of them to be very widely disseminated; a Sahelian workshop report; training manuals; and a policy brief.
A list of dissemination outputs to date can be found at the end of this section.

8. Conclusions have been drawn on appropriate forest management structures for local governance with emphasis on simple and efficient regulation of forest exploitation. These conclusions demonstrate that institutional and distribution issues, rather than technical forestry aspects, are the key to successful local forest management. Some of the institutional issues can be addressed at local level, but others depend on national level policy and law reform. The research has contributed to discussions on policy and law reform in several countries.

POLICY AND SOCIO-ECONOMIC DEVELOPMENTAL IMPLICATIONS OF THE RESEARCH RESULTS FOR TARGET INSTITUTIONS

The research has contributed to the DFID policy of poverty alleviation through a better understanding and acceptance of more efficient and more equitable forest management in the Sahel. A more profound characterisation of local resource management capacity, including that of women has been developed; insights into the resource-management relationship between sedentary and mobile pastoral Sahelians have evolved; and greater understanding of poor rural Sahelians by relatively well off urban policy-makers has been embarked upon.

Key indicators are the initiatives taken by those who influence policy, as witnessed by the written contribution of influential African participants at the Bamako workshop. The research findings are presently circulating in national level committees, government and non-governmental, in various countries. The country specific follow-up which African delegations have prepared is expected to impact on target institutions. Indications are that central forest services will cede more responsibilities to local government institutions.

The main promotion pathways for the research results are
(1) follow-up of the Bamako workshop through national groups
(2) wide distribution of the final technical report in short and longer versions, and
(3) regional networking.
SOS Sahel has a continuing presence in most of the countries concerned which facilitates support to national initiatives. The results of the research have also been promoted through a series of publications (see the list at the end of this section).

Various forms of follow-up are independent of the research project but some action to promote the research findings is desirable. Promotion of networking between African researchers engaged in local governance of natural resources requires continued external assistance at this stage. English/French translation and exchange between West and Northeast Africa are important, particularly in matters of institutional and legal reform. Proposals for training and capacity building workshops (probably one Anglophone and one Francophone) are being worked on.

DISSEMINATION OUTPUTS TO DATE

BOOKS

KERKHOF, P. (in prep) Local management of Sahelian forests. Macmillan, UK.

KERKHOF, P., (in prep) From state to local management of the Sahelian forest. FOLEY G. (Ed.) London: SOS Sahel UK.

NEWSLETTERS

AZIZ, R.A. and KERKHOF, P. (1998) Forest monitoring by villagers. Social Forestry & Environment, April 1999, no.4,pp.5-6.

KERKHOF, P. (1997a) SOS Sahel (GB) research project: "Local management of dryland forest". European Tropical Forestry Research Network (ETFRN) News, July 1997, no.20,pp.13-14.

KERKHOF, P. (1999a) Local forest management in the Sahel. European Tropical Forestry Research Network (ETFRN) News, summer 1999, no.28,pp.6-7.

WORKSHOP PAPERS AND PROCEEDINGS

ALI,A.M. (1999) Institutional analysis of forest management in the Sudan. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 26 pp.

ANON (1999) Local management of Sahelian forests. Proceedings of the Bamako workshop, 13-16 September 1999. SOS Sahel UK, 1 Tolpuddle St. London N1OXT, UK. 17p. English and French.

BACHA,A.K. (1999) Etude des institutions nationales de gestion des forets. Rapport de synthese. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 21 pp. French.

DAMANGO,B., OUSSEINI, S. and KERKHOF,P. (1998) Analyse institutionnelle des Alamodious, Bankass. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 13 pp. French.

KERKHOF,P. (1998a) La photographie panoramique. Seminaire sur la foret seche de l'Afrique de l'Ouest, Ouagadougou, 16-20 november 1998. French. 5pp.

KERKHOF,P. (1999b) Theme 1: local institutions. Keynote address to Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 5 pp.

KERKHOF,P.,SIDDIQ,F. and DAMANGO,B. (in prep) La sylviculture Sahelienne au carrefour de la gestion centralisee et de la gestion locale. Actes du seminaire sur la foret seche de l'Afrique de l'Ouest, Ouagadougou, 16-20 november 1998. French.

MADOUGOU,D. (1999a) Etude sociologique des agents forestiers. Cas du Niger. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 17pp. French.

MADOUGOU,D. (1999b) Etude socio-economique du village de Tientiergou apres six ans de gestion locale de foret villageoise, Arrondissement de Say, Niger. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 24 pp. English and French.

MAZGOUB, T.M. (1999) Law and local forest management in the Sudan. Workshop on local forest management in the Sahel, Bamako, 13-16 September, 1999, 29 pp. English and French.

TRAINING MATERIALS

KERKHOF,P. (1997b) Panoramic photography. 7pp. [one day training workshop for extension staff in El Ain, Sudan, 15 March 1997; plus distribution to Sudanese organisations]. English.

KERKHOF,P. (1996a) La photographie panoramique. 7pp. [one day training course in Bankass,Mali, 2 December 1996 and in Takieta, Niger, 20 November 1996]. French.

INTERNAL REPORTS

KERKHOF,P. (1996b) Mali field report. London: SOS Sahel UK. 9 pp. French

KERKHOF,P. (1996c) Niger field report. London: SOS Sahel UK. 9 pp. French

KERKHOF,P. (1997c) Sudan field report. London: SOS Sahel UK. 25 pp. English

KERKHOF,P. (1997d) Mali field report. London: SOS Sahel UK. 19 pp. French

KERKHOF,P. (1997e) Niger field report. London: SOS Sahel UK. 16 pp. French

KERKHOF,P. (1997f) Sudan field report. London: SOS Sahel UK. 38 pp. English

KERKHOF,P. (1997g) Mali field report. London: SOS Sahel UK. 40 pp. French

KERKHOF,P. (1998b) Mali field report. London: SOS Sahel UK. 28 pp. French

KERKHOF,P. (1998c) Sudan field report. London: SOS Sahel UK. 33 pp. English

KERKHOF,P. (1998d) West Africa field report. London: SOS Sahel UK. 29 pp. French.

KERKHOF,P. and SIDDIQ,F. (1998) Socio-economic analysis of some woodlands in Kordofan. London: SOS Sahel UK. 34pp.

KERKHOF,P., DAMANGO,B. and GUEGUERE, R. (1998) Analyse socio-economique de la foret de Tyi. London: SOS Sahel UK. 38pp. French.

KERKHOF,P. (1999c) Sudan field report. London: SOS Sahel UK. 40 pp. English

KERKHOF,P. (1999d) Mali field report. London: SOS Sahel UK. 22 pp. French.

KERKHOF,P. (1999e) Sudan field report. London: SOS Sahel UK. 13 pp. English.

KERKHOF,P. (1999f) Local forest management in the Sahel. policy brief. London: SOS Sahel UK. 1 p.

KERKHOF, P. (1999g) Local forest management in the Sahel. Final Report. SHEPHERD,G. (Ed.). London: SOS Sahel, nd.

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

Conclusions

It has been difficult to generalise from the material presented in this report, since the Sahelian climate operates in long and erratic cycles, and most of the case studies are from only the last 5 years. Nevertheless the SOS Sahel research project has been able to contribute to the understanding of Sahelian natural forest management in the following ways.

In the early 1990s, it was thought that forest resources under communal management were regressing and that on farm trees increasingly constituted the main remaining source of tree products for local people. Present findings confirm that forest resources under local control include agroforestry systems, patches of privately owned natural forest, related resources such as game, and community forest. In fact community control over forest resources is strongly increasing rather than regressing.

A newly observed factor is forest appropriation: forest resources on public land are increasingly (re)appropriated by local groups, the appropriation is accompanied by rule making and enforcement, and by the application of local law.

The present evidence shows that local legitimacy of the managing institution is the key condition, along with the informal support of the local administration. However, more formal ownership is probably a condition for successful forest management in the longer term.

The right fit between the size and nature of the management institution and that of the forest is a key issue.

Where overarching local institutions exist, they fulfil a useful institutional role. They are an important mediator between village institutions in case of conflict and they have an important union and lobby role vis-à-vis the state.

The economics of local management of Sahelian forest has rarely been researched. SOS Sahel research suggests that while average revenues directly attributable to the forest are very modest outside the peri-urban impact zone, intra-community differences are large and certain poor social groups depend highly on such revenues.

In 1990 it was felt that the Sahelian climate was drying and natural vegetation degrading. Recruitment was poor and woodlands in recession. However, rains over the last 5 years of the decade have been particularly good, and the vegetation has responded. Management intensity has probably increased, in part as a result.

The question now is not whether local management is an alternative to central management, but how it can be best done.

Recommendations

Recommendations in the report are presented in the form of conditions for successful management. A set of ten criteria is proposed.

Criterion 1: the basic criterion for management of Sahelian woodlands is the livelihood dependency of the user groups attached to a particular resource. Where-ever such dependency exists, either economic or socio-cultural, the woodland is subject to management.

Criterion 2: Management transaction costs should be very low, given the low revenue generation capacity of most Sahelian woodlands.

Criterion 3: Management should aim at long term change, and be measured against environmental standards instead of wood volume.

Criterion 4: Local forest management should be based on indigenous knowledge systems. External technical knowledge may be supportive but should not be imposed on local management. A systems approach to R and D is required.

Criterion 5: The different stakeholder groups amongst the settled communities have to negotiate their rights and responsibilities before sustainable management is possible.

Criterion 6: Pastoral interests should be represented in the resource negotiation process. These interests are located at strategic rather than operational levels.

Criterion 7: Local governance of forest resources is a multi-sectoral engagement, which needs support from multi-sectoral institutions. Local government is the appropriate institution at local level, and the environmental and planning agency is the appropriate institution at the national level.

Criterion 8: Short-term institutional arrangements may facilitate local forest management in individual projects, but in the long term, unambiguous legal support should be secured.

Criterion 9: As long as modern law is not functional, local law guarantees enforcement of management rules. Projects should encourage the development and application of local law.

Criterion 10: Good governance must be achieved in local management institutions, as much as in local and national government.

INITIATIVES IN LOCAL MANAGEMENT OF DRYLAND FOREST AREAS OF THE SUDANO-SAHELIAN ZONE'

TABLE OF CONTENTS

INTRODUCTION 1

LOCAL FOREST MANAGEMENT IN THE SAHEL PART I : THE CONTEXT 4

2. EVOLUTION OF SAHELIAN FOREST MANAGEMENT 4

2.1 THE EMERGENCE OF THE FORESTRY SECTOR 4
2.2 1960-1990: CENTRALISATION AND TREE PLANTING 5
2.3 1990S: DECENTRALISATION, DEMOCRACY, SECTORAL INTEGRATION 6

3. WOODLAND ECOLOGY AND MANAGEMENT 8

3.1 ENVIRONMENTAL CHARACTERISTICS 8
3.2 WOODLAND ECOLOGY 9
3.3 INSTABILITY OF SAHELIAN WOODLANDS 10
3.4 WOODLAND MANAGEMENT 14
3.4.1 ASSESSMENT OF PRODUCTIVITY AND QUOTA 14
3.4.2 FOREST MANAGEMENT PLAN 16
3.4.3 FOREST REHABILITATION 17
3.4.4 FOREST EXPLOITATION 18
3.5 CONCLUSIONS 20

4. ECONOMICS OF LOCAL WOODLAND MANAGEMENT 21

4.1 INTRODUCTION 21
4.2 METHODOLOGY 21
4.3 FIREWOOD MARKET ECONOMICS 24
4.4 BROAD VALUES OF SAHELIAN WOODLANDS 28
4.4.1 THE KELKA FOREST 29
4.4.2 BANKASS 30
4.4.3 KORDOFAN, SUDAN 34
4.4.4 LIVESTOCK ECONOMICS 36
4.5 COST OF FOREST MANAGEMENT 38
4.6 CONCLUSIONS 41

5. NATIONAL INSTITUTIONS AND LEGAL FRAMEWORK 43

5.1 INTRODUCTION 43
5.2 THE FOREST SERVICE 44
5.3 LOCAL GOVERNMENT 48
5.4 MULTISECTORAL AGENCIES 51
5.5 LAW AND LOCAL MANAGEMENT 52
5.5.1. LEGAL FRAMEWORK 52
5.5.2. FISCAL REFORM 56
5.5.3. GOOD GOVERNANCE 56
5.6 CONCLUSIONS 57

LOCAL FOREST MANAGEMENT IN THE SAHEL PART II : LOCAL FOREST MANAGEMENT INSTITUTIONS 58

6. LOCAL COMMUNITY PERFORMANCE IN FOREST MANAGEMENT 58

6.1 INTRODUCTION 58

6.2. FOREST PROTECTION 59
6.3. RULE ENFORCEMENT 62
6.4. TRANSPARENCY 65
6.5. MANAGEMENT PLANNING 67
6.5.1 FORMULATION OF MANAGEMENT PLANS 67
6.5.2. IMPLEMENTATION OF MANAGEMENT PLANS 69
6.6. COMMUNICATION 70
6.7. FOREST RESOURCE MONITORING 71

7. LEGITIMACY OF LOCAL INSTITUTIONS 73

7.1. INTRODUCTION 73
7.2. ETHNICITY AND REPRESENTATIVITY 73
7.2.1 CASES FROM EL AIN, SUDAN 74
7.2.2 CASES FROM WEST AFRICA 79
7.3. SOCIO-ECONOMIC DIFFERENTIATION 82
7.3.1 WOMEN IN FOREST MANAGEMENT INSTITUTIONS 83
7.3.2. PASTORAL INTERESTS 84
7.3.3 INTERNAL AND EXTERNAL ORGANISATION 86
7.4. CONCLUSIONS 89

8. SUSTAINABILITY OF LOCAL FOREST MANAGEMENT 90

8.1. ELEMENTS OF PROJECT DEPENDENCY 90
8.1.1 FOREST REHABILITATION 91
8.1.2 OTHER PROJECT INVESTMENTS 92
8.1.3 ILLEGITIMATE POLICIES 93
8.2. ELEMENTS OF INDEPENDENT FOREST MANAGEMENT 94
8.3. CONCLUSIONS 97

9. CONSTRAINTS TO PUBLIC RESPONSIBILITY 97

9.1. LEGAL VACUUM OF LOCAL MANAGEMENT 97
9.3. POWER OF STATE AGENCIES VIS-A-VIS LOCAL INSTITUTIONS 104
9.3.1. MALI 105
9.3.2. SUDAN 106
9.4. CONCLUSIONS 108

10. OPPORTUNITIES FOR THE NEXT DECADE 109

10.1. BUILDING ON EXISTING CAPACITIES 109
10.2 PROJECT TOOLS TO ENHANCE LOCAL FOREST MANAGEMENT 112
10.2.1 INTRODUCTION 112
10.2.1. SIMPLIFIED FOREST INVENTORY 113
10.2.3. LOCAL PRODUCT INVENTORY 114
10.2.4. NATURAL REGENERATION ASSESSMENT 116
10.2.5. PANORAMIC PHOTOGRAPHY 117
10.2.6. MAPPING 121
10.2.7. INVOLVING PASTORALISTS AND MOBILE USERS 126

LOCAL FOREST MANAGEMENT IN THE SAHEL PART III : CONCLUSIONS 127

11.1. INTRODUCTION 127
11.2 CRITERIA OF WOODLAND MANAGEABILITY 128
11.3. CONTRIBUTIONS TO THE UNDERSTANDING OF DRYLAND FOREST MANAGEMENT 136

REFERENCES 141

ANNEXES 151

ANNEX I. PROJECT PROFILES 151

ANNEX II..... 164

ANNEX II.1. DATA GENERATED FROM PRODUCERS IN BANKASS, 1999, THROUGH INTERVIEWS AND PRODUCER OBSERVATION. 164
ANNEX II.2. ESTIMATE OF REVENUES FROM THE FOREST RESOURCE IN TWO CASES. 166
ANNEX II.3. EXCHANGE RATES S£/UK£ 2.1995-1.1999 166
ANNEX II.4. COST MODELS OF LOCAL FOREST MANAGEMENT 167

List of Tables

Table 1: Three different local forest management systems
Table 2: Cost of establishment for a 2,000 ha village forest
Table 3: Cost of maintenance
Table 4: Overall project cost per unit of local management
Table 5: Military hierarchy in Nigerien forest service
Table 6: Redistribution of fines collected by foresters in the case of Niger
Table 7: Hierarchy of central, local and traditional forms of government in three countries
Table 8: The total project cost in US$ per year per village, market or other relevant social aspects as reported by the project.
Table 9: The process of village registration
Table 10: Interventions of forest agents and response from local communities, individuals and Alamadiou in August 1998.
Table 11: Opportunities and constraints of local product inventory in woodlands of El Ain and Bankass
Table 12: Opportunities and constraints of panoramic photography
Table 13: Cost comparison for different mapping techniques, roughly in order from low cost to high cost
Table 14: Firewood markets established in Niger and Mali

List of boxes

Box 1: Some examples of rent extraction in Niger
Box 2: Immigrant groups assert forest ownership
Box 3: Conflicting leadership in Newa village forest management
Box 4: Appropriation and management of a forest in Samori
Box 5: Sergue organises itself against excessive state powers

Glossary

Alamodiou	A Traditional forest management institution in Mali
Bankass	"Cercle" or district in the 5th Region of Mali where the SOS Sahel UK project PPEB and later PAGE operates
CCL	Cellule Combustibles Ligneux, Mali
DFID	Department for International Development
Douentza	A "Cercle" of district in the 5th region of Mali where NEF Mali is operating
El Ain	A location in North Kordofan, Sudan, where the Forest Management Project (NFMP) is operating
Energie-II	Project title, Danish/World Bank funded project
FAO	Food and Agriculture Organisation
feddan	A unit of land equivalent to one acre, approx. 0.4ha
GIS	Geographic information system
GPS	Geostationary positioning system
Kelka	Location in Douentza where NEF Mali is operating
Kordofan	Region in Sudan where SOS Sahel UK is operating
mukhamas	Unit of land in Sudan
NEF	Near East Foundation
NFMP	Natural Forest Management Project
PAGE	
PAFOZ	Projet Agroforestier Ouest Zinder
PPEB	Projet pour la protection de l'environnement a Bankass
PRA	Participatory Rural Appraisal
PUSF	Projet d'Utilisation des Sols et des Forets
Takieta	Location of the PAFOZ project
Tientiergou	Village forest in Niger where the rural firewood market system is operating
TRDP	Turkana Rural Development Project, Kenya
Walde Kelka	Supra-village level institution in Kelka forest

Conversions

300 kgs firewood	= 1 stere
1 cu.m	= 670 kgs

INTRODUCTION

In the 1960s and 1970s, an era of central control in Sahelian States, the orthodox view was that local people were not capable of properly managing their forest resources. The forest management tasks were considered be too complex for local people, and their objectives were seen to be short term and local capacity insufficient for modern forest management. However the failure of central control forced governments and their donors to search for alternatives, experiments in village woodlot programmes and joint forest management were a departure from the orthodoxy and yielded valuable experience.

At the same time, forestry strategies shifted from tree planting to management of the natural vegetation. In the harsh Sahelian environment it usually makes more sense to manage the remaining forest rather than restore it where it no longer exists. Shifts in paradigm were made towards the end of 1980s and led to a new generation of Sahelian forest management strategies, one which aims at understanding and developing the much more complex options for natural forest management by local users.

The initial questions posed in the SOS Sahel study were centred around the nature of local institutions dealing with the forest, and the nature of the management tasks performed by them. An important aim was to adapt forest management tools and make joint forest management more participatory. This soon led to asking more basic questions about such forest management.

It is evident that conventional forest definitions, concerned with crown cover percentage, are hardly useful for Sahelian forest management. It is also clear that many of the forests have always been used and managed by local communities without the use of conventional management tools. The colonial powers first, and then the state have weakened but rarely erased “local management”. A dichotomy appears to exist between, on the one hand, what the state and technical assistance agencies call forest management, and on the other hand, the way rural Sahelians measure, communicate, control and harvest their forest.

More appropriate definitions are proposed in the context of this study. The following definition has been prepared by the workshop on local forest management in the Sahel, held in Bamako, 13-16 September 1999 (SOS Sahel, 1999):

“The Sahelian forest is any land in the Sahel with a forest statute, customary or modern, with some woody biomass” (*reference)*. This definition accepts that a woody vegetation cover percentage is not useful. Many of the Sahelian village forests are only slightly covered by trees and shrubs. Yet they are forests under the prevailing statute, and they may be a key natural resource for some local user groups.

Local management was defined at the workshop as “negotiated management by stakeholders whose livelihood depends on the forest”, rather than by proximity to the forest, so that non-local users with critical dependence on the resource are not

excluded. Negotiation is an essential element of the definition to ensure rational management. The rational of the forester or the firewood cutter, may not be rational to herder or artisan. The negotiation of their interests is the basis for rational local management.

In classic views on forestry, the state, supported by development agencies, insists on its view of the nature of the forest in a given ecozone. If it is thought that the forest is degrading, is invaded by less desirable species or is turning into a desert, conventional wisdom insists on prescriptive measures. These would include a crown cover percentage, a wood volume, an annual wood harvest through a formal management plan, and nationwide protection of certain tree species.

A thesis of this study is that the objectives set by the forest service on behalf of the state are strongly sectoral and are not legitimate. Another part of the thesis concerns so-called modern forest management, which usually includes geographic partitioning, biometrics, remote sensing, mathematical modelling and a standard management plan. The thesis is that:
(a) harvest quotas in the Sahel are not useful since the ecology and economy are far too diverse and variable to be usefully captured in a site specific model.
(b) conventional forest management tools are not useful since they are not understood by the forest managers.
(c) such tools are usually too expensive for Sahelian forest management, where the revenues per unit area are extremely modest.

In short, it appears as if there is a real dichotomy between forest management as conceptualised by the state, and that defined by local institutions. Decentralisation is likely to provide new opportunities to local management. Local institutions are increasingly enabled to get on with the sort of forest management they were used to. However, the physical and human environment have greatly changed since the precolonial time, when many of the local institutions were established. Will local forest management lead to socio-economic improvement, equitable development, civil peace and sustainable landuse ? The experience to date is limited but it does help to outline the opportunities and constraints of the next decade.

The present report is based on a programme of action-research, surveys, networking and communication over three years in the Sahel, with a geographical emphasis on Mali, Niger and Sudan. Three SOS Sahel field projects were the basis for field research. The experience from a much larger number of projects in 6 countries has been incorporated, and networking culminated in the Bamako workshop involving 30 researchers and practitioners from 8 countries.

The report is organised as follows. Part one describes how the forestry sector has evolved, and it gives the ecological, economic and institutional setting. The Sahelian woodlands are an integrated natural resource of which the ecology and economy are explored in chapters 2 and 3, with variability as the common denominator.

The climatic characteristic of irregular wet and dry cycles is a major determinant of the Sahelian woodland ecology. Socio-economic variability is both spatial and temporal. Large differences in economic structure exist between neighbouring villages, let alone within the Sahel as a five thousand kilometre wide region. The interseasonal and interannual variation of economic activity is equally important. The combined ecological and socio-economic variability is also the key problem of any model of Sahelian forests indicating how much they can sustainably yield.

The institutional, policy and legal environment is presented in chapter 5. This is the environment which ultimately determines to what extent local management can be scaled up. It is a turbulent environment of orthodoxy and innovation, sectoral and integrated approaches, dirigiste and democratic tendencies.

The core of this report is the second part, which is concerned with the extent to which local communities are actually managing their woodlands. Chapter 6 explains the praxis of local management as the alternative to state defined management. If given the opportunity, local communities do take charge of their natural resources. What are the nuts and bolts of local forest management, how are cost and benefits distributed, how are conflicts resolved ? A crucial characteristic of local institutions is their legitimacy, which is described in chapter 7. Evidently, there are constraints to local management, some of which may be insurmountable, others which may be solvable. These are discussed in chapters 8 and 9. Finally, the opportunities of local management, with and without project support, are presented.

The third section of the report contains the conclusions and recommendations. It also summarises the understanding gained over the last three years. The most important case studies have been enumerated in the annex.

In order the enhance the readability of the report, names of places have been simplified and are explained in the glossary. The major credit for this report should go to the many Sahelian researchers and practitioners, villagers and project staff, whose work is the foundation of this study. Responsibility for the opinions expressed rests with the author and with SOS Sahel International UK.

Paul Kerkhof, 1999.

LOCAL FOREST MANAGEMENT IN THE SAHEL
PART I : THE CONTEXT

2. EVOLUTION OF SAHELIAN FOREST MANAGEMENT

2.1 THE EMERGENCE OF THE FORESTRY SECTOR

Precolonial practice ought to be the starting point for a description of change in forest management, but descriptions are few and sketchy. Comprehensive natural resource management systems existed in some areas such as the Niger delta under the Peuhl empire of Macina (Diakite,N.). Even so, written sources of information are rare. Codified forest management was only brought about by the introduction of colonial practice.

Forestry introduced by the French and British colonial powers at the beginning of the 20th century was shaped by several factors. It was based on the European forestry tradition, moulded in the 19th century with German forestry as the cradle of the sustainable forestry concept. German foresters and their concepts have had an important influence on the forestry institutions in neighbouring countries as they were often invited to help shape these institutions (Shepherd,G.et al.1998). European forestry of the 19th century was concerned with both natural forest management through single tree selection systems and with plantation forestry for degraded areas. The emphasis of "modern" or "scientific" forestry was increasingly on clearcutting and planting of forest blocks at the expense of more natural and selective forms of forest management (Kuechli,C.1997).

Another influence on colonial forestry practice in the Sahel was a sense of urgency to protect forests against the people who had always lived in or near them. In 1900, a Forestry Code was instituted in the French Sahel which eroded local access and management rights. The forest service retained the monopoly over decisions concerning who could harvest in which forest and under which conditions (Ribot,J.1995). Wood cutting permits were the key instrument in a process which increasingly allowed outsiders to exploit local forests. Other instruments included transport permits, taxation, price setting, and land expropriation for gazettment. In the process, rural people essentially lost legal control over commercial exploitation of the forests they were accustomed to manage.

The nature of the emerging forest service can to some extent be explained by the European model. A sociological study of the German forester explains the instruments of exclusivity and monopolisation over the forest resource applied by foresters at the time (Heeg,W. 1974). Language, uniforms and mysticism were among the instruments which helped maintain exclusivity of foresters over the forest resource. In the Sahelian context, the militaristic nature of the forest service was particularly pronounced, at least in the French colonies. The first Malian foresters

were soldiers who returned from the first world war and who were employed to protect the colonial forests. A military hierarchy has characterised forestry services in the francophone Sahel from the colonial time until today.

A difference between the French and the English colonial administration in the Sahel is the broad assumption of state ownership of land and natural resources in the French Sahel as opposed to reliance on indirect rule in the English colonies of the west African region (Mortimore,M.1997). In the Sudan, local forest management systems continued to exist to a large extent until independence, when respective governments through the forest service assumed formal control at the expense of customary authority.

Colonial forestry was mostly concerned with the steady supply of fuel to trains and river steamers. Firewood plantations along rivers and railways became an expression of modern or scientific forestry, often managed on the basis of forest blocks. This has influenced post-independence forestry strategies which focused on urban firewood production in forest blocks, and at a later stage, village woodlots.

2.2 1960-1990: CENTRALISATION AND TREE PLANTING

The evolution of Sahelian forest management can, unsurprisingly, be seen as a product of changing political and economic conditions. In the newly independent states, one party state authority was introduced and reinforced at the expense of customary authority and traditional resource management. This greatly boosted the role and size of the forest service given that forest resources are a major natural resource in the Sahel.

Efforts were made to further gazette forest land but with a modest impact due to the operational and budgetary constraints of a lengthy reservation process. The main impact of forest resource centralisation was on public land. The greatly increased number of foresters and forest service stations on public land over the period 1960-1990, along with legislative changes, had a strong centralising effect on forest management and weakened local management institutions. Forestry concepts were reduced to those accepted in the forest service. In the meantime, the Sahelian forest ecosystem was degrading, and this was seen to be as a result of climatic instability and also of the activities of hard pressed but irresponsible rural people.

The State applied two forest management strategies on public land. Natural forest management was controlled through the permit and tax system and through policing. Secondly, tree plantations were promoted as a response to the perceived environmental crisis. In the 1970's, the strategic emphasis was on large scale peri-urban plantations, mostly for urban energy (Foley,G. et al, 1997).

The general failure of this strategy led to the emergence of the village woodlot in the 1980's. Village woodlots were much smaller, they were situated on public land, which projects conveniently but ambiguously called "village land", and villagers were expected to be the beneficiaries and to meet an important part of the cost. In

technical terms, village woodlots were the same plantation model of species, spacing, planting, weeding and protection but at a small scale. By the end of the 1980's, the village woodlot strategy was considered a failure both in terms of technique and of community participation (Kerkhof,P.1990).

The important role of natural forests and natural regeneration was increasingly recognised in the 1980's along with the failure of the plantation model. The Nigerien FLUP project and Kenya's TRDP were pioneers in the development of natural forest management strategies. The techniques developed in FLUP relied on physical soil measures, mulching, tree planting and reseeding combined with protection against livestock. By the end, the cost appeared to be too high and sustainable production was lower than anticipated but FLUP was the first major attempt at joint forest management in the Sahel (Christofferson,K.A.,et al.1993).

In Kenya, TRDP developed the idea that local institutions should be responsible for forest management, and it prepared a legal framework for this model (Barrow,E.C.G.,1987). From that time, the idea of legal recognition of local institutions which carry the major responsibility for local management has spread to a larger number of countries, albeit at project rather than at policy level. Also the idea of joint forest management, i.e. joining the state and local communities for the management of forest resources, has spread. The joint forest management idea applies in the first place to state forest reserves and, to some extent, to public land.

In the 1980's, international organisations and donors attempted to reform national forest services and forest policy, aiming to redress the balance from a the bankrupt policing strategy toward extension. The Swiss Development Cooperation invested considerably in the Malian forest service training and infrastructure, and so did the Dutch and Swiss donors in Burkina Faso. The World Bank (IDA) supported change in the Sudanese forest service and elsewhere.

The outcome of their commitment and that of other donors appears to be mixed. A greater interest within the forest service in participatory approaches has been observed (e.g. Kabore,V. et al.,1985, for Burkina Faso). On the other hand, many structural problems have not been addressed and donor support may have had an perverse impact through the legitimacy and resources it provided to the forest service as a centralised management institution. Broad political and economic reform in the Sahelian societies were required for substantial change in forest management.

2.3 1990S: DECENTRALISATION, DEMOCRACY, SECTORAL INTEGRATION

The 1990's were marked by a number of related macro-economic and political changes which had a bearing on natural resources management in the Sahel. Structural economic adjustment was imposed in all economic sectors throughout the region. For the first time, recruitment of foresters halted and operational funds were squeezed. It was increasingly accepted that central control of forest resources was no longer a viable option. The option of local governance although not willingly embraced by administrators, was increasingly seen as the only realistic option.

At the same time as the forest resource declined the proportion of forest service income derived from permits declined steadily in favour of income from fines, increasingly imposed an arbitrarily ‘blanket’ manner. This oppressive behaviour put the foresters as the agents of the state in closest contact with the poorest people, in the front line when political change occurred.

Decentralisation of government is probably the key political change in favour of local forest management. The political revolution in Mali of 1991 is the most illustrative example of change from a centralised to a decentralised system of government within this decade. In other Sahelian countries, the rate of change is less pronounced but is nevertheless clearly identifiable. The Code Rural in Niger has defined an alternative legal model of resource management which it is now implementing, despite the operational constraints to widespread application. The rural firewood market model developed in Niger is an experiment in local resource exploitation albeit with very limited local governance.

In Sudan, The Forest Act of 1989 put in place a system of local forest ownership but the forest registration process is so centralised that its application has proved to be almost impossible. The recently established system of federal governance is much more promising. Locally elected Rural Councils, roughly equivalent to the Malian Communes, are expected to be empowered to support the village forest registration process. In Burkina Faso and Senegal, the decentralisation process is slow but is likely to have a steady impact on the ability of local communities to manage their forest resources.

The notion of sectorally integrated land resource management has gained ground in the 1990's. In many countries, "environment" has for a long time been identified with "forestry". In all Sahelian countries, the forest service is in actual fact a sectoral institution, with few professionals other than foresters. More genuinely environmental, and thus multisectoral institutions have been established in the 1990's throughout the region in the form of National Environmental Planning Secretariats. Although these secretariats are in principle under the President's or Prime Minister's Office, their de facto authority as a cross ministerial organisation is extremely limited. Mali is the only country in the region which has attempted to integrate sectoral Ministries into one Rural Development Ministry, so far with mixed results.

Structural adjustment has had an adverse impact on the efficacy of environmental planning and policy making (Bass,S.et al,1998; Speirs,M. and Secher Marcussen,H,1998). The inflation of institutions and policies has gone together with a reduced capacity for implementation. For local forest management, structural adjustment is thus a double edged sword: it has helped to enforce forest service withdrawal from management of village forest resources, but it has also inhibited the development of alternative, sectorally integrated support mechanisms.

An underlying current in local resource management is increased democracy and accountability. There is uncertainty about the direction and outcome of this process in many countries. Local forest management may enhance the scope for democracy and accountability, but it needs to be supported by a much broader process of societal change.

3. WOODLAND ECOLOGY AND MANAGEMENT

3.1 ENVIRONMENTAL CHARACTERISTICS

The Sahel is usually defined as the zone adjacent to and South of the Sahara desert, excluding the horn of Africa. The rainfall is the major abiotic determinant but there is no universally accepted definition of the Sahel. French colonial maps divide the Sahel into the northern Sahel, with an average rainfall of 100-300mm/year and the southern Sahel with an average annual rainfall of 300-500mm/year. In this report, the Sahel is defined as having 100-600mm average annual rainfall and it includes east Sudan[1]. Nevertheless, the distinction is not clearcut and some cases outside this zone are included in the report.

A frequently used term in literature is “drylands” or “arid and semi-arid lands”. In the Sahelian woodland literature regions such as the Casamance, with a rainfall of some 1,000mm, are included because they are part of Senegal (Jackson,J.K.,1983). Various international drylands forestry conferences recently held in west Africa include areas of 750-1,500mm (Bruns,S.,et.al.,1995). The Sahel in a political sense may include countries such as the Gambia, but the ecology of such areas is very distinct from what this report defines as the Sahel.

Another essential abiotic characteristic of the Sahel is the mosaic of run-off and run-on. What is all too often simplified in development projects and policies as erosion, is in actual fact a dynamic, spatial pattern of redistribution. This is important in that a rainfall event in one area may have a quite different effect in a neighbouring area, which can be conceptualised as a mosaic of run-off, transfer and run-on (Stafford Smith,M. and Pickupp,G.,1993). A multitude of productive natural resources in the Sahel, including many woodlands and forests, would not have existed without such redistribution.

Water is important as both the medium and the substance of redistribution. Soil nutrients are redistributed across the landscape by water, wind, fire and grazing. The subsurface redistribution of both water and nutrients, which reappears at the surface as streams and marshes, or is tapped by deep rooted woody vegetation, allowing woodlands to grow in zones where rainfall does not support such vegetation, is still poorly understood.

[1] The Sudanese Agricultural Research Corporation has recently changed the policy, inherited from colonial times, which conceives Darfur and Kordofan ecologically as a part of the east African zone. These zones are now seen to be part of the west African agro-ecological zone (Hasabelrasoul,F.M.,1999.

3.2 WOODLAND ECOLOGY

The ecological, economic and legal definitions vary considerably, so that, for example, what is called “village forest” as defined under statutory terms in Sudan may not be a forest at all in ecological terms. But also within ecology, a large number of classifications exist. A widely accepted classification in East Africa defines forest, woodland, bushland, shrubland and grassland, plus various combinations. Woodland, for instance, has trees of up to 20m in height and a canopy cover of not more than 20 percent (Pratt,D.J. and Gwynne,M.D.,1977).

A different classification, prepared for UNESCO, defines forest, woodland, bushland, thicket, shrubland and grassland, as well as various combinations and edaphic formations. Forest is defined as a continuous stand of trees at least 10m tall, with crowns interlocking. Woodlands have trees of at least 8m and a canopy cover of 40% or more, bushland has trees of 3 to 7m and wooded vegetation in shrubland is up to 2m high (White,F.). The case studies in this report cover all of these vegetation types. Bushland, shrubland and grassland are the most commonly found categories, and woodland is the economically most valuable category found in most project cases. In this report, the terms forest and woodland are used interchangeably.

In many case studies, a large part of land which is statutorily defined as village forest is dominated by bushland and grass savanna with a dynamic composition of woody and herbaceous cover. This constantly changes over time and space between treeless grassland, denuded areas and wooded thickets. Intermediate wooded grasslands are seen by some as the most desired state in terms of maintenance of productive capacity and biodiversity, but disciplinary orientation may determine perception. What the forester conceives as reforestation may be seen as bush encroachment by the range manager.

Five fundamental determinants exist in the savannah ecology: plant available moisture, plant available nutrients, fire, herbivory and anthropogenic influence. Plant available moisture is by far the most significant factor. Under drought conditions, annuals disappear rapidly while hardy shrubs may survive for years. Upon improved rainfall conditions, annuals may recover in a few weeks, but a forest may require decennia.

How the herbaceous-ligneous balance changes depends to an important extent on the composition of these five determinants. Fire is advantageous to species which recover quickly such as annuals. When areas are fully protected from fire and herbivory, woody vegetation may dominate in many ecotopes on the long term (Moss,J.M.S.,1996). Under a no grazing regime herbaceous vegetation will increasingly dominate turning these woodlands into treeless savannahs. This has been confirmed in various livestock exclosure trials (e.g. Peltier,R.,1994).

While fire may be more destructive to trees than to grasses in the long term, grazing and browsing tend to reduce the fuel load for fires, and may prevent the development of a thick herbaceous cover which inhibits tree regeneration. A

moderate fire regime may stimulate the productivity of both herbaceous and woody vegetation. A research project in Burkina Faso found that protection against fire has reduced production of annuals by 40% and perannials by 25% (Bruns,S. et al.,1993). Research in Niger found that herbivory hardly had any impact on initial Combretum coppice survival (Peltier,R.,1994).

A large number of experiments may be quoted, but universal relationships cannot be established. Simple causal relationships may be established in a site specific context but they cannot be generalised. One reason is, that a given determinant may have varying impacts. In the case of fire, for instance, this could be the frequency, timing and temperature of fire occurrence. Secondly, the various determinants are interactive. Thirdly, a short term impact may be different from a long term change, which is poorly understood (Stafford Smith,M. and Pickupp,G.,1993). Slow processes may operate at the speed of a humans lifetime which makes it difficult to observe and analyse, whereas most experiments rarely continue for more than 5 or 10 years.

Grass production has frequently been researched in the context of pastoralism and range management. Herbaceous matter degrades and recovers much faster than trees and shrubs under varying rainfall conditions, which allows a more rapid assessment. The tree forage biomass, important for small livestock and camels, may be much greater than that of the herbaceous vegetation in some Sahelian forests. In one Nigerien forest, 2,000t. dry matter of tree forage was measured against only 130t. dry matter of the herbaceous vegetation (Ousseinie,G.,1997).

3.3 INSTABILITY OF SAHELIAN WOODLANDS

The ecological equilibrium theory assumes that an orderly and directional process exists by which plant communities are succeeded by others until a persistent, characteristic plant community dominates becoming the climax community for that particular site. In many Sahelian sites this is often seen to be forest or woodland. If this vegetation were to be disturbed, as happens normally under influence of farming and pastoralism, it would overtime and if left undisturbed ultimately return to the forest climax. Restoring the forest climax is also an ecological justification in forestry for rehabilitation and management of woodlands.

A number of researchers feel that in arid environments with a high drought frequency, such as the Sahel, a disequilibrium exists in which abiotic disturbances are dominating. The idea is that the ecosystem is disequilibrial, event driven, and is characterised by non-linear dynamics. Climatic instability is an important element of a disequilibrium ecosystem (Moss,J.M.S.,1996; Behnke,R.H.et.al.,1993; Coppock,D.L.,1993). Five cases are described here to illustrate the particular dynamics of Sahelian woodlands.

1. The most comprehensive natural forest research in the Sahel has been done on the retracted vegetation patterns (such as “tiger bush”) which constitute a common

vegetation type in south east Niger and which are found in parts of the Sahel receiving approx. 300-500mm/year.
Retracted vegetation such as the tiger bush is a woodland on terrain with a very gentle slope (0.5-2%). Soils are lateritic with high run-off on patches of denuded soils which alternate with vegetation strips and patches which absorb the run-off. The shape and size of vegetated patches vary as a function of rainfall, soil and slope (Ambouta,J.M.K., 1997). The profile of these vegetated areas consists of herbaceous plants upstream, which catch some of the run-off. Litter and branches are the most important micro-environment for natural regeneration, they catch and stabilise soil and seeds and protect seedlings from browsers. Subsequently, a mixture of woody and herbaceous vegetation exists and termites are very active. The increased soil porosity and soil organic content result in complete infiltration of run-off, and allow growth of Combretum nigricans, Gardenia sokotensis and other species which are normally found in the Sudanian rather than Sahelian forests(Peltier,R.,1994).

The grass vegetation on the upstream side of the vegetated strips and patches tends to colonise bare soil, under conditions of reasonable grazing pressure and rainfall. The woody vegetation follows suit, and so does the edaphic zone of run-off infiltration. The trees on the downstream section of the vegetation strip receive increasingly less run-off, and they slowly die back, beginning with species normally found in the Sudanian zone. The entire vegetation strip, usually 10-40m wide, is slowly moving upslope. During important drought events such as 1982-84, part of the tiger bush died off. 10 years or so after the drought, part of the run-off is no longer absorbed by the tiger bush and it has not regenerated. Tiger bush in Sudan has largely disappeared since the drought (Wickens,G.E. and Collier,F.W.,1971).

Highly retracted and less retracted vegetation may co-exist on a given locality such as a plateau, with similar rainfall and soil conditions. Research in Niger suggests that the above ground biomass and productivity of highly retracted vegetation is higher than of relatively dispersed vegetation under similar conditions. The biomass of highly retracted vegetation in the case study is 17.5t/ha and of dispersed vegetation it is 15t/ha (Ambouta,J.M.K.,1997). In terms of firewood volume (wood over 4cm diameter), highly retracted vegetation has a stock of 14cu.m versus 8cu.m for the dispersed vegetation. Vegetation retraction offers protection against drought and, once established, such vegetation will only very slowly disperse under improved rainfall conditions.

2. A study of the forest of Bahn in northern Burkina Faso compared vegetation patterns between 1955 and 1984, when the average rainfall was 510mm/yr. The rainfall over this period was lower than in the previous 46 years, when it was 710mm/yr. In 1955, only 27% of the sample area (1,500ha) was covered with trees, bare soil covered 6% and the remainder (72%) was grassland. By 1984, trees covered 40%, bare soil 55% and grassland only 5%.

In 1955, the trees were mostly dispersed in the grass savannah, and the largest contiguous patch of woodland covered 17ha By 1984, the distribution of the tree

vegetation had completely changed. Many of the small patches of woodland that existed previously, had either died off or had been absorbed by a much larger patch of woodland, which was confirmed by the large number of dead trees which were found outside the woodlands of 1984. In 1984, the largest contiguous patch of woodland covered 500ha, which is 73% of all tree cover in the sample area (Couteron,P.,1997).

The researcher attributes the changes observed in woodland cover and structure to a combination of reduced rainfall, and the increased run-off from outside and inside the sample area. Outside the sample area, clearing for agriculture has been a source of run-on, and inside the sample area bare soils have contributed to run-on in certain woodlands. Despite a reduction of 28% in average annual rainfall, run-on has increased considerably, and forest cover increased from 27% to 40%. Many small patches of woodland died but in the form of contiguous woodland in run-on sites forest productivity has much increased. The dynamics of this forest resembles that of the tiger bush but at the scale of several thousand hectares, unlike the woodland ecology described for south east Niger.

3. Acacia mellifera vegetation in North East Africa may have a cycle of regeneration and die-back over large areas. Acacia mellifera forms dense thickets which prevent herbaceous production and protect the thicket against fire. Natural regeneration does not occur and eventually the bush dies off and is replaced by grassland (Harrison,M.N. and Jackson,J.K.,1958). An Ethiopian study found that high livestock pressure in savannah lead to gradual encroachment by Acacia mellifera. The bush savannah is being replaced by dense thickets, forcing the Borana pastoralists to migrate and abandon the area, but in the long term, the thickets are dying off due to lack of recruitment. A herbaceous vegetation recolonises the area and pastoralists are likely to return. The whole cycle is expected to last 60-100 years (Coppock,D.L.,1993).

Woodlands in North Kordofan, Sudan, with an average rainfall of about 300mm, are dominated by Acacia mellifera which is the main source of construction wood and firewood. In 1990-1993 researchers were concerned about the lack of A.mellifera recruitment and an important tree planting scheme was initiated (Seif el Din,A.G. et.al.,1992). During these years, the average annual rainfall was 241mm, which is well below average. Over the years 1994-1998 the average annual rainfall rose by 58% to 380mm and A.mellifera recruitment increased steeply. This rendered earlier woodland restoration strategies, such as tree planting in microcatchments, quite meaningless (Kerkhof,P and Siddig,F.,1998). By 1999, 58,000 trees has been planted in microcatchment schemes over a 9 year period, while about 3 million Acacia mellifera had regenerated naturally since 1994.

4. In the 1980's, arid lands forestry projects such as TRDP in Kenya were concerned about the lack of natural regeneration in Acacia tortillis forests (Kerkhof,P.,1990). Riverine forests of aged A.tortillis were lacking recruitment and it appeared that in the continued absence of regeneration, possibly as a result of browsing extensive forests would die back. Ecological research elsewhere, however, found that A.tortillis

may regenerate abundantly but not under its own canopy (Moss,J.M.S.,1996). A spatially irregular pattern of A.tortillis forest can be anticipated in low rainfall areas instead of the model of homogeneous forest formation and rejuvenation commonly found in forests of high rainfall areas.

The various cases quoted originate from different geographic areas but they have various aspects in common. Low and variable rainfall has a big impact on the woodland ecology, which is subject to important long term changes. The spatial patterns of the woodlands vary over time and may oscillate between “denuded soils” and “dense woodlands”. Ecological characteristics such as recruitment and die-back evolve accordingly. These dynamics may be conceived as a steady state in some cases, but they appear to be more or less irreversible in others. The Nigerien tiger bush or Acacia mellifera in Borana, for instance, may be seen as stable vegetation over larger areas even though it dies off locally. However, in the case of Bahn or the tiger bush in Niger and Sudan seriously affected by drought, vegetation changes appear to be non-linear.

The most important conclusion for this study is that tree stock and productivity for a given site may not evolve according to the principle, by which sustainable wood production can be achieved through management, determined by site specific factors such as rainfall and soils. In spite of management activities such as tree planting and fire control, woodlands may deteriorate and die off or alternatively, woodlands may expand in the absence of such measures. Woodland changes and forestry interventions in Sahelian woodlands should be evaluated against the particular ecological
characteristics.

Little is known about more indirect functions of woodlands such as the provision of water and nutrients to agricultural production systems through redistributive mechanisms, such as the run-off / run-on mosaics mentioned before. Livestock corraling is another form of redistribution. Livestock owned by villagers produce manure which is distributed by farmers on their fields. Livestock of nomadic pastoralists is kept in temporary corrals which, once abandoned, may be cultivated by neighbouring villagers, e.g. in Kordofan.

The relationship between woodlands and dry season water availability is also poorly understood. One idea is that forest and woodland attract rain and produce water, hence the need for reforestation and forest protection. Agro-hydrlogical studies elsewhere in Africa have demonstrated that generally the contrary is true (Loerup,J.K. and Hansen,E.,1997). Although such studies have apparently not been conducted under Sahelian conditions, the same inverse relation between water availability and forest cover may exist.

3.4 WOODLAND MANAGEMENT

Sahelian woodland management can be classified in two distinct categories: interventions by foresters through the forest service and through projects, and management practice by local people. Although forest service management objectives vary from place to place, they tend to concentrate on sustainable, optimum wood production. A range of management activities are undertaken to achieve this, which may include:

- forest inventory and planning, which is the basis for any of the subsequent activities
- division into compartments
- fireline establishment and maintenance
- tree planting or enrichment planting
- direct seeding
- cutting trees of little use and retention of valuable species
- guarding against grazing, browsing and cutting
- clearfelling, simple coppice, coppice with standards or other forms of exploitation.

3.4.1 ASSESSMENT OF PRODUCTIVITY AND QUOTA

Forest inventory is undertaken so as to determine stock, productivity and annual offtake. The key issue is what should be measured and how it can be measured with sufficient precision and at reasonable cost. Initially, only trees qualified as sawn timber or usable for other purposes in the colonial economy were measured. The definition of what should be measured has varied constantly ever since. Forest inventories in the beginning of the 1980's under FAO and UNEP, for instance, used the 10cm diameter threshold as a minimum for wood volume estimates (FAO, 1991). This seriously underestimates firewood volume and more recent inventories establish a 4cm threshold. Other studies again propose wood weight as the reliable estimate for wood energy, which is complicated by variable moisture content (Nygaard,R.,1998). Such estimates may be air dry or oven dry. The continuously changed definitions in forest inventories makes comparison between them very difficult.

The annual yield or productivity is still more difficult to assess. In the case of single age stands, typical in European forestry where most of the techniques have been developed, it may be the average annual increment measured over the rotation, or it may be the actual increment for a given year. In Europe, reliable data exist for key species such as spruce and douglas fir. But in natural European forests with many different species, age groups and exploitation systems, reliable production tables are hardly available. If reliable estimates are rarely available for European mixed forests, they cannot realistically be expected for Sahelian forests.

The earliest estimates are from Clement, who estimated Sahelian forest productivity at 0.5 cu.m/ha/yr. However, very few of the sites observed by Clement fall within the Sahelian zone (Jackson,J.K.,1983). According to Jackson, who presented the first

major review of Sahelian forest management, forests with a rainfall of less than 400mm can be considered to be virtually unproductive, and should be preserved on environmental grounds with only dead wood being collected. This does not tally with SOS Sahel's experience from north Kordofan, where village woodlands in the 250-400mm rainfall zone are actively managed, exploited and play a role in the local economy (Kerkhof,P. and Siddig,F.,1998).

In the 1980's and 1990's, a number of Sahelian forestry projects have estimated standing stock and forest productivity. Two examples are provided here to demonstrate the difficulties of arriving at reliable estimates. The first example is Takieta forest in Niger. In 1987, the FLUP project did a forest inventory and found a standing stock of 0.2t/ha (0.3 stere/ha)(Anon,1988). In 1991, 1992 and 1995 minor inventories have been undertaken by various projects using different methods (Kalla,B.,1992; Carr,S.; Habou,A.). In 1996, a more important study, using different methods again, arrived at an average stock of 4.6 stere/ha (Mounkaila,M.,1997), but the results are not considered useful by project staff, since volume tables from a very different ecological zone were used (Kerkhof,P.,1997). In any case, the difference in stock estimates of 0.3 stere in 1987 and 4.6 stere in 1996 is inexplicable.

In a second Nigerien example, the Gusselbodi forest, inventories were conducted using more or less comparable techniques over a 10 year period. In the early 1980's, the FLUP project estimated productivity at 0.5 stere/ha/yr which was revised to 1.0-1.5 stere/ha/yr later in the 1980's (Ichaou,A. and d'Herbes,J.M.,1997). Two inventories after project termination arrived at a productivity of respectively 0.25stere/ha/yr and 0.34stere/ha/yr (Hopkins,C.,1992). One problem faced by forestry researchers is that woodland management is not fully controlled, and sample areas may be over or underexploited for some period of time. Complete protection against any exploitation over a long period of time is rarely feasible and even monitoring of forest exploitation is hardly possible.

In spite of inherent difficulties, stock and productivity estimates continue to be made by projects who feel there is no way around them. For one category of projects, particularly those of NGO's, the standard forest inventory is an obligation even though the results are hardly used or considered useful[2]. Some project staff feel that the inventory was necessary to justify the project strategy of involving local people vis-à-vis the forest service, since "it takes the pressure off", even though the results may not be used in any way.

In the rural firewood market projects, forest inventories are held because sustainable yield, in the form of annual permissible quota, is seen as a cornerstone of the project strategy. A local forest management strategy without a quota is considered impossible. Energie-II, for instance, found an average productivity of 0.66 stere/ha/yr for the Tientiergou forest in Niger, which served as the basis for determination of an

[2] In the French Forestry literature as recently as 1998, many European mixed forest management concepts are described as 'chaotic' and as being without scientific basis. I argue that productivity estimates under a multitude of Sahelian management regimes cannot reliably be produced in the absense of clear silvicultural concepts.

annual quota (Peltier,R.,1994). However a project survey 6 years after establishment of the market system in one of the two surveyed forests, found that local people were concerned about forest depletion, despite indications that they observed the quota system (Giraud,S.,1998).

A Malian firewood productivity study of 1998 concluded that none of the surveys and experiments in the country allowed reliable productivity estimates (Sylla,L.M. and Nouvellet,Y., 1998). The rural firewood market system requires productivity estimates, whether reliable or not, and the researchers propose a mathematic model in which productivity is determined by rainfall and by crown cover. Yet modelling in absence of substantial empirical data is generally found to be unreliable.

An alternative to the forestry principle of sustainable yield, such as a firewood quota, may have to be developed. This may be conceptualised in the form of minimum environmental standards to which local management is to adhere (Ribot,J.C.,1995). Such standards should have long term, area wide indicators which "see through" short term, site specific changes. It should also avoid an overemphasis on (sub)sectoral concerns through the focus on “environment” as a multi-sectoral concept.

3.4.2 FOREST MANAGEMENT PLAN

The formal forest management plans resulting from inventories, are more or less based on standard procedures in forestry. The rural firewood market system provides guidelines for the production of these plans, which should include :
-general environmental and socio-economic background information
-maps showing boundaries of the forest and of forest blocks
-forest exploitation plan, with annual quota
-possibly an investment plan with tree planting and other rehabilitation measures.

In actual practice, few Forest Reserves have a formal management plan. In the case of North Kordofan State, none of the 160 Reserves have a written management plan, other than one plan produced by an expatriate adviser. In the Zinder Department in Niger, for instance, most of the Forest Reserves no longer exist de facto, and there are no management plans. In the case of rural firewood markets supported and supervised by a project, plans exist but they are much simpler than what has been prescribed (e.g. Energie II). In a number of projects, natural forest management plans have been written by external consultants for villages (e.g. NEF Mali,1997; CARE International/Mali, 1998) but application is unlikely to take place. The following management activities have been undertaken to varying degrees.

3.4.3 FOREST REHABILITATION

1. Forest boundary demarcation and protection. This is the single most important management activity for both government and locally owned natural forests. In the case of State Forest Reserves, deployment of guards to protect the forest against tree cutting, grazing and possibly trespassing is the traditional task of the forest service, which can apply highly punitive sanctions. Nevertheless, many State Forest reserves are poorly guarded due to lack of funds, and others have disappeared altogether.

In the case of locally owned forests, protection is the key management activity which is executed even if no other form of forest management takes place. Protection tends to be much more diversified and very modest sanctions are applied, but under good institutional arrangements, such protection may be much more effective than that by the forest service. In State Forest Reserves and in some of the village forests demarcation has been done, but in may cases markers have been destroyed.

2. Division of the forest into compartments, whereby each compartment may represent an annual cut. This is done in all state forests where management is prescribed under the Rural Firewood Market system. Instead of a large number of blocks, as recommended by FLUP, the Rural Firewood Market system recommends a smaller number, e.g. 6 blocks per village forest, in order to simplify management and reduce the cost of boundary delimitation.

Energie-II found that dividing the forest into blocks is useful in order to (Peltier,R.,1994):
- facilitate control e.g. by the relevant village institution since it will be known which part of the forest can be exploited in a given year.
- ensure an even distribution of exploitation
- allow easier ecological monitoring

However, these arguments can be turned around, and it can equally well be argued that in an undivided forest estate exploitation is more evenly distributed. Ecological monitoring may be easier if locally identified vantage points are used instead of externally imposed blocks. In many village forests, monitoring of the whole forest is necessary to avoid illegal exploitation by outsiders, at least for a part of the dry season.

Most locally managed forests which are not under the rural firewood market system, do not have a system of forest blocks. SOS Sahel found that different parts of the village forest may have different names such as "The Forest Situated Near The Village Limit" or "The Forest Situated Around The Ancient Village". Different parts of the forest are useful to varying degrees for a host of uses: livestock, domestic energy, artisanal and construction wood, fruit, and medicine. The formal partitioning into forest blocks which represent annual cuts is perhaps only useful in the case of single purpose forest management systems.

In the case of village forests studied in Kordofan, a number of villages have partitioned their forest into two or more units, with the following classification system:
- Natural forest/planted forest. The latter usually covers a very minor part of the forest in most villages, but it has the highest level of protection.
- Rich/poor forest cover. The former tends to be used for construction wood, while areas of poor forest cover are protected against green tree cutting.

No form of delimitation has been done in any of the forests which have been divided into blocks or categories, since all villagers know where the different blocks are situated.

Some projects deal with state forests for which local management is being developed. They often find it useful to partition the forest into areas adjacent to the villages, or a group of villages. In Tientiergou, Energie-II recommended that the size of a forest managed by a village should be limited to 4 km^2. This implies that in many cases, the forest is situated at 4-8 kms from the village centre, given that agricultural land is situated close to the village. In Takieta, SOS Sahel found that groups of villages want to manage a piece of state forest (Takieta Forest Reserve). The size of forest considered manageable by villagers appears to be not much different from what was found in Tientiergou.

3. Enrichment planting, with or without soil and water conservation measures, has been widely practised and still figures in many project plans, together with direct seeding. Tree planting may not be recommended since cost are always disproportionate to returns. Direct seeding has been applied by some projects in combination with tillage or organic litter. It is recommended by Energie-II and is used by various Sudanese projects, but the same reservations have to be made with respect to economic returns.

4. Firebreak establishment, early burning and fire fighting is practised to varying degrees, and is stimulated by various forestry projects. This management practice is not often found in forests under local management, but local people do fight fires in their own forest. Firebreaks were established in most of the Kordofan village forests studied but they are not maintained, although firefighting on village land, not just the forest is done. In many other forests studied, such as Segue, Kelka and Samori in Mali, firebreaks do not exist and many of the forests are probably too large for effective firebreaks.

3.4.4 FOREST EXPLOITATION

1. Clearfelling. This has been tested by a number of projects and research stations. The ecological effects are very important, since coppicing is poor and the woody vegetation tends to disappear entirely. Fields abandoned several decades ago can easily be traced on aerial photos since colonisation by woody vegetation is mostly limited to few species such as Guiera senegalensis.

2. Simple coppice, or coppice with standards, with a minimum girth limit for each species. The FLUP project recommended a height of cut of 30 cm, whereas the Energie-II silvicultural recommendation is "as close to the base of the tree as possible", although it recognises that for practical (economic) reasons trees should be cut at e.g. 30 cm height.

SOS Sahel found that under local management, construction wood is generally cut selectively, leaving many stems of a multi-stemmed tree untouched, and thereby preserving much of the productive capacity. Furthermore, villagers apply a more or less random selection of trees. In some cases, informal groups of woodcutters decide to work together and create forest extraction roads and paths in denser patches of forest. This applies to most forms of small size construction wood, which appears to be produced under the most sustainable form possible. However, in some categories of forest exploitation the whole tree is cut and dies, at least in the lower rainfall areas (e.g. 300mm). This is usually done for certain forms of artisanal wood and for large poles.

Energie-II reports that the woodcutters of Tientiergou prefer to cut at the beginning of the dry season when the trees are still full of sap and hence easy to cut. They found that cutting in the middle of the dry season is often fatal for trees, and cutting at the end of the dry season allows trees to regenerate throughout the rainy season and grow beyond the reach of browsers. It is likely that shoots require a great amount of water in the first year and in the absence of sufficient water the tree dies. For each tree cut, Energie-II found an average of 10 shoots growing in the year following the cut (Peltier,R.,1994).

SOS Sahel, however, found that commercial tree cutting is commonly done in the middle of the dry season, for plain economic and probably insurmountable reasons: at the beginning of the dry season much labour is required for the agricultural harvest. This was found for all research sites and may well be generally valid for the Sahel.

3. Many other forms of forest exploitation exist but are poorly researched. Forestry research and development projects have primarily been concerned with wood production, and especially firewood production. Livestock production is generally acknowledged as an important aspect of woodland management but it has been given little attention. In many projects of the 1980’s, livestock herding woodlands was discouraged on the grounds of damage to young trees and shrubs. Woodland management projects at the time, encouraged tree planting as a form of forest rehabilitation, and such plantations are quite vulnerable to livestock pressure.

Research on the interaction between livestock and Sahelian tree vegetation exploited by local people suggests that under most conditions, livestock does not seriously affect tree productivity. In a Nigerien experiment, a few highly palatable species such as Boscia angustifoloa and Pterocarpus erinaceus were seriously affected by livestock (Achard,F.,1997). In measurements of regeneration of the dominant tree species in Kordofan woodlands, significant differences were found in

recruitment of key tree species under varying fire regimes, but livestock had not negatively affected tree regeneration (Kerkhof,P.,1997). Recent woodland management projects no longer recommend livestock exclusion. The question whether, intensive firewood production regimes such as the rural firewood markets negatively affect livestock production, has hardly been researched. However some researchers have voiced concern about the impact of firewood market programmes on livestock production (Paris,P.,1997; Madougou,D.,1998).

Other forms of exploitation include collection of fruit, leaves and flowers, production of pharmaceutical products, oils, gums, and dyes. Apart from important commodity crops such as Acacia senegal, very little is known about their management. In SOS Sahel study sites, woodland management rules prohibit green fruit collection in all cases. Grazing and browsing is prohibited or controlled in a few forests, away from tree planting sites. But so far very little information exists about productivity under different management regimes.

3.5 CONCLUSIONS

1. Sahelian woodland ecology is affected by strong climatic, hydraulic and biological fluctuations which should be understood before recommending management systems. Due to the site specific nature of these fluctuations, local management is a rational response if it is accepted that local managers have a good knowledge of these fluctuations. Standard forestry planning mechanisms developed in Europe are less suitable to the Sahelian conditions.

The sustainable yield concept, which is at the heart of European forestry, is problematic. It aims at a quantified assessment of annual wood yield as the basis for management, as it is applied in the firewood quota system. It is at odds with the complex natural, multi-purpose forests in the Sahel. If standards are necessary, alternative concepts may have to be developed such as "minimum environmental standards".

2. Many of the prescriptions for woodland management in project documents such as tree planting, direct seeding, compartmentalisation and grazing control have a poor ecological or economic basis. In a situation where there has been little success in researching and developing sound technical packages, more attention should be given to local knowledge systems. Whereas agricultural research and extension agencies have appreciated indigenous farmer knowledge for some time, this is not the case for indigenous forestry knowledge in the Sahel.

3. From the few available case studies it appears that woodland management by local groups is more sophisticated than the general literature suggests.

4. ECONOMICS OF LOCAL WOODLAND MANAGEMENT

4.1 INTRODUCTION

The economic value of the Sahelian woodlands and the economic impact of different management regimes are not often analysed. Woodland management projects have primarily been run by foresters, who have pursued innovations in forest inventory, rehabilitation and exploitation. Development agencies have been interested in institutional innovations, sometimes with extensive anthropological or institutional research. But although projects have an interest in economic impact of woodland management, few if any economists have been engaged except for the study of firewood markets. In most projects, neither the economic data nor the methods and expertise to obtain them are available.

The stakes for Sahelian forestry could be high. Lessons of the past demonstrate that successive strategies, from peri-urban plantations through to village woodlots and natural forest rehabilitation, were technically feasible but had a very poor economic efficiency (e.g. Foley,G. et al,1997; Kerkhof,P., 1990). It is evident that contemporary forestry strategies also depend on economic conditions which ought to be monitored.

Present local forest management strategies are dominated by the rural firewood markets approach in the francophone Sahel and by village forest gazettement in Sudan. Firewood markets are not only a dominant current strategy but also a particular case where market economics is highly developed. This category of projects has a strong monitoring system for one subsector, urban firewood, but little interest in other woodland values.

Woodland values other than firewood need to be analysed since they may be more important. This has been done in three case studies in this report in some detail: Bankass and Kelka in Mali, and Kordofan in Sudan. The present chapter also includes a review of economic evaluation methods applied in the Sahelian woodlands. Natural resource economics is poorly developed and the discussion about methods is as pertinent as the data generated.

Finally, an assessment of the cost of management is made based on project expenditure data. A cost benefit analysis is not possible due to insufficient data, but the cost data do serve as an indication of the economic efficiency of the various local woodland management strategies.

4.2 METHODOLOGY

One reason for the lack of attention to woodland economics is perhaps the past performance of economic tools in development projects (Davies,J. and Richards,M., 1998). In the 1970's and 1980's cost benefit analysis was the predominant economic tool used in forestry project appraisal. The outcome was usually a favourable internal

rate of return for the project appraised. But poor development impact in many projects has discredited not only cost benefit analysis but probably also the role of economics in forestry development.

Cost benefit analysis has also been used in evaluation, such as the Majjia Valley windbreaks in Niger (Dennison,S.E., 1996; Rorison,K.M. and Dennison,S.E.,1987; Dennison,S.E.,1988). Again, the outcome of the economic model was very positive whereas the long term outcome of the windbreaks is disappointing.

Several explanations can be put forward for the poor performance of cost benefit analysis in forestry projects. The main reason is probably the gross simplification of the models used and the overoptimistic assumptions applied. Physical data such as forest productivity were rarely available and data from elsewhere, such as research stations, was used instead. In most cases, the interactions between forestry, livestock and agriculture were underestimated. Market information was often patchy, simplifying both the range of products and the interseasonal and interannual variations. Cost elements such as taxation, fines, bribes and confiscation may not have been included, and the subsistence economy was often poorly appraised.

Questionnaire survey, usually aimed at households, is another widely used tool in economic analysis, which may be used as an input to a cost benefit analysis. This tool has the potential benefit of capturing interhousehold variation, but it has several limitations. Many questionnaires deal with a few variables out of the many which influence the forestry sector. Comprehensive questionnaires, some of them consisting of 700 questions, have also been used in Sahelian forestry, but the reliability of the data is not known (e.g. Niger: Giraud,S., 1998). Reliable data on issues such as natural resource exploitation, herd size and even grain harvest may be hard to obtain, either because they are related to wealth or because they involve illegal activity. Finally, many large household surveys are poorly understood by local people and project staff, and have thus little impact on the development process (Chambers, R., 1997).

In the 1990's, two methodological innovations have taken place in the economics of natural resources: participatory economic analysis, and environmental economics (Winpenny,J.T.,1993; Davies,J. and Richards,M., 1998). Davies and Richards distinguish three different traditions, while recognising important overlap:

1. Economic and financial cost-benefit analysis
2. Environmental economic analysis
3. Participatory economic analysis

Participatory economic analysis, has put local producers and consumers at the heart of the analysis. Instead of external analysts implementing large household surveys, local people have a central role in economic assessment with the assistance of a facilitator. One of the strengths of participatory analysis is the incorporation of non-market values, which a cost-benefit analysis tends to put in a footnote or leaves out altogether. The tools are derived from participatory rural appraisal, such as resource

mapping, transects, sociogrammes, group discussions and ranking exercises. The economic appraisal is thus a thematic PRA, one which focuses on the economics of a local forest resource. IIED's Hidden Harvest programme has been a major promoter of participatory resource economics, with some case studies in African drylands (e.g. Pretty,J.N. and Scoones, I.,1989; Bishop,J. and Scoones,I.,1994; Campbell,B.et.al.,1995; IIED, 1995; Adaya,A.L.,et.al.,1997).

On the other hand, participatory economic analysis is characterised by a low level of quantification. The perception and relative values of local people are emphasised which inhibits quantification, and local measurement units make it hard to apply the information on a wider scale. PRA supporters maintain that it is better to be approximately right than to be precisely wrong. Triangulation, the PRA expression of data corroboration, is seen as the main tool to deal with bias. However, it seems that this is often not applied in practice, which raises the question how “approximately right” the outcome is. Furthermore, the way PRA is usually applied is as a one-off survey, in which case it fails to capture important variables. Interhousehold variation is poorly understood since PRA tends to focus on groups.

Environmental economic analysis has been developed in order to value the many non-marketed cost and benefits of the environment (Winpenny,J.T., 1993). Many of the methods are duly poorly applicable to developing countries, but during the 1990's some have been adopted by forestry economics in Africa and elsewhere. (Emerton, L., 1996; Brown, K. and Emerton, L., 1997). In some of the case studies, local units of measure have replaced money and symbols have been used instead of written text, which overlaps with PRA principles. The final outcome of the assessment is in monetary terms, and economists are divided about the usefulness of the method.

The most useful contribution of environmental economics to forestry in developing countries is probably conceptual rather than practical. Forestry economic assessment in the Sahel has often been dominated by a few marketed forest products, and by urban woodfuel in particular. Environmental economics has conceptualised a much broader framework of values, marketed and non-marketed, direct use and indirect use, use and non-use values. This may help to put marketed firewood and construction wood in a more realistic context of woodland values. Firewood may be the most visible product for townspeople, but for local actors, grazing, bequest to the next generation, and options for future land development may be more important.
Sahelian forestry economics literature is modest and is mostly based on household and market surveys and producer interviews, usually dealing with the woodfuel cycle. Some studies have attempted to assess the livestock production value of woodlands, and a few have attempted to quantitatively assess a wide range of values.

4.3 FIREWOOD MARKET ECONOMICS

The Nigerien Energie-II project (1989-1996) has built on the firewood market model developed in the 1980's by FLUP, and the Guesselbodi forest project in particular. FLUP developed the concept of natural forest restoration and controlled exploitation by local communities. It concentrated on ecological and technical innovations, with management based on a contract between the forest service and local woodcutters cooperatives.

The main contributions of Energie-II have been in scaling up of the FLUP project centred approach and achieving and a significant reduction of woodland management cost. It has also developed an improved fiscal policy, which taxes firewood from uncontrolled woodland exploitation more than firewood sold under agreement with the forest service, through the rural firewood market (Foley,G. et al, 1997). The market model was adopted on a much larger scale than in previous projects to both public and gazetted forest lands. On the regional scale, the Energie-II model is being adopted in Mali, Senegal, Burkina Faso and in other countries.

Three different rural firewood market models are analysed here. In all three cases, the issue is one of firewood commercialisation by local institutions regulated one way or another through the forest service. In Energie-II (Niger), the emphasis is on public land, in Kita (Mali) the project is mainly concerned with gazetted forest. In the Kelka (Mali), firewood production is exclusively done on public land. All three projects are pursuing the establishment of rural firewood markets for which the legal context has been created in the two countries, but they have different strategies and are in different stages of development.

Over the period 1994-97 the Kita project has established 48 rural firewood markets which, in 1996, have commercialised 10,710 stere of firewood, with a gross revenue of FCFA 17 million. The revenue accumulated over the project life time represent a benefit of USD 2 per inhabitant, against a project cost of USD 30 per inhabitant (10). This financial cost benefit ratio does not include indirect benefits such as capacity building.

The project has set up a system which allows local associations to benefit from the productive gazetted forests in this region, which has an average rainfall of 600-1,100mm per year (11). Kita is considered the first rural firewood market system functioning in Mali, but a part of the functions, including tax refunds, have been executed by the project instead of the state. The Phase III evaluation notes that highly profitable groundnut production is now the main threat to the forest, due to illegal forest clearing. It follows that firewood marketing opportunities do not stop local people from converting forest into agricultural land if they anticipate higher benefits from such alternatives.

Fifteen villages in the Kelka forest in Mali have been supported by the Near East Foundation (NEF) in order to appropriate the forest resources on village land, and in particular the commercial exploitation of firewood. An extensive household survey

carried out by NEF Mali in the 15 villages reveals the importance and dynamics of firewood markets (NEF Mali, 1997). The Kelka forest covers about 100,000 ha and is situated along the tarmac road north of the regional town of Mopti, which offers exceptional opportunities to urban firewood commerce. Over 40% of Mopti's domestic firewood consumption in 1998 came from the Kelka forest (CCL, 1999).

The firewood subsector is the most important revenue earner in the Kelka, but analysis of the 5 year dynamics shows that the volume is constantly decreasing, from 35,700 steres in 1992 down to 15,200 steres in 1996, representing a decline of 18-20% per year (NEF Mali, 1997). Firewood revenues fell from FCFA 64 million in 1992 down to FCFA 39 million in 1996, without allowing for the devaluation and inflation of the FCFA over this period. In the Kelka, although local forest management and related institutions have existed for a longer time, the rural firewood market approach is recent and is motivated by the need in Niger to legally strengthen the local institutions and to obtain the partial tax refunds typical of the market system.

Energie-II has led to the creation of 60 rural firewood markets in the Niamey basin which cover about 125,000 ha of forest and sold 75,000 stere of urban firewood in 1995. The gross income before taxes and other charges was FCFA 129 million in that year. The system is currently under pressure as donor funds have not been available since 1997, but the legal and tax innovations instituted with support of Energie-II have remained in place (Foley,G. et. al, 1997).

In all three projects, a main result of the rural firewood market system is that outside traders can no longer legally exploit local forest resources. Local exploitation is legalised under a contract between the forest service and local cooperatives, and the tax system allows for fuelwood tax refunds to local management institutions. The permit system enables individual wood cutters to purchase permits locally, so that costs are reduced. An important flow of revenues has been secured in villages by local stakeholders who have few alternative sources of income and tend to be of the poorer groups.

Management costs in the Kelka forest appear to be lower than in the other cases. This may be explained by the effective functioning of local institutions which existed prior to the rural firewood market system, and have been strengthened with project assistance over a long period of time. Local management in the Kelka is much more comprehensive than in the other two cases since local institutions assume responsibilities for guarding, enforcement, fining and intervillage cooperation vis-à-vis state agencies. None of these responsibilities are reported for cooperatives in Energie-II and Kita. Monitoring of rural firewood markets in Niger shows that illegal exploitation by outsiders is seen as a serious problem by local people, who consider that the forest service is the only competent institution to deal with this (Giraud,S.,1998).

An interesting aspect of the Kelka and Energie-II cases is that local forest management has been functioning for at least five years and various economic

indicators have been measured. The Kita experience is somewhat less relevant for the purpose of comparison, since it is situated in the Sudanian and Sudano-Sahelian zone, it has only been functioning since 1996, and forests are not locally owned. Table 1 makes a summarised comparison of the three projects.

The rural firewood market system has constraints which are not apparent from the table. Firstly, the tax differences created between firewood from a rural firewood market and uncontrolled exploitation elsewhere is not sufficient to compensate for the lower efficiency of the rural markets. In the case of Niger in 1993, the last year for which tax collection data are available, only 30% of the taxes due on firewood were collected, a figure which has probably dropped further since 1993.

In Mali, the tax collection rate was only 15-20% in 1997 (Konandji,H., pers.comm., 1998). This implies that the average taxes paid for uncontrolled exploitation may have dropped to a level which fiscally punishes rather than subsidises rural firewood markets.

Secondly, the returns from firewood exploitation remain low compared to opportunities for market oriented agriculture wherever such opportunities present themselves. In the case of Kita, important forest areas are being cleared for the lucrative peanut market despite the rural firewood markets. In Bankass, a study on forest clearing for agriculture demonstrates the economics of such conversion (Trench,P. et al., 1997). About 6,100 ha of forest, the size of a few village forests, has been cleared over the period 1992 to 1996 in the Sourou valley mainly for the cultivation of rice. The 1996 rice harvest was estimated at 5,276 tonnes with a market value of FCFA 615 million (USD 1.23 million), which is three times more than the gross annual revenue of the three firewood market case studies taken together, at no donor or government cost.

TABLE 1. Three different local forest management systems. n.a.= not available

ASPECT	**ENERGIE-II, NIGER**	**NEF MALI - KELKA**	**KITA, MALI**
Average annual rainfall	400-700mm	360mm	600-1,100mm
Population concerned	n.a.	10,000 inhabitants	30,000 inhabitants
Number of associations or firewood markets	60 (1995) (1)	15 (1992-96) (2)	48 (1996)
Forest under management	125,000 ha (3)	106,000 ha	various gazetted forests, area n.a.
Wood marketed per year	75,413 stere (1995)	24,617 stere (avge)	10,710 stere (1996)
Gross income before taxes & local charges	FCFA 129 million	FCFA 52.5 million	FCFA 17 million
Net annual income of wood cutters	FCFA 84 million	FCFA 47 million	FCFA 12 million
Taxes, charges, levies, etc. paid as % of gross revenue	34% excl. hired labour	11% incl.hired labour (4)	29% incl. repayment donkey carts (5)
Part of taxes refunded to village development	66% plus some funds for village woodlands	none but changes being prepared to this effect	in near future

Management cost (6)	6%	apparantly negligable	1.6%
Revenue per wood cutter, per year	n.a.	FCFA 43,969	FCFA 13,918 plus donkey carts for some (7)
Annual revenue from local firewood commerce	n.a.	FCFA 8.6 million	FCFA 3.5 million
Cost of project/year	USD 2.5 million	n.a.	USD 0.6 million

1. Limited to the Niamey basin, which represents 90% of the total.
2. In the case of the Kelka, this is identical to the number of villages, but not necessarily so in the other projects.
3. Figure derived from available reports.
4. The available figures do not allow to establish distinguish between taxes, levies, etc. and hired labour cost. Furthermore, village specific rates exist for levies (included in the data).
5. For those wood cutters who obtained a donkey cart on credit and thus have to repay. Details unknown. Hired labour is probably not included in the figure.
6. This cost is included under line taxes, levies, etc. It is a revenue for the local market manager.
7. For those who entered the credit scheme. Repayment details not known.

Rural firewood markets are a practical option if as in the case of Kelka a significant forest resource is available at a strategic geographic location with a good transport system. Clearly, the majority Sahelian forests do not meet these criteria. Even for the Niamey firewood basin the ambitious Energie-II plan was limited to 250,000ha of woodlands over a 10 year period, which is still only 18% of all woodlands in the basin.

The quota system may not be considered functional in silvicultural terms. In Kankani village, the model rural firewood market quoted in the World Bank technical report, the quota is unrelated to local forest resource availability and productivity. It is simply taken from the average for the given agro-ecological zone (Direction de l'Hydraulique et d'Environnement). Monitoring in Tientiergou, Niger, and in the Kelka, Mali, also indicates that a quota system may not guarantee sustainability (Giraud,S., 1998; Madougou,D., 1998, NEF Mali, 1997b).

Finally, the cost of market establishment and maintenance may be too high if it relies on support by external agencies such as the forest service. Establishment costs are estimated by Energie-II as varying from FCFA 1,270/ha to FCFA 8,440/ha depending on the type and size of market (Foley,G. 1997). Maintenance of the system depends on a complicated market and fiscal administration which may not be sustainable without external funding (Foley,G.,pers.comm.). The forest service is essential in guarding and enforcement, which further increases the cost. Many foresters continue to insist on active forest restoration such as tree planting, thus adding another cost element. In Mali, rural firewood market establishment is contracted to NGO's and private operators, which is expected to reduce cost, but control and maintenance remains with the forest service.

In the early 1990's it was observed that Guesselbodi provided a model, but that the approach adopted, radical though it had been, had not gone far enough. The costs were far too high, fuelwood produced could not compete on the market without a substantial subsidy, and ecological sustainability was at risk (Christopherson,K.A.,et al,1993). The lessons drawn in the early 1990's for Guesselbodi seem to be valid at the end of the decade for the rural firewood market: the social cost is high, the price of firewood sold in the markets may not be competitive, the delegation of control

from the state to local institutions has not gone far enough and ecological sustainability may be at risk. In addition the rural firewood market system captures only one part of woodland economic value and neglects the broad range of non-firewood products and services.

4.4 BROAD VALUES OF SAHELIAN WOODLANDS

In three recent studies (two carried out under this research project and one reviewed for it), a range of economic woodland values have been assessed. The methodological constraints in economic valuation are important because of interseasonal and interannual variations, the relevance of indirect uses and non-marketed uses, option and non-use values, and the sensitivities involved in forest exploitation. In the Kelka, one of the three cases, a questionnaire survey of 500 households has been used in order to evaluate the forestry, livestock, agriculture and artisanal sectors in 14 villages.

The two SOS Sahel case studies presented here have used complementary methods over a period of two years:
- Thematic PRA which includes resource mapping, product ranking, wealth ranking, group discussion and producer interviews.
- Household and market survey.
- Producer observation as a variant of participant observation, and monitoring of production by producers themselves.

The PRA approach created a positive rapport between local people and the researchers, and enabled villagers to fully understand research objectives. In data collection terms, PRA has been important to obtain a broad overview of the different stakeholders, products, markets, prices and priorities. It also allowed an appreciation of non-market values in relation to marketed products and services. Wealth ranking provided first insights in socio-economic differentiation between and within villages. Producers were identified to participate in research at a later stage.

The household surveys were very limited in sample size and in scope. Limited sample size allowed extension staff to take charge of data analysis and thus be able to do such surveys on a regular basis. The scope of the surveys was limited to issues which are neither controversial, (forms of tree cutting), nor sensitive, (wealth in cereals and livestock). In some villages, surveys have been repeated by local staff in the second year in order to capture some of the interannual variation. Market surveys were held seasonally to assess price fluctuations, volume and number of traders as well as their origin.

Forest utilisation was explored through monitoring of key producers and markets over two seasons. Producers were interviewed, and for some of the products, the production cycle was monitored. In other cases monitoring was undertaken by the producers themselves.

Producer observation is a useful step beyond oral data collection. It not only verifies information collected during discussions and interviews, but it also explores issues which are not easily discussed or which have been omitted. The technique is only possible if there is a positive, trusting relationship. It is a time consuming method so that a local researcher, may have to be engaged.

Certain productive activities such as wild fruit collection are problematic to research through recall or observation. Monitoring by local producers with assistance of a literate villager may be the only option. It has, for instance, not been possible to measure the amount of fruit collected and consumed before arrival in the village.

One-off surveys are usually characterised by a variety of frustrations and weaknesses, and longitudinal monitoring is preferred. The need for longitudinal monitoring means that local people such as extension workers and literate villagers have to be in charge.

Net revenues and net returns to labour have been calculated for the main revenue earning activities and total economic value is discussed. The household surveys have provided insights into the relative importance of the different sectors of the village economy. The concept of stumpage value may be defined as the residual value after subtraction of all exploitation cost and the reasonable profit of the entrepreneur from the sales price (Bertrand,A., 1993; Davies,J. and Richards,M., 1998). This has been used by some researchers, but may not be useful in the context of Sahelian forestry. Stumpage value assumes that the standing tree is a part of the market economy, which is rarely the case in the Sahel, where it should be seen as a part of the subsistence economy.

4.4.1 THE KELKA FOREST

The Kelka forest in the district of Douentza is customarily owned by 14 villages, supported by NEF Mali. In the Kelka, forest exploitation is the major revenue earner (48% of total), followed by livestock (33%), agriculture (10%), migration (6%) and others (3%), (figures based on a 5 year average 1992-96). In the forestry sector, firewood production accounts for 81% of this revenue, firewood trade for 15%, baobab leaves 3%, construction wood 1%. The average revenue of FCFA 58 million from forestry per year (1992-96) is very important, but it is rapidly decreasing at an annual rate of 19% over the 5 year period (NEF Mali, 1997).

However, looking at revenues alone greatly underestimates the size of the agricultural sector. The large majority of agricultural products are used for subsistence purposes, and do not appear in the revenue assessment. Using the local market price for cereals, the average market value of cereals alone is FCFA 260 million per year, or 4.5 times that of the forestry sector. This puts the relative economic importance of the agriculture and forestry sectors in a different context. The size of the livestock sector is probably underestimated in that nomadic

pastoralists use the Kelka forest, but are not incorporated in the survey, except for the Peuhl livestock "resident" in some of the Kelka villages.

Forestry products are also partly used for subsistence. However, only 4.2% of firewood produced is for subsistence, the remainder is for sales. Subsistence production plays a more important role for other forest products, but such products only make a small contribution to the forestry sector of the Kelka.

The interaction between the agriculture and livestock sectors follows the pattern of reduced sales from livestock at times of good agricultural production, and vice versa. 1994 was a year of outstanding cereal production, almost double that of other years. In the same year, cattle sales dropped by 48%, and small livestock sales by 59% of the average sales over the four years which had relatively poor agricultural production. Forestry revenues do not appear to be visibly influenced by the agricultural production for a given year. The steady decrease of firewood revenues is explained by exhaustion of dead wood stocks which originate from previous droughts.

The study does not mention non-market and non-use values. Some of the indirect uses such as grazing and browsing have been mentioned, but it is not clear to what extent livestock values depend on the Kelka forest. It is not clear how reliable livestock ownership data is, nor how reliably respondents have been able to recall production and sales information over the five year period. The methodological description of the study is minimal and it is not clear whether any data corroboration has been carried out. Nevertheless, it is clear that the firewood subsector is economically very important though rapidly decreasing. In 1998, the Kelka supplied 41% of the firewood consumption of the regional town of Mopti, and the figure is probably much higher for the period 1992-1996 (CCL,1998).

4.4.2 BANKASS

In the district of Bankass, not far from the Kelka, woodlands on the Bandiagara escarpment are mostly owned by Dogon villages which have been founded in the Seno plains in a process of linear migration (Gallais,J.1975). SOS Sahel UK through the Bankass Environment Project (BEP) has provided assistance to the villages since 1993 and economic monitoring of forest exploitation has been done in five villages over the period 1997-99.

A thematic PRA done in 1997/98 provided the general overview of the key stakeholders present in the area:
- the agricultural village of Tyi, which customarily owns about 1,900ha of the scarp forest. Villagers do not depend on it for revenue, except for fruit collection by the women, since they have important alternative income from dry season gardening.
- The agricultural village of Kobo, which owns a neighbouring part of the forest and heavily depends on the scarp forest for dry season revenue.
- The Peuhl herder settlements of Wini and Jile, who depend on the scarp forest resources for wet season livestock production.

- Artisans in the villages of Kobo of Dounde, who need the scarp forest for supplies of raw material.

The PRA also showed that various environmental and spiritual values were equally important as some of the direct uses such as hay and firewood. Dry season gardening, for instance, is perceived as highly dependent on the steady streamflow from small canyon forests which are well protected against exploitation. In both Kobo and Tyi, spiritual sites are used by people from distant locations as far as Bamako and Ivory Coast, who seek benediction.

The study did not attempt to put money values on any of these non-marketed categories. Spiritual values are linked to the fetish which is clouded in secrecy and thus hard to investigate. The Travel Cost method may appear useful for visitors to sacred sites, but the kind of monitoring system needed for this method cannot be reliably established in this particular cultural context. Market production has been monitored for firewood, various kinds of construction wood, furniture and other artisanal products and for wild fruits. Livestock production has been studied but the outcome is of limited use due to wealth related sensitivities and other complications.

Agriculture is the most important economic activity in subsistence terms for the farming communities of Tyi and Kobo. The household survey data on cereal production is unlikely to be reliable since the head of household, who is in charge of the main millet granary, is rarely willing to provide accurate information, particularly when there is a surplus. A conservative assumption is that the Seno plains are generally self sufficient in cereals. Based on standard cereal consumption rates and market prices of cereals, it is evident that despite modest revenues agricultural production is the main economic activity.

In Tyi village, dry season gardening is an important source of revenue for most households, with an estimated average net income of 59,000FCFA/producer for the 1999 season. In the other villages, dry season gardening is negligable since water is not easily available. In Kobo, forest exploitation and processing are important for 62% of households, with more or less similar proportions for the different wealth classes. The estimated net annual revenues for the most important revenue earning forest exploitation and processing activities are for the 1999 season:
- construction wood for producers with carts 56,000FCFA
- construction wood for producers without carts 14,000FCFA
- bed and stool makers 85,000FCFA (see annex 1 for details)

Except for some of the bed makers and a few artisans, forest exploitation is limited to 3-5 months of the year during the dry season after the harvest. Many of the households who are engaged in forest exploitation claim this activity allows them to pay their taxes and purchase cereals to make up for the deficit. Wealth ranking in Kobo shows that forest exploitation is quite evenly distributed over the socio-economic categories. About half of the households in the category "poor" are not engaged in forest exploitation nor do they have significant alternative sources of income. Such households are characterised by lack of labour, i.e. households of 3-4

members (incl. children), as opposed to 7-8 members for families engaged in forest exploitation. It appears that the very poor are not able to exploit the forest resource for income generation, but the poor with some available labour depend highly on forest exploitation in order to avoid extreme poverty. Extreme poverty is locally defined as not being able to pay taxes and having to beg food from the neighbours.

The poor category in Kobo also has an above average share of construction wood producers without carts. Interviews and producer observation enabled estimation of net returns to labour for the three major wood cutting activities for the 1999 season:
- construction wood production without carts: 77FCFA/hr
- construction wood production with carts: 288FCFA/hr
- bed production: 167FCFA/hr

The first category has the highest frequency but also the poorest return to labour, and half of the producers included in the sample were considering pulling out. All sampled producers without carts are in the category "poor" of the wealth ranking.

Commercial firewood production is rarely practised. All the construction wood producers in the sample stated that the benefits are too low. This is corroborated by the market survey which shows that the volume of firewood sold in the weekly markets is minimal and the number of firewood sellers is much smaller than e.g. sellers of wild foods. An interview combined with producer observation with a woman who was a professional producer suggests that net returns to labour are 40FCFA/hr, a rate which is satisfying to her but which would apparently drive the men out of business.

In the PRA fruit production was ranked by the women in agricultural communities among the most important uses of the forest. In Tyi village, the household survey suggests that richer households are more effective producers than poor households, given that they produce 5-10 times more than their poor neighbours. Monitoring of all fruit brought home daily by four households for the 1998 wet season, corroborated with market surveys, allowed an estimation of the market value of the fruit. Women brought home on average 3,700FCFA/household(see annex 2). Although the amount is modest compared to the income from gardening or from construction wood, it is high if compared to income from firewood, and to other sources of women’s income.

Livestock has a buffer function, it is sold in years of poor agricultural productivity in order to purchase food. In years of good crop production, crops are sold and livestock is purchased. For the two Peuhl communities in the area, livestock rearing is the principal economic activity, but household and producer surveys have not been held in these communities and another tool has been used instead. Much of the Dogon cattle is managed by the Peuhl “attached” to the Dogon community concerned. Seasonal movement includes dry season grazing in the Niger delta.

In Tyi, livestock production has been evaluated using veterinary service statistics, which are more reliable than the administrative statistics which are the basis of taxation. Livestock is valued using the local market prices and an average sales rate,

which is a simplification given that livestock may have other values, at least for the Peuhl. Milk sale, for example, has not been included in the evaluation. The volume of livestock sales is based on a standard rate which the Livestock Department in Mali has established at 10% of the herd size. Another rate is applied to herd size increase in most years, with losses occurring during drought years. When applying the local market rates, the 1997 livestock production value in Tyi, which does not distinguish between Peuhl and Dogon livestock, is thus estimated at 4 million FCFA. Livestock depends on the scarp forest resource for about 3 months of the year so that the contribution of the scarp forest to livestock production in this village may be estimated at a quarter of this value (3 months out of 12), i.e. 1 million FCFA. This is an estimate of the sales and not of the residual value, since the cost of production have not been subtracted.

The herders do not pay for access to the scarp forest as a grass and browse resource. They do pay for access to dry season browse in the form of F.albida branches on cropland, which is negotiated between herders and the local forest management institution rather than with individual farmers.

When combining the various sources of information, forest resource exploitation for income generation may be ranked approximately as follows for a local forest management unit of 10 villages (*Alamodiou*) in this area:
1. Livestock
2. Construction wood
3. Fruit and edible flowers and leaves
4. Furniture
5. Other artisanal products (mortars, tool handles, etc)
6. Firewood
7. Hay.

Ranking based on revenues does not take the subsistence economy into consideration. Firewood is accorded a much higher priority in PRA ranking than in the analysis of revenues. An important part of the fruit is not sold but consumed, a part of the construction wood is collected instead of bought, and local medicine is collected but not sold at the weekly market. It has not been possible to estimate the volume of the major subsistence products and if it had been, valuation would have posed another constraint. Neither has any attempt been made to value the important environmental services and spiritual uses of the forest.

The limitations on the study preclude an overall resource valuation in market terms. The household survey simplified socio-economic relations which are much more complicated the concept of household. All the same, some conclusions can be drawn from socio-economic monitoring over a 2-year period in these villages:

1. The economic benefits of the forest resource are spread over a wide range of sectors such as livestock, food, construction wood, artisanal production and domestic energy. No single economic activity dominates at the scale of the local

forest management institution, although specialisation certainly occurs at the level of individual households and villages.

2. A high degree of specialisation in forest resource use may exist between communities, characterised by extensive trade relations between them. It is probably in the economic and social interest of individual villages not to monopolise forest resource use on their customary territory, but instead to support an “economic community” and leave resource regulation to the supra-village level management institution (*Alamodiou*).

3. Socio-economic differences within the village have an impact on forest resource exploitation. The better off families with more available labour and capital are more effective and efficient at exploiting the forest resource. The forest is particularly important for households which have few alternative income earning opportunities. The poorest households hardly capture the benefits of forest exploitation, due to lack of available labour.

4.4.3 KORDOFAN, SUDAN

Much of the El Ain area in North Kordofan is situated in the northern Sahel, with an average annual rainfall of less than 300mm. Woodland management in the area has been supported by SOS Sahel (UK) since 1989. Due to the arid conditions, both agriculture and livestock are marginal income earning activities. This area has a very poor economic status. Food-for-work is a common intervention and migration is widely practised in which entire villages may leave during the dry season. In 1998 and 1999 small household surveys were held in three villages (n=56) complemented by a PRA and market and producer surveys.

The results show that the woodlands provide a very modest contribution to overall household revenues, 11% in the most positive case. In all three villages, households classified as "rich" (average 12% of village households) spent more on woodland products than they earned from them. Rich households buy woodland products from the poor, who constitute the majority of the village population. The poorest people, due to lack of labour, do not have the capacity to exploit the woodlands to a significant extent. The figures confirm those of another survey held in North Kordofan, which suggest that natural resources make up for 8% of household revenues for the year of research. All of these surveys were held in years of fair to good rainfall, and it is most likely that in years of poor rains and crop failure, the share of the natural resources sector in household revenues rises steeply. The natural resources revenues exclude livestock production, which is seen as a separate economic activity, although it is clearly dependant on natural resources. They also exclude most of the artisanal activities, which depend partly on natural resources.

The variation between individual households is high and therefore the average does not reflect individual interests. A small number of households depend almost entirely

on income from the sales of construction wood, charcoal, fruit, etc. although subsistence agricultural activities normally interrupt these professional activities. A number of artisans who produce rope and furniture also depend almost entirely on these activities for income generation.

During the reasonable good rains of 1997-8 rich households had a surplus agricultural production, poor households had a deficit, which is the normal situation for this socio-economic group. The rich households have not sold much of their livestock, except for those with unusual cash constraints. In years of poor crop production, livestock and natural resources are the most important economic activities for those who do not migrate during the dry season.

The volume of marketed woodland products is distributed as follows for the 1997/98 season:

1. Construction wood	43%
2. Charcoal	38%
3. Fruit	11%
4. Firewood	2%
5. Other (incl. gum)	7%

In the subsistence economy different priorities exist which have been studied using PRA tools. Firewood, perfume, grass, furniture, construction wood and tools are amongst the most important woodland related uses. They are hard to quantify but in the case of construction wood in one village, estimates based on the number of buildings and their useful lifetime, suggests that subsistence production is in the order of 3-6 times more important than the marketed production. The value of subsistence plus marketed construction wood can be estimated at USD 37/ household/year. In this estimate, subsistence construction wood has been valued at the same rate as marketed construction wood.

The cost of production is negligible in most of these categories. However, a form of taxation is imposed by the forest service in the order of 5-10% of the value of wood products offered at the weekly market. The official forest product taxation system is not functional in rural areas. As transport costs incurred to obtain the permit at a distant government office is usually higher than the anticipated gross revenue, people take the risk of woodland exploitation without a permit. The forest service in need of financial resources raids the markets from time to time to collect taxes.

A comparison of forest product utilisation rates and standing stock has been made for some villages. While productivity studies have not been done, an estimated sustainable productivity rate of 7.5% of standing stock suggests that most village woodland reserves cannot meet demand. Either the non registered woodlands will continue to play a major role in provision of wood products, or villagers will have to purchase products from elsewhere, and/or change consumption patterns. These different scenarios have been observed among the village forests in the project area. In villages with extensive woodlands outside the registered village forest, they have a

high level of protection. In villages with modest reserves outside the registered forest, people fear that these reserves will soon run out. In villages without any significant natural resources outside their registered forest, traditional consumption patterns have already changed; for example they now construct banco houses (made from materials purchased from distant places) instead of houses made from local materials.

The Kelka, Bankass and North Kordofan case studies demonstrate the variations found in the Sahel. The Kelka is strongly influenced by the urban market opportunities and the rural firewood market, which although very different from the Nigerien concept, is a relevant system. This is not so in the other two cases, where firewood is of minor importance in the market economy. These two cases also demonstrate the variability which can be found between villages and between households in terms of household revenues derived from the forest. In Bankass, an economic community of a large group of villages makes sense given the intervillage specialisation, in Kordofan villages operate as autonomous units with intravillage specialisation.

It has not been possible to measure the effect of rainfall and agricultural productivity on the forestry sector, since 1997 and 1998 were both years of good rainfall. It is assumed that in years of poor rainfall, the relative importance of the forestry sector is high in comparison to other sectors.

4.4.4 LIVESTOCK ECONOMICS

Valuation of the livestock production function of the forest is difficult in the case of animal rearing by the settled population and still more difficult in the case of nomadic and transhumant pastoralists. The main conceptual problem is how to measure the residual value of the forest resource as a factor of livestock production. Practically this is constrained by getting access to mobile pasotralists and local sensitivity to sharing information on livestock which is related to taxation and wealth attributes of livestock.

There are examples of commoditisation of the grazing resource, especially in the Niger delta, where range ownership and livestock production are very distinct (Diakite,C.N.1993). Herders pay for access as a function of the number and type of animals and number of days. But the residual value concept seems to be of little use to the three case studies and probably to most situations in the Sahel, where access to range is more or less free, although dry season water is often paid for and numerous other obstacles exist which raise the cost of livestock production.

In the Kelka and Kordofan case studies, livestock estimates value locally owned livestock and not the forest resource as a livestock production factor. In the case of Bankass, livestock is kept in the forest during the rainy season and is fattening during that time. It is possible, to provide a value of the forest as a factor of livestock production equivalent to the amount of time livestock spend in that particular forest.

However, this does not attempt to value the forest as a factor in livestock production under different forest management regimes, e.g. state control until 1993, and management by local institutions since 1993.

In the case of Baban Raffi forest near Maradi, Niger, an estimation of livestock value, based on a 5% annual offtake, is FCFA 85 million. This is about 3 times as much as revenues from the 22 rural firewood markets of this forest at the time(Paris, P.,1994). No attempt is made to estimate the impact of different management regimes in Baban Raffi, but it is observed that clearing for agriculture and wood cutting are the two major threats to sustainable livestock production. A study in the Tientiergou forest in Niger, which has a highly profitable rural firewood market, found that even the firewood producers see livestock production as their first economic concern (Madougou,D.1998).

The only available assessment of economic impact under different forest management regimes is from the Day forest in Djibouti. In the project area and in control areas where the project doesn't work, the productivity of different landuse zones inside and outside the forest has been assessed. The effect on nomadic livestock production has been estimated through various economic techniques (Nessim,J.A.; Richards,M.1994). Major methodological constraints appear to be:

1. Project interventions include deferred grazing, establishment of fodder plots, etc. Assumptions are made about increased forage availability over a 30 year period, but this may be unrealistic in the light of the problematic experience of such interventions with regards to institutional sustainability. The study itself notes that generating timely physical estimates of environmental change is a major analytical weakness.

2. Since market values of forage do not exist the assumption is made that the price of sorghum can be used to construct a market with a price based on sorghum importation and transport cost, with a 30% increase to correct for lack of digestible protein in sorghum. It is argued that pastoralists would have no other alternative but to buy imported sorghum in the case of continued environmental degradation. Which appears highly artificial as an assumption.

Even if it were possible to value livestock production under different forest management regimes, additional complications arise. Forests have a nomadic livestock emergency function during serious droughts and they can be a strategic resource when trekking between dry season and wet season grazing areas. The amount of fodder of such forest may be modest in terms of average annual requirements, but may have a key function in the sustainability of the overall pastoral livestock system.

An increasingly important aspect of livestock economics is the cost of fines and damages paid to farmers and to the administration, in the case of livestock intrusion into agricultural fields. Various authors assert that the fines imposed on herders have become so high that farmer's income from fines may be more important than the value of the crops, particularly if situated on livestock corridors. Other forest uses

such as wood cutting, pruning and pollarding may be surcharged through confiscation, taxes and fines. Unlike agriculture, livestock production and modest levels of tree cutting are sustainable forestry practices. It is ironic therefore that relatively sustainable forest exploitation is taxed whereas clearing for agriculture, is rewarded by fiscal policy and practice and as a result of land use and tenure regimes. The cost imposed on sustainable forest utilisation may stimulate woodland conversion into cropland, even though the combined value of forest and livestock products and services may well be superior to that of agriculture, at least in the northern Sahel.

The conclusion for livestock valuation of the Sahelian forest under different management regimes is that there are no widely accepted methods available. Livestock production as a function of the forest resource is often undervalued or simply neglected in many projects. The few studies available on livestock values in the forest environment suggest that livestock is important, and frequently more important than any other single forest product.

4.5 COST OF FOREST MANAGEMENT

None of the study projects or case studies have themselves systematically assessed the cost of local forest management. Project decisions tend to be made by budget considerations (is there a budget line ?) and by the need to achieve the project outputs in the logical framework. Under the project approach cost implications of a policy intervention to society, to local communities and to individuals are not often analysed. Local forest management may have very different cost implications at these levels, such as:

-individuals: fines and confiscation due to changed management
-communities: meetings, surveys, boundary demarcation, guarding, court case follow-up.
-government/donor: forest inventories, extension services, policing.

Table 2. Cost of establishment for a 2,000ha village forest

Rural firewood market establishment, Niger	1.1 average 5,000FCFA/ha: 10million FCFA
Village forest registration, Sudan	2.1 7,5 million S£/village forest plus indirect cost (n.a.): 15,150US$
Fireline establishment, Sudan	3.1 1FFWday/ha: not practised in other cases: 1,500US$ for a 5*4km shape forest
Rehabilitation: - nursery - transport - planting - fencing or guarding, and possibly replanting	As a rule, cost far too high for large scale implementation

Sources: 1.1 Foley,G. et al.1997. 2.1 Kerkhof,P.1997 and Kerkhof,P.1999 3.1 Kerkhof,P.1998, based on a village forest of 4km*1km(400ha) and standard food-for-work rates and conversion to S£ based on dry season market rates.

The various models of local forest management are so different that cost comparison between the models is of limited use. Such comparisons nevertheless are nevertheless indicative for the potential of scaling up. Available figures are presented

in tables 2, 3 and 4. Total project cost per forest or per community yields another indication, but it does not separate out the non-forest management components (*mesures d'accompagnement*), research and policy development, etc.

Table 3. Cost of maintenance

1. Rural firewood market: 1.taxation + refund system 2.local market manager 3.forest service policing, 4.quota revision, resource monitoring	 1.Unknown. Taxation is poorly functioning in Niger and Mali 2.6% of sales 3.personell, operational cost 4.only with donor funding
2. Full local management: 1.communication, meetings 2.guarding and enforcement	 1.15,000FCFA/village/yr (24US$) 2.25,000S£/village/yr or 10,000FCFA/village/yr (avge 28US$)
3. Standard forest inventory	22 mio.FCFA/forest of 83,000ha estimated equivalent at 2.5 mio.FCFA/village forest of 4,500ha e.g. frequency once per 5 years. 358US$/village forest/year
4. Participatory monitoring systems 1.Local product inventory 2.Panoramic photography	1.65,000FCFA/village forest of 1,000ha 2.83,000FCFA/village forest of 1,000ha in either case, e.g. once per 5 years
5. Policing by forest service	Cost to local communities 100,000FCFA/village (161US$) plus individual fines or 5-10% of market sales in Sudan

SOURCES: 1.mostly based on Foley et al,1997 2.1 estimate mainly based on written accounts of Assaga Anda *Alamodiou*,Bankass. Cost are lower for small management units. 2.2 Assumes that cost are equal to average income from fines and/or local taxes, figures based on written and oral accounts.

Table 4. Overall project cost per unit of local management

PROJECT TITLE	COST PER VILLAGE OR MARKET	COST PER HA
ENRGIE-II - ENERGIE DOMESTIQUE PHASE I, NIGER	141,000 USD	96 USD
NFM PROJECT, SUDAN		
PAGE BANKASS, MALI		
KITA, MALI	52,000 USD	n.a.
NEF DOUENTZA, MALI		

These cost data do not clearly illustrate the human resources requirements. Relatively complex data collection or data management systems such as GIS and GPS, used in Energie-II, require trained human resources. Two different cost models may be construed:

1) highest possible cost model: directed firewood market with quota based on regular standard forest inventories, combined with a high level of policing and monitoring by the forest service, and with investments such as tree planting.

2) lowest possible cost model: local institution covering 10 villages making, applying and enforcing rules without formal quota, management plans and taxation systems, and without investments and codified monitoring.

The highest cost model is highly realistic in terms of present policies, institutional and legal framework. Any project proposal based on this model would be highly acceptable to the administration and to the forest service in particular. However, it carries a prohibitive cost in financial and human resources terms. The lowest cost model is financially highly feasible but can only be realised in the presence of a development agency which has sufficient weight to create an artificial policy environment in which local management can thrive, and is thus costly in an indirect manner.

A cost benefit-analysis may be attempted on the basis of available data on the revenue flow from woodlands under local management, combined with cost data available from different management regimes. Socio-economic studies from two different areas provide estimates of revenues from the forest resource (see annex 2):

Kelka, Mali:	4.900,000 FCFA/village/year
Bankass, Mali:	1.500,000 FCFA/village/year

The estimates do not include subsistence products, environmental services and non-marketed values such as option values and bequest values which have surfaced in the PRA. Two cost models may be formulated which are based on actual practice:

1. A high cost model based on the cost of forest management under the firewood market model with quota system, monitoring and policing by the forest service, but without forest rehabilitation measures. For a 2,000ha village forest the cost estimate is 10 million FCFA. The estimates for maintenance vary greatly with a minimum of about 400,000FCFA/yr to over 2 mio.FCFA/yr if donor cost (table 4) are incorporated.

If this were applied in the Kelka, the cost would be 8%-40% of the total revenues, in the case of Bankass cost would be equal to total revenues, and in El Ain the cost of the management system would largely exceed revenues from the forest. The cost to villagers' time is not included but it is relatively modest since many of the management functions are the responsibility of the forest service.

2. A low cost model has no establishment cost of any significance. It involves meetings, communication, guarding and enforcement cost in the order of 25,000FCFA/village/year for a large management unit, and perhaps double that for a small management unit. If local product inventory and panoramic photography were to be added, 31,000FCFA/village/year should be included. The total management cost range is 25,000FCFA - 81,000FCFA /village/year. For the three case studies this is in the order 1-10% of the total revenues. Cost calculations are limited to financial cost and do not include the villagers' time. This model is only possible on a large scale in a policy environment which favours local governance.

4.6 CONCLUSIONS

1. The majority of economic studies in Sahelian local forest management deal with specific sectors or subsectors, in particular firewood. There are few studies which present a quantitative evaluation of the broad economic interests of local people in the forests they manage. Studies which analyse the interests of the different socio-economic strata are rare, and none of the available studies have valued the forest economics of both farming and pastoral communities.

2. Forest exploitation is hard work and is generally avoided by those who have alternative, sources of income. Exploitation of locally managed woodlands benefits the poor more than other economic groups. The poorest group, however, may not have the means to exploit the woodlands for the generation of significant revenues. Forest exploitation is often considerably more efficient if tools and equipment are available such as donkey carts, and if wood cutters are well organised. Those with access to some capital and labour exploit the forest more efficiently.

3. Economic activities tend to be opportunistic, especially in the northern Sahel. Opportunism is recognised as a characteristic of nomadic pastoralism, but it is equally characteristic of farming communities, in their own way. Crop production is highly variable and it is often inadequate for the majority of farming families. A range of complementary economic opportunities are seized such as temporary or long term migration, food for work, herding and forest exploitation or processing. This is not to say that all commercial forest exploitation is opportunistic. A small group of professionals have an established pattern of forest exploitation and processing.

Income from forest exploitation may fluctuate considerably as a function of crop production and other economic opportunities. The implication for forest management is that such management should respond to opportunism. The imposition of an annual yield or quota based on silvicultural considerations does not make sense since it does not respond to fluctuating economic needs. Firewood projects should not be surprised if they find that local wood cutters do not meet the annual quota, or surpass it.

If society requires gaurentees of forest sustainability, it makes more sense to establish long term ecological indicators such as minimum environmental standards, rather than short term silvicultural indicators.

4. In some cases, woodland exploitation offers important urban market opportunities. In these cases, a reasonable level of management cost seems to be acceptable. In the large majority of woodlands, however, revenues are very low and local management cost should be kept at an absolute minimum to avoid driving many poor people who use the forest into extreme poverty.

Many forest management packages are costly in financial and in human resource terms. They are particularly costly in comparison to the benefits of forest

management under most conditions. Various cost minimisation opportunities can be suggested:

- Leave delineation of woodland boundaries to villagers and customary authorities and/or representatives of local government.
- Abandon the "scientific" quota system and leave quotas to local institutions. Also leave forest inventories and other forms of monitoring to villagers. The administration may want to use remote sensing information, GIS and other tools to monitor long term changes, the cost of which should not be charged to local forest management.
- Drop any pressure on local management institutions to make investments in forest restoration (*amenagement*). Whilst this is an old recommendation many projects still make such investments or plan to do so.
- Encourage local institutions to undertake guarding and enforcement. Cases which cannot be resolved locally will be dealt with by the administration and the justice system.

The quality of local forest management should not be measured by the principle of sustainable maximum wood yield. Different communities make different choices based on dynamic values and needs, economic or otherwise. Some villages establish exclusive user rights over a part of their woodlands, whereas others share their forest resources with neighbours. Some impose strict forest conservation measures, others may prefer gradual conversion into an integrated landuse system of forestry, livestock and agriculture, a mixed landuse system which often makes most sense.

METHODOLOGICAL ISSUES

The methodological constraints in Sahelian forest valuation are numerous, and are due in particular to the complexity of livelihood systems and cultural diversity. Economic comparison is constrained by variable definition, and sometimes studies do not explain how measurements have been made. In some studies, livestock, forestry and artisanal production are seen as different, in others they are seen as integrated since they concern the same natural resource. The Bankass and Tyi studies suggest that the keys to sound methodology are:

1. Good relations between researchers (or project staff) and local stakeholders. For example, the relationship between the Sudanese project and the forest service, has constrained relations between researchers and local stakeholders, which enthusiastic PRA and a lot of patience did not significantly change. In Bankass, the clear institutional distinction between project and the forest service enabled the necessary positive rapport for producer observation.

2. A regular presence instead of one-off surveys. This is only practical if local staff are capable and motivated to monitor socio-economic change, and methods are adapted to local capacity. For example, household surveys which can be analysed with a pocket calculator instead of SPSS. The usual statistical analysis of variance

cannot be applied, but the results may be more reliable than those conventionally produced.

3. Corroboration through a range of methods which may include PRA, wealth ranking, household and market surveys, producer surveys and observation of the production cycle. This confirms conclusions drawn by other researchers, who did a detailed comparison of PRA and household survey in natural resource valuation (Davies,J., et al., 1999).

5. NATIONAL INSTITUTIONS AND LEGAL FRAMEWORK

5.1 INTRODUCTION

In sociology a distinction is made between an organisation and an institution. An organisation is a distinct body with a legal identity such as a line Ministry, set up to achieve certain objectives, while an institution is more than an organisation: it includes structured and persisting patterns of norms, behaviour and relationships, put into practice by organisations. It includes formal rules underpinned by law as well as informal rules which are usually supported by ideology (Bass,S. et al., 1998). This report uses the term institution for both institutions using formal laws and those using informal rules.

The national level institutions which bear an impact on local forest management are defined by law, by policy as a principle of action, and by a mission which can be expressed in norms, behaviour and relationships. Despite the ethnic, linguistic, geographic and climatic diversity in the Sahel, dominant trends can be determined. Institutions and law appear to be relatively durable phenomena in forestry as opposed to policy, of which numerous versions are adopted and discarded.

In the 1990s numerous forestry policy initiatives were taken in order to integrate new objectives, in particular to improve participation and integrated resource management in the direction of joint forest management. The forest service has had to cope with many new policies. This led to policy inflation contrasting with a reduced capacity for implementation consequent on structural adjustment. Rather than merely cutting back on resources Institutional reform of the forest service is considered necessary, while learning from experience in other sectors.

A contrary argument holds that the objectives of local forest management are so different from those of the forest service, that the two should not be joined. The forest service has the capacity to protect and manage national forest reserves, which should be considered as a structurally different task from natural resource management by local communities. The implication is that capacity building in institutions other than the forest service is required.

Nevertheless, the forest service is presently the major institution at national level. It is backed up by a legal framework and it is responsible for much of the policy making in the sector. However new multisectoral institutions emerged in the 1990s and are assuming some responsibility, these include environmental agencies at national level and elected government at local level.

5.2 THE FOREST SERVICE

While organisations in the public or in the private sector may not have the persistent patterns of norms, behaviour and relationships characteristic of institutions, sociological studies in various countries suggest that such characteristics do exist in the forest service. Foresters have traditionally been trained to become the guardians of the forest, with a specific jargon, set of codes, symbols and culture.

The very beginning of forestry may be traced back to medieval Europe, where kings and other notables created the job of managing the forest estates (e.g. Gerner,H.,1998). There was no forestry education but, as far as written records go, these people became the first professional foresters of a kind. Their main interest was protection of the forest against the commoners, an aim which they pursued by vigorous means.

The more contemporary form of professional forestry is seen to originate from Germany from where it spread to neighbouring countries in the 19th century, and subsequently to Africa (Shepherd, G., et al.,1998). A comprehensive sociological study of the German forester gives an insight of the strong socialising character of the profession and its education system at the time (Heeg,B., 1972). While these characteristics have undoubtedly been modified in the various countries, the forestry services in the Sahel have maintained some of it.

In the francophone Sahel, the colonial government established the forest service as a quasi-military institution, in the traditions of the French forest service, *Office National de Forets (ONF).* In the ONF, foresters still carry firearms and are subject to military hierarchy, and so do the Sahelian counterparts. The current organisation or the Nigerien forest service is presented as an example in Table 5. In Sudan and other countries with a British colonial history, the military character and espirit de corps is less pronounced although foresters may also carry firearms.

Table 5. Military hierarchy in the Nigerien forest service (Madougou,D., 1998)

Category	Class	Corps	military rank		
A	1	*Ingénieurs*	Commander	Lieutenant-colonel	Colonel or General
	2	*Ingénieurs Techniques*	Captain	Commander	
B	1	*Conseiller Forestier*	under-Lieutenant	Lieutenant	

	2	*Contrôleur*	Deputy-chef	Aspirant	Underlieu-tenant
C	1	*Agent Technique*	Sargent Major	Adjudant	
D	2	*Préposé*	Sargent	Sargent-chef	
E	1	*Garde*	Brigadeer	Brigadeer-chef	

Regulation of commercial forest exploitation was legally attributed to the forest service. Although protection of trees and forests against local people, i.e. the policing function, was the basic preoccupation. A major legal instrument was gazettement, through which local rights were abrogated in order to establish state forest reserves. Another instrument was the forest exploitation permit system, which was applied outside the gazetted forest. One peculiarity of the forest policing system is the distribution of a part of the fines to the foresters, a characteristic which dates from the medieval European system. The system of distribution in Niger is presented in table 6 as an example.

The dominant political ideology in the newly independent states of the Sahel was marxist or socialist. The land and much of the forest resource was essentially appropriated by the state and by the forest service as the competent authority in the forest estate. The authority of the forest service was thus increased to include all forest exploitation, be it for commercial purposes or for subsistence, though some access to forest byproducts remained in place for local users.

Another change in the forest service was brought about by the major droughts and subsequent flow of development assistance. This introduced policy innovations such as support to tree planting and management outside the forests, renewable energy, desertification control and popular participation. It lead to some reform in the forest service and to a change in attitude, at least among the more progressive foresters. It also extended the authority of the forest service into the kitchen, where Malian foresters, for instance, used to fine villagers for not having improved stoves. Furthermore, additional financial resources helped to execute the policing functions more effectively. Deforestation and Firewood gap hypotheses prevailed in the 1970s and 1980s (Foley,G., 1999). This put a further emphasis on certain forest values and subsectors at the expense of others.

Table 6. Redistribution of fines collected by foresters, in the case of Niger (Madougou,D., 1999).

Beneficiary	Percentage of fine paid out	Repartition of sum paid out
Agent and possibly assistant	10%	40%
Forestry staff in local district	4%	16%
National directors	03%	12%
Central directors and deputies	02%	08%
Chiefs of central services and their deputies	02%	08%

Other forestry agents in headquarters	03%	12%
Forestry staff attached to Minister (*Conseillers, Secrétaire Général*, ...) and elsewhere (DEP, DAAF)	01%	04%
Total	25%	100%

The Forest Codes tended to define broad legal terms while the elaboration of their application through rules and regulations (*Voie Reglementaire*) was to a large extent left to professional foresters. This led to excessive control. Clauses on collective guilt remained in many forestry codes, making accessories to forestry crimes equally culpable with the perpetrator. This clause has been widely abused leading to annual fines for whole villages, a practice which was still reported in 1999. Recourse in disputes between local people and Forestry Agents was in many cases only to the Forestry Director (Ribot,J., 1995).

In the 1990's the trend of a widening domain and increased authority of the forest service has been reversed, in part as a consequence of macro economic policies such as structural adjustment and through decentralisation and increased democracy. Also, as the impact of the forest service on rural people has been recognised as excessively negative in some countries their authorities have been curtailed by government.

Considerable differences have emerged between the Sahelian countries. In Sudan, the forest service (FNC) is authorised to regulate all forest exploitation, apart from by products, through a permit system including production on village and private woodlands. “Forests” includes all trees and shrubs. The 1989 Forest Act supports the establishment of village woodlands with land titles accorded to the community, however exploitation is controlled by the FNC through a management system, and through a permit and tax system for commercial exploitation.

The FNC is self-financing at the State level. North Kordofan State, for instance, has few productive forests and much of the income is derived from taxing and fining villagers and traders. The tax on forest products is variable but villagers often avoid obtaining permits as they find the transaction cost higher than anticipated revenues from forest exploitation so that they avoid obtaining the permit. In order to maintain the flow of revenues, the forest service regularly confiscates forest products at markets and along roads.

Sudanese forestry policy is to turn 25% of the national territory into a forest reserve, up from 15% in the 1980s. Presently only a minor fraction is gazetted. Given that almost all forests in the gazettement process are state forests rather than community forests, the policy effectively implies expropriation of most traditional community forest resources, used by farming communities and pastoralists. About 96% of the professional cadre are foresters and only 1-2% have social and environmental science qualifications (Adil M.A., 1999). It is obvious that the FNC is driven by the ideology of forest control and protection as well as financial extraction introduced by

the colonial forest service. But under the present dynamics of decentralisation from the centre to the States this approach is under great pressure (Tarig,M., 1999).

In Mali, the forest service was amongst the most repressive in the region until the 1991 revolution, but has been reformed since. In 1995 new laws on forest exploitation were adopted which have reduced the authority of the forest service:

- trees in land lying fallow for up to ten years remain the property of the owner and can be managed without permit (except for protected species). This used to be 5 years.
- forests under the authority of the Rural Communes are subjected to a management plan by the competent agency which is not necessarily the (national) forest service. The text is ambiguous at this point, but it may allow a Commune to establish its own technical service.
- A rural woodfuel market system along the lines of the Niger model will provide improved opportunities for local forest management in gazetted and non-gazetted forests.

Furthermore, the forest service is no longer a sectoral Ministry but has been reorganised with other technical services into a Rural Development Ministry. The forest control functions of this Ministry were integrated with matters such as seed quality control, animal diseases, etc. The personnel of the various sectoral Ministries was amalgamated and reorganised, which probably had a considerable impact on the mission and ideology which underlies the forest service. But in 1998, the Malian government reversed this institutional innovation and the forest service was re-established as the Department of Nature Conservation, responsible for policing in all forest areas (Bacha,A., 1999).

In Niger, the forest service has experimented since the 1980's with forms of local forest management through donor assisted programmes which led to the development of the rural woodfuel market system, often seen as a breakthrough in local forest management. Furthermore, the Nigerien model of natural resource tenure development is one of continuous experimentation in which the forest service has allowed considerable freedom to pilot projects.

Nevertheless, the forest service has retained tight control over forest legislation. Recent attempts at legislative innovations in the light of the Code Rural, supported by GTZ, have not been successful (Anon, 1995). The committee charged with legislative review consisted entirely of forest service cadre, so the only non-forester invited, a lawyer, did not turn up. The review concluded with a recommendation to uphold a maximum of control functions. Important stumbling blocks to local forest management, such as high fees on valuable forest products such as ronier (Borassus aethiopium) are maintained. In the field forestry agents maintain an extensive system of rent extraction and continue to instil fear in local communities, see box 4.

Box 1. Some examples of rent extraction in Niger

1. The PRSAA agricultural training project incorporated pruning and pollarding in the training and extension scheme. Farmers found that, once they applied their skills, foresters were the next to visit them and fine them for pruning and pollarding.

2. The Energie-II project experimented with selected farmers on how to best prune tress. The project researchers coordinated their fieldwork with staff of the local forest office. To the surprise of the researchers, the same foresters went around to the farmers the day after the research visit, in order to fine them for pruning trees. (Madougou, D., 1999)

In Burkina Faso and Senegal, the forest service has also experimented in participatory approaches, but local groups are usually treated as syndicates implementing a forestry service plan and are rarely given management responsibilities (Kane,O. and Winter,M., 1997; Painter,T. and Sanou,S.,1997).

The current mission and ideology of the forest service and of individual foresters in the Sahel is variable. Many of the younger foresters tend to be interested in training and extension rather than policing, but in the hierarchic organisation they have little power and little opportunity to put ideas into practice. Many of the more progressive foresters tend to leave the service and work for NGO's.

The forest service will undoubtedly maintain authority over gazetted forests, either through traditional policing and management, or through joint forest management schemes in which local user groups play a role. The role of the forest service in integrated resource management by local groups on public land is likely to remain limited. The structure and the mission of the forest service, as well as the sociology of the traditional forester go against the grain of integrated, local governance of natural resources. The Malian model of alternative technical services at the Commune level, although untested as yet, should be an interesting experiment. Also, alternative institutions of a multi-sectoral nature are being established, such as environmental agencies at national and at regional level, and various forms of local government.

5.3 LOCAL GOVERNMENT

International policy is increasingly important in local affairs. In the 1990's a number of international policies have impacted on the natural resources sector, in particular:

- the principles of good governance;
- the transformation from centrally planned economies to market economies, accompanied by privatisation and structural adjustment;
- the globalisation of economies;
- decentralisation (Bass,S. et al., 1998).

Privatisation through land titling is one element of change. Some researchers argue that Jeffersonian ideals underlie recent policy trends in land privatisation. The ideas of a link between a regime of private property of a solid, roughly egalitarian class of peasants and democracy is gaining momentum in West Africa (Elbow, K. et al., 1996). Another idea is that privatisation is the only way out of the "tragedy of the commons", and land titling may resolve endless resource conflicts.

While privatisation and market based strategies have gained strength in the agricultural commodity sector, the existence of market failures in the natural resources sector is characteristic, with land privatisation policies falling short in the case of shared natural resources. On the contrary policies aimed at decentralisation of government provide a significant impetus to local forest management.

The OECD/Club du Sahel characterise change in the West African Sahel essentially as: (a) transformation of the Sahelian rural economy with urban markets and roads as catalysts for economic change (b) decentralisation of government and administration, supported by legal adjustment and (c) insecurity and conflict (OECD, et al). Although decentralisation of government is a regional characteristic, its content and speed varies greatly from country to country. Various francophone Sahelian states have established the *Commune* (or *Commonauté Rurale*), and Sudan the Rural Councils as key institutions for elected local government (see table 7).

Senegal is the first country to experiment with elected local government. Since 1972 locally elected councils have owned their natural resources though under a high level of central government control. In Senegal the 1993 Forest Code aimed at local participation but leaves the elaboration of forest management plans to the forestry service. Management plans are required for all forests, including those belonging to local government and private individuals. The forest service monitors implementation and may revoke management plans, even though there is no specific appeal procedure. Forest product taxes collected are not under local control, although the Minister may allocate 25% of such taxes to local government (Ribot,J.C., 1995).

In Niger, some Communes have been established since the legal context was created in 1964 but only 21 of the required 200 communes programmed at the time had actually been established by 1994. The communes consist of about 50 villages, a size which restricts representativity of local government.

In Mali, decentralisation has been high on the agenda since 1991. Rural Councils were elected in 1999 and they are now major interlocutors for rural development assistance. These Rural Communes will have a considerable degree of autonomy in local affairs, although precise roles and responsibilities have not been finalised. It is a possibility that the Rural Commune may establish its own local forest service independent of the national forest service.

Constraints to representativity concerns the size of the Commune. In Niger, about 50 villages make up a Commune, in Mali and Senegal this is 10-20 villages. The

appropriate unit of local forest management may evidently not be that of the Commune. A further criticism of decentralisation concerns landuses which cross Commune boundaries, such as nomadic pastoralism (Bacha,A.K. and Tessougue,M.,1996; Mortimore, M., 1997). It is obvious that a choice must be made between smaller units of local government, which are probably more representative of the electorate, and larger units which are may respond better to mobile landusers.

Sudan has elected Rural Councils which to date have little power over forests and natural resources. In the current process of decentralisation the power transfer from the centre to the States is being negotiated. The forest service wants to uphold central authority over natural resources, but the government is likely to transfer authority over 60% of the resources to the States, which are expected to further decentralise to the Rural Councils. The Rural Councils are large, comprising a hundred or so villages, but unlike in West Africa the Sudanese resource tenure legislation allows resource appropriation by individual villages (Government of Sudan, 1989; Tarig,M., 1999).

Table 7 provides an overview of the hierarchy of government and administration in the three countries. This does not reflect the wide variations within each country, nor does it reflect the role of the judiciary, land commissions, Sultans, religious leaders, etc.

Table 7: Hierarchy of central, local and traditional forms of government in three countries.

SUDAN	MALI	NIGER
National government = political/administrative	National government = political,administrative	National level = political\administrative
State. authority: Governor Province: Commissioner	*Region*. *Gouverneur* *Cercle*. *Commandant*	*Departement*.*Prefet* *Arrondissement*.*Sous-Prefet*
Rural Council, elected government approx 100 vill.	Arrondissement (*Chef)*	*Chef de Canton/Groupement* traditional authority
Nazir, traditional authority	***Commune Rurale*** **elected government** approx. 10 villages	(No elected local government in rural areas)
Umda, traditional authority		*Chef de poste*: administration
Sheikh, traditional authority and Village Council (elected)	*Chef de Village/Campement* (state/traditional) and *Chef de Terre* (traditional)	*Chef de Village/Campement* traditional authority

Elected local government with important powers over natural resources is thus a very recent phenomenon in the Sahel. The trend is to transfer power from the forest service to local government. The resistance put up by the forest service is understandable and can probably be overcome. There is another, more important concern, that decentralisation of government without empowering village level authority carries risks. It is feared that in order to fund running costs local government will sell natural resources. This fear is expressed both in central

government and in the villages. It is evident that Malian villages well endowed with forest resources fear that the *Commune* may sell the forests on village land. It is felt that the Sudanese States and Rural Councils may do the same thing. Whereas villages are likely to use their resources sustainably, since they will be faced with the consequences of overexploitation. Elected officials in charge of ten to several hundred villages may be less concerned with the long term consequences.

5.4 MULTISECTORAL AGENCIES

One of the criticisms of the forest services is the mono-disciplinarity of institutions which are formally in charge of a multisectoral resource. By 1999 no significant sociological, economic and environmental expertise is present in any Sahelian service. But environmental and other multi-sectoral agencies have been established throughout the Sahel which have assumed some of the responsibilities previously taken by the forest service.

In West Africa, national environmental action plans have been prepared and in both Sudan and west Africa, environmental committees and secretariats exist. In Niger, the "*Principes Directeurs d'une Politique pour un Développement Rural*" of 1992 provides the general framework for all interventions in rural development, and the PNEDD (*Plan National d'Environnement pour un Développement Durable*) was published in 1995. A secretariat (CNEDD, *Committee National pour l'Environnement et un Développement Durable*) has organisational responsibilities and UNEP coordinates amongst donors. In Burkina Faso environmental planning is organised through PANE (*Plan d'Action National d'Environnement*).

In Mali the PNLCD (*Programme National de Lutte Contre la Desertification*) of 1987 provides the general principles while the *Schema Directeur du Secteur Rural* works out sectoral plans under the principles of the PNLCD. The main environmental policy instrument is the PNAE (*Plan National d'Action Environnementale*) which is coordinated by a permanent secretariat and supervised by an interministerial committee chaired by the Prime Minister. A similar set-up exists in Sudan, where the Higher Council of the Environment and Natural Resources has been established under responsibility of the Prime Minister with a permanent secretariat for day to day matters in the Ministry of the Environment and Tourism.

While the various countries each have their own environmental policy and planning system and follow their own rhythm, broad issues are identical. One conclusion is that of policy inflation (Bass, S., 1998; Speirs,M. and Secher Marcussen,H., 1998). An increasing number of policies promulgated, along with a reduced implementation capacity of the institutions expected to guide and implement those policies. Secondly, environmental plans tend to rely on a rhetoric which lacks realism. This is in part due to the overwhelming impact of structural adjustment and other macro-policies which have an adverse effect on environmental conservation, and partly due to dependence on models of environmental conservation which are increasingly seen as outdated (Ribot,J.C., 1995; Leach, M.et.al., 1997). Finally, the planning

process is still highly centralised, although stated intentions are to open up the process to all stakeholders.

Both the Malian and the Sudanese environmental agencies have been set up for interministerial coordination under the Prime Minister. In both cases, the interministerial meeting has only once taken place over the last 5 years and the agencies have recently been located in the Ministry of the Environment, thus losing the scope for intersectoral coordination. In the Malian administration, sectoral Ministries were reorganised into one Ministry of Rural Development in 1995. This was reversed in 1998, when most of the forestry tasks and most of the foresters were relocated in a different Ministry, and thus regained their disciplinary nature (Bacha,A., 1999). It has become apparent that the direction of institutional reform with reference to local forest management in the Sahel is variable.

All the same, multisectoral agencies now exist and take charge of matters which were previously the exclusive domain of the forest service. These agencies cover a wide range of disciplines including foresters who do not use the military insignia and similar symbolism. The agencies have a very modest staffing but receive a relatively large amount of external support, whereas donor support to the forest service is now very modest.

5.5 LAW AND LOCAL MANAGEMENT

5.5.1. LEGAL FRAMEWORK

Four levels of law may be identified with respect to local forest management: constitutional and international law, forest law, other laws pertinent to local forest management, and local laws and bye-laws. The Sahelian countries have their individual legal framework, but a number of issues apply throughout the region.

In the area of environment and rural development, international conventions have been signed by many Sahelian states, such as the Biodiversity Convention and the Convention against Desertification, which imply a certain concession of central state sovereignty. Signing up to Agenda 21, for instance, engages African states to apply principles such as "flexible planning which allows optimal participation of local people and collectivities."

Similarly, CILSS and UNEP have mandates in the formulation of national and regional planning. International conventions are general by their very nature, but are superior to national laws in the legal hierarchy, just under the constitution (Sani,A.M., 1996). Both international conventions and the constitution support local forest management in a general sense, but there may be a wide gap between international conventions and laws of application.

The Forest Acts in the Sahelian countries often comprise all forms of natural vegetation whereas different rules generally apply to plantations and trees on cropland. Acts pertaining to the transport of forest products, on the other hand, generally include woodproducts which originate from cropland and plantations.

Grazing, picking of fruit and food and collection of deadwood in public forests are usually allowed without a permit. The exploitation of green trees tends to be subject to authorisation in various forms. As a rule, a permit-and-tax system applies to any green wood production. In the rural firewood system, the production of green wood is controlled through the annual quota (CCL, 1997; Foley,G. et al., 1997).

Green wood production in forests under the responsibility of the Malian Rural Communes should follow a management plan which is subject to control by the competent authority: probably, the forest service (Republique du Mali, 1995). The content of a management plan is not described by the Act, but if the management model of the rural firewood markets is taken as authoritative, it is evidently too complicated and too expensive for application by local communities (CCL, 1997).

The Malian Rural Communes may have the authority to establish a technical service other than the forest service. The first Commune elections have only been held in 1999, so that no experience exists to date. If implemented, the model may be a radical departure from the conventional institutional and legal framework.

In Sudan, exploitation of the gazetted village forests is the responsibility of the committee elected by the local villagers, but the forest service may “issue directives or take measures for the protection” of village owned forests (Government of Sudan, 1989). No reference is made to a management plan in the Sudanese Forest Act, so that a great deal of uncertainty exists. This leaves wide powers to the local forest service agents.

Decentralisation of governance in Sudan from the centre to the States and Rural Councils implies that the village forest registration procedure will be decentralised and that competencies for land registration will be established in the individual States (Tarig,M., 1999). It follows that monitoring and control will also be the responsibility of the States rather than of a forest service under a national director, and the States are expected to decentralise certain responsibilities to the elected Rural Councils. As in the Malian case, experience will have to be gained with this model of local government.

Forest Acts are important but there are other relevant acts of a more general nature, such as land acts and acts on local governance. Wherever such acts conflict with the forest act they tend to be subordinated by the latter, since the forest act is usually more specific. But the acts are incomplete in the organisation of natural resource management. Acts pertaining to land and to natural resource ownership and usufruct in Sudan may eventually, in the context of decentralisation, become more important for natural resource management than the Forest Act 1989.

Similarly, acts pertaining to local government in Mali may turn out to be highly relevant for local forest management as the Communes take on responsibilities. The Malian Forest Acts 1995-003 and 004 were a precondition for GEF-Dutch funding of the rural firewood market project and are considered premature in the process of Commune establishment and local governance in general (Bacha,A., 1999). A more

integrated legal framework for local governance is likely to be adopted sooner or later.

Legal dispositions on the nature of the forest management committee may or may not exist in the various forest acts, but such dispositions are generally quite weak. How can local management committees be best shaped in the existing legislation? Should they be considered as public or as private institutions ? If they are to be considered as private institutions, the following options are available in the francophone countries (Sani,A,M., 1996):

1. Associations, in particular those for Public Good (Niger:*L'ORD.84/6 du 1er Mars 1984* with modifications, in Mali: 1959 legislation on Associations) have the advantages of simplicity and efficiency. Takieta, Kelka and other forest management committees are registered as associations. As long as pursuing commercial interests is not a primary objective, local management committees may be conceived as associations. However, this legal construct poses two major problems:

- Associations for Public Good are created with the objective of supporting education and assistance; whereas local management committees do not aim at support to others, but at self supporting activities.
- Associations are based on voluntary adhesion of adults, which is not the intention of local management committees for natural resources, which are expected to represent the community. Local committees are usually intended to represent a local public interest.

2. Cooperatives, or similar. The more sectoral objective of local management committees for some forms of local forest management such as woodfuel markets make cooperatives apparently more suitable. However, various constraints exist. Cooperatives are expected to pursue a specific commercial activity, whereas the Sahelian forest covers a range of economic sectors. Cooperatives are also based on voluntary adhesion of adults.

The Burkinabe village hunting associations which are entitled to engage in contracts with tourist hunters have similar legal restrictions (Ouedraogo,H.,1999). They deal with a sectoral resource which is controlled by the relevant state agency. Although the hunting contracts ensure a degree of resource transfer to the local communities, the arrangement is still far removed from integrated, local resource management. What is required is much more creative law reform.

In other cases, such as Gestion de Terroir projects, local committees may be defined by an ad hoc arrangement which has tacit or explicit approval from the administration, but which is often not supported by the national legal framework. Projects may develop arrangements through the local administration, such as an *Arrêt Prefectoral*, a convention with the local forest office, etc., and, it is hoped, gradually develop legal recognition as a function of their proven efficiency. Almost invariably such arrangements collapse when the project terminates (Sani,A.M., 1996).

For both Associations and Cooperatives the question is how they can exercise prerogatives which exceed Private Law. This is only possible if they pursue a public service function. If an organisation is to be recognised as a public service three criteria apply:

- With respect to its origin, it is created upon public instigation. In the case of a multilateral project such as Energie-II this criterion is met to some degree, but not in the case of most projects.
- Its mission should be of public interest. The sustainable use of natural resources could probably meet this criterion.
- Internal and external organisation reflect those of the government service.

This poses limits on the conceptualisation of local management committees as public institutions. Under current legislation, such committees would be responsible to government, at the expense of their independence. The experience shows that local management institutions are effective and efficient if they are relatively independent from government institutions such as the forest service and the judiciary.

Another constraint is that the formal organisation of the local management committee should reflect that of the government service. Where local forest management institutions exist, they tend to have an internal organisation and an ideology which widely differs from those found in government. Unless and until good governance has become standard praxis, local forest management institutions should not be copies of government, and the legal dichotomy should persist.

The lowest level of legislation is customary and local law. Local law is described as the emerging, usually unwritten legislation adopted by local communities in the face of change, whereas customary law is based on tradition (Le Roy, 1985). Since many local forest management opportunities are recent, they are supported by local rather than customary law. The state tends to respect local law to an important extent.

Le Roy (1990) suggests that in many African societies conflict resolution is not predetermined or based on assessing who is right or wrong as is the case in Western justice systems. Rather, conflict resolution is part of a longer term management of social relations and often has as its objective to reconcile opposing groups rather than to sanction or privilege one side over the other. Customary institutions are more capable than modern institutions in this form of conflict resolution.

In the Kordofan case study, most forest management conflicts have been regulated by local law. A minority of conflicts have been presented to the court, all of which have been resolved out of court before the opening of a court case (Kerkhof,P. and Damango,B., 1998). It has been suggested, in order to strengthen local law, to formalise these rules and incorporate them in Rural Council bye-laws (Tarig,M., 1999). Various Malian case studies suggest that almost all forest management

conflicts are solved under local law, some of them with involvement of the administration, but rarely the court (Diallo,Y. and Winter,M., 1997; Kerkhof,P., 1998). Conventions between the newly established Communes and the local forest management institutions may formalise and strengthen local law.

5.5.2. FISCAL REFORM

Fiscal reform accompanies institutional and legal reform. The issue is one of reversing resource transfer, which in the past has been from the rural areas to the centre. Taxes, permits, penalties, and confiscation under the forest act, and extortion under the pretext of the forest act, have made rural people poorer and have turned many forest agents into wealthy urban inhabitants. Town based entrepreneurs have exploited poor forest control to their benefit. In the case of Niger, for instance, incomes of urban citizens are about 7 times those of rural citizens (Danida, 1999).

The rural firewood market system is intended to reverse this trend by providing sole user rights to local communities and by differential firewood tax rates in favour of local producers. But poor application of the tax system may jeopardise the resource transfer.

The trend is to use the firewood market system to impose very high taxes on non firewood products, such as construction material. The forest service, as a national institution, imposes standards and rates irrespective of regional characteristics. A species may be declared protected nationwide whereas it makes up more than half of the trees in a given community forest. A building pole may be taxed at a level which seems reasonable for capital city standards, but which is exhorbitant for a rural Sahelian who lives in a very modest hut.

The tax laws do not spell out whether locally sold forest products are subject to taxes. In the Gaya project, local institutions and project staff managed to obtain an agreement with the forest service to exclude locally sold palm products from the very high taxes. But this is unlikely to happen outside a project environment.

If the resource flow from rural Sahelians to urban based traders, forest agents and forest service is to be arrested, much more significant fiscal reform will be required. Institutional, legal and fiscal reform should be seen as integrated and should be much more innovative. It should be adapted to local conditions and favour local management.

5.5.3. GOOD GOVERNANCE

Two qualities of governance by the state are relevant to local forest management. One is the rule ordered congruence of the state, the second is the lawful behaviour of state agents and agencies.

If the term state is used for legally empowered and legitimately coercive institutions, questions are raised about a number of African states. At some stage countries like Zaire, and Somalia may be considered stateless, but the qualification is not just

about "state" or "stateless" but about the degree to which states are legitimate (Jessop,B., 1990). Rule ordered congruence between politico-legal institutions in the state is a measure of state formation. For instance, an ever increasing number of contradictory rulings from the central government, local government, judiciary and others are indicative of poor state formation.

Even if congruent laws exist, they may not be applied. Many cases of unlawful behaviour in forest management by state agents and state agencies have been recorded. Such behaviour typically includes:
- refusal to pay reasonable compensation, as stipulated in the forest act, to acquire local usufruct rights in the case of forest expropriation.
- intimidation of local leaders who attempt to defend local rights vis-à-vis commercial companies or state agencies.
- extraction of moneys and animals for personal benefit of state agents in the name of the forest act.

Sustainable forest management by local communities can only be secured by fair governance at higher levels.

5.6 CONCLUSIONS

The forest service has historically been in charge of policy making and of project support to community forestry. It has so far been the institution responsible for supervision of local forest management projects. However, the mission of the forest service as well as the social psychology of the forester are at odds with the type of support required for effective local forest management. Institutional alternatives are emerging in the Sahel, in particular local government at community level, and environmental and other sectorally integrated agencies at national and regional level.

Institutional, legal and fiscal reform should be conceptualised as an integrated issue. The process of reform is different in the various countries but generalisations can be made. In the short term, projects may uphold local forest management but in the long term, such management should be defined in the framework of public law. Public responsibilities may be situated in the village, in the Rural Council/Commune or in a combination of institutions (Abari,M.M. et al.,1997). Local law as a complement to state law is likely to persist for a long time, because state law is inappropriate or inefficient. Local law may be formalised in the form of local government bye-law, but there is little experience to date.

In any case, unlawful behaviour by powerful actors such as commercial companies, the forest service or corrupt civil servants needs to be curtailed by the practice of fair governance. Responsible local institutions with legitimate local law cannot sustainably manage their resources under conditions of poor governance at higher levels.

LOCAL FOREST MANAGEMENT IN THE SAHEL PART II : LOCAL FOREST MANAGEMENT INSTITUTIONS

6. LOCAL COMMUNITY PERFORMANCE IN FOREST MANAGEMENT

6.1 INTRODUCTION

A local forest management institution is defined here as any community based organisation which is directly involved in forest management. Such institutions are characterised by a pattern of norms, behaviour and relationships as opposed to a government organisation, which is characterised by a legal identity and a set of formal objectives.

Local institutions presently manage forest resources in their immediate environment. Part II of this report analyses how they are performing in the various management tasks, what constraints they are facing and some of the opportunities. An analysis of performance raises the question of comparison: what should their performance be compared with? Historical comparison is not possible since data on the impact of management are unavailable, and such comparison is probably not relevant since the setting has completely changed. Given that the alternative to local management is state management, performance of local institutions may be compared with that of the state forest service. The forest service manages gazetted forests and it had, until recently, almost full responsibility for forests on public land. The comparison is presented in chapter 6.

Conflict study reveals a great deal about the interaction of the different actors, those within and those outside the local communities, those who are clearly visible and those who are not (Lund,C.,1995). During conflicts, historical arguments are put back on the agenda and actors who seem to have little importance may turn out to be key players. Recent conflicts in the case studies have been important events to help understand how local institutions function internally and externally.

Interviews with the various actors are the main data collection tool. Such data are subjective but forms of corroboration can usually be obtained. The acceptance and enforcement of rules in the case of a village forest, for instance, can be understood through interviews of villagers, inhabitants of neighbouring villages, an evaluation of forest offences and fines paid up, and by observation of the forest itself, directly or through occasional photography. Household interviews, group interviews and discussions with specialist producers yield information which build up a case description.

Winter (1994) has proposed a characterisation of forest management institutions in terms of law, of legitimacy, of functionality and of operations. In this classification, legitimacy is a key aspect which is mostly expressed in terms of transparency, representativity and accountability. Chapter 7 describes the process of representation and exclusion of interest groups in forest management as the key element of legitimacy. Pastoral groups are often a particular case of exclusion from local forest management. They are often excluded also from the research and development agenda, so that the available data are scarce.

The functionality and operationality of forest management is to an important extent determined by financial and human resources. Chapter 8 draws up two different experiences: forest management praxis inside a project environment, and outside a project environment. This helps explain the scope for sustainability and replicability of the forest management model.

Chapter 9 analyses the legal and political constraints to local management. The outcome of conflicts are usually determined by historical, legal and political arguments. The judiciary, forest administration and political institutions are particularly important for local forest management institutions, as obstacles or as allies. In chapter 10, the immediate future of local forest management is discussed. Increasing capacities in local communities are emerging opportunities for local governance, and a range of project tools may help strengthen these institutions - as long as external support does not choke local initiative.

6.2. FOREST PROTECTION

In the 1970's and 1980's, national forest management strategies aimed at forest restoration through tree planting and similar measures. The key forest management strategy of the 1990's is protection of remaining natural forests rather than rehabilitation of forests which no longer exist. Protection is also the most essential strategy of local communities which have assumed the control over forest resources they had previously lost to the state. Protection against uncontrolled exploitation is the basis of any local forest management system. In all case studies it is found to be the elementary form of forest management.

In the national forest service also, protection was and still is the key management activity. The gazettement of forests is followed by the posting of salaried forest guards who, in many Sahelian countries, have a military status. An formidable system of sanctions is in place with penalties of up to 10 years imprisonment for forest offences. In spite of this, forest protection by the state has been notoriously ineffective and inefficient.

Very few guards have been deployed in relation to forest area. In many cases, one or two forest guards have to protect forest reserves of 5,000ha or more, and sometimes a guard may have to protect several forest reserves at a time. Guards

are notoriously corrupt and the legitimacy of forest expropriation by the state is often poor in the eyes of local people. When signs of illegal exploitation are found by a forest agent, the nearest community may be considered guilty and be penalised. Many forest agents have been associated with repression and extortion and they are identified with private rent seeking behaviour.
The exploitation rules applied by the state agency are often impracticable. The permit system of the forest service is impracticable for local people if only because of distances involved. Permits have often been sold without reference to rational forest management, since forest reserves did not have management plans to start with. The forest has often been illegally exploited since local people or urban based traders managed to circumvent rules and repression.

Forest protection by the state has been unable to maintain the forest resource, both on public land and on gazetted land. In the Zinder Department of Niger, for instance, most of the gazetted forests no longer exist de facto even though they continue to exist de jure. A government survey team noted that most forests and agroforestry systems outside the forest reserves, on the contrary, were in fair condition (PUSF,1986). In Kordofan, the forest service has sold off whole forest reserves in order to raise cash (Adil,A.,1999).

When taking this as the baseline, forest protection by local communities appears to perform much better in most cases. Guarding may the responsibility of:

- guards who have been employed to protect the whole forest, or a part of the forest which is insufficiently monitored by the village population. Such guards may be employed for a specific season, in particular during a part of the dry season when the risk of illegal exploitation is high. The salary may be paid from fines or from community revenues derived from sales of forest produce. Alternatively, guards receive goods confiscated from illegal exploitation, they are given the right to harvest certain forest products, or they are released from other community work.

- members of the forest management committee may be in charge of guarding. The number of people guarding the forest is higher than in the case of salaried guards, but the committee members may visit the forest on a less regular basis. In some cases, remuneration is obtained as a percentage of fines or taxes being paid out.

- all members of the community may be responsible for monitoring of forest exploitation and inform leaders in case of irregularities. In the case of an arrest, several male members of the management committee may be recruited for the occasion. In some circumstances, arrest may be dangerous and a team is preferred. Another advantage of arrest by a team is that witnesses are present. In the absence of witnesses, contradictions between the culprit and the guard may arise which are hard to verify.

In many forests, forest protection is the responsibility of different actors at various seasons. During the cropping season, most villagers are occupied with cultivation and women may bring lunch to those working on the land. Also, wild foods may be abundant and women and children spend some time collecting fruit and flowers throughout the forest. At this time, the village forests are well monitored by the whole village population. In the latter part of the dry season, however, few villagers walk around in the forest. Many men may have migrated for the season, and there are no wild foods to be collected. It is also the peak time of the construction season, so that the risk of illegal tree cutting is high. Forest protection may be the task of specially assigned guards who may at the same time be engaged in certain forms of forest exploitation.

The assignment of guarding a forest may also be specific to certain sites, instead of the forest as a whole. Valuable and vulnerable sections of a forest may be protected whereas others hardly need protection, at least for a given season. In Abunaanaa village in Kordofan, for instance, hay production is valuable in the last few months of the dry season. This is the time that urban livestock traders put up camp close to the forest but just outside village boundaries. Abunaanaa guards deployed during these months have to protect the peripheral section of the forest. But the traders will go as far as encroachment during the night to avoid being caught. The alternative for Abunaanaa is to liaise with the court to force the traders out of the area altogether.

Whereas protection by the forest service is governed by national standards, local institutions apply a degree of protection which is highly variable as a function of local physical, economic and institutional factors. Most rules are very different between villages and tend to be flexible.

Rules which are found in most forests under local management are:
- no whole tree cutting of important species by non-villagers. Cutting of such trees by villagers is regulated by licence. Species which are considered "firewood trees" are not protected. Species which are important for fruit are protected against any form of cutting.
- protection against charcoal production.
- fruit production is not regulated except for prohibition of green fruit collection.
- protection against clearing for agriculture.

Rules which are found in some of the forests are:
- the entire forest or part of it is protected against any form of tree cutting for specified period.
- no temporary settlement of nomadic groups for more than some days.
- grazing and hay production regulated in certain areas and seasons.

In forests under the rural firewood market system, firewood production is highly regulated but legally permitted. The rules are very different from those mentioned above. Other forms of exploitation are hardly regulated under the firewood

market system.

It is clear that forest protection by local communities is numerically much stronger than protection by the state. The number of guards and informants (people who report infractions to those responsible) per unit area is incomparably bigger than in the forest reserves. But what is the impact of forest protection under local management? Interviews, review of infractions and conflict cases in general, as well as physical monitoring are some of the means of verification.

6.3. RULE ENFORCEMENT

In the forest service, infractions are dealt with by punishment of the culprit, or in his absence, of the nearest community. Alternatively, a proxy is invented which assures a flow of income. In North Kordofan, for instance, most forest products are taxable but the tax and permit system is so impracticable that local people cannot follow it. Instead, the forest service occasionally raids weekly markets and confiscates forest products. In west Africa, the nearest community may be punished if evidence of a forest offence is observed and the culprit cannot be found. The punishment for an infraction is severe and is typically in the order of 10-20% of the annual income of local people. In Sudan, forest infractions are punishable by prison terms of up to 10 years.

In comparison with the forest service, local communities deal with infractions in milder ways. In the first place, local communities only sue the culprit if there are no ambiguities about the identity. Unlike the forest service, forest offences are not followed up if the culprit cannot be identified. In the most typical case, the culprit is given a warning and may be required to present his apologies to local leaders.

Distinction may be made between infractions by local people and infractions by strangers. Local villagers are expected to be fully aware of the rules which apply to the different parts of the village territory, but strangers or visitors can be excused for not being fully aware. Tamarind may grow in what seems to be community forest, but which is in actual fact an old, abandoned field where valuable trees still belong to the person who once cultivated the land. A stranger collecting the fruits of this tamarind is informed that he has no rights to collect the fruit in this site without permission of the owner; he will excuse himself and he may even leave with the fruits he has already collected. But a local villager is likely to be sued and the harvest will be confiscated.

The way that the culprit reacts is particularly important at this stage. If he is sorry about his behaviour, or he can reasonably explain why he is not aware of the rules, and promises not to do such a thing again, he will get away with the forest offence lightly. This is normal for a first case offence.

A second step in the enforcement of rules is confiscation of produce and possibly

arrest. The culprit is perhaps not behaving respectfully, the offence has been repeatedly made, or is of a more serious nature. The culprit is brought before local leaders who will pronounce judgement. If the offence is considered punishable, any locally appropriate fine may be imposed such as:
- confiscation of the produce, a typical punishment
- a measure of millet
- a sum of money, which tends to be extremely modest compared to what forest agents or the court impose

In some instances, fines are quite important. Examples are fines imposed on nomads who have put up camp in protected zones of the village forest and who have cut a large number of trees. In El Ain, fines of up to 75,000S£ have been reported, and the pastoralist association in the forest of Banh has imposed fines of up to 15,000FCFA. Illegal firewood production in the Kelka forest, where the commercial interests in firewood exploitation are very high, is severely punished. In N'dounkoye village, Kelka, fines of up to 50,000FCFA are imposed.

A third step in the enforcement of rules is necessary if the culprit refuses to accept a ruling by the local leaders. Recourse is usually possible to higher local authorities or to a council of local leaders of several neighbouring villages. But at the end of the day, customary and local law may not be accepted, particularly if the penalties are high. State institutions may become involved, such as the forest service and the police and in the end, the court. If the accused is found guilty, the fine to be paid is often higher than in the village.

The community may ultimately apply the highest possible sanctions which exist. In Kordofan, this may be complete social exclusion in the case of a village member, in which all other villagers will refuse to communicate with the person concerned. Migrants who have settled in the village, such as agro-pastoralists, may be forced to leave. In Bankass, the fetish may be applied as the ultimate sanction, which has death as a consequence. Very few examples have been recorded of severe punishment in recent years as a result of forest offences.

The application of sanctions and taxes may be poverty indexed. In both Malian and Sudanese cases, poor members of the community may be pardoned for a forest infraction if it is felt that, due to poverty, they have no options. In the case of taxes imposed by local management institutions such as the Alamodiou, fund collection may be poverty adjusted, so that villages known to be very poor do not pay any contribution at all.

To illustrate the majority of forest offences and ways of dealing them, a number of short case descriptions of Kordofan is presented here, roughly in order of seriousness.

1. a group of 3 nomads stayed inside the forest last season. They were told to leave but they said one of their people was sick. They were allowed to stay for

three days until the person concerned was better, then they left.
2. Abu Hemera and Filia villagers were found cutting trees in a recently registered forest, and received a warning but kept their produce.
3. A man of neighbouring Burbur village had established a cheese factory near the forest on land belonging to Burbur. He was asked to leave since the large number of livestock was seen as a threat to a part of the El Goz village forest. He relocated his factory.
4. Someone of the village itself had goats inside a new plantation in the village forest. The "official" rule is that a fine of 1,000S£ (0.46US$) should be paid per animal. But the person apologised, and the fine was not paid.
5. A nomad brought his cattle into a plantation inside the forest and villagers took his animals which were put in a designated corral in another village. The nomad had to pay a fee to the owner of the corral but was not fined.
6. Two charcoal makers from another village were found inside the forest. Their produce was taken and they were fined 5,000S£ (2.34US$) each, which was paid up.
7. Someone from another village produced charcoal in the forest and refused to apologise. He was taken to the police in Banjedid and a trial was going to be prepared. The matter was resolved by the umda, members of the court and others.
8. Someone who cut a Baobab and who refused to pay the fine imposed by the village committee, fought with the Sheikh, was subsequently reported to the forest service office and was fined S£ 3000 (6.90US$).
9. In november 1998 three people of a neighbouring village, including their Sheikh, were found cutting trees to produce "mutrags" (building poles). Two of them were fined 10,000S£ (4.20US$) each, the third 5,000S£ (2.10US$), which they paid. Their produce was confiscated.
10. A nomad cut trees and was fined 75,000S£ (34.50US$), paid up.
11. Three agropastoralists who were living on El Goz land had cut a large number of Acacia seyal to feed their livestock inside the forest. They were fined 140,000S£ (73US$). When the time came to pay, they escaped and were never seen again. In a similar case, a nomadic group established a camp inside the forest, cutting trees to erect fences. The villagers first went to the project office, then to the police. However, by the time the police came, the nomads had fled. They have not come back.

Some researchers distinguish various forms of non-state law. Some forms of non-state law are embedded in specific normative structures, such as religious law and customary law (Lund,C.1997). Another category of non-state law may be called local law and can be seen as a pragmatic adoption in the wake of legal reform. In this concept, local law in forest management can be seen as a recent adaptation to changing circumstances which allow local management institutions to defend their interests and settle a case outside court and outside modern law. From the case studies it appears that local law is a key element in successful local management since modern law and state institutions are usually inefficient, whereas customary law does not cover the emerging opportunities of local

governance.

State institutions may back up the enforcement of local law through informal mechanisms. In the case of El Ain, 5 cases of forest offence have been observed among the 19 village forests over the period 1995-mid 1999 where local institutions have not been able to enforce penalties. The court has been involved in these cases but four out of five cases have been resolved before it came to a judicial process, and none has been resolved under the provisions of the Forest Act (one case is pending).

Other Sahelian case studies confirm that enforcement by local institutions works up to a point, but requires backing by national institutions for some of the forest offences. The Sudu Baba of the forest of Banh, Burkina Faso, and the village leaders and sultan of the forests of lake Fitri, Chad, manage forest offences to an important degree (Ouedraogo,I. and others, 1999; Tidiane,D.A., 1999). In both cases, enforcement is legitimised by customary authority which has been weakened by the modern state, but which is still functioning. In the forest of Banh, this is the Sudu Baba, the assembly of lineage representatives. In Fitri, it is the traditional village leadership, the area representatives of the sultan and in the final instance, the sultan himself. But they do require assistance from the government administration or court for those offenders who do not accept customary enforcement.

Local law may conflict with modern law if local institutions protect a resource for which the forest service has issued exploitation permits. Such cases have been documented for the Kelka and Samori forests in Mali and for Gaya in Niger. Local institutions have “arrested” the intruders concerned, who are invariably from outside the community, and may have confiscated the produce. The outcome of such conflict varies from case to case, but it is evident that forests may be protected by local communities against external interests, even if such interests are legally backed up.

6.4. TRANSPARENCY

Transparency or visibility of forest management expresses the degree to which stakeholders know the management practice. It is also about an understanding of the internal and external rules of the forest management institution. To some extent transparency is a function of accountability, i.e. knowledge of money, goods and services received and expended.

The forest service has published internal and external rules and ought therefore have a high level of transparency. But there are large discrepancies between formal rules of the organisation and practice of forest service agents. A study of forest service agents' knowledge of forest policy and regulations in Mali, for instance, shows how poorly agents understand the policies and rules they are supposed to apply (McClain,R.).

Research in Mali and Niger shows many examples of forest agents illegally fining villagers. It is not clear whether forest agents and villagers have poor knowledge of the law, or whether this is rent seeking behaviour against which villagers have no defence. In many cases receipts are not issued for fines, which raises questions about accountability.

In Sahelian societies, oral communication is the tradition. The written medium is of a much more recent nature and although it is increasingly applied, it remains of modest importance in most of the forest management case studies. The rural firewood markets, on the contrary, are highly organised due to the quota system and tax payments and refunds, which require written accounts. In most other cases of local management, written accounts are absent.

Differences are noticeable between the Sudanese and the west African cases. Literacy in the Sudanese villages appears to be higher than in the West African cases. In the Sudanese villages, written accounts are kept by the village treasurer of fines received, and under the influence of the project, many villages have written up the rules of forest exploitation. In a number of villages, the management committee has written up accounts of forest offences and how they have been dealt with.

In none of the Malian cases other than the rural firewood markets do written rules exist. Taxes and fines are levied but only rarely are there written accounts. There are no known examples of management committees keeping written records of forest offences and of procedures followed. In many committees, the functional literacy rate is low and, in the case of the Alamodiou, only one out of 5 committees has functional written accounts.

Household level studies of rules, carries out in Malian and Sudanese villages show the rule interpretation varies considerably. Several dozen different rules may be mentioned in a single village, some of which are contradictory, and few households mention the same set of rules. A written prescription of the internal organisation only exists in the case of the rural firewood markets, whereby rules are prescribed by the projects. The rules of forest management other than firewood production are rarely written down in the firewood market system.

The analysis of forest management rules is more complicated than the simple question of knowledge about rules. Rules mentioned by one source may have a different meaning for others, depending on the site, season, species and other variables. The rule "Do not cut green trees", for instance, may be mitigated by exceptions such as "weedy species", or an exceptional licence provided by the leadership, or the cutting of minor branches only, or extreme poverty. A range of exceptions and ambiguities may therefore exist but some rules are clearcut. Fruit trees such as the tamarind cannot be cut, certain reserves may be out of bounds for any tree cutters or pastoralists.

Another complication in rules analysis is that inhabitants from neighbouring communities may simply deny they have knowledge of rules, even if rules are known. On the whole, transparency is a conspicuous problem in local forest management which can be explained by the wide range of sites and products concerned, the poor legal framework and the dynamic nature of forest management.

The lack of written and published accounts, especially concerning income from taxes and fines, has led to poor legitimacy in some institutions. In the Alamodiou, there are several examples of voluntary contributions more or less stopping because villagers feel that collected funds have been misused or because they have no knowledge about the use of collected funds. There is a great deal of overlap between accountability problems and issues of representativity.

In the majority of cases, however, accountability does not appear to be the major constraint. In many institutions the amount of funds collected is very low and the few funds collected are to an important extent redistributed to the people who collected them in the first place, such as the guards. Representation of all user groups and legal backing are more important concerns.

6.5. MANAGEMENT PLANNING

A key issue in conventional forest management is the production of management plans. Production of the management plan is often seen to be an important accomplishment, the completion of a phase of inventory and consultation and the prelude to more formal and more "scientific" forest management. Such plans may also be an explicit legal requirement.

Various criteria of community performance in forest management planning can be defined. One criterion is comparison with state performance, and thus the degree to which management plans are produced by the forest service for state forests. Another criterion is the degree to which formal management plans are produced and understood by the relevant actors. A third criterion is the application of plans, whether formalised or not.

6.5.1 FORMULATION OF MANAGEMENT PLANS

In two case studies, state managed forests co-exist with community managed forests within the same administrative territories: the Mirriah Arrondissement in the Zinder Department of Niger, and North Kordofan State, Sudan. Due to the Sudanese forest policy, which requires that 25% of the land should be put under forest reserve, North Kordofan has a large number of gazetted forests, or forests under the procedure of gazettement. The total is 160 forest reserves, of which only one reserve, El Ain, has a management plan. As this plan was produced by an expatriate adviser, none of the reserves in this state have a plan produced by the forest service itself. In Mirriah, Niger, management plans do not exist, even in

the case of the most important remaining reserve, Takieta, which is being rehabilitated through project support from various organisations since 1987.

In the case of community forests, different scenarios exist. Community forests under the rural firewood market system are required to have a formal management plan as the basis of a contract between the forest service and the local management committee. The available Nigerien examples, where the market model has been applied since 1992, show that management plans exist and that they are generally simplified.

In the market system, the key element of the management plan is delimitation of the forest with firewood harvest quota for specified blocks. In all known cases, the plans have been written by project staff while villagers may have been responsible for forest boundary establishment. Given the complexities involved in the annual quota system, local communities cannot realistically be expected to master the planning procedure.

In another category of management plans, project consultants have produced village management plans after completion of standard forest inventories (NEF Mali,1996; CARE, 1997). Since the plans have not been produced by project staff but by visiting consultants, the procedure is another step removed from local management planning. Some project staff noted that such plans are of no use since they are not understood by project staff in the first place, let alone by the local forest managers. Others suggest that the plans help in formal recognition of local forest management by the authorities. In neither case does the planning appears to be of practical use to local management.

In a third category of forest planning, plans do not exist in a codified form. This is the predominant but least recognised form of forest planning. In this category, some aspects of forest management may exist in writing but most of it does not. In Sudan, where land registration is an essential aspect of local management, the delimitation and registration process is in writing. As a consequence, the forest appropriation process in Sudan is more formalised than in any other Sahelian case of local forest management. In most cases, land is not formally registered and demarcated, but approximate limits are known to community members, although conflicting views on precise limits are quite possible.

In almost all cases, partitioning of the forest into zones is quite common. Many locally managed forests are divided into zones of different ecological and economic potential, and management rules may apply to specific zones. With the exception of the rural firewood markets, these zones have not been not mapped or otherwise codified but they are known to the members of the community. The different zones may have a geographic name such as "Near The Village Limit" or be given the name of the predominant species. The villager's understanding of such stratification is undoubtedly much better, and the investment made is much lower than the partitioning by surveyors and foresters.

In the case of the rural firewood markets, technicians partition the forest into blocks which correspond to the annual firewood harvest quota, e.g. on a six year rotation basis. The corresponding management plan is only concerned with optimal firewood production. A study of sample villages shows that some communities do, and others don't understand the zoning of their forest (Giraud,S.,1998).

Outside the firewood market scheme, management plans originate from the community owning the resource. Grazing, establishment of cattle camps, hunting, fruit collection and artisanal wood production, to mention some examples, may be higher on the planning agenda than firewood production, depending on local priorities. Rules governing the different management units have been formulated and the degree of guarding and enforcement is an indicator of the weight given to the various elements of the plan. But plans have not been written up by local institutions in any of the known cases.

In Sudan, where literacy is much higher than in the francophone Sahel, some villages have begun to codify a part of their management plan. The plan typically includes the land ownership certificate and the map which goes with the certificate, written rules, and a list members of the management committee. It may also contain panoramic photos of the forest, taken by villagers of permanent sample plots. A description of major forest offences may be included. A part of the codification is project supported and although it is probably sustainable since it is understood and mostly implemented by the villagers, it may not be continued and replicated in absence of such support.

6.5.2. IMPLEMENTATION OF MANAGEMENT PLANS

Very few data exist on the implementation of forest management plans. Relatively few formal management plans exist and they are quite recent, the oldest dating from 1992, the rural firewood markets in Niger. Study of the implementation of non-codified plans is still harder. Only very tentative conclusions can be drawn at this point in time.

The Guesselbodi forest in Niger had a firewood market system in place from 1987, but remeasurement of the forest in 1991 and 1992 indicated that the forest was overexploited and the markets were closed down by the forest service (Hopkins, 1992). Firewood markets have been functioning in the Tientiergou forests since 1992, and an evaluation in 1998 indicated that wood cutters in one village were following the quota system and were respecting the blocks to a large extent, but they were concerned that stocks were running down (Giraud,S.,1998). In the second sample village, a large minority of woodcutters were not aware of the system to follow.

In both villages, the woodcutters were concerned about outsiders exploiting the

village forest, and felt there was not much they could do about illegal exploitation. In all three cases, uncertainties exist about the implementation of management plans. Either the plans have not been properly implemented, and as a consequence sustainability may be at stake. Or implementation was properly done, but the quota were not well formulated to start with.

In the case of forests managed without codified plans, local control is more intensive and often respondents are fairly confident about rules being adhered to, which is confirmed by the imposition of sanctions. In some cases, user groups voiced concerns about sustainability, in other cases villagers felt that their forest is now recovering, but there is not much objective evidence.

One study shows how woodlands "inside village forest" have higher natural regeneration than "outside village forest". Another study shows that fruit trees, which always have been protected under customary rules, now constitute a major proportion of all trees. It is not possible to generalise from isolated cases. Most cases of local management are from the 1990s which are characterised by relatively good rains. Conclusions about the causal relation between management plan implementation and forest dynamics are fraught with difficulties since the impact of the rains may override that of changed management. Only persistent, long term monitoring is likely to yield relevant information. Panoramic photos of locally managed forests made by projects and villagers in three countries date from 1997, which is obviously too early for meaningful conclusions about vegetation changes.

The conclusion which can be drawn is the state demands more of local communities in terms of management planning than it performa in its own estate. Secondly, non-codified forest planning is widely practiced, it responds to cross sectoral needs and plans originate from the communities managing the forests, but the planning process is not transparent in the eyes of external stakeholders. Finally, there is little evidence at this stage about the implementation of management plans, and about the relationship between management plans and forest sustainability.

6.6. COMMUNICATION

Means of communication by local forest management institutions is a key performance indicator. By tradition, communication is oral and is channelled through informal gatherings, village assemblies, markets, festivities and other occasions. The complexity of communication is very different between the case studies depending on the size of the institution. In the Sudanese cases, where forests of a hundred hectares or so are owned and managed by small, individual villages, communication between members is relatively simple. Pastoralists are excluded from the management institution, which further simplifies communication.

In the case of the Kelka and the Alamodiou in Mali, a dozen or so villages are members of one institution which manages an area of tens of thousands of hectares. Pastoralist groups may be attached to this area and are member, which further complicates communication. Important and urgent problems may arise such as a conflict between two villages or intrusion in forest management by a state agency, and the credibility of local management may suddenly be at stake. Effective communication may be a key issue in those situations.

Projects tend to assume a part of this responsibility through vehicle transport and written messages. An institutional evaluation of the Kelka warns of the risk of poor sustainability when the project organisation assumes responsibility for communication between villages (Diallo,Y., and Winter,M.,1997). At the same time, local institutions need to develop more dynamic forms of communication and not rely on traditional oral communication only. Several cases of modernisation have been observed as spontaneous practice:

- The use of written notes for convocation of meetings. The weekly markets are the main mode of distribution.
- The distribution of information notes to neighbouring villages and to pastoral groups informing them about the rules of forest management.
- The use of the local radio station (against payment) to inform committee members and the public.

The common denominator is literacy. Even though the leadership may not be literate, as often happens in the francophone Sahel, a younger, literate villager is often charged with transcription of the information. Communication may cost some money, even if it is a minor amount, e.g. 100FCFA (0.15USD) in the case of a short rural radio message.

6.7. FOREST RESOURCE MONITORING

Changes to the forest resource are of interest to local and to external stakeholders. Monitoring technologies applied by external agencies have expanded greatly over the years through the development of improved remote sensing techniques, geographic positioning systems, geographic information systems, plotless sampling methods, etc. This has been useful in the rural firewood projects which have measured the domestic energy resource of peri-urban areas in great detail.

The typical monitoring tool is the forest inventory which estimates wood volume based on tree diameter measurements in sample plots. Local people may be required to assist as casual labour, or to help in general orientation of the inventory team. Other than that, such inventories are planned and implemented without any involvement of local institutions. Resource monitoring by local users as the ultimate forest managers, on the contrary, has not made much progress. Very few projects have invested in locally manageable resource monitoring

systems.

Local users obviously do observe changes in the forest on which they depend, in other words, local monitoring systems exist, but in a form which is not codified and which is not objectively verifiable. The advantage of locally observed and communicated information on forest change is that it is cost free and comprehensible. “Modern” forms of forest monitoring have the opposite characteristics: it is expensive and unintelligible for local users, but it is objectively verifiable.

Yet local institutions may benefit from objectively verifiable monitoring systems which they master themselves. El Jefil village in Kordofan asserted that their forest has been well managed and that by 1999 the forest is in better condition than in 1994, when it formally became their property. The forest service representative stated that the opposite is true, and that forest management by El Jefil needs close supervision by the forest service. The existence of objective monitoring data would have enabled El Jefil to defend the superiority of their management system vis-a-vis the forest service. Unfortunately, baseline data in the form of panoramic photos are only a few years old.

The two objectively verifiable monitoring systems developed in Kordofan and in Bankass are panoramic photography and inventory of local forest products. Panoramic photos have been taken by villagers from identifiable positions such as rocks, baobab trees and boundary stones. The relatively open vegetation, characteristic of the Sahel, has allowed photography of relatively large areas. Once developed, the photos are kept in the village file, along with the ownership certificate, the map and other documents. This initiative is unlikely to be taken by the village, since it requires a camera, but the photos serve as baseline data which are generally well conserved by the village.

Literature on participatory forest monitoring demonstrates that local communities do measure their forest resources (Carter,J.,1996). In very few cases, wood volume is measured and such cases appear to be limited to higher rainfall areas where local wood cutters sell trees for sawn timber and other high value products. Also in European forestry, wood volume is only measured if the products are of high value. In Sahelian village forestry, prices are low and products are very irregular and difficult to measure. The need for objectively verifiable forest monitoring should be put in the context of forest economics.

7. LEGITIMACY OF LOCAL INSTITUTIONS

7.1. INTRODUCTION

Local institutions are performing in forest management. They guard their forests in effective ways and they enforce the rules by socially acceptable means. They plan and monitor forest resource utilisation in their own way, and some may use the written medium. But how are internal differences in the society represented and worked out in these institutions?

Development researchers have criticised the concept of community as it has been applied in many development projects, such as Gestion de Terroir or rural firewood markets in the francophone Sahel (Anon,1992; Sani,A.M.,1996). In many projects, internal differences in the villages have been neglected in project strategies in which village committees have been appointed and are considered representative without critical review. Constraints such as conflicting interests between the spiritual land owners and other villagers, or between settled and transient landusers, have lead to poor policy and project impact.

In this section, the effect of ethnic composition on forest management institutions and related leadership issues is presented for three cases in three countries. Specific reference is made to women and pastoralists, stakeholder groups which are usually underrepresented. The internal and external organisation is described for a large number of case studies, including the mechanisms of recourse. It also deals with unions of village institutions.

7.2. ETHNICITY AND REPRESENTATIVITY

The basis of resource tenure in the Sahel is spiritual land ownership of the founding lineage. The ancestor of the founding lineage has appropriated a tract of land and cleared all or part of it through fire and hoe. Occupation rights were granted, in popular imagery, by the local spirits, owners of the resource base, to first arrivals. A pact symbolises this alliance and it is periodically renewed by a sacrifice offered by the oldest member of the recipient lineage (Anon,1996). Both lineage and age determine inheritance of leadership.

Others moving onto this tract of land ("immigrants"), temporarily or permanently, required permission to do so and often tithes or symbolic payments were made. The immigrants could be removed by the founding lineage under varying conditions, but generally the longer usufruct rights were held, the more difficult it became to force out the immigrants. Pastoralists have moved periodically through with varying claims over local resources. In recent decennia, forcing out immigrants and pastoralists has become an increasingly important issue since natural resources have become scarce. But apart from general concepts, traditional tenure is not at all clear, it is very localised, constantly changing and

unwritten.

In West Africa, the Islamic invasions of the 19th century introduced Islamic concepts of tenure in which land can be sold or otherwise exchanged (IIED, 1998). The Islamic invasions in west Africa superimposed their tenure systems on the pre-Islamic systems and clashes have erupted as a result of conflicting Islamic and pre-Islamic interpretations (Maiga, I. and Diallo, G.S.A.,1995; Mortimore,M.,1997). In the case of French colonisation, "occupied lands" were governed according to local custom whereas "unoccupied lands" were claimed as state property. This principle was not applied in the Sudan and various other parts of anglophone Africa, which relied to a greater extent on customary authorities according to the principle of indirect rule (Elbow,K. et al,1996).

The identification of a chief amongst the founding lineage was widely applied in west Africa through colonial powers, first through the Peuhl empire of the Dina, then by European colonialism. In the process of colonisation complex traditional tenurial institutions were reduced to the chieftaincy, although traditional institutions continued to exist. At independence, customary institutions were further weakened. In Mali, a chief appointed by the administration was instituted to replace colonial or pre-colonial chiefs and spiritual leaders.

In Sudan, the Numeiri Government attempted to eliminate the customary authorities and replace them with village councils. More recent governments have recognised customary authority to some extent, and customary authority presently co-exists with elected village councils. In Niger, ambivalent relations between the administration and chieftaincy have developed. At various points in time, national politics either emphasised user rights or lineage ownership rights (Lund,C., 1995).

The general situation is that traditional institutions have weakened to varying degrees but continue to exist in many villages as parallel institutions. The state vested authority in the administrative chief or local committees but the de facto authority is often shared with traditional authorities, depending on the issues at hand.

7.2.1 CASES FROM EL AIN, SUDAN

Project support to communities wishing to appropriate and manage forest resources was based on the principle that each village has a leader ("Sheikh") under whose authority woodland in the village periphery is registered on behalf of the community. This followed the official procedure of land registration starting from traditional leadership in hierarchical order: signatures from the Sheikh, followed by the Umda, and finally the Nazir, before government institutions are involved.

However, over the period 1992-1999, when 19 village forests were registered or were in the registration procedure, it turned out that in about half of the villages, the procedure was slowed down or occasionally blocked at the traditional leadership level. From 1997 to 1999, local leadership was analysed through repeated interviews. The study shows that the official position in which each village controls community land through its Sheikh, is no longer tenable.

In all project villages, traditional leaders (Sheikhs) exist who represent the settled ethnic groups. The origin of these leaders dates back to the settlement of the ethnic group in the area. A patrilinear system usually determines how leadership is passed down within the village and how the leader of a new settlement, split off from the village, is determined. Upon his death, the Sheikh is succeeded by one of his sons, or in the absence of a son, by a brother. The successor may be his oldest son, but for various reasons another son may become sheikh, and the villagers have an important influence on the succession.

Though the Sheikh embodies traditional leadership, other village representatives tend to have an important voice, depending on their status and personality. The sheikhs regularly consult representatives of other families in the village. Discussions with project staff, for instance, are usually held with a group of men including the Sheikh, who may not have the last word or indeed the most important word. An influential teacher, for instance, may sometimes act as the village spokesman in spite of the presence of the Sheikh.

Sheikhs are a traditional form of leadership which follows patrilineal succession, but villagers may depose their Sheikh in the case of unacceptable behaviour. The Umda is the next level in the traditional leadership hierarchy, followed by the Nazir. They have to confirm that such behaviour warrants deposing a Sheikh and that they will appoint a new leader. Conflicts in the village are in principle solved within the village. If not, neighbouring Sheikhs will be invited to help solve the problem; the Umda and Nazir may ultimately be consulted. The Nazir also serves as a recourse for the sheikh in case of an unacceptable ruling by the Umda.

Three categories of Sheikhs have been distinguished in the project area:
- A Sheikh who represents the lineage of the first cultivator, which owns a large tract of land. He has considerable powers;
- A Sheikh who represents a group of immigrants and who have relatively little land and not much power;
- A Sheikh who is actually an assistant of the land owning Sheikh and who represents a group of people who originate from the lineage of the first cultivator, but who settled in a neighbouring locality.

The three different categories are not very distinct but are useful to describe a continuum between powerful landowning leaders and leaders with few powers. The actual control over land and natural resources varies from case to case, including the personality of the Sheikh.

In the view of "Big Sheikh" Eljak:

"A Sheikh is a descendant of the founding family of his territory. My grandfather, for instance, was recognised as the Sheikh of an area which presently includes five villages. After my grandfather passed away, an area called Baduga became the land of one of his uncles. However, this Sheikh never had any sons, so when he died his elder brother, who was also the Sheikh of Higeina became the Sheikh of Baduga. He allowed some families to settle in this area and appointed an assistant Sheikh to represent him. What the project calls "the Sheikh of Baduga" is in my eyes only an assistant to Sheikh Mohammed Ismael of Higeina. Neither the assistant Sheikh nor his descendants can ever become a real Sheikh. Only the son of a Sheikh could possibly become a Sheikh himself"

The formal government position is that each settlement has a Sheikh who is responsible for community land matters on behalf of the people he represents. This is the case for community land brought under cultivation by villagers, which is formally allocated by the Sheikh. Once under cultivation, such land rights are inherited. But for more important land issues, such as the settlement of immigrants or of land development companies, or village forest registration, land appropriation procedures are different. By tradition they are seen to fall under the authority of the land owning Sheikh who may not live in the village concerned.

This is why, in the eyes of customary authority but not in the eyes of the project, the Sheikh of Baduga required permission from the Sheikh of Higeina to register Baduga village forest. Sheikh Eljak, on the contrary, autonomously permitted registration of a village forest of 200ha and furthermore granted permission to 5 companies for mechanised farming totalling 3,000ha

Apart from the first cultivator descendency, others characteristics may play a role. Differences exist between immigrant groups of local Arab origin and those of more distant origin such as the Haoussa and the Nuba. Differences also exist between groups who are established for a longer time and those who are more recently established. The personality of a Sheikh also plays an important role.

Box 2. Immigrant groups assert forest ownership

A large number of villages in North Kordofan originate from migrants such as pilgrims on the move between west Africa and Mecca. Their descendants are often seen as guests (inhabiting a place for guests, hakura) by the original Arabic speaking inhabitants, with little access to natural resources. Village forest appropriation is not an easy task but can be achieved.

Three generations ago the village of Abunaanaa was established by a group of Haoussa who were given land by the Sheikh of El Mulbas. At the time, the fertile, riverine forest a few hundred meters from the village was part of the allocated

land. However, in the 1940's landowning leaders have expropriated the riverine land and sold it to traders from the town of El Obeid. Since that time, Abunaanaa villagers only have access to this land through crop sharing arrangements or work on it as paid labourers.

The villagers have access to land for rainfed agriculture but woodland is at some distance from Abunaanaa and belongs to landowning Sheikhs. When the project encouraged the village to establish a village forest, it was clear that none of these Sheikhs would allow Abunaanaa to appropriate a stretch of woodland. The only option left was to register a piece of treeless land near the village and start from scratch. In December 1993 the village proposed a site of 34ha but Sheikh Agib of neighbouring El Mulbas village protested in February 1994, because he had not been contacted by the project even though he is the competent Sheikh of the area. Agib is the Sheikh of the Arab tribe Bazaa, who considers the leaders of migrant villages as his assistant Sheikhs.

Through repeated discussions and attendance of project workshops, Sheikh Agib was finally convinced that the request from Abunaanaa village is reasonable. The area was registered and has been rehabilitated by the villagers with project support and presently has a high degree of protection against all types of exploitation, except for hay collection towards the end of the dry season. The big Sheikh of El Mulbas has received hay free of charge for his animals on some occasions, but Abunaanaa feels secure about its ownership of the forest. By 1999, the area was transformed into a well vegetated bushland with appreciable annual income from hay.

But most other migrant villages have not been able to secure and rehabilitate land. Even where such villages, with support of the project, started up land registration procedures without consent of the landowning Sheikh, the higher traditional leadership, who are ethnically related to landowning Sheikhs, blocked the procedure at some point.

Many different cases are found in the project area and the following 5 profiles are helpful to illustrate the differences.

1. El Jefil is an old village without immigrants and it is the cradle of the Jeleba tribe. The sheikh has customary authority over the extensive El Jefil land as well as some of the neighbouring villages, and he represents the inhabitants of this large village. Also the higher leadership (Umda and Nazir) originates from El Jefil. Decisions on land are taken with a high degree of autonomy.

2. About 100 years ago a group of people from Aloba village decided to settle in an area they named El Goz. The present Sheikh of El Goz, a distant cousin of the Sheikh of Aloba, is entitled to take important decisions on land issues without reference to the sheikh of Aloba. The land boundaries with other villages, in case of conflict, are determined by the higher leadership (Umda, Nazir) who originate

from elsewhere.

3. Baduga village was established 30 years ago, when 5 families split off from the village of Higeina. The sheikh of Baduga may be considered an "assistant sheikh" who cannot take decisions on important land issues, although he can autonomously allocate land for agriculture to his people. The land of Baduga is limited to whatever is taken into cultivation. Other land allocations as village forest registration are only possible by consent of the Sheikh of Higeina, who permitted the appropriation of 250ha of good quality woodland by Baduga through the village forest registration process.

4. Several villages of Haoussa origin were established about a hundred years ago. They were allocated land by the landowning sheikhs which was limited to the land taken into cultivation (the hakura, place for guests). In 1992 the project suggested they establish village forests, and they requested land from their respective sheikhs. Only one of them, Abunaanaa, succeeded (see box 1).

5. Several village forests are shared by distinct groups. Jebel Kordofan is shared by three groups, the bigger village is represented by the landowning Sheikh, the smaller two by assistant Sheikhs. When the project approached the three villages, the two smaller villages each wanted to establish their own forest, but were prevented from doing so by the Sheikh. Jebel Kordofan is now a poorly managed forest with much internal strife. Newa village is another example (Box 3).

Box 3. Conflicting leadership in Newa village forest management

In 1994 the project started working in Newa village, North Kordofan. In 1996 the project started supporting the Village Forest registration process, given that Sheikh Ali of Newa, supported by others in the village, was in favour of registration. A wooded area of 330ha was considered suitable for registration but required permission of the representative of the Jellaba tribe, even though the forest is located on Newa village land. The Jellaba representative in this matter, Sheikh Hemiti, agreed with the registration of the forest in question by Newa village and the registration process took off.

But later in 1996, after the applications had been approved by local leaders and had gone to government level, serious problems started. It appeared that there was both resistance from within Newa village, and from neighbouring Mehela village. Project staff then investigated the social relations in some depth.

The area of which Newa is a part, is inhabited by two Arab tribes: the Jelleba and the Dajo, with the Jelleba as the most numerous group and as the lineage representing the first cultivator. The Jelleba Sheikh is consequently the most powerful person in terms of resource tenure and in terms of people. Newa village was only settled by the end of the 19th century by the two groups, Dajo and

Jelleba, of which the Dajo happen to be the by far most numerous group. The Sheikh of the Dajo people in Newa, in terms of formal government procedure, represents the inhabitants of Newa village, which is geographically one village but consists of two distinct quarters.

The Jellaba as a minority group in Newa have their own leader and in early 1996 this was Hemiti, Sheikh of the Jelleba, who happened to live close to Newa. As the landowning Sheikh he was entitled to decide that the woodland concerned be registered as Newa village forest. But Hemiti died the same year, and the Jelleba people decided that they did not want the eldest son, Yahya, who also lives in Newa, to become the Sheikh, but instead asked his younger brother Mohammed who lives in the main Jelleba settlement, Mehela, to become the successor. Immediately upon the succession, Mohammed contested the village forest registration through his representative in Newa, assistant Sheikh Yahya, his eldest brother.

The project staff pointed out that Yahya was in no position to oppose the ongoing process, but it found that Sheikh Ali of Newa and the Dajo people were no longer interested to continue registration, particularly now that it was obvious that Sheikh Mohammed was clearly opposed to it. The project talked with Sheikh Mohammed to try and settle the matter, but was told off: "The project will bring blood on Newa if it continues forest registration". The project explained to Newa, that under modern law, the village forest would belong to Newa villagers, not to Jellaba or Dajo tribes. But the Dajo people of Newa are scared of tribal conflict. But the registration process was now in the hands of government and continued.

In 1997, the registration and gazettement process had almost been completed and by law, the forest should be managed as a reserve by the Newa village forest committee. The Newa village forest committee is dominated by the majority Dajo, whose Sheikh insists that the committee is the only competent agency. But assistant Sheikh Yahya of the Jelleba states that he not the committee, is the main guard of the forest. Sheikh Mohammed of neighbouring Mihela states that neither Sheikh Ali nor the committee, but he and his people, including Yahya and the 7 families he represents, decide on Newa village forest.

In the past, large tracts of woodlands existed outside the village forests so that the pressure on the village forest was modest. But presently, most woodlands around Newa except for the village forest are being cleared by a commercial company. In the near further, the two ethnic groups of Newa and the large population of neighbouring Mihela will only have Newa village forest as the major source of forest products. Resource conflict and poor forest management should be anticipated, unless the Dajo and Jelleba arrive at a mutually acceptable solution.

7.2.2 CASES FROM WEST AFRICA

In West African case studies, recently immigrant groups are often underrepresented in local leadership. In the Samori forest in Mali, members of recently established villages must show respect to the leaders of the founding village. All migrant villages and the founding village together may have one forest management committee, but in important issues, the founding village dominates. Contacts between local people and outsiders such as government and project staff are closely followed by representatives of the founding village, and communication in their absence may be almost impossible. But cases of poor forest management due to unequal representation have not been recorded by the project. A main constraint to forest management in the Samori is the permit-and-tax system of the forest service which allows outsiders to exploit local resources.

In the rural firewood markets, the forest management system is occupied with sustainable firewood production for urban areas. In most cases, a piece of woodland is managed by the nearest village through a management committee, under contract with the forest service. As a result of the subsectoral focus of the markets, the committee members tend to be wood cutters and thus a specific social group in the local community. In the available case studies, the composition of the committee is not representative of the local community.

Baban Rafi forest in Niger is of major importance for livestock production. One estimate puts the economic value of livestock production, most of which is herded by the Peuhl, at three times that of firewood production through the market system (Paris,P.,1996). The 22 rural firewood markets in the forest are managed by committees in which the herders are poorly represented. Project requirements demand inclusion of a representative of the Peuhl herders in the committee, but very few of the relevant positions such as chairman and treasurer in the 22 committees are occupied by Peuhl herders.

This is analysed in detail in one community, Tientiergou village, Niger. The representative of the Peuhl herders is nominally in the committee, but is effectively excluded. The woodcutters, who are all members of the Rimaibe ethnic group, have monopolised power in the committee. Consequently, one ethnic group within Tientiergou dominates forest management, relations with the key government institution (the forest service) and the funds which have been paid out for the benefit of community projects in the framework of the firewood market. The researcher concludes that this is a socially explosive situation (Madougou,J.,1998).

The Takieta gazetted forest in Niger is traditionally used by the surrounding farming communities of mixed ethnic origin and, during the rainy season, by the Peuhl and by other herders. In the process of disengaging the forest service and putting the user groups in charge, the project has encouraged both farmer and herder groups to plan and implement Takieta forest management. A large number of consultative meetings have been held which has led to two different

kinds of association: a general assembly of all interest groups which meets occasionally and which sets out policy, and four committees which meet regularly and which implement local management policy in the four geographic zones.

Transhumant herders were very keen to be involved in the consultation for Takieta forest management, which is important in the annual movement between dry season and wet season pastures. In an all important general assembly in 1997, they were numerically at par with the representatives of settled communities. But they also expressed reservations about the frequent and time consuming representation in the four committees responsible for day to day management. This emphasises the need for measured participation and representation: neither too little, nor too much, depending on the nature of forest resource use.

In forests which have been, and still are occupied by one ethnic group, questions of ethnic representativity appear to be less important and are less likely to put local forest management at risk. The Alamodiou forest management committees are culturally and numerically dominated by the Dogon tribe. The land is owned by the Dogon people and their culture dominates. The Peuhl herders are a minority of 7 out of 50 villages, who have been more or less incorporated in the local economy and in the forest management committees, despite cultural differences between the traditionally animist Dogon farmers and the Muslim Peuhl herders.

The membership of the management committees often has important animist attributes such as ceremonies when members are born and die. The Peuhl are strict followers of Islam, but they may participate in the Alamodiou management committees and Peuhl members may also participate in the ceremonies, be born and die as members and enjoy spiritual blessings from the Alamodiou. But other Peuhl propose a distinct Peuhl management committee, parallel to the Alamodiou, which does not have the Dogon cultural characteristics alien to them. The project has supported this initiative.

Across the Mali-Burkinabe border, in the forest of Banh, the Peuhl are the traditional landusers and managers of the forest, with few immigrants to date (Painter,T. and Sanou,S., 1996). Representativity is traditionally assured through the lineage representative in the decision making body, the Sudu Baba. However, people of other ethnic groups also live in this area. The concern of enhanced representativity has been addressed through the constitution of an association, the Walde Kawral Pulaka, which is intended to represent all interests.

7.3. SOCIO-ECONOMIC DIFFERENTIATION

Ethnic divisions are obviously not the only social differences which have a bearing on representativity in forest management. Sahelian societies have greatly changed in the 20th century and the extended family has broken up in many ways. Opportunities for market production and migration have increased and individuals have become anxious to appropriate profits privately. As a consequence, socio-economic differentiation has increased. This has been observed for the Haussa in Northern Niger, the Dogon and the Dafing in Mali, the Jelema in Kordofan and elsewhere (e.g. Mortimore,M.,1997; IIED,1998, Chevenix-Trench,P. et al,1998; Kerkhof,P.,1998). Nevertheless, forms of extended family solidarity are maintained but vary from place to place.

Seasonal and long term migration has become a general feature of the landlocked Sahel, with an anticipated 12 million migrants by the year 2020 (OECD et al). Migration has induced a degree of specialisation in natural resources management which probably did not exist previously. While subsistence forest exploitation used to be a common feature of all members of an age group, an increasing number of community members are involved in income generating activities, often through seasonal migration. Their knowledge of the local forest resource is very limited, and an increasing number of young men have never been in their village forest.

From two studies of socio-economic stratification in forest exploitation it appears that those who continue to exploit the forest increasingly do this for the market, including sales to community members who practice seasonal or long term migration. Forest exploitation is hard work and those who have sufficient alternative income opportunities may prefer to buy forest products from other community members. The knowledge and practice of forest exploitation is subject to a differentiation which did not exist previously.

Specialisation may be geographic, if one village has alternative income opportunities such as dry season water sources for gardening, and not it's neighbour. Or specialisation may be defined by wealth class within a given village; poorer members of the community are more active in forest exploitation than the richer strata, and sell a part of their produce to the richer families.

Socio-economic differentiation appears to be less of a factor in success and failure of local forest management than ethnic division. Those who are regularly absent from the village due to migration are less well represented on committees. In some institutions, committee membership is excluded for those who do migrate regularly. But since migrants are less dependent on the forest than those who stay behind, this may not be much of a problem.

Villages who do not use their forest much may enter into conflict with neighbouring villages which lack forest resources, and which exploit their

resources. Case studies exist of villages where this has happened, and others where conflict has not arisen. Conflict appears to surface more quickly if the forest produce has a high market value and if villagers feel that the rate of exploitation is not sustainable.

Issues in representativity other than those of ethnic or socio-economic origin have also been recorded. In one of the Alamodiou entities, for instance, historic sensitivities of four ethnically closely related villages have lead to near collapse of the management institution. The problems first arose when the French colonial administration accorded priority to a settlement which was not the founding village. Five years of project assistance in recent years has not had any significant impact on the poor functioning of this Alamodiou.

7.3.1 WOMEN IN FOREST MANAGEMENT INSTITUTIONS

Women tend to be underrepresented at the decision making level in development. The general development policy has been to impose the condition of female representation in project management committees. This has been the practice many of the case studies, and some projects require that 50% of members are women. Also, the traditional leadership, which is characterised by all male membership, has been under pressure in some Gestion de Terroir and firewood market projects. In the Niger market system and in the Gaya palm groves, for instance, the village chief has been excluded from the key positions in the management committee, although he is a member.

In all the case studies, women are formally members of the management committees. Does this imply that they are well represented in forest management decision making ? For the Kordofan case study, two indicators have been used: the presence and the participation in the many meetings over the period March 1997 through to March 1999.

Apart from meetings specifically organised for women, in about two thirds of the management committee meetings, no women were present. In the meetings where women were present, they did not substantially participate in the discussions. This is illustrated by a sample of the numerous cases:

- When Sheikh Ali was asked to enumerate the members of the Village Forest Committee, he gave the names of men only. Then he was asked about possible female members, and he responded that there were women members but he could not name any of them.

- Upon request of the project, the Halfa committee was made up of equal numbers of men and women, all present at the meeting. One of the five woman frequently attempted to participate in the discussions, but she did not get a chance and left halfway through the meeting. The other women did not speak a word.

- In Goz village, half of the committee members are women, as required by the project. During the meeting they did not speak up.

- Sheikh Yahya confirmed that women hardly participate in matters concerning the village forest. He and his councillors said that the women do not know the management rules and that this does not matter, because the women do not use the forest, which is situated about 4km from the village.

- The female head of the project extension team noted that women are not really involved and don't even want to be involved in village forest establishment. For the women, land issues are a matter for the Sheikh and the men in general. The project has organised special meetings for the women to inform them in spite of their wish not be involved.

In Mali, the Alamodiou committee has female members if only because part of the members were destined by culture to become so even before they were born. Women in these committees do speak out and they participate in forest patrol, but in some important issues, such as conflicts with the forest service, only men were represented. The Alamodiou leadership is uniquely male. None of the research meetings held with Peuhl herders in the neighbouring Samori forest over the period 1996-1999 had any presence of women.

Women seem to participate more in communities where Islamic traditions are weaker, such as the Dogon villages. Separate meetings for women can obviously be held by any research or development agency. Projects and policies may enforce a formal committee composition which represents women at numerically equal terms, but these formal committees may not be functional. In the long term, important decisions are most likely to be made in accordance with local traditions. Project staff cannot police committee meetings in a sustainable and replicable manner, so that active representation of women in forest management committees is likely to be a function of cultural norms in the long term. Nevertheless, the presence of women may inform village women of the issues at hand and gender policies may contribute to the wider issue of women's participation.

7.3.2. PASTORAL INTERESTS

Sahelian forest, woodland, bushland and wooded savanna is of high value to livestock production, particularly during the time that cropland is not accessible to animal husbandry. Much of the land categorised as forest is actually grassland. The principle of mise en valeur or land development as a way of securing land rights was codified by the colonial government as a tool to induce economic development and continued to be applied in post-colonial tenure as a major criterion of access and ownership (Elbow,K., 1997). This led to insecurity for the multitude of traditional landusers who relied on mobile livestock production.

The relationships between different traditional landusers have greatly changed since precolonial times. The complementarity of farming and nomadic livestock production which used to be a common feature has been transformed at least partly into a relationship of competition. Not only have pastures and livestock corridors been taken into cultivation, but farmers have also diversified their economy through livestock production. This is now an important strategy in dealing with the risks of rainfed agriculture in the Sahel. The implication is that settled communities and mobile users increasingly compete for the same natural resources.

Many livestock owning farmers have reduced access to forage and water resources for traditional livestock keepers. The millet stalks in Mali's Seno plains are removed as soon as the millet is harvested, and put into large stacks protected by thorn fences. Farmers prefer to keep these resources for their own livestock and take the risk of increased conflict. Such conflict arises when hard pressed Peuhl herders remove the thorn fence. In Kordofan, farming communities increasingly resent the annual arrival of the Baggara herders, since "they finish all our grass in a short time", at least in years of poor rainfall. Deadly conflicts between farmers and herders appear to be on the rise in the Sahel.

The description of enforcement in Kordofan villages usually includes cases such as:

- Nomads have cut a large number of Acacia seyal for small livestock and have been fined.
- Nomads were found staying inside the village forest and were fined.
- A nomadic group had established camp inside the forest and had cut trees to erect fences, refused to pay a fine and fled before arrival of the police.

In Kordofan, traditional usufruct (Afaa) by mobile herders of the village forest has not been recognised in the registration procedure and no form of compensation has been made, despite legal provisions in the Forest Act, 1989 and the Civil Transactions Act, 1984. Once in the registration procedure, such forests are legally no longer accessible to the nomadic herders unless by specific permission from the village committee. By law, only villagers are represented in the forest management committee, so that pastoralists are excluded.
A review of forest offences suggests that, at least in some cases, discrimination is made between forest offences of nomadic and settled herders. In these cases, herders from local villages got away with a warning, herders from other ethnic groups have had to pay a significant fine. Many signs of frustration on the side of Baggara herders have been noticed, such as destruction of all forest boundary posts, plain refusal to accept directives from committee members and project staff and sometimes more violent events occur.

In the forests around lake Fitri, pastoralists are traditional users of the Acacia

forests. However, the increased gum arabic prices have encouraged the Bilala farmers to appropriate natural Acacia senegal groves and to increasingly exclude pastoralists (Tidiane,A.D. and others, 1999). Changing economic circumstances have evidently changed the rules of access.

But In many cases, farmers tend to maintain relationships with specific nomadic groups in which farmers' livestock may be kept by the nomads under various arrangements. Also other forms of interdependency exist so that local fodder and water resources continue to be negotiated. In Bankass, the Assaga Anda Alamodiou committee and Peuhl leaders negotiate the pruning of Faidherbia albida which is pollarded in years of need, but not more than once in three years. After negotiations have been concluded, the herders are entitled to clip the trees of any owner on the territory for a specified number of days against a payment to the committee.

At the level of project organisation, pastoral groups are also underrepresented. In none of the case studies, until 1998, had projects recruited any nomadic or transhumant herders as team members. Gender is generally a criterion for project staff recruitment, but otherwise the teams uniquely consist of members of settled groups and some staff may have nomadic ancestors but without present attachment.

The conclusion is that mobile herders, despite the important stakes they have in Sahelian forests, are poorly represented or totally excluded from forest management in the majority of cases. Institutional innovations to enhance their representation exist but are of a very recent nature. In the meanwhile, conflict between mobile users and settled forest managers is on the rise.

7.3.3 INTERNAL AND EXTERNAL ORGANISATION

The organisational characteristics of local forest management institutions seem to be as different as their number. No two institutions appear to be identical in the way they are organised. The hugely variable environmental, socio-economic and political conditions in the Sahel are probably the main reason for the heterogeneity. Furthermore, the legal definition of local management institutions is poor in most countries.

In the Kelka, village level committees deal with rule making for their forest and for day to day forest management. The rules vary from village to village, are unwritten and appear to be ever changing (3). The 13 villages together have a union of institutions called the Walde Kelka, with two representatives from each village, which deals both with problems between villages and with problems between villages and authorities or non-member villages. The Walde Kelka also functions as a recourse for judgement passed by the village committee. The ultimate recourse for anyone is the administration, but fines tend to be much higher than under local arrangement.

The Walde Kelka meets twice a year to discuss any internal and external issues of the union, or at any time of need. Member villages contribute a modest annual fee to the union. Both the Walde Kelka and the village committees have been defined and registered as associations under the 1959 Law on Associations. This legal definition is at odds with the actual practice of rule making and of arrest, confiscation and fining of forest offenders, but the project found that the 1959 law is the nearest local committees can get to legal recognition.

Conflicts between villages of the Walde Kelka occur from time to time. More serious conflict occurs when one of the litigants does not wait for local negotiation and problem resolution, but involves the forest service directly. Persistent behaviour and "non-respect" for the Walde Kelka by one village has led to the ultimate measure the local society can take: social exclusion of the village concerned. None of the other 12 villages turned up for an annual event in which the offending village took part. The matter was finally resolved by mediation of the Regional authorities.

The five Alamodiou entities in Bankass which cover 50 villages altogether, are traditional Dogon institutions. The fetish used to be an important cultural element in the Alamodiou since it inspired the respect needed for forest management. Interpretations vary about the contemporary importance of the fetish, symbolised by the cow's tail. Another cultural element of the Alamodiou is membership, which may be voluntary and temporary as it is in most organisations, or it may be through birth. Membership through birth may be the result of the mother, who used to be barren, becoming pregnant through the blessings of the Alamodiou. As a result, the Alamodiou seems to be among few institutions where women are members without external agencies insisting on female membership.

The leadership is elected and is in principle for life. In one Alamodiou, the leader is now blind and old, so that he is assisted by young and literate members, which has modernised the institution. In most cases, however, modern features such as written accounts do not exist. The rules are vague, unwritten and interpreted differently by different members of the community and of the committee. The revenues of the Alamodiou consist of voluntary contributions by the villages, fees for access to forest resources by important consumers such as artisans, and fines and taxes. Members may confiscate illegal goods and collect fines, of which they receive a percentage. Recourse procedures are not clear, but strong village leaders may render judgement by the Alamodiou invalid, or enforce renegotiation.

Meetings are convened about twice a year by the leader, or when need arises, for example on occasion of crisis. The legal status of the Alamodiou is uncertain, since they cannot be registered as associations under Malian law given the archaic internal regulations.

Internal discipline is primarily maintained by respect for the Alamodiou leadership. A crisis in one Alamodiou emerged in 1998 when three Dogon members served as assistants for forest service agents when they pointed out forest infractions of a neighbouring Peuhl settlement, which was subsequently fined by the agents. The Alamodiou leader convened an all member emergency meeting in which he spoke of the shameful behaviour of the three members, shameful because possible problems inside the Alamodiou should first have been discussed and possibly solved inside the committee. The Peuhl community felt heartened by the action of the leadership, and the 3 members are unlikely to repeat their initiative.

In Kordofan, law stipulates that committees elected by the citizens of the village are in charge of management. Since the village forests are registered as reserves, exploitation and even trespass is illegal unless the committee approves. Fines, confiscation and other sanctions are the responsibility of the court. This is a well defined status in comparison to the west African case studies, but actual practice is quite different from statutory arrangements.

The way committees operate depends more on the authority and effectiveness of the leadership than on regulations. The aging Sheikh Ali of Newa was the main liaison between the village and local government until 1993, when this function was handed over by the government to a member of the Village Popular Committee. In neighbouring Mihela, a young, literate Sheikh is the liaison with local government. In El Goz, liaison with the police and the court is left to a representative of the Village Popular Committee which serves 5 villages, and who is a member of the local government council as well. Any contacts between the 5 villages and police or court are dealt with by this person, including forest offences. The powerful Sheikh of El Jefil hardly needs the court. Stiff penalties are applied which are readily paid by the offenders.

Written, internal regulations for the Village Forest Committees do not exist and management responsibilities may be held at different levels, such as:
- the village assembly (all adult villagers)
- the village popular committee (instituted by government)
- the village forest committee
- the customary authorities
- the village forest guards
- individual villagers

The actual practice varies from village to village but the following characteristics seem to be predominant:
- All villagers are responsible for monitoring the Village Forest and possibly other woodlands and report irregularities.
- Young men are more responsible than others for some of the difficult work such as arrest, and transport of offenders to the police. Older men deal with conflicts which can be resolved locally.

- Village forest committees deal with project staff visits and the male members may be more active than other villagers in control and arrest; in some villages they issue licences, in other villages the Sheikhs are responsible.
- The relatively young Sheikhs tend to be active in guarding and arrest, all Sheikhs play an important role in conflicts, and they may be the main contact with police and court;
- The village assembly may decide what use is made of net income from the forest.

The criteria for selection of members in a sample of villages were:
- adults who do not migrate.
- villagers active in community work and who are not too individualistic.
- both old and young people.
- at least one fully literate person.

In the rural firewood markets, internal and external regulations have been spelled out in the contract between the committee and the forest service. The committee is legally defined as a cooperative, which is due to the sectoral nature of the organisational objective. The market system is closely supervised by the forest service so that the committees are not engaged in rule making, control and enforcement commonly found in other situations. Members of firewood market committees express concern about illegal tree cutting in their forest, but do not arrest, confiscate, fine or otherwise pursue offenders. The forest service has not delegated any responsibilities of this kind to the committees. Management committees outside the market system do not have the legal powers either, but in the relative absence of the forest service, such powers are exercised de facto.

Since the market system is hardly concerned with non-firewood issues, resource management outside the firewood sector is hardly defined. Rules on fruit collection, grazing access and protection of valuable trees on fallow hardly exist, whereas rules on commercial firewood production are elaborated in great detail. No proper recourse procedures are defined in the various forest acts.

7.4. CONCLUSIONS

Insufficient representativity is an issue in most local forest management institutions but most of them function reasonably well. In a minority of cases relations are so disturbed that forest management functions poorly. Ethnic divisions between settled groups are the main source of poor representativity, but even if ethnic differences are minimal, clan or lineage differences may prevent representative management.
Mobile herders have been underrepresented, or entirely neglected, in a large majority of cases. The legal and institutional framework in the Sahel has made the exclusion of mobile landusers worse. Conflict between farmers and herders in local forest management is generally increasing. Some projects have now recognised pastoral groups as partners in management institutions but the

experience to date is very recent. In exceptional cases, where pastoralists are virtually the sole landusers, management institutions are run by pastoralists and the same conflicts do not occur.

Women are underrepresented in local management institutions in terms of active participation, particularly in societies with a strong Islamic culture. The most important resource uses for women, such as firewood, perfumes, fruit and other foods as well as browsing by small livestock are usually accessible, whether the forest is under protected status or not. This may help explain why poor representation of this stakeholder group has not visibly affected forest management.

Increased specialisation and market orientation has had an impact on the socio-economic structure of the forest users. Some villagers have never been to the forest whereas others draw their main revenues from forest exploitation. This may have some impact on representativity, but it is likely that those who have higher stakes in the forest are better represented in the management institution. A risk of the firewood market institution is that it impacts on non-firewood values of the forest even though the institution may be run by firewood cutters.

Local institutions offer more opportunities for recourse than the state. In most cases, judgement passed at one level may be reviewed by another level, such as an enlarged council of leaders. The government administration and justice system serves as a final recourse, although in exceptional cases sanctions by the community may be more severe than those of administration and court. In the forest act, on the other hand, recourse procedures are poorly defined.

8. SUSTAINABILITY OF LOCAL FOREST MANAGEMENT

Despite donor support to the Sahelian forestry and natural resources for the last 30 years, local forest management is a recent phenomenon. One of the older examples, Gusselbodi forest in Niger, was revolutionary at the time but the model offered very little autonomy for local institutions. The autonomy of local institutions in the present case studies is much greater, even though many of them operate without the necessary legal and institutional support. But the present experience is from the 1990's and mainly from the latter half of this decade. An assessment of sustainability is pertinent but only preliminary conclusions can be drawn. This will be done by review of elements of dependency and elements of independent forest management.

8.1. ELEMENTS OF PROJECT DEPENDENCY

International political change along with institutional, legal and macro-economic reform have been the major impulse for local governance of forest resources in

the Sahel. But the nuts and bolts of local management have been worked out by many projects at micro-level, which have experimented and which have monitored change. The results of their work is essential for the development of better legal and institutional arrangements. But the interpretation of project impact requires care since it usually contains elements of dependency. These elements cannot be maintained in the absence of a project environment and should be isolated from conclusions on sustainable change and policy development.

8.1.1 FOREST REHABILITATION

Forest management projects have invested important resources in the rehabilitation of natural forests where they have disappeared. Most projects reviewed in this study have, at some stage, invested in nurseries, microcatchment establishment, reseeding and protection. In the Sudanese and some of the Nigerien projects this was done by payment through Food for Work, in some of the Malian projects payment has been made in the form of tools, and most projects have carried the financial burden of seed provision and nursery inputs or seedling production. Village forest guards have also been paid in some cases.

In some of the Malian projects, forest management plans include investment plans based on annual tree plantation objectives. These plans have been inspired by the forestry tradition which prescribes forest rehabilitation through tree planting or reseeding in absence of economic considerations and cross-sectoral interests. As long as forest resource management is seen as a sectoral issue and is thus under responsibility of sector specialists, the risk of bias and inappropriate management strategy is likely to stay put. Village institutions are likely to accept the burden of tree planting schemes as long as the overall benefit flow of the project is maintained.

Over the last few years, many of the projects have abandoned tree planting schemes. The rural firewood markets have been amongst the first to stop tree planting and instead focus on better management of the natural forest. Although tree planting schemes have generally been abandoned, new project proposals by forest service agents are still centred around tree planting. Clearly, tree planting may be sustainable under special circumstances such as occasional planting of fruit and shade trees in villages. The objectives of such schemes are quite different from natural forest management.

Other forestry investments may include the establishment and maintenance of firebreaks. This is required by the project in Kordofan in order to qualify for forest registration. All villages have thus created a firebreak, but once the forest is in the registration procedure, the firebreaks are not maintained. This does not imply that villagers do not care about fires in their forest, but they may have their own ways to reduce fire risk. In Baduga village forest, for instance, natural

regeneration of the main tree species was 30-40% higher than in the surrounding woodlands, apparantly because of improved fire control. Yet the firebreaks had not been maintained.

8.1.2 OTHER PROJECT INVESTMENTS

Most NGO projects and some bilateral and multilateral projects are concerned with broad, equitable socio-economic development as much as sustainable and productive forest resources, as reflected by their logical frameworks. The concern is that impoverished local communities cannot be expected to invest in their forests or abstain from overexploiting them, in the absence of short term economic improvements. Typical investments may be wells and boreholes, or mills and donkey carts to reduce the labour burden. Or they may be credit schemes, stores, tools and equipment to enhance incomes, and any of this may be accompanied by training in literacy, accountability and technical themes.

Villagers are often expected, explicitly or implicitly, to engage in improved forest management as a part of the project package. The objectives, strategies and resources of the many projects vary a great deal, but the short term investments offered are somehow tied to the expectation of long term forest conservation, if only because the project is one and the same organisation.

Table 8. The total project cost in US$ per year and per village, market or other relevant social unit as reported by the project.

TITLE OF PROJECT	PROJECT COST/UNIT/YEAR
NFMP, Sudan	
Energie-II, Niger	30,000$/market/year
PAFOZ, Niger	
Roneraie, Niger	
Kita, Mali	13,000$/market/year
PAGE-B, Mali	
NEF, Mali	

Large investments are likely to influence the acceptance of natural forest management strategies. An example of dependency is a project which supplied both food through food for work and dry season drinking water through tankers - villagers are likely to accept anything in natural forest management in order to guarantee these services. The average project investment per village is rarely monitored, but total project cost per village or per beneficiary may be calculated and gives a rough impression of the risk of dependency, see table 8. This is at best a crude indicator, since the nature of project investments, such as the local financial contribution and management of the investment, are essential for an evaluation of dependency. This cannot be done in the present study.

8.1.3 ILLEGITIMATE POLICIES

Project policies are mostly determined by national and donor policies. While adherence to national policies should guarantee a certain sustainability, some policies may not be legitimate in the eyes of some stakeholders. Project impact may be maintained by the presence of project personnel, but may be at risk when they leave.

One example is the project strategy of village forest registration in Kordofan, which follows the national policy of village governance by elected committees and village leadership). Project staff have maintained this position for a long time vis-a-vis the villages and land owning Sheikhs who occasionally blocked the registration procedures. Due to the high level of project support to the local economy, opposing Sheikhs have been silenced to some extent. But now that the project is phasing out, old claims resurface.

The requirement of gender balance has been imposed by many projects. The examples show that such impositions may have a formal impact on local institutions, but may not have a significant de facto impact on decision making. Another example is the exclusion of traditional leaders in some committees, as required by various projects such as the Nigerien firewood markets. Several researchers noted that the exclusion of the Chef de Village in Nigerien committees has reduced legitimacy and increased the scope for conflict (Sani,A.M.,1996; Madougou,J., 1998).

In Kordofan, the exclusion of nomads from village forest management is codified through the forest act, 1989, since only the citizens of the village concerned are eligible as committee members. Villagers and project staff have pursued Baggara pastoralists for trespassing in village forests. This may be fully legitimate and supportive in the eyes of the villagers, but not in the eyes of the nomads, which puts institutional sustainability at risk. The Baggara pastoralists do not accept the alienation of wet season pasture through village forest registration, which has been done without the slightest consultation. Various observers note an increased risk of armed escalation, knowing that many pastoralists carry guns.

It is also noticeable in various projects that after many years of project assistance, villagers are still afraid to provide information on de facto forest management to project staff. The identification of project staff with the forest service has placed a burden on this relationship. Some project staff and project vehicles have been active in repression, and villagers find it difficult to distinguish between assistance and repression. Due to this ambiguous relationship, project monitoring data may be biased.

The firewood market system depends to a large extent on project assistance. The establishment of markets and appropriation of forests require advanced equipment and well trained human resources. Fiscal arrangements are complicated and are subject to malpractice. Determination of the annual quota requires extensive studies if it is to be useful. It may be argued that the relatively

high level revenues earned from the urban firewood market justifies external inputs to some extent.

8.2. ELEMENTS OF INDEPENDENT FOREST MANAGEMENT

The most useful experience in local forest management for policy development is management independent of project assistance. In the Sahelian context, only low cost forest management may be considered viable, with the possible exception of areas with a high urban-rural cash flow.

An evaluation of this experience is made difficult by poor monitoring data. Projects tend to report most on those activities which have important financial implications. Changes in forest management which are independent of mainstream project activities are not always reflected in the monitoring and reporting system, even though they may be the most interesting elements for policy development.

The appropriation and protection of forest resources without significant project inputs is an important example of independent forest management practiced the moment that a key policy constraint is removed. The best examples are found in Mali's 5th Region in the forests of the Kelka, Samori and Bankass plateau. The political revolution of 1991 has moderated the repressive and extractive nature of forest agents and it has allowed projects to support local management in restricted areas. Projects have reduced the interventions of forest agents in these forests so that management is mostly in the hands of local institutions. Although the arrangements may collapse when projects terminate, the policies of local governance presently developed in Mali may sustain local forest management in the long term.

Projects have informed local people about rights and responsibilities and some have catalysed discussion between the local forest service and local institutions. Formal or informal conventions between the forest service and local institutions have been prepared and project relations with higher echelons of the administration may have had an influence on the adherence of local agents to the hands-off policy. Localised policy change is project dependent but elected Rural Councils change local power structures permanently.

In forests which have now been under local management for half a decade, appropriation, guarding and enforcement are happening without project support or presence which indicates the sustainability of such management. The symbolic nature of most fines indicates that rule enforcement is for the sake of management and not for immediate financial gain. In cases where local forest agents have reverted to the traditional role of issuing permits to outsiders and fining villagers, conflicts with local management institutions have been serious, which may suggest that local management has settled in.

Box 4. Appropriation and Management of a forest in the Samori.

Ganida village and 13 hamlets are spread over a forested area of thousands of hectares in the Samori forest, Mali. Project support in this area has been modest and support to local forest management has been limited to encouraging the villages to create committees which take responsibility for the forest resources on their land.

The local forest agent, based in Sokoura, has the habit of issuing a large number of cutting permits to outsiders allowing them to exploit Ganida's forests. Outsiders are accustomed to cut trees anywhere they like in Ganida and usually they harvest much larger quantities than their permit allows them, since actual exploitation is not controllable by the agent. Furthermore, forest agents from other administrative units also issue many permits for tree cutting in Ganida, due to deforestation in their areas.

In 1996 Ganida's traditional leadership decided to put a brake on the large influx of wood cutters. Those without permits issued from Sokoura were stopped from tree cutting altogether and those with permits were guided to selected areas and were stopped from cutting any quantity they wanted. Ganida has stratified its forest into protected zones and zones subject to certain forms of exploitation with a scheme of rotation. The management committee is made up of members from each immigrant village under coordination of the local leaders in Ganida.

Ganida's initiatives led to conflict with the forest agent, who engaged the police in order to arrest members of the committee. Requests by the village to the forest agents to discuss forest management were never met. The agent is usually present at Ganida's weekly market in order to fine villagers and traders, but he has not been prepared to discuss local forest management. But committee members continued to stop outsiders from tree cutting at will. Project staff have tried to intervene and moderate, but the issue has not been settled.

The forest agent told committee members: "I will let you go this time, because of that project. But once the project is gone, I will be on your back". Nevertheless, the Rural Communes have now been elected and are expected to take over responsibility for local forests from the forest service. This does not guarantee Ganida's control over its forest, but it does bring decision making much closer and hopefully makes it more accountable.

The appropriation of forest resources by local institutions is hardly feasible in some of the other case studies. Although some projects have been operating since the early 1990's, no examples are reported of local communities taking initiatives to appropriate a forest. In Kordofan, village forest registration procedures are too long and too expensive. Many villages have expressed interest to project staff in forest registration, but no examples exist of a village taking initiatives independent of the project. None of the rural firewood markets, a

concept which exists since the 1980's, have been established by initiative of a local community. Projects report interest by villagers to participate in the project model, but this is a big step removed from communities taking initiatives in absence of project support, and thus from widespread adoption.

The available cases suggest that the degree of lawfulness of local management is inversely related to the degree of independent adoption. Land registration in Sudan and firewood markets in the francophone Sahel are legally well defined in comparison to various other models, but are most difficult to adopt spontaneously.

Unsurprisingly, local institutions discard unsustainable elements of the project package for local management. Villages throughout the Sahel have been very active in microcatchment and tree planting schemes when supported by the various projects. Very little if any forest rehabilitation is done in the absence of project support, but forest protection is maintained. Firebreaks may be established where it is a part of the project package, but are not maintained at a later stage. Even relatively user-friendly monitoring such as panoramic photography and local product inventory are unlikely to be adopted by local institutions if there is no external assistance and presence, and there certainly are no examples of such adoption.

A range of forest management initiatives exist without any policy or project support, but which are hardly reported anywhere. A system of taxation by local institutions exists in the forest of Mali's 5th Region without any project intervention. The minor funds raised in this manner finance the operations of the institutions, such as the regular meetings required for communication and problem solving. In one forest, an informal cooperative of woodcutters has established a forest road in difficult terrain which allows access by donkey cart instead of by headload. Groups of woodcutters operate in unison but appropriate the produce privately, so that dangers can be faced by the group instead of individual operators.

Another indicator of sustainable forest management is the way conflicts which threaten local management institutions are dealt with. In a conflict in 1995/96 between Tete and Tibouki villages, in the Kelka, Tete engaged the forest service in the conflict and ignored the role of the local institution Walde Kelka. In the end, all other villages, united in the Walde Kelka, decided to socially exclude Tete village (Diallo,Y. and Winter,M., 1996).

In another example, forest agents raided a large number of villages which are members of the Alamodiou association and where forest has been under local management since 1994. In many villages, leaders refused to bend to the demands of money from the agents. Leaders of two committees explained to village leaders that no payment should be made to the forest agents, and most local people acted accordingly. Emergency meetings within and between

Alamodiou were held and all of this happened without any participation of the project.

In a third case, in Sudan, the forest service expropriated 1,200ha of woodland from the village without proper legal procedure. The village leadership did not budge, and symbolically claimed their land by taking livestock daily to the land, getting their animals confiscated, followed by a lengthy procedure of release. At the same time, local leaders have engaged a lawyer to sue the forest service in court.

In all these cases, local institutions go to great lengths to maintain integrity independently from project assistance. What they do need is better policy and a clearer legal framework for local management.

8.3. CONCLUSIONS

With the exception of the rural firewood markets, projects make significant investments outside the forestry sector. This makes it hard to evaluate project outcome for the purpose of wider forest management policy. It is evident that a number of forest management investments, which are expensive in financial and human resources, are not sustainable. Other forest management activities appear to be highly sustainable but are not legal. Lawfulness and sustainability are to some extent inversely related. Some other activities again seem to be sustainable and legal, but are poorly recorded since they are not part of the project package.

9. CONSTRAINTS TO PUBLIC RESPONSIBILITY

9.1. LEGAL VACUUM OF LOCAL MANAGEMENT

The legal frame of local forest management of the west and east African studies are distinct. Although traditional tenure and Islamic law are inherited in both the western and eastern Sahel, the west African studies are based on the French, the east African studies on the British legal system. Furthermore, a process of political differentiation is occurring since independence, although this may be counterbalanced by more uniform changes such as increased democracy and local participation.

Some customary management institutions, with their internal and external rules which existed before colonialism still exist in the 1990's. The much improved scope for local resource management has raised the issue of reviving and legally recognising traditional institutions, such as pasture management in the Niger delta, organised under the Peuhl empire of the 19th century, or the Alamodiou of the Dogon plateau. However, traditional resource management institutions have

not kept pace with the greatly changed ecological, socio-economic and institutional environment.

Resource exploitation rules of customary institutions often emphasise those which existed at the time of relative resource abundance. The internal regulations in many of those institutions have not kept pace with the need for representativity, accountability and lawfulness. Several legal studies have been done in the francophone Sahel of local forest management institutions. Some of the institutions are designed and inspired by projects, such as the Gestion de Terroir and the rural firewood market projects, others are customary, such as the Alamodiou and to some extent the Kelka. Several conclusions may be drawn:

1. Approaches to community development may be diverse, but are often based on presumptions concerning the community as a group of people who occupy a given administrative territory. The social differences within the community, and their dynamics, tend to be analysed superficially, if they are analysed, and tend to be ignored at the implementation phase. Social difference is generally accepted in development research, but simplistic notions of community are retained in the context of many community based environmental projects (Leech, M. et al, 1997).

As a result, the representativity of local management committees is at stake, and the legal value of local management is questionable. In the case of Energie II, for instance, non woodfuel interests are poorly represented in committees which decide on forest management. Some projects have supported intervillage committees which may respond to some of the intervillage landuses, but they exclude others such as livestock corridors and pasture or fisheries. Coherent landuse planning at higher levels may be essential, which has implications for the legal definition of local management.

2. In customary institutions, both internal and external rules lack transparency and efficiency and are often not lawful. Management is not transparent, accountability is weak. Local institutions may not have the legal status required to open a bank account, for instance.

3. A main constraint identified in all projects is the statutory land tenure system which is poorly adapted to communal resource management. Uncertainty remains about the strength of powers devolved to the local management committees, and the formal rights associated with Gestion de Terroir. Ad hoc legal and institutional arrangements are made to encounter this constraint, and tend to fall apart once the project terminates. Projects have insufficiently addressed the prevailing policy and legal framework, but on the other hand this framework is hardly appropriate for local management.

As a result of these constraints, local forest management tends to operate in a legal vacuum. In many cases, the rules governing natural resources formulated

by the local management committee are disputed. In the case of dispute, one of the litigants may refer to the local administration, which may put the local management institution in a weak position. If there is a conflict between local institutions and the local administration, rules are often discarded as without legal force.

Two different categories of legal recognition may be distinguished. In the case of national bilateral or multilateral projects such as some of the rural firewood and Gestion de Terroir projects, the project is considered a representative of the state through the international agreement signed between the Government and the donor. The international agreement is a document of important legal value, though it may be of little use once the project terminates. In this type of project laws may have been adopted as a precondition to donor finance, such as laws on forest exploitation (rural firewood market projects) and laws on village management committees (Gestion de Terroir projects).

In the case of Energie-II, for instance, the local forest management contract (Dossier d'agrément du Marché Rural) can be described as a concession of the state, through the project, to the local management committee. It provides a firm legal basis for commercial firewood exploitation by the local woodcutters. It does not resolve the legal status of the local management committee, which is generally seen as a cooperative. A cooperative has a specific economic objective, such as firewood exploitation, but has not been defined for a general good. A cooperative cannot manage and enforce rules for a public good. Membership of a cooperative is voluntary and, for all practical purposes, restricted, whereas the forest is a public resource. The committee cannot sue forest offenders in a court, it relies on the forest service to do so.

Other projects, NGO or smaller bilateral projects, pursue a degree of legal recognition through an ad-hoc arrangement with the local authorities such as a decree of the local Sous-Prefet or a convention between the local administration and the committees. The legal value of such a document is questionable and in practical terms, implementation of the arrangement is dependent on project presence.

Local institutions may be legally recognised under the private law regime, such as a cooperative or an association. The Kelka committees are registered as Associations under the 1959 Law on Associations which allows the committees to assume certain responsibilities in finance management and legal procedure. The Alamodiou and the committees in the Samori forest do not have this legal status and depend entirely on respect by the local administration for the convention signed by both parties. The constraints to registration of Alamodiou as an association are important: many Alamodiou members are born as members and are thus children, which is not possible under law. None of the internal and external regulations exist in written form and in most cases there is no system of financial accountability.

It is evident that the archaic structure of traditional resource management institutions cannot be simply restored and empowered. Modernisation is necessary through adoption of basic legal principles. But also legally defined management committees, as associations or cooperatives, operate in a legal vacuum. They have no exclusive forest resource management prerogatives, which prevents the local management committee from legally suing those who infringe on local rules.

In Sudan, legal recognition and exclusive rights of the local management committee not an issue if the full land registration procedure is followed, which is presently defined as gazettement. The procedure is lengthy and costly and can only be achieved through project support. In an alternative model, applied in the Blue Nile Region, villages pursue land registration up to the State level instead of the national level, which is a simplified procedure. There is not much experience with this model, but villagers may find that their land rights are not recognised.

In Kordofan, the project has supported land registration of village forests through the forest service. The first batch of 5 village forests took a long time to register, but the certificates were available by 1995. A description of the full process with timing and some financial aspects is provided in Table 9.

TABLE 9: The process of village forest registration

NO	DESCRIPTION OF EACH STEP IN REGISTRATION PROCESS	TIMING	PROJECT EFFORT REQUIRED
1	General awareness, training, misc. project activities (nurseries, stoves, tree planting, water, etc)	1989 and 1990	very significant
2	Sheikh and leader courses (3 times)		significant
3	Villagers decide; requests for VFs	1991	
4	Those who request: additional training, reflection		
5	PRA mapping, define location, boundary definition	early 1992	one visit/VF
6	Visit neighbouring villages, verbal agreement on described boundaries	last vill by Dec "93	avge 12 visits per VF
7	Village authorities sign (Sheikh & management committee)	Dec 1993	1 visit/VF
8	Higher customary authorities sign		avge 3 visits

9	Khartoum surveyor measures forest boundaries	Finished by Dec "95	Bus ticket & Per Diem
10	Surveyor prepares map		Maps, 7VFs: 240,000S£
11	Rural Locality Officer signs		1 visit/5 VFs
12	Lands Department Authority & Head of Muhafatha (District/Province) sign		1 visit/5 VFs
13	FNC in state forwards to FNC Director, Khartoum		(by mail)
14	Lands Registration Department, Khartoum, approves		200S£/feddan
15	Certificate sent to NFMP, which collects certificate from District		1 visit/5 VFs
16	Participatory resource inventory	1996/97	30 staff*days/village
16	Utilisation survey	1996/97	10 staff*days/village
17	Management plan	1999	Several visits/ village
18	handing over certificates	1999/00	

It can be argued that the effort and the long time required for the first batch of village forests can be justified since they are the first village forests ever gazetted in Sudan and in the Sahel. It was hoped that the next 7 village forests, followed by another 6 forests, would go through an accelerated process. This has not happened, and none of the 13 forests under the registration process since the first batch has been registered by 1999. Village forest registration has been blocked by a number of bureaucratic and financial constraints, such as:
- the forest service has poor relations with the Lands Department which is responsible for issue of certificates.
- the forest service does not want to pay fees for any registration, national reserves or village forests.

The village forests which are gazetted are offered a high level of legal protection against exploitation by outsiders. No entry, collection of forest produce, grazing and other uses are allowed unless by specific permission from the elected village forest committee. The penalties for forest offences are extremely high: trespass, for instance, is punishable by minimum one year and maximum 10 years imprisonment. By law, the Sheikh may arrest anyone suspected of a forest offence and seize property and means of transport in connection with suspected offence. The accused is required to prove that the seized property is in lawful possession.

But in actual fact, community forests are protected through mechanisms of

community control and enforcement which have been described above, and not by the mechanisms stipulated in the forest act. It is not the process of justice prescribed by law, but customary authorities and forest committees, informally backed up by state institutions, which deal with enforcement and punishment. Yet local enforcement mechanisms are not legal.

Another legal constraint to local forest management is that commercial forest exploitation may require a forest service licence and tax payment. In Kordofan, some 50 forest products require transport licences and are subject to taxation. Forest exploitation is thus permitted for subsistence purposes but if it is for commercial purposes, it is taxed. The licences can be obtained from forest service or local government offices which are at an average distance of some 30kms, a prohibitive distance for most small producers.

In Sudan, forest agents may issue any orders or take any procedure for the protection of village forests, as a part of their technical supervision. This is a vague task description which leaves local management vulnerable to unpredictable intervention by forest agents. The woodlands outside the registered village forests, and thus the large majority of natural resources on village land, cannot be legally protected by the local community against exploitation by outsiders.

By law, usufruct, whether registered or not, is protected and may only be acquired by the State through compensation. In the project area, however, the forest service has expropriated the land and acquired all rights without any compensation. Under the present policy which aims at reserving 25% of Sudan as a forest reserve, if implemented, it is likely that local usufruct rights will be extinguished in many of the remaining woodlands.

9.2. CONSTRAINTS OF FORESTRY ADMINISTRATION

Not all constraints on local forest management are described by law. Another category of constraints consists of administrative rules issued by the forest service. Some of these rules are quite formal and transparent and some are rather vague. Local management institutions and the projects supporting them have to deal with these explicit and implicit rules, which mostly concern forest inventory, management planning, licensing of forest products, combined with taxation and policing.

Although it is not mentioned in the forest code, the management plan is seen by the forest service as the essential tool for sustainable management of any forest. There are no universal models for the management plan. One of the few available models has been developed by the CCL, the unit responsible for rural firewood markets in Mali. This can be summarised as follows:

1.Development:

- administrative information
- national policy, local practice
- any inventory data
- description of proposed investments
- training needs
- internal regulations
- maps

2.Exploitation:
- description of forest blocks
- annual quota
- exploitation rules

3.Contract:
- contract between forest service and local institution

Although presented as a simplified management plan, it is a very complicated document for the local institutions. The Nigerien examples are illuminating a typical management plan, taking the example presented in the World Bank technical paper on the firewood markets, is a 15 page paper (Energie-II, Kankani market). The largest part of the text is generalities; the specific information is the annual quota and composition of the committee. The quota is based on data from a national forest reserve in south-west Niger; the committee is composed of village based firewood cutters.

It is not known to what extent the market committees understand the management plan, but it is highly unlikely that even the simplified plan mentioned in the above example is understood by any members of the committee which signed it. In those forests where inventories were done by consultants, project staff hardly grasped the procedures and the results, let alone the local institutions.

In Sudan, village forest management is by law under the responsibility of locally elected committees. The forest service has supervisory responsibilities which are so vaguely phrased by the Forest Act that local forest agents may intervene as they see fit. Forestry agents in the El Ain project have interpreted this by not handing over the forest ownership certificates, issued by the Lands Department, to the rightful village committees, unless forest management plans have been produced and agreed on by the agents.

The case studies show that local communities which are not under close inspection of the forest service, take overall forest resource management into their hands; communities which are supervised closely, do not. Formal management plans are not essential for management to take place, and they are not necessarily a form of progress. In French forestry, for instance, many forests are managed without formal plans; in some regions less than 1% of all forest estates have a written management plan. This does not imply that 99% of the forest estates are not managed.

Another burden of the Sudanese forest administration on villagers is confiscation of forest products. Since the licensing system is impractical given the long distances involved for small producers, the forest service occasionally confiscates forest products during production, transport or sales at the market. Aggery market in El Ain, for instance, has been raided regularly. Since the producers have no permit, forest agents may confiscate any of the 50 odd forest products listed under the regulations. During one raid in 1995 the local people prevented the forest agents from confiscating their products. Staff and lorry left and returned with the police, who arrested Sheikh Salola. He was fined S£10,000 (5.20US$).

The position of the Sheikh is, that the people who exploit the woodlands for sales at Aggery market, do this because they have to feed their families. He feels that the permit system makes no sense since the travel costs to the nearest office where permits can be purchased, are between 7,000S£ (3.70US$) and 10,000S£ (5.20US$). For many producers the travel cost alone are more than the gross revenue from the sales and therefore prohibitive.

Firewood markets have rationalised taxation of local producers through the local institution which obtains the permits collectively and which ensures that the firewood producers pay through their association to the forest service. But this only works as long as the forest agent respects the local organisation, which is not always the case.

In projects which are institutionally located in the forest service, an ambiguity can be noted amongst villagers towards the project. On the one hand, project staff have assisted villagers with economic development and social assistance, on the other hand some project staff have exercised forest policing functions, including confiscation of forest products and arresting local people. Such ambiguities do not concern projects outside the forest service.

How can the constraints of forestry administration be alleviated? The suggestion in a 1996 World Bank paper to "transfer authority permanently and then let people experience the consequences of their own management decisions" is far from general policy (Floor,W. and Gorse,J.E., 1986). It is happening for the time being in isolated cases such as the Kelka and Alamodiou (Mali) or Takieta forest (Niger) but not as a policy. As a matter of policy, the forest service is not prepared to transfer authority other than through annual quota. Legal reform alone is not enough to change this, as the example of Sudan shows. Reform of the forest administration is another condition.

9.3. POWER OF STATE AGENCIES VIS-A-VIS LOCAL INSTITUTIONS

Local institutions not only depend on a legal framework supportive of local governance and on appropriate technical support, but also on the power base

they may constitute to defend their interests. State agencies and private corporations may not act according to law and may threaten the integrity of local forest management. Several case studies are presented here from Mali and Sudan.

9.3.1. MALI

The five Alamodiou in Mali have been functioning since 1994 as local forest management institutions, through a convention signed by the forest service and the institutions concerned. The convention has little legal value, but the Alamodiou assumed de facto management and forest agents stopped fining villages and individuals. Issuing forest exploitation permits to outsiders in the 50 villages under Alamodiou management was also stopped.

The convention has been renewed several times. In August 1998, after the second renewal had run out and before the third renewal was signed, a team of forest agents raided villages, markets, hamlets and pastoral camps as they used to do before local management took off in 1994. The technique used is intimidation: 6 uniformed agents wielding guns, occasionally firing volleys in the air when entering a village or camp. A person with local knowledge was asked, forced or paid in order to locate the Peuhl camps. Forest products, tools and means of transport have been confiscated at weekly markets, villages as whole as well as individuals have been fined and the small livestock of herders has been confiscated. The existence of a fence, hut or other construction was considered evidence of a forest offence.

Before the 1991 Malian revolution, such activities by forest agents were passively accepted. But since that time and particularly since the Alamodiou was reinvigorated in 1994 forest agents have kept a low profile. In August 1998 the agents declared to local people that the local institution was no longer in charge of forest management. The response of the Alamodiou, and of the local population was surveyed and, Table 10 summarises the results from 11 recorded cases.

In legal terms, the agents were hardly bound by the convention, whether expired or not, to refrain from forest policing, since the convention is unlikely to stand up in court. But the fining of whole villages, confiscation of animals, receiving fines of over 50,000FCFA without receipt and other interventions are generally illegal. The varying reactions of the Alamodiou and villagers are of interest. Two tendencies can be observed:

- The Peuhl herders are a small minority of the local population but constitute about half of the reported cases and a majority of the fines paid, and all confiscated animals. They are also the group which adheres relatively poorly to the Alamodiou. They hardly engage in tree cutting for commercial purposes and their dwellings use little wood, although they do use a great deal of branches for

fencing. Like other pastoralists, they are relatively poorly organised and represented, and are described as "easy victims".

- In the Alamodiou which are well organised, leaders take initiative and possibly personal risk to defend the integrity of their institution. Internal emergency meetings and meetings between different Alamodiou have been convened, leaders have campaigned and pressed local communities not to pay the forest agents, district authorities and project staff have been contacted. Two out of five Alamodiou are weak due to internal conflict and for other reasons, and in both cases the farming communities paid up.

Table 10. Interventions of forest agents and response from local communities, individuals and Alamodiou in august 1998.

VILLAGE	FINE	DESCRIPTION
hamlets Peuhl	100,000FCFA paid	a large number of goats were taken from Peuhl camps dispersed in the Sounfounou area.
Leguéré Dogon	225,000FCFA refused	3 fences, fined at 75,000FCFA/fence. The village refused to pay.
Sounfounou Peuhl	50,000FCFA paid	Fine without particular reason. The only known case where a receipt was provided in exchange for the fine.
Dinyi Dogon	meals refused	The agents demanded meals from an alamodiou member, who responded he could only give them a cup of tea.
Doum Dogon	15,000FCFA refused	An individual has been fined but refused to pay.
Silpanga Peuhl	110,000FCFA paid	general village fine
Kassagou, local market	The local Alamodiou leader intervened after the agents had confiscated products and tools. He took the confiscated items and returned them to the owners. The agents left	
Dounde, local market	The local Alamodiou leader intervened at the market before the agents started and ordered people not to pay.	
Dogo Lay Dogon	35,000FCFA paid	40,000FCFA fined, negotiated down to 35,000FCFA.
Dimbal Dogon/Peuhl	150.000FCFA paid	the morning after the new convention was signed, and before the village representatives had returned, agents raided the village
Yolo Peuhl	fine refused	

Note: 680FCFA=1US$

9.3.2. SUDAN

In Kordofan, the case of Jandel, a Saoudi land development company within the

project area, is enlightening. In 1997, Jandel obtained 2,000ha of land from 5 villages. It followed the process of obtaining written agreement from local leaders, though it was noted two of them were put in prison before signatures were obtained. Other leaders assert that they agreed to sign up in exchange for development assistance by the company.

The acquired land blocked the main livestock corridor. The company called in the army when the Baggara nomads arrived, and threatened to shoot the herds if the nomads trespass.

In 1998, the company simply took another 2,400ha of communal land without the effort to obtain signatures from local leaders. In 1999, it appropriated another 7,200ha through a lease from the forest service which consists of:

- National Forest Reserves (5,800ha) most of which had not yet been gazetted, had not been mapped by the Survey Department, and for which signatures from all relevant local leaders had not been obtained and compensation of traditional usufruct, as required by law, had not been settled.
- 1,400ha community land under public land status, some of it cropland, for which signatures from local leaders had not been obtained.

According to Sheikh Mohammed, 107 families of his village are affected by the land expropriation since they will lose agricultural land (sira, mostly fallow land which by tradition can be claimed). Villagers have met and meetings between traditional leaders have been held to respond to the forest service. At some of the meetings, villagers said they were ready to fight for their land. Sheikh Mohammed tried to calm them and said he would try to find a solution, and that land for the displaced would be found. Sheikh Mohammed stated that "You cannot fight the government".

Another part of the expropriated land is customarily owned by El Ain village headed by Sheikh Eljak. When the forest service started the forest reserve registration procedure in the 1970's, he was the only Sheikh who refused to sign. From his point of view, the registration process did not get any further and the land has always been used by El Ain villagers. The forest service, however, simply demarcated the area and the company has started to clear all vegetation. The village leadership has contacted many government institutions to protest against expropriation. Finally, the State Governor appointed a committee to look into the issue. Members of the committee include the forest service director, and therefore one of the litigants, but not the villagers, and in any case, it has not met.

The Rural Council suggested that the Sheikh takes the matter to court. The Sheikh has contracted a lawyer to sue the forest service and the Saoudi company. Sheik Mohammed considers the situation of Sheikh Eljak different from his: Eljak was encouraged by some members of the administration to sue the

forest service. It has become "government against government" made possible by the fact that Sheikh Eljak has never signed. Sheikh Eljak knows that taking the forest service to court is extremely expensive, the lawyer alone may cost 2 million S£ (750US$) and carries other risks, but "they can put us in gaol and we lose our money, but we fight because of the land which is ours".

The company has also attempted to appropriate some registered village forest land. In November 1998, Baduga villagers noted a tractor ploughing demarcation lines in the woodlands of their gazetted village forest. They told the tractor driver and the surveyor that they should go away, since this was Baduga village forest. However, they continued ploughing. The villagers warned the surveyor that they would sue the forest service for any trees they would loose, and they sent representatives to the project office almost daily to follow up the matter.

By March 1999, the forest service and the company had withdrawn from the intended expropriation of Baduga village forest, but most of the woodlands around this village forest will be cleared by the company and will no longer be accessible to the villagers. It will change village forest management in many ways. The village forest has been little used since there was sufficient woodland elsewhere. Baduga villagers estimated that 90% of their commercial production has come from woodlands outside the registered forest, and people from other villages rarely attempted to illegally exploit Baduga forest.

This will drastically change after the 1999-2000 dry season, when most of the surrounding woodlands will have been stripped of vegetation and Baduga village forest will stand out as forest island. Already, villagers fear that the pressure on their village forests will increase dramatically and so will the work of guarding them. They think that their village forest is large enough for their subsistence needs but not for commercial exploitation from the year 2000 onwards, let alone supporting the needs of neighbouring villages. They have not attempted to defend their traditional usufruct rights in expropriated woodlands, which they think is pointless in the face of the power of the State. Only forest registration has saved a part of their woodland resource. The fact that Baduga has no customary authority over the woodlands may have contributed to their inability to defend usufruct rights outside their village forest. It is up to the neighbouring landowning Sheikhs such as Eljak to contest expropriation.

9.4. CONCLUSIONS

Law reform over the 1990's has enabled some local institutions to gain legal recognition of forest management. The Sudanese village forests and the west African rural firewood markets allow judicially recognised forest management but the procedures are tedious and costly and management rights tend to be strictly limited. The procedures are highly dependent on forest service support, inspection and approval. The much broader and more successful forest management found in some of the case studies operates in a legal vacuum for

an important part of the management spectrum. It relies on quiet approval or tolerance by state agencies and enjoys a certain protection from project staff. Institutional and legal reform are required to ensure more widely applied, sustainable management by local institutions.

Management plans are considered an essential tool by the forest administration, but the planning process is not defined in legal terms. The few examples of formal management plans for village forests indicate that the plans may not be effective and do not guarantee sustainable management. Forest service licensing for commercial exploitation is often impractical except for the rural firewood markets. In some cases, the forest administration has poisoned the relationship between project staff and intended beneficiaries.

Local institutions may have to face unlawful acts by powerful State agencies. Legal dispositions do have an influence but are not independent of poor relations, so that local institutions need to be empowered to defend their interests. Case studies show that law may be poorly respected by state agencies. The outcome of conflict in these cases is determined by a number of factors, of which the must important are local organisation and courage of leaders in their willingness to accept personal risks and financial loss. A combination of legal arguments, modern and customary, plus good organisation and courage appears to be decisive for the outcome of the observed conflicts. But it is likely that only a minority of communities have the capacities needed to face the challenge of unlawful acts by powerful state agencies.

10. OPPORTUNITIES FOR THE NEXT DECADE

10.1. BUILDING ON EXISTING CAPACITIES

An encouraging number of local institutions among the case studies have assumed responsibility for forest management. Locally relevant management tasks have been effectively and efficiently executed by the communities when compared with state performance. But important constraints may prevent a much wider and more sustained local governance. In legal and technical terms state agencies have maintained a great deal of leverage over management. Internal divisions in some local communities have inhibited effective management and exposed local institutions to external interests. Opportunities for better anchorage and spread of local governance should be explored.

Important opportunities present themselves at the level of national institutional and legal reform, socio-economic development and a better understanding of the ecology of Sahelian woodlands. But also within local communities and stakeholder groups opportunities exist and should be explored. The PADLOS Education Study has reviewed cases of local governance in west Africa for broad

socio-economic development and identified elements which trigger an upward spiral of self-governance, in particular (22):

1. the multi-sectoral nature of such governance with viable economic activities as the motor of spiralling development.
2. the sequencing of critical learning and application which has writing and management skills at its heart.
3. linking the various forms of local capital: the natural, social, human etc.
4. the development of a new social contract which combines decentralisation and local representativity, and which has municipal or district councils as the link between local communities and government.

In this schema, the local forest management cases present opportunities for a much wider spread. Taking the multi-sectoral nature of successful local governance first, it is evident that the "forest" connotation which implies a sectoral remit is entirely misleading. In the more successful cases of local forest management, governance is under responsibility of multi-sectoral institutions. The constraints imposed by sectoral institutions at national level have to be resolved at that level and they are not relevant in local governance.

In the PADLOS study, development of viable economic activities has been identified as a key to successful governance (Easton,P., 1998). In Sahelian forest management, monetary gains are less apparent than in such ventures as cotton production, water schemes and manufacturing. But the stakes in the subsistence economy are high, if difficult to assess, and so are the gains of local communities which are exempted from state taxation in the form of fines, confiscation and resource expropriation.

Villages in Mali which previously paid several hundred thousand FCFA in annual community fines alone and now manage their own forests, no longer pay. Sudanese villages under community forestry regimes have conserved land and natural resources, compared to those which did not and which lost an important factor of production. The news has spread and many villages which showed little interest as early adopters are now looking for ways to become recognised forest managers.

Another opportunity for local forest management is the steadily increasing capacity of local communities to use the written medium. A more encompassing descriptor is codification, since tools such as photography for resource monitoring can be mastered by villagers and are recognised as evidence in science and in the justice system. Whereas oral tradition remains important, management by codified information is essential to deal with increasingly complex management tasks and is increasingly mastered by local people and institutions.

The capacities to deal with basic numerical and written reports is available in

nearly all the communities investigated. Exceptions are herders and some of the small settlements. In all other cases, at least some of the inhabitants can deal with management in writing, even when many have migrated for seasonal employment. In most villages schools, credit schemes, water pumps and medicinal stores are managed using this capacity. These capacities may not necessarily be available to forest management. But forest management tasks such as collection of signatures for a forest appropriation procedure, codified monitoring and suing a transgressor in court, if necessary, are occasional tasks. If forest management is a community benefit and the institution is fairly representative of key user groups, the required capacities are most probably available when required.

The linking of the various forms of local capital may be essential for the need to defend the local resource against expropriation by outsiders. El Ain's effort to defend its natural resources is an example of this combination. Another case is provided in box 4.

Linking of local capital also ensures interdependence and mutual support. Wood cutting is often done by the poorer groups who are also guardians of the forest but lack formal education. Those who are economically well off may not depend financially on wood cutting but need to buy forest products from others, while their livestock, guarded by pastoralists, requires secure access to the forest. Their contribution to management may be the formal skills needed for some of the tasks.

Finally, a new social contract is developing which combines decentralisation and local representativity, and which has rural or district councils as the link between local communities and the state. Locally elected government should be responsible for public resources instead of line ministries and be the public institution which enters into contract with village committees. Contrary to technical agencies where field staff are accountable to their director and which are sectorally organised, local government is both locally accountable and is potentially free of such technical compartmentalism.

Opportunities are presently growing in many countries. In Mali, local government has been elected in 1999 and has important public responsibilities over forest resources. It also has the powers needed to enter into management contracts with local communities. In Sudan, elected local government exists and may soon have authority over most of the woodlands. The Rural Council is the lowest form of local government, where 90% of the governing body is elected by members of the Village Popular Committees. Stronger local government may also greatly simplify the village forest registration procedure (Mazgoub,T., 1999). In Senegal, elected Rural Councils have existed for a long time but have been relatively powerless. Recent political changes favour stronger local government.

Box 5. Segue organises itself against excessive state powers

The villages of Segue Arrondissement in Mali were subjected to the rent seeking behaviour of state agents which was a common and passively accepted practice until 1991. At that time, the secretary of the Arrondissement was singled out as guilty of excessive abuse. When students studying in Bamako were in Segue for their annual home leave in 1991, they organised themselves and urged local leaders into action. In a crisis meeting with village leaders and the authorities, the students proposed burning the accused whereas village leaders proposed that the accused had to leave the Arrondissement. Government authorities implemented the latter decision.

Four years later, the Chief of Segue Arrondissement had taken on the habit of extracting moneys and animals from most villages in the area. One of the literate villagers visited all communities and recorded the cases of extraction. Together with concerned local leaders including the headmaster and the clinic doctor a document was prepared and sent to government and party officials. The Chief of the Arrondissement was forced to leave Segue. The increased capacity of local people to defend their interest was demonstrated again four years later again, when forest service agents raided villages to extract moneys: in the villages of Segue Arrondissement, most of these raids were resisted and failed.

The emergence of elected local government as the key public institution to which local communities relate will not be a magic solution. It is to be feared that poor Council revenues may lead to sales of forest resources to the highest bidder, rather than allow well endowed villages to manage their forest sustainably. Ganida village leaders in the Samori expressed this fear and attempted in vain to change Commune boundaries in a way which would have grouped Ganida with other villages rich in forest. In the present set up, Ganida will be the only village in the Council out of ten with abundant forest resources. Their response is that only a strong village organisation can prevent wholesale pillage of their forest by the future Council. Similar fears have been expressed in Sudan. Local government is an opportunity but does not exempt local communities from organising themselves and defending their interests.

10.2 PROJECT TOOLS TO ENHANCE LOCAL FOREST MANAGEMENT

10.2.1 INTRODUCTION

A considerable number of projects are now supporting local forest management institutions. The challenge for these projects is to assist local initiative without choking it. The duality of classic forest management techniques and local management praxis may lead a project to overtake local management and replace it. This risk has been recognised by many project staff and various attempts have been made to develop locally appropriate tools instead. A variety of tools are presented in this section along with initial results.

Practical ideas can be found in a large number of development assistance manuals, such as manuals on participatory rural appraisal, participatory forest inventory or market and household surveys. These manuals have been developed for large geographic zones, usually for developing countries in the tropics, e.g. Pretty,J., et al, 1995 for PRA; Carter,J., 1996 for participatory forest surveys; Scarborough, V. and Kydd, J.,1992 for market surveys.

The Sahelian conditions are specific in the sense that the forest is very open and productivity is very low. The role of the market economy in forest management is very modest. Management costs should be lower than in most other forest types. On the other hand, the Sahelian bush offers possibilities for monitoring tools which can hardly be applied in denser forests. Adaptation of tools found in development manuals to the Sahelian conditions is desirable.

Various methodological innovations are presented here:

- participatory forest inventory, with three distinct levels of participation:
    * simplified standard forest inventory
    * inventory adapted to local forest managers
    * panoramic photography, usable by illiterate villagers
- methods used for mapping the forest
- involvement of pastoralists

The socio-economic monitoring tools mentioned in chapter 4 can be added to this, although such tools may be equally useful in more humid zones.

It is evident that these tools must be further developed and constantly adjusted to changing conditions and that other tools will be developed as time goes by. Nevertheless, they are probably a useful addition to the existing development manuals.

10.2.1. SIMPLIFIED FOREST INVENTORY

This method has been developed in Mali for the rural firewood markets, and it is thus mainly concerned with firewood inventory (Sylla,M.L.,1999). Simplification of the more common forest inventory method is made as follows:
- by transect sampling instead of 2-stage sampling;
- by location of the sample plots at 100 paces from each other on the transect, the size of each sample plot being defined by the 4 nearest trees. The size of the sample plot is not measured, the vegetation on each plot is inventoried.
- using a model of firewood production for four major rainfall zones, one of them being the Sahel, which is defined as having an average of 300-500mm per year.

Trees are defined as ligneous vegetation with a height of at least 7m The measurements on each plot include woody vegetation of at least 10cm circumference at 1.5m height. The volume for each specimen measured is converted into cu.m by means of the volume table.

The work is carried out by a team of four people, one of whom is a villager whose task it is to guide the inventory team. There is no information about the cost of this method. The main constraints for local forest management in the Sahel are:
- Although it is simplified in relation to the standard forest inventory, local people remain spectators rather than participants. Local institutions cannot conceivably manage this inventory and its results.
- The inventory is concerned with firewood and has not been developed for monitoring of the forest resource.
- Although it has a volume table for the Sahelian zone, few inventory data are available for the Sahel so that the table is hardly reliable.

10.2.3. LOCAL PRODUCT INVENTORY

The simplified forest inventory maintains wood volume (cubic metre) as the unit of measurement. This is a foreign concept to local forest managers. Wood volume can be converted to stere of firewood, which is now the unit used for fiscal purposes in the rural firewood market, and is thus known to commercial producers active in these markets. But outside the taxed firewood markets, the stere is not used by commercial firewood producers, and in any case, other wood products such as poles, forks and raw material for artisans are not expressed in cubic meters.

An alternative has been developed in Sudan, where local products have been chosen as the unit of measure instead of wood volume. Local products such as building poles, forks, roof poles and raw material for furniture production are intimately known to villagers, at least by those who regularly produce them. The principle of the local product inventory is that the local products are defined and then counted on sample plots by those involved in forest exploitation.

Some products are relatively easy to count, such as building poles, of which there are not many. Other products may be very numerous, such as the sticks used to construct furniture or bundles of firewood. Other products again may have to be expressed by proxy, such as number of trees suitable for mortar production. The number of mortars cannot easily be determined, but the number of trees which are harvestable can easily be counted. How elaborate the product definition is and how large the sample size, obviously depends on the survey objectives.

In the Sudanese case study, sample plots based on a local agricultural measure (mukhamas) were used, but it turned out that transect sampling is much more time efficient. Simplicity and speed of work can be further improved by a simple change in transect sampling. Experience shows that in relatively homogeneous Sahelian woodlands, the vegetation of one transect segment is quite similar to the neighbouring segment. It is not very efficient to measure two neighbouring segments because the information is quite similar. Instead of measuring all

segments on the transect, it is more efficient to measure only every second segment. This is about half the work of measuring all segments, whereas the information obtained does not change much.

The sampling intensity of Sahelian woodlands is often subject to discussion. In Sudan, the University of Khartoum has recommended a 2.5% sample. In Mali, a 1% sample has been used by BICOF, a consultancy company which has done many of the forest inventories there. In Niger, SOS Sahel's Takieta project used a 2% sample for the gazetted forest but in various other studies, the sampling intensity was well under 1%. The most important principle is probably to accept the human resources which are locally available and adapt the forest inventory accordingly. Resource availability and meaningful local participation are the point of departure to which statistical criteria have to adapt.

In El Ain's forest product inventories with a 1-1.5% sample of a village forest of 400 ha typically took a week to complete for a team of 3 villagers and 2 extension staff. The use of transects for the same inventory in a Malian project reduced the workload by more than half. Nevertheless, the inventories are much more demanding than panoramic photography in terms of human resources, which requires at most a day for a village forest.

Table 11. Opportunities and constraints of local product inventory in woodlands of El Ain and Bankass.

ELEMENT	OPPORTUNITIES, CONSTRAINTS
Stratification	Local users may know strata such as poor, medium and rich woodlands. However, surface area of each stratum may not be available unless recent photos or reliable maps exist.
Randomisation	NFMP used a simple technique of throwing a stone which identifies a corner. Local people may find this impracticable, and have made suggestions to establish permanent sample plots instead.
Line intersect sampling	Principle of compass bearings is known in Islamic societies, compass is a simple and relatively cheap instrument. In the simplified forest survey, suggestions have been made to ask local people to do line intersect sampling without a compass, but this has not been tested.
Permanent sample plots	Some local people prefer this. Experience in various projects is that markers may be destroyed by forest users.
Lay out of sample plots	Using ropes of a known length, which can be used for square plots or for intersects. Measures which are locally known are recommended. Plotless methods have been suggested but are analytically complicated and have not been tested in participatory forest monitoring.

Units of measure	Advantage of local definition is that it concentrates on key forest resources. A constraint may be imprecise definition of a product, which may reduce comparability over time. Even if products are well defined, comparability between different areas may be poor, e.g. for purpose of national resource accounting.
Processing	Data storage, processing and reporting are very simple, though at least one villager should be able to write and calculate averages. Alternatively, a local project staff takes responsibility. Raw data and results should be kept in the village while the project or a national agency may want to keep a copy.

Totals are calculated, and extrapolation may be possible for the forest concerned if the forest area has been measured. The simplicity of the calculations allows villagers with literacy and numeracy skills to take charge of the work. The results are expressed in locally meaningful socio-economic units which can be combined with local market information, and thus converted to financial values. Various aspects of the method are exposed in table 11.

10.2.4. NATURAL REGENERATION ASSESSMENT

Poor recruitment of key species in the (semi) arid woodland ecology has frequently been a concern for environmental research and development. A study of natural regeneration is important in those woodlands where the problem occurs and can be seen as a part of an inventory. A Sudanese project has introduced natural regeneration survey as a joint venture of project staff and villagers owning the forests. The procedures applied are not particularly novel although a degree of local participation has been attained which may be hard to find in most surveys of this kind. Here follows a brief guideline of the method used in Sudan.

Before starting the work, decide together with the village which are the most important species for the local economy. It may be best to measure only a few species. This will keep the work simple and fast.

1. Materials are a functional compass, a rope of 50m. and a second rope of 10m with a knot at midpoint, a village or forest map, as well as writing materials. Instead of 50m and 10m ropes, villagers may want to use rope lengths which they commonly use for agricultural plot measurement.

2. A team may consists of seven people: two project staff of whom at least one is conversant in the use of a compass; one villager who is fully literate, another villager who knows the woodlands very well, and another three villagers who may be boys and girls, the “auxillaries”. The person with compass keeps the bearing; two others will count the regeneration, the others hold the two ropes. Recording

the natural regeneration for the stretch of 50m long by 10m wide may be done by the literate villager.

As time goes by, villagers can be made responsible for most of the work, and all the extension staff do is monitoring the quality of the work: is the work going too fast, too slow, any problems with the records ?

3. Before going to the woodland, decide on the sampling intensity. The principle of measuring every second transect segment may be adopted. Stratification of the village forest may be used if villagers have clearly defined strata.

4. When starting the work, make sure everyone knows what the objective is, and what is expected of every team member. It is important that the literate villager is in charge of the writing, though it may be necessary to check regularly how he/she is doing. One copy of the data sheet and results should go to the village. It is best to work out the totals within a day or so. Usually, a villager can do the totals for each species. The most interesting information is often the natural regeneration per unit area.

The results of the work should be discussed with knowledgeable villagers to see what sort of conclusion can be arrived at. Why is the natural regeneration in a certain area lower than in another, or why are there differences between species? Such discussions may contribute to management ideas.

10.2.5. PANORAMIC PHOTOGRAPHY

Forest inventories have inherent weaknesses as tools for local woodland management under Sahelian conditions. The most important of them are:

- Data collection is complicated and as a consequence the results are questionable. Methods used are not always well described and due to institutional memory loss data comparability can be queried. Large differences in standing volume between successive forest inventories, such as in Guesselbodi and Takieta in Niger, raise questions about the methods used. The local product inventory described above may be less complicated but can also be queried.

- Many surveys provide averages for the whole forest even though the forest is in actual fact divided into smaller units appropriated by different local institutions. Forest change is best surveyed on the scale of the local institution which manages the land.

- Many surveys are concerned with a particular sector or subsector instead of the range of forest products and services. Such monitoring may miss out important economic values.

- The major constraint is the amount of time and human resources required, in

particular for standard forest inventories. But even local product inventory may cost more than what users are prepared to pay. Woodland management cost should be absolutely minimal in the majority of the Sahel. Related to this is the level of effective local participation and decision making, which is extremely low in most surveys. Wherever local participation is low, the usefulness of the results is probably equally low.

An alternative which has been developed by the forestry research project is panoramic photography, which is the photography of the landscape. It is a conventional technique in ecological research which has advantages of simplicity and objectivity. The idea of panoramic photography in local forest management has been developed in Kenya in the 1980s and in Tanzania in the 1990s. From 1996 it has been applied in the Sahel as a participatory forest monitoring technique with some success.

The great advantage of this monitoring system is that the financial cost and human resources requirements are very low and effective local participation is very high. Illiterate villagers, often those who use the forest most, can be fully involved in this form of monitoring. Furthermore, the objectivity of photographic material is undisputed. Whereas forest measurements and statistics may well be disputed, photos are accepted as the true image of the forest at that time.

The tool is efficient if the landscape is fairly open, which is often the case in the Sahelian wooded savannas and woodlands. It is particularly efficient where hills, mountains or rocky outcrops exist, which is less frequently found in the Sahel. The major technical aspects are summarised in table 12.

BASIC APPLICATION

The four basic steps in panoramic photography are:

1. select well defined sites which represent the major woodland zones.

2. Take photos which cover the horizon over 360 degrees.

3. After development and printing, collate the panoramas, add a minimum amount of text on the back, and store the panoramas in the village, while the films may be kept by the institution responsible for long term monitoring.

4. Repeat when changes should be monitored by comparison of panoramic series.

Table 12 Opportunities and constraints of panoramic photography

ELEMENT	OPPORTUNITIES, CONSTRAINTS
Sampling framework	By definition in the form of permanent sample plots. No guidelines on sample size exist. It makes sense to rely on stratification by local management institutions
Permanent sample plot definition	An important issue and potential weakness is clear definition of the exact location which is photographed. Usually local people remember sites in their forest but such knowledge may be lost over the generations in which case it will be difficult to trace the location. Solutions are suggested below.
Equipment and processing	The simpler the camera (with wide angle lens), the better. Cameras and films can be purchased everywhere, film development in a local town may be of poor quality but it is generally good in the capital city.
Conservation of photos	Little is known about the conservation of photos in rural areas over the decades. Films can be kept by the agency responsible for long term monitoring.
Time between photos	No experience as yet but this should depend on monitoring objectives. Interannual differences on photos may be great as a results of rainfall differences.
Quantitative interpretation	Limited possibilities which should be explored in advance. Much depends on the objectives of woodland monitoring.

The major advantage of panoramic photography is the potential participatory nature. Rural people have strong visual experience and all who know the forest can be equally involved, regardless of literacy or numeracy skills. Villagers define the woodland strata and determine the sites to be photographed. When using a simple automatic camera the photography itself is sufficiently simple to allow anyone to have his or her turn, which enhances local ownership. Anyone can collate the photos into a series and a literate villager can add a few words on the back to document some key characteristics for future reference. The panoramic series are a data base to be kept by the local institution.

The cost of panoramic photography is essentially the investment in a small camera, films and development, and a two hours training of a group of villagers by extension staff. The work can very well be done when extension staff visit the area for other duties, which reduces transport cost.

The major disadvantage is the poor scope of quantitative measurements in terms of wood volume, if this is the aim of monitoring. Quantitative measurements are obviously possible such as the oblique crown cover by means of a scanner, but this type of monitoring is outside the scope of local institutions.

Often project donors, visitors, researchers and others are interested in panoramic photos taken over different periods of the project. Photos can be much more convincing than opinions or statistics

DETAILED GUIDELINES
Some of the operational characteristics to be kept in mind are:

1. Unlike aerial photos, panoramic photos are not taken perpendicular to the terrain, so that changes in scale on the same photo are very important.
2. Trees and other large objects close to the photographer lead to a "shadow effect". For example, a row of trees nearby will cover up anything behind it. This makes panoramic photography less suitable in dense vegetation. It also means that on flat terrain the area covered by a panorama is a function of the density of the vegetation.

TOOLS
Often, panoramic photography is best done with a wide angle focus of about 35mm A small automatic camera is suitable for people who are not used to taking pictures. Generally colour films of 100-200 ASA are the most useful and films of 36 pictures are most efficient. For a 35mm lens, the average panorama over 360 degrees requires 8-10 pictures. If a map exists of the forest or the village land, it may be used to indicate from where pictures have been taken.

THE PHOTOGRAPHY
Before starting the work, extension workers need to spend one or two hours explaining to villagers what panoramic photography is and how photos are taken. One problem when villagers take photos is the skill needed to primarily capture the landscape in the frame and not the sky. Another problem may be the lack of overlap between photos, in which case less efficient photography is recommendable. If 10 photos are used for one series instead of 8, the overlap is not efficient but at least overlap is ensured. When the choice of sample plots has been made the photos can be taken.

There are several ways to take photos from a landscape: 1) from a fixed vantage point, or 2) from a changing position of the photographer, so as to make photos which are more or less perpendicular to the objects. The advantage of fixed point photos are that the determination of the place from which the photos are taken is simple, there is only one place. The photos can easily be joined to make a panoramic series.

But it is a disadvantage that the photos are not taken perpendicular to the object, especially if the object has a straight form, such as a forest boundary. In that case, the photographer can choose to take each photo from a different position, with the disadvantage that it is more work.

The time of the day may be important for the quality of the photos. It is generally

best to take panoramic photos in the late morning or early afternoon, so that there is sufficient light and the position of the sun does not affect the photos. The season is very important for the interpretation and comparability. Choose a season which shows an important difference between the relevant vegetation aspects, for instance at the beginning of the dry season when trees are green but grasses have dried. It may be useful to choose a moment when important tree species can be distinguished from others, e.g. the colouring of Combretum leaves.

COLLATING THE PANORAMAS

Photo development can be done in many regional towns but in various Sahelian countries a much better quality is obtained by laboratories in the capital. Upon receipt of the developed photos the back of the photos should be numbered to avoid the risk of having to sort out a big puzzle. A knife or cutter and sticky tape are needed to collate the photos, which can very well be done by villagers.

A literate villager may want to indicate date and location, as well as name of the photographer on the back of the series. The camera focus is also useful information for future reference.

If the photography is seen as the responsibility of an external agency such as a project, it may be necessary to map out the location from where photos are taken. If the photography is primarily seen as the responsibility of the local institution, it is sufficient to take a photo of the place from the panoramic photography series and glue that photo on the back of the series. This serves as a close up of the location and has the advantage of a reference which is useful to those who do not have map reading skills.

INTERPRETATION AND DOCUMENTATION

It is important that the films are safely stored. After all, panoramic photography is only useful if the information is available over a long period of time. In some villages, photos have been damaged by rain or by rodents. The back up is storage of the film by a project or national agency.

If the intention is to obtain quantitative information such as surface area or length of trees, measurements are required. This is possible if known references exist on the photos. For instance, villagers may stand next to trees on the photos and thus allow measurement of length of trees and change over time, or a building or rock may serve as a reference. As an alternative to absolute measurements, measurement of relative change is possible, e.g. % change in length or crown cover between photos taken in different years.

10.2.6. MAPPING

In some situations maps are a prerequisite for local forest management. Maps exist for state forest reserves but rarely for forest on public land. Such land is usually under forms of customary tenure with more or less known and accepted

forest boundaries. Partial maps may exist, prepared in the past for an agricultural of livestock development project, and boundary markers may still be found of livestock corridors and other landuse interventions.

The production of a map indicating forest limits may be necessary to assure legal recognition of exclusive management or ownership rights. It may also be useful for resource monitoring, forest zoning or experimentation. Mapping is the relatively simple technical part of a much more complicated institutional issue of resource appropriation. Some projects found that mapping opened a Pandora's box of conflicts between local stakeholders, at least in some of the communities.

METHODS

Five different forest boundary mapping methods have been applied by the case studies under review, which are listed in order of their participatory nature:

1. PRA mapping which usually delineates boundaries as well as major landuse zones. This has been used by a host of projects for exploratory purposes, it is highly participatory but it is not useful for formal mapping purposes. The type of maps produced are not true to distance, area and direction.

2. Aerial photograph interpretation which can be used both for boundary demarcation and for landuse zoning. Villagers can be involved to a high degree.

3. Boundary demarcation through a compass and vehicle mileage gauge, a method which can be applied by project staff in absence of such tools as GPS or aerial photos. It is limited to areas which are accessible by a vehicle and requires basic trigonometric skills.

4. Technologically more advanced is mapping by project staff through application of the GPS. Field staff of a NGO or of the forestry service are responsible, and villagers are just involved to point out the boundaries. This method which has been used by some of the rural firewood market projects.

5. Mapping by the Land Survey Department, which may be contracted through project funds, in which case the villagers' responsibility is limited to pointing out the boundaries during fieldwork.

Projects have to be opportunistic with regards to choice of mapping methodology. While recent aerial photos of appropriate scale are always a desirable tool, they can rarely be afforded unless they are made available from other sources. The same was true for GPS, but this tool has become much more affordable. Other considerations include local sensitivities. In Sudan, all maps made for land registration are the responsibility of the Survey Department, which may render the cost of woodland mapping on a significant scale prohibitive.

Table 13. Cost comparison for different mapping techniques, roughly in order from low cost to high cost.

No	Type	Description of cost
1	PRA	Project staff with facilitation experience
2	Compass, vehicle	Compass from USD 40, project vehicle use approx 1 day / 4,000 ha Project staff with knowledge of basic trigonometry. (NFMP)
3	GPS	Equipment and trained staff. In Energie-II, establishment cost of rural markets is estimated at USD 7,000-14,000 for 1,000 ha, but only a part of this is related to boundary mapping
4	Aerial photos	Reproduction of aerial photos. Tracing paper. alternative: high cost of aerial photography & print. Project facilitator with experience in photo interpretation
5	Survey Department	Cost of contract and organisational cost

In the example of local woodland management in North Kordofan, where mapping is a prerequisite for village forest gazettement, 8 village forests are in the gazettement procedure which takes about 5 years. They are to be mapped by a surveyor from the State at a contract sum of approx. 4,000USD, plus transport. It is difficult to imagine how the odd 4,000 villages in this State can have their woodlands mapped without cheap and rapid procedures.

Handbooks on aerial photograph interpretation and GPS are available. Mapping by means of a compass and a vehicle, tools which are normally accessible to project staff, has been developed in NFMP and is explained below.

PRODUCTION OF A BASIC MAP

The procedure for the production of a map based on the measurement of distance and compass bearing, applied in woodland and village land delineation in Kordofan, can only be used if the land is relatively flat and accessible by vehicle. The steps are as follows:

1. Check the two most important tools, the car mileage gauge and the compass and ensure that they reasonably precise. In the case of the car mileage gauge, check the distance given by the gauge for a known distance. Compare the bearings provided by the compass with another compass. If there is a significant deviation, there may be a problem with the compass and further checks are necessary.

2. Ensure that the land to be measured is a clearly known entity. This is best discussed on the basis of a PRA type map. Which families or hamlets are part of the village, which are not part? How is this defined? Problems are best discussed and resolved before starting the mapping.

3. The team includes knowledgeable villagers delegated by the relevant authorities. These people point out the village boundaries to be mapped.

Depending on the purpose of the map, it may be necessary to include representatives from the neighbouring villages in the team. The driver and project staff with compass and notebook complement the fieldteam.

4. Using the PRA sketch map, the team determines which route it will take. It is recommendable to measure all roads and paths which can be used by the vehicle and which are relatively straight. Often, these are the roads and paths which lead to neighbouring villages. The village boundary can be followed, but it is only useful if it is passable by the vehicle and if the route does not become too winding.

5. For each road or path followed, the procedure is:

- set the mileage gauge to zero and start following the road.
- note the compass bearing for the direction taken on this road.
- whenever the bearing changes significantly, stop the vehicle, write down the distance followed since the previous bearing. Reset the mileage gauge and continue at the new bearing.

This continues until the road or path has arrived at the village boundary as indicated by the villagers in the team. Write the bearing and distance on the rough map. The principle is the same when following a village boundary.

One problem is that the trajectory followed is not straight. A compass bearing may be at 180 degrees for some time, then at 160, briefly at 140, then 220 for a long time. But it is possible to decide on an average compass bearing when keeping an eye on the time that the vehicle is on a certain bearing.

The second problem is that a winding trajectory increases the distance followed by the car but not the distance to be mapped.

In order to reduce this problem, a correction can be made based on how winding the trajectory is. In the case of the mapping of NFMP villages, correction percentages of 5%,10% and 20% have been applied, i.e. the real distance is calculated as the distance measured by the mileage gauge minus the percentage. Which percentage to apply needs testing. The correction percentage is the difference between the known distance and the measured distance.

6. In case a hill or other form of elevation exists in the village, a viewpoint can be used to take compass bearings of many characteristic sites. These sites are for instance important baobab trees, hamlets and water reservoirs. In this case, distance may not be measured but the compass bearings alone are a useful complementary information for map production.

7. Once the fieldwork is completed, the data are transferred to a map. Apart from a pencil and paper, a ruler and a protractor, possibly combined into one, are all that is needed. Take the village as the central point, the north (0 degrees) as the

top side of the paper, east (90 degrees) to the right, etc. A scale has to be decided, e.g. 1:25,000 (one centimetre equals 250 metres). If necessary, two A4 papers can be stuck together to make a large paper (A3) which can later be reduced by a photocopier.

Calculate each distance in centimetres using the chosen scale. For instance, 720m equals 72,000cm becomes 72,000/25,000=2.88cm on the map. The protractor is used to determine the direction for the given trajectory. The trajectory is drawn on the paper. This is done for all trajectories measured, see the example of Jagrur village below.

8. The precision of the method is determined when the map is prepared. During the fieldwork the team can travel from a fixed point such as the village centre, move to various locations and return to the village centre via another road. When making the map, the end of the trip should be the village centre which is also the beginning of the trip. Normally, there is some degree of error so that the end of the trip is not exactly located at the start. This is often due to the various errors in distance and bearing. When making the map, it is best to average out the errors over the various bearings.

If the end of the trip location is far away from the start, serious errors have been made during the fieldwork or in the calculations and measurements in map preparation. Check the calculations and measurements first. If the errors are general, the source of error should be traced and the fieldwork will have to be repeated in a more precise manner.

8. Once all information is on paper, a map can be produced which indicates landscape features which have not been exactly measured, but whose existence is known in certain locations. The village boundaries, for instance, may not have been followed during the fieldwork but a number of points are known so that connecting lines can be drawn. Microcatchment schemes, hafirs, hamlets, hills and other features can be drawn on the map. Indicate the north and the scale.

9. The map can be copied now using a new paper, the copying technique can simply be by positioning the new paper on the existing map and put them on a glass plate (such as a car screen). Copy only the physical map features and not the bearings and distances used for the map production.

10. The new map can now be (photo)copied and adjusted for thematic purposes such as forest inventories.

Two things should be kept in mind when doing this:

- The magnetic north is rarely identical to the geographical north, depending on the location on the earth. The difference is the declination which is a fixed number of degrees for each project area. However, there is nothing wrong with a

map based on the magnetic north as long as it is indicated.

- Copying maps may change the scale and therefore surface area. Indicate the new scale on a map if the original is blown up or reduced.

10.2.7. INVOLVING PASTORALISTS AND MOBILE USERS

Most local forest management projects have made few serious attempts to involve pastoralists, or mobile forest users in general. A response in both Gestion de Terroir and rural firewood markets is the requirement to include a pastoralist in the management committee. This does not ensure that the interests of pastoralists are represented in forest management, as various Nigerien case studies show (Paris,P.,1996; Madougou.D.,1998).

The involvement of pastoralists may be reinforced at quite different institutional levels and it is likely that the efforts are most effective if they are addressed simultaneously. Two different levels are presently being tested in two projects.

1. In PAFOZ, Niger, the pastoralists occasionally using the Takieta forest have been identified and a large number of meetings have been organised. A series of meetings among pastoralists have helped to better internally organise the pastoralists vis-a-vis future joint forest management. Other, larger meetings have helped to discuss and negotiate forest management between pastoral groups, agricultural communities and external stakeholders. This approach can be compared with the organisation of pastoralists for local forest management in the Turkana Rural Development Project, Kenya, in the 1980s.

2. In PAGE, Mali, the project noted that extension staff consisted entirely of people with an agricultural background. This is rather typical of most projects. Staff recruitment criteria normally include gender, so that a form of gender balance is achieved. It never includes the need to incorporate the background of the major land user groups, so that almost no project has an extension staff with active pastoral background. This evidently leads to bias among the staff who tend to have a poor view of the pastoral production system and cultural practice.

In order to strengthen the involvement of pastoralists, PAGE decided to recruit two active pastoralists in collaboration with leaders of the major pastoral group, the Peuhl. Selection criteria included the ability to work in the two different cultures, i.e. the project culture (with codified practice, often in the French language) and the Peuhl culture; and respect among the pastoralists they have to work with.

LOCAL FOREST MANAGEMENT IN THE SAHEL PART III : CONCLUSIONS

11.1. INTRODUCTION

When drawing up conclusions about local forest management in the Sahel, various constraints must be accepted. One is the generalisation of issues over a huge geographical area, from Dakar to Eritrea, or in northern terms, from London to Tehran. Hundreds of case studies and narratives in local forest management constitute a useful data base but overall conclusions may mould this experience into vague generalities devoid of practical significance. The challenge is to draw out overall conclusions which go beyond established wisdom without speculation. In any case, general conclusions on Sahelian forest management cannot be more than an inspiration for institutions and policies in any particular country or site.

The second major task is the systemic nature of Sahelian natural resource management. The disciplinary threads are ever present in the analyses but do not combine convincingly at the level which really counts, the local forest management praxis. Those managing the forest are not led by the disciplinary bias of the formal organisations which support them. The action-research approach of the last few decades, which is expected to respond to the dualism of science and praxis, has not radically changed this disciplinary vision. The conclusions of this report retain a certain disciplinary origin.

Finally, it is evident that any conclusion is no more than a blip on the screen. The large majority of case studies are from the last 5 years. Decentralisation of governance in particular is a highly mobile target. A review of the issues at the turn of the millennium has a temporary value.

The conclusions are presented in the form of criteria of manageability or conditions for successful management. A set of ten criteria is proposed for the assessment of projects, programmes and policies. This is followed by a review of the key findings of the SOS Sahel UK forestry research project in relation to previous findings : what’s new in local forest management ?

11.2 CRITERIA OF WOODLAND MANAGEABILITY

Criterion 1

The basic criterion for Sahelian woodland manageability is livelihood dependency of user groups with local attachment. Wherever such dependency exists, economic or socio-cultural, the woodland is potentially subject to management.

The very wording "forest management" is misleading in the Sahelian environment. As ecologists are quick to point out, forests barely exist in the Sahel. Most of the land under a forest statute, under customary or under modern law, is not forest according to conventional definitions. More apt ecological descriptions are scrubland, wooded grassland, savanna grassland with perhaps a patch of woodland, quite possibly interspersed with some cropland. An important proportion of the land is not under any vegetation cover since it is denuded, and yet such land may be crucial to the productivity of patchy tree vegetation. It would be much better to speak of the natural resource in a broad sense, a resource which is essential to a range of local user groups.

Colonial history introduced the concept of forestry. Post-independence states enshrined an all encompassing forestry domain which has been extended to any "waste land" and any tree or shrub growing anywhere. The concepts of ecology, economics and management applied to the forestry domain have introduced a dualism in landuse perceptions, a rift between local landusers and the state.

Local values are cross sectoral and are often in the first place related to livestock production. Option and bequest values are important in many communities, even if the tools to measure these values are hardly available. Spiritual values, rarely mentioned in environmental economics, may locally dominate management decisions. The range of wild foods, game, perfumes and medicines, and the primary products of a host of tools and materials may be the major concern for management of the natural resource. These values influence manageability.

Criterion 2

Management transaction costs should be very low given the low revenue generation capacity of most Sahelian woodlands.

External interventions in Sahelian forest management started off in the colonial time with high cost models of plantation establishment and management. Plantation forestry has only been rejected over the lst 10 years in favour of natural forest management on the basis of cost-benefit considerations, although many agencies continue to promote plantation forestry. Natural forest management strategies developed in the 1990's use tools which were initially developed in European forestry and in the Sahelian plantations.

Land survey and land registration, boundary demarcation, forest stratification and inventory, harvest regimes and monitoring tools are generally derivatives of classic forestry and related landuse sciences. Efforts have been made at cost reduction through application of emerging techniques such as GPS and by scaling up the management units. Nevertheless, the financial costs are prohibitive under most scenarios. The technical models have been primarily developed for the Rural Firewood Markets, which have a revenue earning capacity well above the average for the Sahel. Away from the urban market opportunities, revenue earning from local forest resources is extremely modest and most of the techniques developed under the Rural Firewood Market system are too costly in financial and human resources terms.

The highly variable forest productivity in the Sahel and the wide range of products make the cost of effective modelling prohibitive. Simple firewood production models which produce annual quotas cannot be considered reliable unless they are redesigned and fine tuned for every management unit. The construction of more integrated models which include key economic values such as livestock production, wild foods and construction wood is not even attempted.

The distribution of revenues tends to be very uneven. Generally, forest exploitation is hard work which is done by the poorer groups or villages without alternative revenue earning opportunities. Although average revenue earning from forest exploitation may be very modest, it may be the principal source of income for some groups or for some villages. The non-marketed and indirect income from the woodlands may be much more important than the revenue. The poorest people, though, may not have the resources to exploit the forest effectively.

Alternative forest management planning and monitoring procedures are being developed, all of which are much simpler than their standard forestry counterpart. Examples are the simplified forest inventory (Mali), the simplified management plan (Sudan, Niger), panoramic photography (Mali, Niger, Sudan) and local product forest inventory (Mali, Sudan). The outcome is as yet uncertain since many of these techniques are project dependent. Finally, the necessity of these techniques for sustainable local management is not proven. Are these tools really necessary for effective local management ? If scaling up of codified forest management is necessary, simplified techniques are needed.

Criterion 3.
Management should aim at long term change and be measured against environmental standards instead of wood volume

It can be said that forestry, by its very nature, is a long term venture. But there is an issue of variability in Sahelian forestry which requires planning on a longer term than may be proposed for high rainfall areas. A series of dry years may be followed by a series of wet years and differences may be so pronounced that

ecological characteristics are entirely determined by such variation. Recruitment may be absent during dry spells and whole forests may die off, whereas the reverse is possible during periods of good rainfall, though in some cases ecological changes may be irreversible. It is obvious that management goals should recognise such variables, which requires a long term perspective.

Traditional forestry standards are stock and productivity, expressed in cubic meters of wood, often as firewood. They are inappropriate for several reasons:
- major stock and productivity changes occur as a result of climatic variability and should therefore not be linked to management performance.
- the Sahelian natural resource may primarily serve values other than (fire)wood, values which should be measured against appropriate standards.
- Volume of wood is a complicated unit of measure which requires financial and human resources which are not available outside a project environment.

It may be argued that if society requires guarantees for sustainable natural resource management, such guarantees should be expressed in terms of environmental standards. The wider impact of local natural resource management may be a concern for society, such as hydrology and biodiversity. Environmental standards may be conceived which deal with these concerns. Such standards are of a long term nature and have a broad environmental, rather than a narrow (fire)wood production focus.

Criterion 4.
Local forest management should be based on indigenous knowledge systems. External technical knowledge may be supportive but should not be imposed on local management. A systems approach to R&D is required.

Technical support to local forest management is essentially based on European forestry science and praxis, adapted by a modest amount of Sahelian research and development since the 19th century, and mostly from recent decades. An assessment of local or indigenous forestry knowledge systems is rarely done, even though local people have observed and managed their natural resources from immemorial times.

In the agricultural sciences, the study of indigenous agricultural knowledge systems has long been accepted. Case studies, research guidelines, workshops and numerous publications have been devoted to such systems. The parallel has not been drawn for Sahelian forestry.

Forestry research has mostly addressed questions of microcatchments and tree survival, exotic species and harvesting regimes. Ecosystems research has only recently been introduced and has provided useful insights in the tigerbush ecology. It has also demonstrated that forestry research has been far too narrow to arrive at useful prescriptions. Ecosystems research is more comprehensive, may be very useful for an understanding of ecological change and it may help

formulate technical recommendations.

Management recommendations such as cutting height, number of stems to be cut, cutting season and encouragement of natural regeneration may not present anything that local producers did not know in the first place. Economic considerations may override technical recommendations which aim at an improved ecosystems productivity. Local management practices may not be the best for long term productivity, but this is no proof of poor ecological and technical knowledge of forest users. Any research and formulation of recommendations ought to start with a comprehensive understanding of indigenous forestry knowledge.

Criterion 5.
The different stakeholder groups amongst the settled communities have to negotiate their rights and responsibilities before sustainable management is possible.

The objective in most projects and policies is to arrive at statutory ownership or usufruct rights. There is a general tendency to allocate these rights to the settled community in the proximity of the forest resource, since this community is the most visible user of the resource and the nearest community often has the strongest claims and stakes. But in a number of cases this is a simplification of historic ownership and usufruct patterns.

In some cases, a neighbouring community has a historic claim on the land which is usually derived from the spiritual ownership of the first cultivator. It may be necessary to recognise spiritual ownership through culturally appropriate mechanisms, while for all practical purposes the forest resource is owned by the village situated in or near the forest. Alternatively, sharing of formal ownership and/or usufruct may be necessary for legitimate local management. In other cases again, local ownership and usufruct are undisputed, but usufruct is shared with neighbouring groups on an informal basis.

Socio-economic and ethnic differences within the local community or village may equally require sharing mechanisms for ownership, usufruct and management. One group may be responsible for commercial wood cutting, but should respect the spiritual ownership of the land by another group in the same village. Strategic forest management decisions may have to be negotiated between various groups, whereas day-to-day management may be the responsibility of a specific user group.

Various projects, institutions and laws tend to gloss over the complicated relationships at the risk of favouring one stakeholder group at the expense of others. As a consequence, the management system put in place may not be legitimate in the eyes of important stakeholder groups. Resource exploitation may not be rational, such as firewood production in a forest resource at the

expense of valuable construction poles or high quality fodder, because the management institution is dominated by commercial firewood interests. In the absence of negotiated forest management, social unrest is a possible outcome. This will affect both the natural resource and the local society.

The inter- and intra-village differences may be sharp but they appear to be modest in the majority of cases. In the process of local appropriation of forest resources, from an free for all to a situation where local communities defend their interests, some adjustment is inevitable. Previously, forest users were faced with ineffective state agencies; today they deal with a different set of rules and with a much more effective guarding and enforcement system. Adjustment takes time and it may not be in the interest of all users. But the local society as a whole appears to be gaining.

The dividing line between a process of adjustment in the interest of local society, and a process of ever sharper conflicts in forest management appears may well be related to the institutional framework of the supporting agency. Local government institutions and NGO's appear to be better at the appreciation of multistakeholder relations and the political process needed for local forest management than line ministries, which have their sectoral agendas and impose a bias on forest management objectives.

Criterion 6:
Pastoral interests should be incorporated in the resource negotiation process. Their interests are located at strategic rather than operational levels.

It is quite common that the forest resource is used annually for some weeks or months by certain pastoralist groups. Their traditional claim is not spiritual land ownership or daily usufruct, but passage and use of certain water and grazing resources. Many forest management projects and policies continue to ignore traditional usufruct rights of pastoralists, and at first sight they get away with it. Forest resources are increasingly appropriated by settled communities. Pastoralists may respond to blocking of passage and water resources by choosing alternative routes, but the ever more frequent blocking of pastoralists has seriously narrowed their options. The conflicts throughout the Sahel which involve pastoralists speak for themselves. For how long will civil peace last with the continued exclusion of a major stakeholder group ?

Several projects have involved pastoralists in the emerging forest management institutions, and legal reform which recognises pastoral rights is on the table. At what level should pastoralists be involved ? After all, they are often not permanently present for the management of a resource which requires regular decision making, guarding and enforcement. Although the experience is embryonic, it seems that pastoralists should and want to be involved in strategic decisions rather than day to day forest management. Operational responsibilities

are limited to areas which are more permanently or exclusively used by pastoralists.

Criterion 7:
Local governance of forest resources is a multi-sectoral engagement which needs support from multi-sectoral institutions. Local government is the appropriate institution at local level and the environmental planning and coordination agency is the appropriate institution at the national level.

Historically, forest management is the responsibility of the national forest service. This is necessary for national forest reserves which are owned and managed by the state, even if responsibilities are delegated to local communities in the case of joint forest management. Such forests will remain ultimately under control of the forest service unless the reserve is degazetted.

However, the large majority of natural resources are on public land. Before decentralisation, the forest service was empowered by the forest act to govern management and harvesting of forest resources and to license forest produce transport. This was a peculiar position, given that the forest service, as a sectoral institution, had the authority to govern a multi-sectoral resource.

The evidence is that local forest management is only possible through decentralisation of governance. Locally elected government is a multi-disciplinary institution with accountability to the electorate rather than to any technical ministry or discipline. Elected Communes or Councils which are presently emerging throughout the Sahel are the natural partner in development for local natural resource management institutions. Range, livestock, forestry, wildlife or other technical expertise may be called in as required by local government but should no longer be empowered to impose day to day management of an integrated resource.

Nevertheless, there are considerable uncertainties about the natural resources policies of the emerging local government. Whereas there is considerable evidence that local communities have a vested interest to manage their natural resources in a sustainable manner, this is not certain for Councils or Communes. Politicians and administrators at this level may not feel the long-term consequences of poor forest management, unlike the local communities. There is a fear that forests will be seen as a source of short term revenues to fill urgent cash deficits. Decision making on forest exploitation should be shared between the council and the community concerned.

At higher levels, planning and coordination should be the responsibility of the institutions with competencies of environment, range, livestock, forestry, energy and game, depending on the nature of the natural resource. In most countries, interministerial committees or environmental planning institutions have emerged. They should have the responsibility for policy making and coordination of

assistance.

The institutional role of the forest service ought to be changing from an authority to a research and extension agency, similar to the agriculture and the livestock departments or ministries. In addition, they continue to govern the national forest reserves. The institutional change which is presently on-going varies in pace, scale and rhythm, and has led to considerable friction, not least amongst the foresters themselves. The traditional mission of the forest service and the disciplinarity of the forester appear to be a major constraint on the ability of the forest service to assume new institutional roles.

Criterion 8:
Short term institutional arrangements may facilitate local forest management in individual projects, but in the long term unambiguous legal support should be secured.

Decentralised governance and integrated resource management are emerging throughout the Sahel, but the reform is far from complete. Old attitudes continue to prevail amongst field level staff, institutional and legal frameworks are not changed overnight. In the absence of effective reform, projects which support local forest management institutions have to deal with short term problems and temporary solutions. They tend to create a convention of some kind between the local administration and the local management institutions. This may take the shape of an order, a letter of understanding or other arrangement which points out the rights and responsibilities of local institutions and the local forest service office. The legal status of the management institution may be enhanced by statutory recognition as a cooperative or an association.

These arrangements tend to function as long as the project is there to support them. The political and financial weight of a project may override the interests which urban based traders and local administrators may have in the collapse of local management institutions. But it is evident that local institutions cannot defend their interests after the end of a project if their legal framework is poor. Associations and cooperatives bear no legal responsibilities of a public nature, and the forest service may want to ignore local conventions if wants to seek rent from forest resources and from local communities. Only a firm legal framework in support of community institutions will secure local management in the long term.

Criterion 9:
As long as modern law is not functional, local law guarantees enforcement of management rules. Projects should encourage development and application of local law.

The co-existence of customary law, Islamic law and various layers of statutory law has been abundantly described by researchers. Local law is another layer, the non-statutory rules and regulations developed in local communities to deal

with emerging opportunities in natural resources management.

The Forestry Code alone is ineffective in the regulation of local forest management. In most countries, the Forestry Code does not support local management competencies. Throughout the Sahel, formal law enforcement is by the police and the courts, which renders enforcement in the rural areas impractical, particularly in the case of woodland exploitation. In projects which insist on rule making and enforcement by legal institutions, guarding and enforcement are not effective.

In local communities which have developed a degree of autonomy over forest management, local laws have been developed in the form of rules which govern access to natural resources, along with rules for taxation. Guarding mechanisms have been developed and a system of enforcement is in place and is functioning.

Some organisations have encouraged a certain formalisation of local laws by putting them in writing and some lawyers suggest incorporation of local community law in local government (bye)law. For the time being, the function of statutory law is recourse and a last resort.

Criterion 10:
Good governance is to be sought in local management institutions as well as in local and in national government.

Governance of natural resources by local institutions offers a micro-cosms of issues found at higher levels of government. Local woodland management is presently characterised by a large number of partially contradictory and often changing rules. Many of the existing rule incongruities are a result of contradictory interests which will have to be negotiated in the process of institutional formation. The institutional experimentation in woodland management which is taking place in the Sahel may provide models for enhanced representation, legitimacy and legal recognition. The congruence of woodland management rules will enhance along with these qualities.

The economics of Sahelian woodland management show that management costs should be very low. How can representative, accountable and functional institutions be established and run at very low cost ? Perhaps the solution should be found in the emergence of local capabilities outside the forestry sector which may be seen as the key to development in the Sahel. Literacy, numeracy and social organisation are capabilities which are increasingly found in other sectors of the local society. The capacity of communities to manage local educational and health services for instance, although established and maintained for other reasons, may enable monitoring and evaluation of village woodlands. A condition is that the woodland management transaction cost should be sufficiently low in comparison with present and anticipated future benefits of improved woodland management.

There is much speculation about the quality of governance at the level of locally elected government and other levels in between central government and the community institutions. They are only beginning to function and where they have existed for a longer time, they are only beginning to carry significant responsibilities. The concerns may be justified, but elected local government is likely to be more responsive to community interests than line ministry staff whose accountability is to their director and their discipline.

Successful local woodland management will also depend on good governance by central government as the enabling framework. Lawlessness of central government institutions puts local governance and sustainable environmental management at risk. A relatively democratic and accountable government, corrected by civil society institutions, is a sine qua non for local forest management.

Related to good governance is a more balanced transfer of resources between rural areas and the centre. The imbalances are presently very high and forest resources have historically been a milk cow for the urban areas through a range of legal and fiscal mechanisms.

11.3. CONTRIBUTIONS TO THE UNDERSTANDING OF DRYLAND FOREST MANAGEMENT

The SOS Sahel research project has been running from 1996 through to 1999. How has it contributed to the understanding of Sahelian natural forest management ? How can this be extrapolated to Africa's drylands ? The following section compares present concepts and previous concepts, notably those reported in Shepherd,G., 1992, SOS Sahel UK, 1996, CILSS, 1997 and d'Herbes,J.M., 1997.

In the first place, the understanding of the Sahelian forest has been adapted to the realities of natural resource conservation in this zone. Previously, the forest has been defined by a more conventional criterion, the crown cover percentage. This has created prejudice of many kinds in Sahelian resource management. It is now increasingly accepted that this resource is not simply characterised by a ligneous variable, but also by tenure. Forests, woodlands, bush and grasslands and mixed vegetation types are subject to a high level of dynamics, but they have a common denominator: they are a more or less natural space under customary or modern statute. The statute, rather than crown cover, determines management. It is not primarily a forest resource, but a multi-stakeholder natural resource.

By the early 1990's, it was thought that forest resources under communal management were regressing and that trees on the farm increasingly constituted the one remaining source of tree products for local people. Present findings

confirm that the forest resource under local control is much more than the community forest; it also includes agroforestry systems, as well as patches of privately owned natural forest and related resources such as game. But community control over forest resources is now increasing strongly rather than regressing.

State forest management remains an issue and there is a large number of joint forest management projects to deal with the issue. No instances of degazettement of state forest in favour of community control have occurred. It seems to be a bridge too far for the time being. Given the relatively small amount of land under gazetted forest in the Sahel, local control over natural resources on public land is the key issue.

The forest management concept was seen to aim at enhanced quantity and quality of the forest and/or improved sustainability. Present findings show that there is another forest management objective, which comes first and foremost: forest appropriation. Forest resources on public land are increasingly appropriated by local groups, based on historic and present claims. The appropriation is accompanied by rule making and enforcement, by the application of local law. Forest development and sustainable use come second, and are more difficult to verify.

Formal ownership was seen to be a precondition for successful forest management. The present evidence shows that local legitimacy of the managing institution is the key condition, along with informal support, or at least without major hindrance by the local administration. This allows a local community to assume responsibilities and de facto to manage the resource. But it is likely that more formal ownership is a condition for forest management in the long term.

The right fit between the size and nature of the management institution and that of the forest was seen to be a key issue. As it turns out, the size of the forest and the managing institution are first of all determined by historical factors rather than by design. A small community may appropriate and govern a large, valuable forest resource and vice versa. In some cases, local community claims may be overstretched in terms of geography or exclusive use, and face poor local legitimacy as a consequence, so that resources have to be renegotiated.

The issue of finding the right fit between the local institution and the resource is relevant in state forests where historic claims are no longer a practical guide. Findings are that the size of the institution and the forest are not the only determinants. Legitimacy is equally important when cutting the cake. Representative local institutions may have to be bigger or smaller than what appears to be logical at first instance, depending on the balance of power. Given the recent nature of the experience gained, continued action-research will be revealing.

Whether overarching local institutions exist or not depends on historical factors and on project strategy. Where they exist, they fulfil a useful institutional role. They are an important mediator between village institutions in case of conflict and they have an important union and lobbyist role vis-a-vis the state. Where they do not yet exist, the emerging elected local government will probably fill some of the institutional vacuum.

Research recommendations have tended to prioritise technical components such as firewood harvesting models or fire as a management tool. In Niger, the ecosystems approach has been prioritised with extremely useful contributions as a result. The present research project has recommended a still more systemic research agenda which gives equal weight to anthropogenic systems. Given the complexity involved, action-research is recommended which uses local forestry knowledge systems as the starting point, a recommendation which has been endorsed by the Bamako workshop. The workshop itself has been more systemic than previous dryland forestry workshops, by attracting lawyers and sociologists as well as forestry experts.

The economics of local management of Sahelian forest have rarely been researched. The SOS Sahel research has contributed two case studies which suggest that average revenues directly attributable to the forest are very modest outside the peri-urban influence. However, intra-community differences are very large so that certain social groups depend highly on such revenues, especially the poor though not the poorest. The indirect benefits, subsistence benefits, option, bequest and spiritual values should be added and are likely to outweigh the marketed benefits.

The overall benefits rather than just revenues explain why it is in the interest of the majority to appropriate and protect the forest. This explains the engagement of many community members in active or passive guarding along with daily tasks. The very modest level of direct revenues explains why forest management should be at very low financial cost. Investment in formal inventory, forest compartmentalisation and active tree regeneration are not justifiable in the majority of cases.

The present study confirms the critical importance of local legitimacy. Various research projects, and the PADLOS studies in particular, have underlined the need for more comprehensive representation, one which goes beyond customary institutions. The same studies pointed out the development of rule systems by local institutions and their operational inadequacies. The present research has strengthened the evidence for this, and proposes the following process of forest management.

Local law, i.e. informal rules and their enforcement, should be accepted and even encouraged as the starting point if it is efficient. Action-research based on local forestry knowledge should address the operational inadequacies of rules, and the

poor legitimacy it may have in the eyes of certain user groups. This should lead to renegotiation of the rules and more comprehensive legitimacy. Operational adequacy will enhance in the process and local law can increasingly be formalised in local government bye-law.

Previous studies have identified the incompetence of the state as the major institutional constraint. The forest service was considered unable to manage the forest due to lack of human and financial resources. Donors have made heavy investments in the national forest services without lasting effect.

The present research demonstrates that the mission of the forest service is an important constraint, and is probably more crucial than the lack of resources. The sociology of the forest agent shows how this mission goes against the grain of local resource management. The essence of the forest code has not changed, either. Formal policies may change to include local participation, but have little impact if the forest code and the mission of the key state agency do not change.

In the absence of a dynamic forest service with a greatly changed mission, other institutions take over. Local government is accountable to the electorate rather than a national director, and they have multisectoral concerns unlike the forest service. At national level, environmental agencies are emerging as a more appropriate policy making body. NGO's play an increasingly important role at national and local level. The present institutional dynamic should have an important bearing on donor policy.

The perceived conflict between national level policies and local forest management should be seen in a different light. The countries concerned have signed up to the international conventions which aim at enhanced local governance and the national environmental and legal frameworks are increasingly supportive of such governance. Instead, there is increased conflict noticeable between innovative national institutions, policies and law on the one hand, and the forest service and forest code on the other hand.

The present research falls short of drawing firm conclusions at the impact level. This is difficult under the best of circumstances. One reason is that a "before" and "after" comparison is hardly useful under the major changes which have swept through the Sahel. One difference between the beginning and the end of the 1990s is the perception of climate. By 1990 it was felt that the Sahelian climate is drying and that the natural vegetation was degrading as a consequence. Recruitment was very poor and woodlands were in recession. But the average of the 1990s jumped and rains over the last 5 years of the decade have been particularly good, so that the vegetation has responded. Another element is policy, which has been subject to major change over the 1990s.

The question now is not whether local management is an option to central management, but how it can be best done. Impact measurement will require careful, long term monitoring of all aspects of change.

To what extent the Sahelian experience can be extrapolated to other dryland areas in Africa, depends on the multitude of variables under which local forest management operates. Even within the Sahel, the general conclusions drawn in this report require a great deal of adaptation to spatial and temporal changes. Given that most of the critical variables are institutional, legal, political and economic, and assuming that decentralisation and democracy are high the agenda throughout the continent, many of the conclusions drawn for the Sahel should serve as an inspiration for analysis elsewhere.

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ANNEXES

ANNEX I. PROJECT PROFILES

ANNEX I.1 GAYA PALM GROVE PROJECT, NIGER

The Gaya palm tree belt covers an area of 34,000 ha over a length of 65 km along the river Niger. The average annual rainfall is 600-900 mm/yr which is outside the Sahelian zone. Nevertheless, the Gaya project offers experiences of institutional change which are also instructive to the Sahel.

About 65,000 people, distributed over 78 villages and hamlets, live in the project area with a population density of 206 inhabitants/sq.km The exceptionally high population density is related to the economically valuable palm groves. The palm trees are said to have 801 uses, of which construction material, fruit and flowers are the most important marketable ones. One study assessed the value of the main food products alone at some 700 million FCFA/yr (Gambo,E.H.S.,1999.

In 1978, the first Gaya project was initiated when local people expressed increasing concerns about the rate of destruction of the palm groves, and in particular, about the exploitation licences issued by the forest service. The various projects of 1978 through to 1993 emphasised technical support with, amongst others, regeneration of 5,000 ha of palm groves over this period. But the scope of local management was very limited since policies and laws over the period 1978-1991 were designed for resource management by the state. The degradation of the palm groves accelerated rather than reduced. Hard pressed local people always found the ways and means to exploit the natural resource which the state claimed as its property (Sani,A.M.,1999).

In the early 1990s changes in the institutional and legal framework of Niger enhanced the opportunities for local management. The 1992 General Development Policy for Niger, the Rural Code and legislation on Rural Concessions set a policy and legal context which allowed more space for local governance. The present project (PAIGLR) started in 1995 and is financially supported by the Swiss Development Cooperation to the tune of 2.5 million SF (1.19 billion FCFA), represented by the IUCN (UICN, 1999). The Nigerien partner is the forest service of the Department of Dosso.

The PAIGLR project follows the Gestion de Terroir approach and thus aims at multisectoral negotiation, planning and implementation within the village territory, with intervillage planning through Canton level committees. Although general orientations are laid down by the project, individual communities define their own internal and external organisation.

Palm grove management plans produced by the forest service with annual harvest quotas were actually rejected by the local institutions. When the present project started in 1995, it was agreed between the stakeholders that these annual quota be dropped. It is not clear by what standards palm tree exploitation is currently organised. As far as local institutions are concerned, palm tree exploitation is now organised through management plans approved by the overarching steering committee. But the government administration does not necessarily agree, saying that palm trees are a protected species under the regulatory competency of the forest service.

The local institutions have rule enforcement teams to ensure that rules are respected. In the project area, 59 teams with 312 members have the daily responsibility for palm grove protection. They generally receive a small remuneration from village funds, which is a contentious issue in the eyes of project staff. Furthermore, their legal status is questioned: are village guards auxillaries of the administration, comparable to the legal definition of traditional authorities, or are they simply “informers” of the forest service ? Protection is not simply directed by the forest service, though. Some villages have arrested and banned those who were in possession of a permit issued by the forest service.

Taxation of some key palm tree products is organised through mechanisms designed for the rural firewood markets. Taxes are paid by producers through local institutions with partial tax reimbursement to the community concerned. However, should local consumers also pay the taxes ? As a part of the various compromises made in PAIGLR, local consumers are not taxed.

The institutional and legal definition of the local management institutions may be the cooperative, the association or otherwise. They are generally defined under private law although the natural resource is essentially under control of institutions defined by public law. A complicating aspect of the palm tree is that it is a protected species. For the time being, the poor legal context for local management is cushioned by the project. The project structure is defined by the Swiss-Nigerien agreement which is situated at the level of international law. Furthermore, local decrees, usually at the level of the sub-prefect, have been adopted to facilitate local management. IUCN Niger has considerable legal expertise to back up such arrangements - but will this hold when the project terminates ?

This is obviously a concern for long term sustainability and PAIGLR has involved the Secretariat for the Rural Code in the Gaya project, in the hope that the Gaya experience will contribute to a redefinition of institutional roles and legal context in favour of local management. In this process, appeal is made to international conventions signed by Niger which favour local participation, and it is hoped that the decentralisation process will gain momentum. One of the encouraging signs of institutional strengthening in local communities are the regular evaluation and

planning meetings held by supra-village committees without the support of the project.

I.2 RURAL FIREWOOD MARKET PROJECTS

This profile does not describe a single project but a project approach under the name of “Domestic Energy Strategy”. Although the strategy is employed by a number of projects, one of them can said to be the genesis: Energie-II in Niger. This project was funded by Danida, the World Bank (Energy Sector) over the period 1989-1996, with a budget of about 11 million USD. It was replicated with funding of the Netherlands Development Agency (NEDA)/GEF/World Bank for about 6 million USD in Mali for the period 1996-2000. Other projects have rather similar approaches such as the Norad supported Kita project in Mali, various Danida and NEDA supported projects in Burkina Faso, and projects in other Sahelian countries.

The domestic energy strategy covers supply and demand components and intervenes in the fiscal and legal framework. The rural firewood markets are the main project component of interest to local forest management. Rural firewood markets are a confusing title in the sense that they are set up to serve urban firewood markets. Rural firewood markets are mostly situated around major cities such as Niamey and Bamako. A part of the markets is located in the Sahelian zone, although many are in the Sudanian and Sudano-Sahelian zones, particularly in the case of Bamako.

The firewood market is often defined as a cooperative of firewood producers for a given village territory. The cooperative is set up by the forest service (Niger), or by NGO’s contracted by the forest service (Mali). Market establishment includes delineation of village forest boundaries, partitioning into forest blocks and planning of an annual firewood harvest scheme. The internal and external rules of the cooperative are prescribed by the forest service, which enters into a contract with the cooperative.

Legal and fiscal reform in favour of the firewood markets has been a pre-condition for disbursement of funds, and has been realised in Niger and Mali. The markets are defined under legal reform as a concession of the state (as the statutory owner of all village forests) to the cooperative, under conditions stipulated by the forest service. Fiscal reform aims at increased taxation of the firewood trade with tax reductions to rural firewood markets. Firewood markets with a high level of management, as defined by the forest service, enjoy the highest tax rebates. The tax rebates are paid into a village fund.(Foley,G. et al,1997).

Table 14 gives the total number of markets established in Niger and Mali, although not all of them are necessarily functioning and not all markets have

followed the principles set out by the forest service. The data are from different sources and from different years, which limits comparability.

Table 14: Firewood markets established in Niger and Mali

	Number of markets & turnover
Energie-II, Niger	85 markets,103mio.FCFA(1995)(Foley,G.et.al,1997)
CARE, Maradi, Niger	22 markets, 28 mio.FCFA(derived, Paris,P.,1994)
Kita, Mali	48 markets, 17 mio.FCFA (1996)(ILO,1997)
NEF Mali	15 markets, 53 mio.FCFA (average)(NEF Mali,1997)
SED Mali	30 markets (SED,1997)

The oldest markets are situated in Tientiergou, Niger, and date from 1992. Market establishment and impact have been well researched over the last 6 years. Ecological sustainability appears to be good in terms of regeneration, but the tree diameter of key species seems to be receding (Giraud,S.,1998). Local people express concern that the firewood resource is unsustainably used. There may be a shift in species composition away from forage species valued by herders (Madougou,J.,1998).

The annual firewood harvest quota is seen as the essential guarantee of forest sustainability. But it is also felt that there is no scientific basis to establish the quota, since Sahelian forests are ecologically extremely variable and dynamic. “In the absence of reliable data, we are doing the best we can” said some of the Malian staff. In practical terms, it means that an average firewood productivity is established for each zone in the country. The soils and vegetation characteristics of an individual village forest, which are major productivity variables, may not be assessed.

The income from firewood sales is very considerable though less than income derived from agriculture and livestock. The study of Tientiergou village itself suggests that one interest group, the firewood cutters, derive all the benefits, including those from the village fund which is intended to serve the whole community.

There is little evidence that the local forest management institutions have assumed responsibility for forest protection. In comparison to other case studies, the rural firewood market system is strongly controlled by the forest service. Local people are expected to inform the forest agents in case of a forest offence, and they are not expected to assume protection functions such as arrest, confiscation and imposition of penalties. The limited legitimacy of this institution within the local community, demonstrated by some studies (Paris,P.,1994; Madougou,J.,1998), may also be a reason why an informal system of forest protection is not functioning.

The projects are aware that the tools for rural firewood market establishment and management should be simplified. Simplified biometric procedures have been proposed in Mali (Sylla,M.L.,1999), and some project staff propose that the village forest should be legally owned by the villagers. It is clear that the firewood market system should evolve to keep up with the pace of decentralisation and the need to scale up.

I.3 SOURINDOU-MIHITY, BURKINA FASO

This case study concerns traditional resource management with modest support in the 1990s provided by INERA, an agricultural research organisation, and Sahel Action, a Burkinabe NGO and other organisations. The case study is the exception where pastoralists are the primary stakeholder and manager of the forest resource.

The Sourindou-Mihity river drains a catchment of 5,200 sq.km in the Banh Department in north west Burkina Faso. It floods a plain of 400 sq.km called the “forest of Banh”. This is situated in the Sahelian zone and receives an average annual rainfall of 400-600 mm Due to the run-on from the Sourindou-Mihity, the vegetation is richer than what is normally found under the prevailing climatic conditions. Rich pasture and forest exist on the floodplains, whereas banded vegetation patterns exist in neighbouring areas (Painter,T. and Sanou,S.,1997).

The Foy is the name of the traditional socio-cultural entity of the Peul who have occupied this area since the 18th century, along with the Rimaibe, and who have conserved it for pastoral production. Neighbouring areas are quite densely inhabited by Mossi farmers, who have exerted considerable pressure on the Foy since the 1980’s (Ouedraogo,I. et al,1999).

The Foy dates from the reign of Cheikh Amadou in the 19th century and organised livestock passage and exploitation of the natural resources. A system of protection and sanction of offences was applied by the pastoral assembly (sudu-baba) and it assigned guards accompanied the herds and their herders. The colonial administration appears to have reinforced the Foy, but after the Burkinabe revolution of 1984, traditional management was disfavoured. This was partly due to the drought which forced many herders to abandon pastoralism. Important political changes were made in 1984 to supress traditional institutions such as the Foy, and appropriate all land as state property. As a consequence, resource management rules of the Foy were poorly respected and migration of farmers towards the floodplains increased.

The Foy survived suppression by the state although it was weakened. In the 1990’s it has been provided with modest support by various organisations such as INERA and Sahel Action in the form of research, training and lobbying. In 1990, an association called Walde Kawral Pulaku was created in order to formalise local resource management. The forest and grazing resources are

protected and offences are fined, with penalties of up to 15,000FCFA. Those who do not accept the local penalty, are brought to the administration.

Research has established the high biodiversity values of the forest. Plans of some organisations to construct a dam upstream in the Sourindou-Mihity, which would more or less destroy the forest, have been blocked. Various initiatives have been made to provide the association with more substantial legal recognition. In 1993, the association deposited the request to obtain recognition of their resource as a village forest, but this file was lost by the forest service in 1996. The management rules have recently been revised to ensure that they are negotiated between the stakeholders. A draft convention for local management has been filed more recently, but has not yet been accepted.

The process of decentralisation in Burkina Faso appears to be the main hope for effective, legal natural resource management by the local communities. The land tenure legislation of the RAF (Reforme Agraire et Fonciere) was drawn up for centralised management and requires thorough review. Law reform will have to be flexible and creative if it is to support local resource management (Ouedraogo,H., 1999). The Walde Kuwral Pulaku will then be in a much better position to effectively manage the resource, assuming that it represents the widening range of stakeholders in the forest.

I.4 ENVIRONMENTAL MANAGEMENT PROJECT (PAGE) BANKASS

The project started under the title PPEB in 1992 in the Cercle de Bankass, 5th Region, Mali, which has a Sahelian climate in the north and Sudano-Sahelian in the south (PPEB,1992). The project was renamed PAGE in the second phase which is funded from 1997 to 2001 (PAGE-B,1998). Main donors over the two phases are DFID, EU and FENU.

The project area covers in principle the entire district, an area of 6,800 sq.km, with three agro-ecological zones:
1. The plateau, spiritual home of the Dogon, the major ethnic group in the district. The forest management component of PPEB was concentrated in this zone.
2. The Seno plains.
3. The Samori forest, where forest management support is extended in the second phase.

The average population density is 24 inhabitants/sq.km but it is locally over 70 inhabitants/sq.km The more traditional Dogon farming communities live on and near the plateau, where some villages are an international tourist attraction. The Dogon who migrated over the last century from the plateau to the Seno plains are less attached to tradition, and those who migrated to the Samori forest, a more recent migration, are living together with various other ethnic groups. The

Peuhl herders have always moved through the three zones in search of grazing and water.

In ecological terms, the plateau zone is well forested and some of the agricultural land there is now covered by forest vegetation, due to the emigration from the plateau to the plains. The latter contain almost no forest but many trees grow on cropland. The recent migration of many groups to the Samori forests has led to strongly increased agricultural production and rapid deforestation in this zone. The dynamics in the three zones have an important bearing on the nature of local forest management.

The PPEB strategy was initially to support immediate economic activities with the aim to develop longer term environmental management as short term needs are addressed. Within a few years it turned out that the project was getting so involved in immediate economic needs such as water, health, credit and agriculture that more emphasis on environmental management concerns was necessary (Winter,M.,1994).

PRA was the main tool used for analysis and planning, taking the village as the appropriate level of intervention. It turned out that the PRA's were very useful for the introduction of the project and the development of a good relationship, but that the depth of the analysis was often poor. Institutional issues were initially not properly analysed, which blocked various project components. Later on it was under stood that lineage and tenure were often key issues in the project area. Project support which appeared successful initially was often blocked at later stages if underlying tenurial systems were not properly addressed.

Improved understanding of institutional issues led to the identification of the Alamodiou, traditional institutions which cover about 10 villages of ancestral origin. The Alamadiou was always responsible for important aspects of Dogon society, including protection of the natural vegetation. It had been suppressed by the state but was still functioning to some degree. The political changes of the 1990's and the support provided by the project revitalised the Alamodiou. In 1994 a convention was signed by the local forest service and the Alamodiou which formalised local forest management to some extent. To make this happen, the project has done considerable lobbying at various levels in the administration. Six Alamodiou institutions, with members in each village, cover about 50 villages in total, mostly near the plateau.

Since 1994 internal and external rule making and enforcement is effectively executed by the most of the Alamodious, including arrest, confiscation of produce and application of penalties. In some cases, the Alamodiou involve the administration. Under the convention, forest service agents have a monitoring responsibility, but in principle do not interfere with the usual activities such as cutting permits and penalties. This has not always worked: research in 1998 shows how the agents have held a rent-seeking campaign in 10 villages covered

by four Alamodious. The research also demonstrates that the institutions have become robust since in the majority of cases, the agents were not successful.

The traditional nature of the institution provides it with considerable legitimacy among the Dogon, but representativeness among the Peuhl and various other groups is insufficient. Tradition also may have slowed down the adoption of more acceptable forms of accountability. Finally, the legal status of the Alamodiou is very weak. Due to the cultural characteristics, they can hardly be registered as associations (Diallo,Y.,1997). Yet the Alamodiou are locally perceived as partners rather than auxilaries of the state agencies. The elected local government in place since 1999 may offer opportunities for legal recognition through forest management conventions and contracts, but the test is yet to be made. One complication is that the boundaries of the Alamodiou entities and its Rural Communes are not identical.

Since 1995, the project has worked with communities in the Samori forest, which covers about 80,000 ha (Bacha,A.K. and Tessougue,M.,1996). This time, the PRA was much more successful since staff was aware about the critical importance of institutional and tenurial issues. Not the Alamodiou but the “mother village” where descendants of the first cultivators live, constitutes the appropriate institutional unit of local forest management. The mother village grants the right of installation to migrant cultivators, but maintains customary prerogatives. A number of these institutions are now supported by the project and they plan the natural resources in their territory, they establish forms of control and sanction, and they negotiate with the administration.

A constraint noted in the project is that donors and administration want to see physical achievements such as plantations, forest inventories, physical soil conservation and the like. The project found that the capacity of local institutions to negotiate the various interests and to control and monitor the forest is more important than immediate physical impact, a conclusion which is now accepted by some of the project partners. But useful indicators of a lasting impact, negotiated between the African animist and the European modern vision, remain to be found (Diakite,M.,1999).

I.5 NATURAL FOREST MANAGEMENT PROJECT (NFMP), SUDAN

Opportunities for local forest management in Sudan improved when new forest legislation was enacted in 1989. In the same year, SOS Sahel UK started a forest management project in El Ain, northern Kordofan. This is a project of three phases lasting from 1989 to 2000. Initially, the project put emphasis on the management of El Ain state forest reserve, but it gradually concentrated on the management of village forest resources by local institutions.

About 7,000 agricultural people from different ethnic groups live in the project area which is also used by the nomadic pastoralists in a north-south movement

which corresponds with the rains. The land is traditionally owned by descendants of the first cultivator, whereas usufruct rights acquired by immigrants. The post-colonial state has established committees and leaders which are superimposed on traditional institutions. Commercial companies have expropriated considerable amounts of land for large scale farming.

The project area has had an average annual rainfall of 361 mm over the period 1951 to 1980, but only 220-250 mm in the 1980's. During the first years of the project, up to 1994, the average annual rainfall was 241 mm Natural regeneration of the dominant tree species was very poor and the project invested much in micro-catchments, tree planting and guarding. From 1994-98, however, the average annual rainfall was 380 mm, a 58% increase over the previous period. The abundant forest regeneration measured in sample plots demonstrated that costly tree planting campaigns were ecologically inappropriate, apart from being very expensive.

The woodlands are unevenly distributed, some villages having abundant resources but many having little. The project encouraged villages to better manage the remaining woodlands. The most important tool is the Forest Act, 1989, which defines legal appropriation of forest resources by the local community through a process of gazettement. Although villages were initially concerned that their forest would be taken from them, they gradually became interested to register their forest. By 1995, five village forests were registered and by 1999, another thirteen village forests awaited final steps in the procedure with many others showing interest in registration.

Once the first steps towards registration were taken, in particular acceptance by neighbouring villages and by the traditional leaders, villages started to set the rules, patrol their forest and enforce rules. The legitimacy of local management is generally high among settled communities, but quite poor among pastoralists who have been entirely excluded from the registration process. Apart from some initial problems, the settled communities by and large respect the rules. The majority of forest offences are settled by informal means, such as a warning or confiscation, penalties have been imposed in a small number of cases. Only 5 cases have involved the administration and have been settled before the opening of a court case.

The project initially considered the need for standard forest management plans, but rejected this idea given that the village institutions in charge of the woodlands would not be able to use them. Instead, it considered local capacities and developed innovative elements of a local forest management system. It developed a forest inventory based on the count of local forest products rather than measurement of wood volume. It also applied panoramic photography as a forest assessment tool owned by the villagers. Furthermore, it helped villagers write up their own management system, such as the internal organisation, the

rules of forest exploitation and penalties for forest offences. Unsurprisingly, there is a large diversity of forest management plans.

The project is facing three major constraints now that it is reaching the end. One is the expropriation of large areas of woodland by commercial interests and subsequent deforestation. Large areas of state forest reserve have been leased by the forest service to a company and the area has been deforested. So far, the village woodlands in the registration procedure have been saved from expropriation, but will the rule of law be respected in the absence of a project structure ? On the other hand, the affair has raised great interest among local communities to register their land as village forest.

The second constraint is the tedious, centralised process of forest registration. This inhibits the scaling up of village forest registration and the overall area managed is very small in comparison to the area which requires management. An opportunity the near future is offered by decentralisation which is likely to put village forests under the authority of the States rather than the centre. In the process of decentralisation, the locally elected Rural Councils and the State administration and court are likely to be in charge of the registration process. Decentralisation may also prevent large scale land expropriation directed from the centre - if it is locally accountable.

The third constraint is the poor legitimacy of the registration process in the eyes of the nomadic pastoralists, traditional users who have been excluded but who are highly dependent on this wet season resource. A regional pastoral action-research project implemented by SOS Sahel and IIED has begun interacting with the stakeholders in the project area, so that communication and negotiation is somewhat improving. Law reform in the context of decentralisation should back this up, but the outcome is far from certain. If attempts to involve pastoralists are not successful, civil peace will be at risk in a country which can hardly afford it.

I.6 TAKIETA FOREST MANAGEMENT PROJECT (PAFOZ), NIGER

Takieta forest was gazetted in 1950 and covers 6,720 ha It is located at 50 km from the town of Zinder along the highway to Niamey. The average annual rainfall is in the order of 375 mm (Ministere de l'Agriculture, 1997). The population density in the 13 villages around this forest varies from 50 to 80 inhabitants/ sq.km with the agricultural Haoussa as the major ethnic group.

Takieta forest has been subject to degradation and attempts at forest restoration for a long time. The PUSF project in 1982-89, IDA in 1985, and both SNV and SOS Sahel in 1992-94 have done forest inventories, and reseeding, established nurseries, planted trees and paid guards. It appears that these projects relied mostly on food for work and similar mechanisms of local participation. Takieta forest continued to deteriorate, though perhaps less than most of the other state forests in the Department (PUSF,1986).

In 1995 the Takieta forest management project (PAFOZ) was established in collaboration between SOS Sahel UK and the forest service, for a five year phase. The objectives are sustainable forest management through a transfer of responsibilities from the forest service to the local communities, and improved economic conditions (PAFOZ,1996a).

The project has gone through a number of stages. Introduction and initial studies were done through PRA which was found to be very useful for team building, to create positive rapport and basic understanding, although the depth of analysis and reporting were not satisfactory (PAFOZ,1995). This was followed by village level planning of a range of economic activities.

The initial strategy in Takieta forest was built on redefinition of forest boundaries and their demarcation, enhanced control through forest guards and checkpoints and forest inventories (PAFOZ,1996b; PAFOZ,1997a). In 1997, the project went ahead with a programme of information exchange and coordination involving villagers, pastoralists and the administration.

An innovative approach was developed to involve Peuhl and Touareg pastoralists in this negotiation. These groups had hitherto not been involved in project activities in Takieta and rarely elsewhere in Sahelian joint forest management. Individual pastoral leaders, pastoralist unions and camps were visited so that pastoralists became aware of the stakes and of the opportunities for decision making along with other stakeholders. In the major decision making forum pastoralists were represented at par with settled communities (PAFOZ,1997b). When looking back at the event, some project staff said “we though it would be very difficult to involve pastoralists, but we could have involved them right from the first year”.

The initial idea for forest management among the villagers was to partition Takieta forest in blocks to be managed by neighbouring communities. However, it was feared that powerful families might appropriate parts of the forest for their own good and also, that problems with the pastoralists would arise. It was finally agreed that the following principles should govern the forest:
- a general assembly decides on policy for the whole forest;
- four committees deal with day to day management. Pastoralists are generally not involved at this level, since they are mobile;
- “user pays” principles apply;
- part of the revenues pay for management, control and forest restoration.

Simple forest inventories have been done and maps have been made by the committees. This is an important departure from previous approaches. Many projects in Takieta and elsewhere have done forest inventories based on classic methods. Resource monitoring done by local committees is a departure from

classic approaches. Nevertheless, the usefulness of local inventory techniques remains to be tested.

The various committees were fully operative by 1999 and the internal and external rules have been worked out and are accepted by the general assembly. Takieta forest is beginning to be managed by local communities, including pastoralists. The forest service director is supportive of this experiment but as yet there is no legal framework for management of the gazetted forest by local communities. This may become a major hurdle since legal reform for local appropriation of village forest resources has made little progress in Niger, let alone the appropriation of state forests by local stakeholders.

I.7 NEAR EAST FOUNDATION, DOUENTZA, MALI

The NGO Near East Foundation (NEF) has supported projects in Douentza district, Mali, since 1984. It has provided some assistance to forestry activities in the 1980's, and support to the forestry sector has become a priority since 1990. The Malian revolution of 1991 was a major impulse for NEF to support local governance of the forest.

The Kelka forest measures about 45,000 ha with an average annual rainfall of 300-400 mm, while some of it receives run-off from neighbouring areas (Diallo,Y. and Winter,M., 1996). Some parts of the forest are therefore dense under the dry climatic conditions, whereas other parts of the forest have the banded vegetation patterns which are also characteristic for parts of northern Burkina Faso and south eastern Niger.

The forest is traditionally owned and used by 15 villages of different ethnic origin, and a number of nomadic cattle routes cross the forest (Bocoum and Diallo,Y., 1999). The routes are used for the annual movements between the Niger delta to the west and the Gourma and Seno plains to the east. More recently, the Kelka forest has become a major source of domestic energy for the regional town of Mopti, 100 kms. from the Kelka forest and served by a good tarmac road.

Already before 1991, a progressive district forester managed to put an end to abusive tree cutting permits issued for exploitation of the Kelka forest, and he encouraged local communities to improve forest management. In 1992, the project supported a process by which the 15 villages defined their territories and the forest management rules applicable to each village. Various management issues cross village boundaries, so that an intervillage institution was established with representatives of all 15 member villages, the Walde Kelka. It is the responsibility of the Walde Kelka to help solve conflicts between villages, and negotiate with the administration.

Over the period 1992-96, half a dozen conflicts between villages were resolved with assistance of the Walde Kelka. In various cases, the Walde Kelka

negotiated conflicts between a village and the forest service. The legitimacy of the Walde Kelka turned out to be the foundation for its success. But the institution did not fit in the legal framework of Mali and neither did the village institutions. In the case of a conflict with the administration, this was an important weakness.

The project staff, which includes a lawyer, found that the formula of Private Law Associations, as defined by a 1959 law, is the best way to enhance legal backup. All 15 village institutions and the Walde Kelka are now registered as associations under this law, which allows a certain institutional sustainability. The legislation on the rural firewood market is presently being explored to further reinforce the legal support to local governance.

Nevertheless, de facto forest management is only partially legal. The firewood trade is more or less organised along the 1992 legislation on the firewood markets. But each village institution has developed rules and sanctions, backed up by local forms of enforcement, which are not defined by law. De facto forest management is based on an exclusivity which the villages do not legally have, although it works as long as the administration cooperates.

In 1996, the project contracted a consultancy company to survey the Kelka forest. The inventory was used by the consultants to propose village forest management plans. It is not clear how village institutions will use this form of data collection and forestry planning. Among project staff there is a felt need for formal tools such as the standard forest inventory but the appropriation by local institutions is not evident. A socio-economic survey in 1997 was held by project staff and demonstrated the importance of the commercial firewood sector, but also the vulnerability of this sector and the need for economic diversification.

The project has been funded by NEDA for another phase which started in 1999. Three challenges will be faced in the development of local forest management during this phase:
- the adoption of locally useful assessment and planning tools;
- reinforcement of the legal support to local forest management, which will mostly depend on changes in laws on local government and forest ownership;
- involving mobile forest user groups in management. The pastoralists are traditional users of the Kelka forest, but have been mostly excluded from the decision making process.

ANNEX II

ANNEX II.1. DATA GENERATED FROM PRODUCERS IN BANKASS, 1999, THROUGH INTERVIEWS AND PRODUCER OBSERVATION.

1A DRY SEASON GARDENING IN TYI: AVGE REVENUE/PRODUCER, 1999		
REVENUE EARLY SEASON	REVENUE HIGH SEASON	TOTAL FOR YEAR (*)
4,169FCFA (n=10)	29,295FCFA (n=10)	58,590FCFA (n=20)

(*) based on assumptions concerning length of season
n=sample size.

1B CONSTRUCTION WOOD PRODUCERS, KOBO Between brackets [] : information according to producer observation		
	PRODUCERS WITH CARTS	PRODUCERS WITHOUT CARTS
SAMPLE SIZE	5 [2]	6 [3]
AVGE WORK/DAY (HRS)	9hr5m [9hr]	6hr [6hr5m]
AVGE NO.STICKS/SEASON	490	315
AVGE NO.POLES/SEASON	23.2	0
AVGE PAYMENT ALAMODIOU	1,300FCFA	950FCFA
NET ANNUAL REVENUE	56,200FCFA	14,110FCFA
NET RETURNS/HR IN FOREST	288FCFA, i.e. sticks 232FCFA poles 415FCFA	77FCFA

1C PRODUCERS OF BEDS, KOBO (n=5, observation n=3)
Avge collection time of sticks = 3hr13m
Avge time preparation leather straps 5hr10m for a cow skin (sufficient for 2 covered beds)
Avge manufacturing production time 1 covered bed = 3hr20m
Cost: no payment Alamodiou leather 1,250FCFA/skin transport to market 125-250FCFA/bed
Market: avge 2-3 sellers, 6 beds sold for 12,400FCFA/wk
Total labour time required for one covered bed: avge 8hr13m (excluding marketing requirements)

Returns on labour: 167FCFA/hr (excl. cost of marketing)

1D. Artisans of mortars and related products (n=3):
In case of successful production, gross returns on labour are 600FCFA/hr., net returns in the order of 500FCFA/hr.

1E. Commercial firewood production by women in the villages: in the village of Tyi, only one woman is specialised in production and sales. Producer observation indicates that net returns on labour are 40FCFA/hr. which is sufficiently attractive for the woman to remain in business. Annual net revenue is 32,500FCFA. Firewood sales in weekly markets: only one product has been signalled in 8 weekly markets, half a cart of firewood sold at 500FCFA, net returns of labour are probably well under 100FCFA/hr.

Table 1F. Fruit production during the 1998 wet season by a sample of 4 families in Tyi village (2 rich and 2 poor), measured by a literate woman during the season.

FAMILY	Kembe, Zaba senegalensis	Umu, Tamarindus indica	Oro, Baobab
Minata Damango rich family	2.5 baskets	286 bowls	0
Usinanga Songosso rich family	2.0 baskets	0	113 bowls
Koyen Damango poor family	2.7 baskets	244 bowls	0
Ata Damango poor family	0	0	176 bowls
Market price Dounde	500FCFA/basket	15FCFA/bowl	12.50FCFA/bowl
MOYENNE	1.7 baskets	133 bowls	72 bowls

Table 1G. Total wet season fruit production in Tyi village, 1998, with market prices and total market value, for the most important commercial fruit species. Extrapolated from monitoring of 4 families.

SPECIES	QUANTITY	EQV. EN WEIGHT	MARKET VALUE FCFA
Zaba senegalensis	64.4 baskets		32.200
Tamarindus indica	5.054 bowls	421 kg.	75.810
Baobab	2.736 bowls	391 kg.	34.200
TOTAL			142,000 FCFA, i.e. 3,700 FCFA/hh

ANNEX II.2. ESTIMATE OF REVENUES FROM THE FOREST RESOURCE IN TWO CASES.

Kelka
Based on revenues over 5 years for 14 villages, the following average annual revenues are obtained (source: NEF Mali,1997,p.82: derived from 5 year totals).

Livestock 0.7 mio.FCFA
Assume that the forest accounts for 25% of the forage requirements, hence for 25% of revenues derived from livestock.
Wood products 4.1 mio.FCFA
Artisanal 0.14mio.FCFA
Assuming that 50% of the artisans' income estimated in the study is derived from forest products
Total: 4.9 FCFA

Bankass
Based on a management unit of 10 villages (=average for Alamodiou) including Kobo, as a village specialised in forest exploitation, Dounde as a village of artisans, Tyi as a village characteristic for the remaining 7 villages of farming and herder communities. Source: Kerkhof,P. 1998c; 1999 monitoring data.

Livestock 1 mio.FCFA/village
(Based on estimate for Tyi, 1998)
Firewood 65,000FCFA/village
(Based on Tyi: revenues of one specialist producer, plus same amount for other occasional producers)
Construction wood, beds: Kobo
1.48mio.FCFA/10 villages
Fruits 231,000FCFA/village
(Based on fruit production monitoring in Tyi, extrapolated to two seasons/yr)
Artisans 600,000FCFA/10 villages
(Based on 4 artisans with an annual net revenue of 150,000FCFA, derived from interviews and producer observation of 4 artisans in Kobo and Dounde)
Hay, kapok, leaves, flowers:
30,000FCFA/village
(Based on number of sellers & price in the weekly market)
Total 1.53 mio.FCFA/village

ANNEX II.3. EXCHANGE RATES S£/UK£ 2.1995-1.1999

DATE	2.1995	7.1995	1.1996	7.1996	1.1997	7.1997	1.1998	7.1998	1.1999
S£/UK£	650	850	1,360	2,130	2,560	2,752	2,860	3,269	3,994

ANNEX II.4. COST MODELS OF LOCAL FOREST MANAGEMENT

High cost model.
Establishment cost: average of 5,000FCFA/ha (range: 1,270-8,440FCFA). For a 2,000ha forest this is a cost of 10 mio.FCFA, assume interest rate of 5%. Source:Foley,G.et.al.1997.
Forest inventory cost: assume one inventory per 5 years in order to establish a realistic quota. Based on Segue forest inventory. Source:Diabate,pers.comm.; CARE, 1998.
Management cost of the market (salary of the market manager): 6% of turnover.Source:Foley,G.et.al.,1997.
Monitoring and policing: cost equivalent to fines, estimated at 100,000FCFA for village and 100,000FCFA to individuals, each year. Based on Kerkhof,P.1998c.
Forest registration in Kordofan: cost estimates based on survey cost, Survey Department (and not the lower rates of FNC), plus 10% transport cost, plus 200S£ registration fees/feddan.

Low cost model: see data in table 2, main text.