

Niger Responses to EPSA Study Questions

November 2007

**Study Coordinated by the CRAC-GRN and more specifically by
Gill Vogt
Kees Vogt
Amadou Bachir**

Contents

Methodology Used	3
I. The importance of ecosystem services to the poor	3
1.1 What ecosystem services (e.g., pasture) are important for livelihood activities (e.g., goat breeding)?	4
1.2 What livelihood activities are most important to the poorest stakeholders?.....	6
1.3 How does the position of poor stakeholders vary among agro-ecological zones and land use systems?	7
1.4 How does lack of access to ecosystem services make people poor?	9
1.5 How does being poor affect access to ecosystem services?	10
1.6 How do ecosystem services help poor people support themselves in times of crisis?	10
2. Trends in ecosystem services and drivers of change	11
2.1 What trends have you observed in the productivity of ecosystem services over the past 20 years?.....	11
2.2 What do you think has driven these changes?.....	14
2.3 What impacts on poverty have been experienced or are anticipated?.....	15
2.4 What will determine whether the ecosystem can continue to provide these services?	16
3 The valuation of ecosystem services	17
3.1 How are ecosystem services valued by stakeholders, in monetary or non-monetary terms?	17
3.2 What are the trade-offs (échanges) when ecosystems are exploited (give examples, e.g., transformation from woodland to cultivation)?	18
3.3 What are the trade-offs (échanges) when ecosystems are protected by the state?	18
3.4 How do poor stakeholders adapt individually to changes in ecosystem services?	19
3.5 How do communities adapt to changes in ecosystem services?.....	20
4 Management strategies	20
4.1 What management strategies can help maintain ecosystem services?	20
4.2 What incentives or disincentives influence poor peoples' investments in sustainable ecosystem services?	21
4.3 What policies, institutions, programmes or projects lead to ecosystem services benefiting the poor? What do they have in common?	22
4.4 How can local adaptations (=the use of local knowledge, action research, stakeholder participation) sustain ecosystems and reduce poverty?.....	23
4.5 How can local communities be empowered to manage their ecosystem services sustainably and equitably?	24
5. Knowledge and capacity needs for sustainable management of ecosystems	24
5.1 What are the knowledge needs perceived by different stakeholders?	24
5.2 What are capacity needs perceived by different stakeholders?	25
5.3 What are the institutional knowledge and information needs?	26
5.4 What are the benefits and the shortcomings of existing and new practices? ..	26
5.5 What are the research needs?	27
5.6 What can be done to maximise the impact of scientific research on the policy and practice of NRM?	27

Methodology Used

The EPSA Study was primarily carried out as part of a process of the capitalisation of experiences from:

- 5 different common property sylvo-pastoral sites under collective stakeholder management (Takiéta, Moa, Mairemi, Mai Salka and Kupkup) Total about 250 people Consisting mainly of :
 - Grassroots level stakeholders from villages and pastoral groups
 - Traditional authorities
 - Communal authorities
 - Grass roots level Technical services
- 5 Cadres de Concertation Départementaux (Gouré, Matamaye, Magaria, Mirriah, Tanout) consisting mainly of .
 - Department Level Technical services
 - Communal authorities
 - Traditional authorities
 - Local NGO's

The study was able to profit from a number of different multi-stakeholder workshops carried out from September to December of 2007 by the PAGCRSP (Projet d'Appui à la Gestion Concertée des Ressources Sylvo-pastoral) and ERP II (Extended Response Programme).

The EPSA study was able to benefit to pose its various questions during the course of the various workshops and financial contributions were therefore kept to a minimum.

The methodology used was opportunistic, asking questions wherever possible at the different workshops and noting them down. An automatic system of triangulation was thereafter used when the three consultants sat together to fill in the questionnaire for the Ecosystems study using their notes. In this way we were able to agree on ideas before noting them.

Extensive use was also made of PAGCRSP and CRAC-GRN internal documentation and a number of thematic articles on different aspects of collective management produced by the latter.

KEY QUESTIONS ECOSYSTEMS STUDY - Niger

- 1. The importance of ecosystem services to the poor***
- 2. Trends in ecosystem services and drivers of change***
- 3. The valuation of ecosystem services***
- 4. Management strategies***
- 5. Knowledge and capacity needs for sustainable management of ecosystems***

I. The importance of ecosystem services to the poor

1.1 What ecosystem services (e.g., pasture) are important for livelihood activities (e.g., goat breeding)?

Ecosystem services	Livelihood activity
<p>Water Water for human and livestock use. In Niger this primarily consists of :</p> <p><i>Surface water</i></p> <ul style="list-style-type: none"> ○ <i>The River Niger</i> ○ <i>Permanent/Semi permanent lakes</i> ○ <i>Small Dams</i> <p><i>Subsurface Water accessed through</i></p> <ul style="list-style-type: none"> ○ <i>Wells (Traditional or modern)</i> ○ <i>Boreholes (handpumps, pumping stations)</i> 	<p>Collection and sale of water (rural and urban) Watering of livestock Small scale Traditional Irrigation Sale of water from the source</p>
<p>Agriculture <i>This consists primarily of :</i></p> <ul style="list-style-type: none"> • <i>Subsistence rainfed</i> • <i>Traditional Irrigation</i> • <i>Limited tendency to Ranching/Agriculture for the richer</i> <p><i>Important aspects are:</i></p> <ul style="list-style-type: none"> • <i>Access to land</i> • <i>Land tenure security</i> • <i>Soil fertility</i> • <i>Field trees</i> 	<p>Subsistence farming Production of crops for commercialisation Increasingly collection of residues from fields for sale or for home consumption</p>
<p>Pasture</p> <ul style="list-style-type: none"> ○ <u><i>Non agricultural space</i></u> (refuge from areas of cultivation, resting points for livestock on transhumance); ○ <u><i>Pasture (grazing and browse) and Hay</i></u> for sedentary and pastoral livestock; ○ <u><i>Security of production systems:</i></u> Existence of and access to these services permits the seasonal transhumance/pastoral exploitation of rich but ephemeral pastoral resources further north, which constitute the foundation of the pastoral system. ○ <u><i>Pasture products form the fields:</i></u> i.e crop residues 	<p>Pastoral Livestock production Sedentary Livestock production Sale of Hay</p>
<p>Wood:</p> <ul style="list-style-type: none"> ○ Wood fuel (rural and urban) ○ Simple construction materials (rural and urban) ○ Wood for craftspeople (rural) 	<p>Woodcutting Wood transporting Fuel wood markets Sale of construction materials Craftwork</p>
<p>Wild plant and animal products</p> <ul style="list-style-type: none"> ○ Fish 	<p>Fishing (small scale and limited to certain</p>

Ecosystem services	Livelihood activity
<ul style="list-style-type: none"> ○ Natural Medicinal plants ○ Wild plant food supplements (<i>Cassia tora</i> and '<i>Mulukhia : Corochorus spp</i>') ○ Famine/dry season food source (<i>Boscia senegalensis</i>); ○ Bees; ○ Wild animals: Hunting (small sale); 	<p>zones with surface water)</p> <p>Processing and commercialisation of fish</p> <p>Production and sale of traditional medicines</p> <p>Traditional treatment</p> <p>Collection/processing/marketing of wild plant and animal food supplements</p> <p>Collection of Famine Foods</p> <p>Bee keeping</p> <p>Honey/Wax commercialisation</p>
<p>Social relations</p> <ul style="list-style-type: none"> • Having a viable Action space where people can viably function • Use on non monetary services 	<p>Interdependence between different systems of production;</p> <ul style="list-style-type: none"> ○ Exchange of products between systems (Cereals, milk....) ○ Manure contracts (especially n the past) ○ Herding contracts e.g. pastoralists herding sedentary peoples livestock <p>Social Communication e.g “lodgers”</p> <p>Conflict management/reduction (both formal and informal)</p>
<p>Cultural Diversity</p> <p>Diversity of distinct ethnic groups sharing the use of the area in a number of different ways;</p> <ul style="list-style-type: none"> ○ Nomadic pastoral groups/communities (Peuhl Woodabé); ○ Transhumant pastoral groups (Peuhl Ouda); ○ Sedentary Agro-pastoralists with fields and mobile livestock (Peuhl, Touareg); ○ Agriculturalists with sedentary livestock (Haoussa, Kanori) 	
<p>Knowledge Systems</p> <ul style="list-style-type: none"> ○ Pastoral livestock production and traditional systems of pasture management; ○ Hunting and wildlife systems; ○ Botanical knowledge for drylands survival (drought foods) and traditional medicine 	

Note : All these services are vital for human well being in terms of their contribution to primary production systems/livelihoods, nutrition, economic buffers (diversification) and the reduction of conflicts between diverse user groups occupying the same space and competing for the same resources.

1.2 What livelihood activities are most important to the poorest stakeholders?

Before answering this question we have defined poor in terms of vulnerability/lack of resilience to cope with abrupt changes/events

<i>Livelihood activities</i>	<i>Why important to poor stakeholders?</i>
Subsistence Farming	Rainfed agriculture is the principal activity of most rural people in the agricultural and agropastoral zones. This activity allows families to feed themselves as well as sell excess produce for other daily necessities. Irrigated agriculture is also important but is often an activity for the richer people who can afford to own/control the irrigable land or pay people to carry out the work or them
Pastoral Livestock production	It's the way of life of pastoral people and all their cultural values are attached to that. Pastoralists who lose their animals or fall below the "viability threshold" fall out of the system and risk losing their cultural identity.
Woodcutting	People typically fall back on this activity in the dry season when cash is short. Originally this activity was culturally regarded as a poor mans safety net. However this taboo is becoming increasingly less stigmatising throughout Niger.
Sedentary Livestock production	It a way of diversifying economic activities for risk spreading. Certain livestock types are more resilient such as goats and they can basically look after themselves (not demanding in terms of input and fast in regenerating). However people prefer the larger livestock if at all possible even if the risk is higher: reasons for this are utility (Oxen) as well as status.
Domestic Commercialisation	It's a way of adding income to the families. Most domestic commercialisation consists of women transforming field products into edible foods e.g production of beignets from beans. It's interesting to note that in certain studies we made consisting this women actually don't make that much money with this activity (they break even). However, socially it's an important activity.
Casual Labour	It's a way of making ends meet. If it's possible working in ones home area people always do
Sale of Hay	As with woodcutting people fall back on this activity in the dry season when cash is short. It's a relatively new activity which is rapidly expanding due to increasing sedentary livestock numbers and demand form urban areas.
Collection and sale of water (rural and urban)	When no other resources are available people can

<i>Livelihood activities</i>	<i>Why important to poor stakeholders?</i>
	use their manpower to earn some money
Collection/processing/marketing of wild plant and animal food supplements and or Famine Foods	This is an extremely important traditional buffer mechanism for getting through the lean periods and moments of major food deficit. It serves directly for the family as a food/vitamin supplement and may also be commercialised
Herding contracts	While this has been a practice for some time. Nowadays, with increasing “sedentary” livestock numbers and pastoralists without viable herds. Strategies of commercial herding of sedentary owned animals by salaried pastoral herders is increasingly prominent.
Seasonal Work outside the area	People have traditionally left to find additional work in the “conjuncture period” (period from Jan-May) when there is no agriculture taking place. However there seems to be an increasing tendency of more people leaving and for longer periods of time even during the agricultural season as fields get smaller and there are more people around.

1.3 How does the position of poor stakeholders vary among agro-ecological zones and land use systems?

Principal Stakeholders are

- Pastoralists
- Agriculturalists
- Agropastoralists
- Mixed Agricultural Livestock production

Within these major stakeholder groups there are socio economic variations and consequently the poor/vulnerable are present in all these categories

<i>Category of poor stakeholders</i>	<i>Agro Ecological Zone</i>		
	<i>Pastoral</i>	<i>Agro-pastoral</i>	<i>Agricultural</i>
Poor pastoralists	<p>Can more or less get by as :</p> <ul style="list-style-type: none"> ○ pastoral social support systems exist ○ Resources are common property and consequently open to all 	<p>The situation is more difficult since :</p> <ul style="list-style-type: none"> ○ Resources are more scarce and liable to have access problems (physical barriers, paying or negotiating for them) ○ Due to conversion into fields the resources are 	<p>The situation is most difficult as:</p> <ul style="list-style-type: none"> ○ Pastoral resources are very few and competition for these resources is greater (and increasing yearly) because of sedentary livestock ○ Any few remaining resources are

	<i>Agro Ecological Zone</i>		
<i>Category of poor stakeholders</i>	<i>Pastoral</i>	<i>Agro-pastoral</i>	<i>Agricultural</i>
		dwindling on a yearly basis	<p>under great pressure for conversion to fields</p> <ul style="list-style-type: none"> ○ Any crop residues are increasingly conserved for private use or sale ○ Arrangements which used to exist such “manure contracts” are increasingly rare although according to some they are on the way back e.g Magaria (Strategic placing of wells on private land) as people want to increase pastoralists back on their fields
<i>Poor Agriculturalists</i>	<p>Circumstances increasingly push this group to try to cultivate in the best parts of these already marginal areas which brings them in direct conflict with other pastoral users over these strategic areas. The chances of reasonable production are very limited.</p> <p>NB. This group may be encouraged as part of the strategy of advancing the agricultural front. Some pastoralists also feel the necessity of being a part of this</p>	<p>Still some chance of borrowing a field under some sort of arrangement but it's becoming increasingly difficult</p>	<p>No space left. Fields are getting smaller and smaller forcing out-migration. Chances of waged labour are very slim. Many poor agriculturalists are forced to sell their fields</p>

<i>Category of poor stakeholders</i>	<i>Agro Ecological Zone</i>		
	<i>Pastoral</i>	<i>Agro-pastoral</i>	<i>Agricultural</i>
	game.		
<i>Poor Agro-pastoralists</i>	From a pastoral background and therefore able to exploit these resources seasonally (know how and contacts)	Very often found in this zone. Position is better than other groups as they have the possibility of diversifying activities and therefore spreading risks	The same applies as for the poor pastoralists and agriculturalists
<i>Poor Mixed Agricultural Livestock production</i>	Not really viable don't have the knowledge contacts or means		

1.4 How does lack of access to ecosystem services make people poor?

ACCESS TO PRODUCTIVE/FERTILE LAND ??? as an ecosystem service.....

<i>Ecosystem services</i>	<i>Effect of lack of access on poverty</i>
<i>Water</i>	<ul style="list-style-type: none"> • Limits the possibilities for livelihood activities; • May mean having to pay for access; • If far away, may have to pay to get it or spend time looking for it (opportunity cost)
<i>Agricultural land</i>	<ul style="list-style-type: none"> • Lack of access to agricultural land means that agriculturalists are forced to out-migrate or sell themselves as labour to others. • No access to land reduces a persons possibility to diversify into other production systems which therefore reduces his/her security • People become increasingly more dependant on working for others so they tend to lose their autonomy
<i>Non agricultural Space/refuge</i>	<ul style="list-style-type: none"> • Causes chronic breakdown in certain production systems and livelihoods, such as livestock production • Increased competition/conflict and less security
<i>Pasture/Browse</i>	<ul style="list-style-type: none"> • Limits the possibilities of exercising livestock production
<i>Wood</i>	<ul style="list-style-type: none"> • Need fuel wood / construction wood. If they don't have access then they will need to buy it or take the risks of getting hold of it illegally.
<i>Wild plants</i>	<ul style="list-style-type: none"> • Wild plants have an important role to play in nutritional balance, income generation and drought survival. Without access to them people's way of life is seriously compromised, particularly at specific times such as the lean period at the end of the dry season through to the

	new harvest. Access to modern health care is very limited especially to poor people as it is a paying service. People therefore rely heavily on traditional medicine based on the use of wild plants .
<i>Other</i>	

1.5 How does being poor affect access to ecosystem services?

Ecosystem services	Effect of poverty on access
<i>Water</i>	<ul style="list-style-type: none"> • If you don't have money then you won't be able to pay for it and/or most of your resources are used for obtaining this resource. This leaves you poorer the ever. • If you're poor you have less negotiating power for gaining access to water. This is especially access to water for livestock where the powerful will have easier access
<i>Agricultural land</i>	<ul style="list-style-type: none"> • If you are poor then it's more difficult to secure access to the land either through buying or other borrowing/renting arrangements
<i>Non agricultural Space/refuge</i>	<ul style="list-style-type: none"> • If the resource is really 'open access' then that's Ok but when there are access conditions (including' taxes') then things will be more complicated when one is poor;' However as said above getting hold of the water is often the problem which then tends to be the limiting factor
<i>Pasture/Browse</i>	<ul style="list-style-type: none"> • If the resource is really 'open access' then that's Ok but when there are access conditions (including' taxes') then things will be more complicated when one is poor;' However as said above getting hold of the water is often the problem which then tends to be the limiting factor
<i>Wood</i>	<ul style="list-style-type: none"> • Effect on the number and type of meals produced • Type of shelter built, • Greater tendency to risk illegally accessing resources and paying the consequences (fines, imprisonment...)
<i>Wild plants</i>	<ul style="list-style-type: none"> • Reduced buffering effect against change. Therefore reduced resilience and greater vulnerability.
<i>Other</i>	

1.6 How do ecosystem services help poor people support themselves in times of crisis?

From the moment that livelihoods are based on the primary exploitation of natural resources/ecosystems services (as in Niger), the relative availability of these services at any given time will have an important/crucial impact on how people are able to support themselves in moments of crisis. People are dependant on these resources/services for their basic needs. What's important here as well is maintaining the of Biodiversity of resources as this will ultimately reduce risk.

Ecosystem services	Forms of support
<i>All above mentioned services</i>	<ul style="list-style-type: none"> • Income generation (collection and transformation for sale),

<i>Ecosystem services</i>	<i>Forms of support</i>
	<ul style="list-style-type: none"> • Direct consumption (food supplements, food), • Product substitution (use of second preference species etc) • Risk spreading;

2. Trends in ecosystem services and drivers of change

What is important to note here is that adaptability is a way of life for all the different groups of people we talked with. They talked about this with:

- Dealing with situations as a way of life
- Seeing what will happen
- It's the will of Allah
- etc

People have been managing variability as a way of life and the observations taken in the following sections should take this into account.

2.1 What trends have you observed in the productivity of ecosystem services over the past 20 years?

<i>Key ecosystem services</i>	<i>Trends + or -</i>	<i>Variability + or -</i>
<i>Non Agricultural Space</i>	Negative: Progressive loss of common property sylvo-pastoral resources (pasture areas) and access to them due to agricultural expansion northwards towards the pastoral zone and the effective 'privatisation' of the space. This has and is leading to increased conflict between agricultural and pastoral production systems and communities as well as within the agricultural communities, who also increasingly keep livestock and need somewhere to put them particularly during the cultivation season but who are also locked into a race with one another to be at the front line of the agricultural advance.	Progressive and consistent negative trend
<i>Agricultural Land</i>	Negative: In the Agropastoral Zone...People are moving into increasingly marginal areas where low input practices often lead to reduced soil fertility and the need to clear new land In the Agricultural Zone... <ul style="list-style-type: none"> • Extension is no longer feasible and people have been forced to adopt more 	Progressive and consistent negative trend

Key ecosystem services	Trends + or -	Variability + or -
	<p>intensive practices in order to maintain soil fertility and production.</p> <ul style="list-style-type: none"> • Field are getting smaller and smaller as collective family plots are split up into individual family units which are no longer viable. This obliges people diversify locally or search for work elsewhere • Complementary arrangements (manure contracts) that used to exist between agriculturalists and pastoralists have largely broken down but there seems to be an emerging tendency towards the revival (by necessity: loss of soil fertility) of this practice <p><u>Positive:</u> There now seems to be tendency for people to try and intensify production and look for other opportunities/new ideas. This “window of opportunity” could potentially used by the government/others to allow development of new ideas (species, cropping mixes, methods)</p>	Potentially positive
<i>Pasture</i>	<p>(See above)</p> <p><u>Negative:</u> Once under cultivation, annual pasture is lost during the rainy season but during the dry season the land is by law open again for grazing for all livestock. This crop stubble, which was originally left in the fields for dry season grazing, is now increasingly gathered for exclusive use by sedentary livestock owners and/or sale on the market. Remaining grasses are few and increasingly likely to be conserved as hay by the settled population. This means even where space exists, the quantity and often quality of grazing left is much reduced. Browse perennial pasture also suffers in the same way when put under agriculture. Smaller bushes and shrubs are completely eliminated. Trees may be cut out completely or selectively retained. The species retained may be good browse but cover tends to be sparse and access to leaves and fodder-fruits is not guaranteed especially for outsiders (pastoralists).</p> <p><u>Positive:</u> Legislation is allowing for agriculturalists to keep field trees on their fields. This is increasing the diversity of agricultural fields</p>	<p>Progressive and consistent negative trend with inter-annual variation. Progressive trend towards exclusion of outside user groups</p> <p>Greater variability in fields</p>
<i>Wood</i>	<p><u>Both Positive and Negative:</u> Wood from natural forests is the main source of local building material and fuel wood in the rural and urban areas alike. However there is an increasing tendency towards use of field trees. The increasing tendency towards urbanisation and lack of accessible energy substitutes means that demands on already</p>	Progressive change from use of natural forest to increased use of field trees;

<i>Key ecosystem services</i>	<i>Trends + or -</i>	<i>Variability + or -</i>
	<p>sparse and fragile natural forest are enormous leading to deforestation and greater difficulties in satisfying urban fuel wood demands either in terms of cost or availability. Rural households are increasingly forced to use crop residues and cow dung as a fuel source; elements which are also coveted for their financial or soil fertility benefits.</p> <p>Wood is also required for construction and craft purposes but large trees for construction and crafts are far fewer than before and the overall trend is for a decrease in availability (quantity & quality) through overuse and importation into the area from elsewhere with associated costs.</p>	
<i>Hunting</i>	<p>Negative Historically rich in wildlife, the area has seen the decimation of all but the most resilient species (rabbits/hares) due to uncontrolled hunting practices. ‘Hunting’ still takes place today (it’s a tradition in the area) but on a very limited scale (rabbits and guinea fowls etc) and almost entirely on recreational basis though providing a useful food protein supplement. Given that everything is more or less ‘hunted out’ income generating through this activity is no longer an option.</p> <p>Positive: Some smaller managed common areas in Zinder region (Takieta, Moa, Mai Salka, Kupkup) are showing a return of wildlife (rabbits, guinea fowl, monkeys) after 5-6 of management. Careful thought is required on the rational management of these species in the future.</p>	<p>Progressive and consistent negative trend</p> <p>Possibly positive</p>
<i>Famine/Food supplements</i>	<p>Negative: These are still often selectively retained in fields but the tendency is moving towards their disappearance along with the conversion of common lands into fields. They are however still an extremely important nutritional source for the rural population even in ‘normal’ years, particularly in the more vulnerable households. Leaves and fruit collection are important but access to drought food species is essential on an annual basis for poorer families particularly during the later part of the dry season. Their disappearance leads to greater vulnerability</p>	<p>Progressive and consistent negative trend</p>
<i>Wild plants/Traditional Medicine</i>	<p>Negative: A strong role is still played by traditional healers and their products. This is particularly so in the rural areas where health services are in reality not very accessible (either cost or distance). However, even the educated urban elite often still give first choice to the use of traditional products. The loss of open forest</p>	<p>Progressive and consistent negative trend</p>

<i>Key ecosystem services</i>	<i>Trends + or -</i>	<i>Variability + or -</i>
	land and the general reduction of the diversity of plants through their utilisation have obvious effects on product availability leading to an increasingly wider search. There is therefore a reported loss of a number of valued species from the area (now need to go to Nigeria). Its agreed between traditional healers that an internal control of acceptable practices within organised associations is required for a more sustainable use of useful species.	
<i>Bee-keeping</i>	Positive and Negative Trends: Apiculture has been long practiced in the area according to traditional systems of production which still apply today. It's regarded as specialist activity though younger less 'professional' keepers don't always apply the more ecologically appropriate techniques. It has a good income generation potential and high market demand as a food supplement. Disappearing natural forest cover and changing species have had a negative impact on the production system/service as does the availability of water sources. More appropriate technology at all levels can lead to positive trends	Specialised activity more linked to commercial opportunities than climatic factors.
<i>Fishing</i>	Positive and Negative Trends: There are few large permanent surface water sources and no rivers in the whole region. Nevertheless, in the last 20 years there has been an increase in the number of semi-permanent lakes (very occasionally permanent). These are increasingly stocked with fingerlings with the help of the forest department or though private initiative. The lakes are most often exploited directly and sold to locals by migrant fishers from outside the area as local fishers are for the moment few and far between.	Specialised activity depending on natural surface water availability and therefore sensitive to climatic variations.

2.2 What do you think has driven these changes?

<i>Trend</i>	<i>Drivers 1</i>	<i>2</i>	<i>3</i>
Loss of CPR to agricultural Expansion in all areas	Population increase	Low investment agriculture	Government policies which are more positive to agriculture than pastoralism
Agricultural Expansion into marginal areas	Population increases and greater demand for land for cultivation	Effect of low investment agriculture on soil fertility;	Government policies as above "Sedentarisation" of pastoralists;

Intensification of Agriculture	Lack of land	Lack of other options	Intensive = greater investment of time and effort. When push comes to shove people are forced to invest
Reduction in quantity and Quality of pasture	Population increase	Increase in sedentary livestock production;	Wet season grazing pressure leads to selective eating of the best species
Commercialisation of Hay	Economic need	Greater demand from built up centres	
Decreasing availability of woody products	Population increase	Loss of natural forest	
Changing source of woody products	Loss of natural forest	Relative land tenure security encourages investment in fields	
Decreased availability of famine foods/traditional plants	Population increase leading to increased exploitation	Increased Poverty leading to greater pressure on 'free' resources	Commercialisation of locally collected famine foods (eg <i>Boscia senegalensis</i>)

2.3 What impacts on poverty have been experienced or are anticipated?

	Impact on poverty/equity	
Key ecosystem service changes	1	2
Loss of Common Property Resources to agricultural Expansion	<i>Breakdown of pastoral livelihoods production systems due to reduced mobility</i>	<i>Greater vulnerability of stakeholders due to higher risk agriculture(marginal zones) and reduced mobility</i>
Agricultural Expansion into marginal areas	<i>Risks of crop failure and low production are significantly increased</i>	
Intensification of Agriculture	<i>External inputs are needed on an annual basis.</i>	<i>If you are too poor to own your own field your are less likely to want invest (manure) in the resource as it takes time to feel the benefits</i>
Reduction in quantity and quality of pasture	<i>Reduced productivity of system leading to greater vulnerability</i>	<i>Greater competition over remaining resources</i>
Commercialisation of Hay	<i>Short term economic</i>	<i>Reduced access to</i>

Key ecosystem service changes	Impact on poverty/equity	
	1	2
	<i>buffer for seller</i>	<i>basic resources for the most vulnerable</i>
Decreasing availability of woody products	<i>Substitution with other (inferior) products Higher cost of living.</i>	<i>Certain communes (e.g Kantché) have tried to alleviate this problem through the subsidised/priority selling of planted state owned trees (wayside trees/state plantations) to the different sectors of the town populations</i>
Changing source of woody products	<i>Reduced access to woody resources by landless people</i>	<i>Forced to change lifestyle patterns and use other products</i>
Decreased availability of famine foods/traditional plants	<i>Reduced resilience to variation in production systems</i>	

2.4 What will determine whether the ecosystem can continue to provide these services?

Factor	At subregional scale	At AEZ scale	At local scale
Legislative environment	Inclusive, multi-sector legislative processes; Country engagement to sub-regional policies; Appropriate legislation relevant to context; Effective mechanisms for applying appropriate legislation Policies insist on equity, rational exploitation and decentralised decision-making;	Appropriate legislation relevant to context; Effective mechanisms for applying appropriate legislation	Appropriate legislation relevant to context; Effective mechanisms for applying appropriate legislation
Decision-making capacity	Availability of capacity building support; Principles of subsidiarity applied	Availability of capacity building support; Principles of subsidiarity applied	Availability of capacity building support; Principles of subsidiarity applied
Permanent, Functional multi-sectorial 2 way	Functional institutions; Constant (vertical	Functional institutions; Constant (vertical	Functional institutions; Constant (vertical

Factor	At subregional scale	At AEZ scale	At local scale
Information and Communication systems	and horizontal) dialogue and information sharing between all 'stakeholder institutions' Flexibility and feedback mechanisms to allow timely adaptation;	and horizontal) dialogue and information sharing between all 'stakeholder institutions' Flexibility and feedback mechanisms to allow timely adaptation;	and horizontal) dialogue and information sharing between all 'stakeholder institutions' Flexibility and feedback mechanisms to allow timely adaptation;

3 The valuation of ecosystem services

3.1 How are ecosystem services valued by stakeholders, in monetary or non-monetary terms?

Provisioning services	Indicators of value	
<i>Water</i>	Opportunity Cost: water permits habitation and exploitation of an area. It determines the type of activities that can take place and the scale.	Water has a monetary value at all levels either as an input into a production system or for domestic use
<i>Non Agricultural Space</i>	The existence and security of tenure of these common areas is of prime importance to both sedentary and pastoral populations	The fact that these CPR areas exist reduces the likelihood of conflict. They are valued as conflict reducing mechanisms
<i>Agriculture</i>	Meets subsistence needs	Land is bought and sold
<i>Wood</i>	Seen as a standing bank in fields and as a standing illegal bank in unmanaged CPR areas	Bought and sold
<i>Wild Plants/Animals</i>	Adds variety to the diet Wild plants are an essential element for famine coping strategies Medicinal plants are used for auto-treatments and also by professionals	Products bought and sold
<i>Pasture/Browse</i>	Quality (species composition and diversity)	Access to and availability
Cultural services		
<i>Social Relations</i>	Level of dialogue and social interaction between different	

	ethnic/production system groups	
Supporting services		
<i>Conflict Management</i>	Social Peace and stability	

3.2 What are the trade-offs (échanges) when ecosystems are exploited (give examples, e.g., transformation from woodland to cultivation)?

Note : In the Sahelian context we are assuming that it's difficult to say when a woodland becomes a pastoral resource. The two activities can run concurrently

Form of exploitation	Gains	Losses
<i>Pastoral to Agricultural</i>	Crop/food production	Pasture Species diversity Mainly Pastoral livelihoods Sedentary risk spreading Non agricultural Space
<i>Agricultural to Agro-sylvicultural</i>	Species diversity Soil protection (water & wind) Overall greater productivity Wood and fruits Greater autonomy with own products	Crop Shade Birds roosting Attraction of outsiders
<i>Woodland/Pastoral to Agriculture</i>	Crop/food production	Woody and non woody forest products & biomass Wildlife Habitat Species diversity Pasture Pastoral and other livelihoods Sedentary risk spreading Non agricultural Space

3.3 What are the trade-offs (échanges) when ecosystems are protected by the state?

Form of protection	Gains	Losses
<i>Legal Protection</i>	Right to pursue law breakers Can be very positive if it is regarded as being locally legitimate People will invest more if their private and CPA resources	Often associated with loss of local control and user rights

Form of protection	Gains	Losses
	are legally protected by the state	
<i>Physical protection</i>	Local employment (guards)	Huge cost Associated with repression and exclusion
<i>State recognised local governance</i>	Close and therefore potentially more effective especially if legitimate	Being too close might lead to temptation to exclude other non resident user groups

3.4 How do poor stakeholders adapt individually to changes in ecosystem services?

For poverty impact see section 2.3

Key changes	Poverty impact	Livelihood adaptations
Loss of CPR to Agricultural Expansion	Breakdown of pastoral livelihoods production systems due to reduced mobility Greater vulnerability due to higher risk agriculture(marginal zones) and reduced mobility	Pastoralists are forced to sedentarise and find other work Agriculturalists need to accept the risk of more erratic crop production
Agricultural Expansion into marginal areas	Risks of crop failure and low production are significantly increased	Agriculturalists need to accept the risk of more erratic crop production and try to diversify into other things in order to reduce risk
Intensification of Agriculture	If you are too poor to own your own field you are less likely to want invest (manure) in the resource as it takes time to feel the benefits External inputs are needed on an annual basis.	You do your best to invest or accept reduced crop production. You also tend to diversify into other things
Reduction in quantity and quality of pasture	Greater competition over remaining resources Reduced productivity of system leading to greater vulnerability	Don't stay as long if you have the possibility of moving on A possibility could be ... Come up with local user conventions or improved use of pasture
Commercialisation of Hay	Reduced access to basic resources for the most vulnerable Short term economic buffer for seller	This is a livelihood adaptation If hay is removed there is a reduced quantity and quality of standing pasture. Therefore livestock keepers: <ul style="list-style-type: none"> • Don't stay as long if you have the possibility of moving on • Come up with local user conventions or improved use of pasture???
Decreasing availability	Higher cost of living	Use second choice materials

Key changes	Poverty impact	Livelihood adaptations
of woody products	Substitution with other (inferior) products	Look for substitutes Cook less Use more of your budget for wood Look for wood illegally Benefit from commune subsidised sale
Changing source of woody products	Landowners can profit from woody products from their fields. However for landless people there is a net reduction of access to resources	Landowners can increase investment in the biodiversity in their own fields through improved natural regeneration and clearance techniques
Decreased availability of famine foods/traditional plants	Reduced resilience to variation in production systems	"Famine foods" are becoming a standard part of the diet as people seek to harvest the foods/plants earlier and earlier. There are also tendencies of people to start selectively seeding these wild plants into their fields e.g Corochorus species

3.5 How do communities adapt to changes in ecosystem services?

- Unless a community is particularly cohesive people will always tend to act as individuals.
- Community action in the face of ecosystem service change often takes the form of local conventions or agreements concerning rights of access or modalities of access e.g temporary ponds
- Unfortunately the extended African family with its associated support systems is tending to disappear where more and more people feel the need to tend for themselves. It's still very much there but it is weakening. This progressive weakening of the African extended family has been mainly put down to the effects of chronic poverty where the heads of households no longer have the means to keep such systems in place and where migration to towns has also helped to weaken this.

<i>Key changes</i>	<i>Poverty impact</i>	<i>Community adaptations</i>
N/A		

4 Management strategies

4.1 What management strategies can help maintain ecosystem services?

Management strategies	Impact on poverty (e.g., on assets, incomes, security of access)
Agricultural intensification using appropriate local inputs (manure), cultivation techniques and practices (field trees), new species and crop associations.	Improving food availability and income, decreasing risk and improving buffer effect, improving the diversity of 'products' available from the space.
Active Pasture Management: improvement through user group consensus: selective weeding of bad species and reseedling of good species; set aside, management decisions etc	Improving the productivity of the resource (quantity and quality) over time; impact on production systems and therefore livelihoods; improved security of access to pastoral resources and other associated products/services;
Promotion of good governance in local management of common property natural resources based on equity, dialogue and the valorisation of local knowledge and techniques.	Improved production and security of access by all groups including the most vulnerable.
Integrated management techniques which seek to maximise the productivity and complementarities that exist/could exist between different production systems.	Security of access to multiple products with potential for improved livelihoods, nutrition and reinforced buffers against incertitude.
Accepting the principles of flexible and adaptive management of natural resources;	Impact on incomes and production security: Enabling timely decision-making so as to modify plans and practices and take advantage of opportunities.
Ensuring/opening up communication systems between different user groups to help trade between them and better use of existing systems e.g pastoralists and agriculturalists in agricultural areas	Reduction of risk for the different stakeholders

4.2 What incentives or disincentives influence poor peoples' investments in sustainable ecosystem services?

Incentives/disincentives	Impact on investment decisions	
	Positive	Negative
The level of perceived control over the resource;	The greater the sense of control, the greater the incentive to invest in the resources and their sustainable management as there is greater likelihood of benefiting from the results of that investment.	If there is no sense of control, there is less security and less likelihood of investing
Security of access/land tenure to both private and common property resources;	Having sure/guaranteed access promotes investment in the resource	No security of access means no likelihood of investing
Access to information concerning the long term stakes;	Better appreciation of risks. If people have an understanding of the consequences of what they	Lack of information means uninformed decisions

	<i>Impact on investment decisions</i>	
<i>Incentives/disincentives</i>	<i>Positive</i>	<i>Negative</i>
	doing then they can modify their practices to make best decisions.	
Access to information concerning appropriate techniques for investment	Better appreciation of opportunities and potential possibilities	Lack of information leads to uninformed decisions
Access to appropriate credit opportunities	Capacity to invest to a greater degree in order to reap greater benefits	There are risks involved when receiving credit. People can easily be caught in a debt cycle
Favourable legislative environment (ref: equity, land tenure)	If the law recognises equity and land tenure security this further reinforces security of access	
Taxation	Ensure positive taxation	If too much taxation is made on products (wood, plant products, commercialised items) then this will reduce people's willingness to want to invest in their resource. This is seen as a real danger where taxation of anything seems to be the in thing.
Pressure on the resources in question (competition)		If there is high pressure on a given resource from many user groups then poorer/marginalised people will be less likely attracted to invest in the resource

4.3 What policies, institutions, programmes or projects lead to ecosystem services benefiting the poor? What do they have in common?

<i>Examples of interventions</i>	<i>Benefits</i>	<i>Common properties</i>
Land tenure policies and the institutions to apply them in close proximity to the field e.g Rural Land Tenure Code and COFOs	They protect the right of the poor through legislation	
Programmes and projects based on the good governance of natural resources.	They benefit the people who participate in the projects/programmes and also show others what good governance should/could be	
Capacity building initiatives	Building up capacity allows people to better represent	

<i>Examples of interventions</i>	<i>Benefits</i>	<i>Common properties</i>
	themselves, have better access to information	
Decentralisation policies	Decentralisation well carried out ensures proper decision making at all levels	
“Soft Projects” The soft projects invest in peoples capacity to invest for themselves	Once peoples capacity has been reinforced to look after themselves one doesn’t to reinvest time and time again	

4.4 How can local adaptations (=the use of local knowledge, action research, stakeholder participation) sustain ecosystems and reduce poverty?

<i>Local adaptations (examples)</i>	<i>Impact on:</i>	
	<i>Ecosystem</i>	<i>Poverty</i>
Local conventions	Agreement on rational use of the resource between (at least) certain users	Reduces risk and consequent vulnerability of the different actors
Dry planting of crops Planting a little at a time Planting in different fields at the same time	Different traditional associations of crops help keep e.g cereals and leguminoseae help keep up the fertility of the soils	Dry planting of crops before the rains etc is not recommended by the agricultural authorities. People nevertheless carryout these activities the whole time as risk spreading exercises. Government authorities need to learn to respect that traditional adaptations are often relevant
Seasonal Transhumance/ Nomadism	This is an age old adaptation which makes best use of the Ecosystem resources never staying too long in any one area. However, for many reasons, as outlined earlier, this is becoming more and more difficult	Reducing poverty risk by making the best use of the resources
Direct Seeding	Low cost improvement to the biodiversity and biomass	Leads to a richer resource base on which livelihoods depend
Dispersing strategies of different assets		This has not really been talked about by people but we thought it worth mentioning as people do try and “share out their animal wealth” to decrease risk and

<i>Local adaptations (examples)</i>	<i>Impact on:</i>	
	<i>Ecosystem</i>	<i>Poverty</i>
		also have many fields in different areas if they can afford this

4.5 How can local communities be empowered to manage their ecosystem services sustainably and equitably?

<i>Empowerment strategies</i>	<i>Impact on ecosystem services</i>
Promote decentralised decision making	Decisions made at a local level according to the local context
Ensure the existence of institutions and mechanisms which will promote decision making at a local level and allow for a vertical as well as horizontal flow of information	More informed decision making at all levels allow for better management
Ensure that adequate legislation exists to allow for community empowerment	By empowering people and making them responsible for their own resources this will lead to more rational/responsible use

5. Knowledge and capacity needs for sustainable management of ecosystems

5. 1 What are the knowledge needs perceived by different stakeholders?

<i>Stakeholder group</i>	<i>Knowledge needs</i>
Agriculturalists	<ul style="list-style-type: none"> • Information on new technical possibilities <ul style="list-style-type: none"> ○ Intensification ○ Crop/Crop and Crop/Tree associations ○ Tree crops • Markets (prices, knowing how to play them) • Giving value to local knowledge and not allowing this to be lost
Pastoralists	<ul style="list-style-type: none"> • Information on their rights • Technical possibilities e.g pasture and livestock improvement • Improved communication to understand pasture dynamics at any point in time • Markets (prices, knowing how to play them)
Other specialised user Groups :	<ul style="list-style-type: none"> • Information on new technical possibilities

Stakeholder group	Knowledge needs
Fishermen, hunters etc	<ul style="list-style-type: none"> • Legislation
Technical Services	<ul style="list-style-type: none"> • Information on new technical possibilities • Legislation • Understanding today's context (climate change, adaptive management, holistic approaches..) • Their new role in a decentralised context
Local Elected Government Representatives	<ul style="list-style-type: none"> • Legislation • Their new role in a decentralised context • Understanding the commune (what it can provide, who lives in it, a common vision for its development..) • Understanding today's context (climate change, adaptive management, holistic approaches..) • How to set up effective two way communication systems in the commune and between communes etc • Understanding the principles of good governance
Local Administration	<ul style="list-style-type: none"> • Legislation • Their new role in a decentralised context • Understanding today's context (climate change, adaptive management, holistic approaches..) • Understanding the principles of good governance
Civil Society Organisations	<ul style="list-style-type: none"> • Legislation • Their mandate, what they can be doing • Their role in a decentralised context • Understanding today's context (climate change, adaptive management, holistic approaches..) • Understanding the principles of good governance
Central Government/Ministries	<ul style="list-style-type: none"> • Legislation • Their new role in a decentralised context • Understanding the principles of good governance • Have a large picture :from the realities of the field to larger political implications • Understanding today's context (climate change, adaptive management, holistic approaches..)
	<ul style="list-style-type: none"> •
	<ul style="list-style-type: none"> •

5.2 What are capacity needs perceived by different stakeholders?

Stakeholder group	Capacity needs
Agriculturalists	<ul style="list-style-type: none"> ○ Organisational/communication to allow them selves to be felt e.g in markets ○ Sustainable Mechanisms for self help ○ Lobbying ○ Promotion of small scale enterprises e.g transformation of products
Pastoralists	<ul style="list-style-type: none"> ○ Organisational/communication to allow them selves to be felt e.g in markets ○ Sustainable Mechanisms for self help ○ Lobbying ○ Promotion of small scale enterprises e.g transformation of products
Other specialised user Groups : Fishermen, hunters etc	<ul style="list-style-type: none"> ○ Organisational/communication to allow them selves to be felt e.g in markets

Stakeholder group	Capacity needs
	<ul style="list-style-type: none"> ○ Sustainable Mechanisms for self help ○ Lobbying ○ Promotion of small scale enterprises e.g transformation of products
Technical Services	<ul style="list-style-type: none"> ○ Improve communication and outreach techniques ○ Create mechanisms for staying up to date with developments ○ Improved internal (horizontal and vertical) communication flow within the services
Local Elected Government Representatives	<ul style="list-style-type: none"> ○ Improve communication and outreach techniques ○ Create mechanisms for staying up to date with developments ○ Improved internal (horizontal and vertical) communication flow within the services
Local Administration	<ul style="list-style-type: none"> ○ Improve communication and outreach techniques ○ Create mechanisms for staying up to date with developments ○ Improved internal (horizontal and vertical) communication flow within the services
Civil Society Organisations	<ul style="list-style-type: none"> ○ Improve communication and outreach techniques ○ Create mechanisms for staying up to date with developments ○ Improved internal (horizontal and vertical) communication flow within the services

5.3 What are the institutional knowledge and information needs?

Institutions	Dissemination	New knowledge	Exchange, etc
N/A			

5.4 What are the benefits and the shortcomings of existing and new practices?

Practice	Benefits	Shortcomings
Technologies		
<i>Small scale affordable drip irrigation</i>	Allows production of vegetable outside of the rainy season Better nutrition for poorer people	Drip kits are not made locally
<i>Basic cultivation equipment</i>	Improved cultivation techniques	Not widely accepted Cost Often require animal traction

Practice	Benefits	Shortcomings
Management		
<i>Gathering of crop residues</i>	Creates market opportunities Feeds domestic livestock	Exposes soils to wind erosion Reduces soils fertility (organic matter and manure through grazing livestock)
<i>Pastoral mobility</i>	Rational exploitation of pastoral resources	Not well understood/accepted as a valid form of exploitation

5.5 What are the research needs?

First of all the general tendency of thought is that research needs to be linked to the ground problems. This has been stressed again and again. There seems to be a feeling that there is no link at all between researchers and problems on the ground!!

Users	Knowledge
All	Information and research on new technical possibilities. However, the research needs to be carried out on the real needs of people and <u>not</u> the imagined needs of researchers
Projects and programmes	Numerous projects have taken place unfortunately most of them come and go leaving very little impact. Research is needed to better understand as to why things work and don't work.

5.6 What can be done to maximise the impact of scientific research on the policy and practice of NRM?

Research theme or topic	Policy or practice
Make scientific research based on field needs	Go to the field and understand what people want. Do not assume to know what needs are. Create/reinforce communication between research and practice Promote participatory action research
New dynamics of pastoral herds: how are they evolving, who do they belong to.	