Land use and livelihood trajectories in SE-Niger:

Wise local coping or vicious adaptation to climatic and demographic pressures

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Road map for the presentation

- Introduktion to the study site
- The explorative lenses
- Data and methods
- Qualitative/quantitative monitoring of perceived land use changes
- Assessing causal relationships and incentives for change
<table>
<thead>
<tr>
<th>Method</th>
<th>Issues explored</th>
<th>Data acquisition time</th>
<th>Temporal window</th>
<th>Data density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite based field reconnaissance</td>
<td>Land resources (no. and location of bas-fonds, cuvettes, dune cultivation)</td>
<td>1992 (June-August)</td>
<td>snapshot</td>
<td>Total coverage of the village territory</td>
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<td>Informal interviews with key informants</td>
<td>Explanation of livelihood strategies; perceptions of change; cuvette wells’ water table</td>
<td>1992 (June-August)</td>
<td>snapshot</td>
<td>1992 (&gt;20)</td>
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<td>2011 (November)</td>
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<td>2011 (6)</td>
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<tr>
<td>Questionnaire survey</td>
<td>Broad range of issues (40 questions): demography, livelihood, resource use, land use</td>
<td>1992 (June-August)</td>
<td>snapshot</td>
<td>41 household heads (total coverage)</td>
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<td>35 interviews with women</td>
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<td>Participant observations</td>
<td>Calibration of information on livelihood, land use, resource use</td>
<td>1992 (June-August)</td>
<td>3 months</td>
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<tr>
<td>Group interview – land use</td>
<td>Detailed recording of intensity and diversity of land use in cuvettes and bas-fonds</td>
<td>1992 (June-August)</td>
<td>2 snapshots</td>
<td>All bas-fonds and cuvettes in the Karagou territory</td>
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<td>2011 (November)</td>
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<tr>
<td>Group interviews – ranking exercise</td>
<td>Shifting importance of main livelihood components</td>
<td>2011 (November)</td>
<td>From 1960 to present day</td>
<td>Two group interviews</td>
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<tr>
<td>Group interviews – timelines</td>
<td>Co-evolution of driving forces and livelihood strategies</td>
<td>2011 (November)</td>
<td>From 1960 to present day</td>
<td>One group interview</td>
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<tr>
<td>Cuvette - Name Manga</td>
<td>Distance Karagou km</td>
<td>1992 Karagou cultivation</td>
<td>1992 Other villages</td>
<td>1992 Natron and salt (a)</td>
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<tr>
<td>Karagou</td>
<td>-</td>
<td>Yes</td>
<td>No</td>
<td>P, sa</td>
</tr>
<tr>
<td>Bal</td>
<td>1.5</td>
<td>Yes</td>
<td>No</td>
<td>P</td>
</tr>
<tr>
<td>Bakon Sada Tingili</td>
<td>1.5</td>
<td>Yes</td>
<td>No</td>
<td>P</td>
</tr>
<tr>
<td>Alhamdra</td>
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<td>No</td>
<td>P</td>
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<tr>
<td>Kajoumba</td>
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<td>No</td>
<td>S, P, sa</td>
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<td>Bulbulj</td>
<td>2</td>
<td>Yes</td>
<td>No</td>
<td>P</td>
</tr>
<tr>
<td>Gumba Matingili</td>
<td>4</td>
<td>Yes</td>
<td>Yes</td>
<td>P</td>
</tr>
<tr>
<td>Karonam</td>
<td>4</td>
<td>Yes</td>
<td>Yes</td>
<td>P</td>
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<tr>
<td>Gumba Korra</td>
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<td>Yes</td>
<td>S, P</td>
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<tr>
<td>Belbelwa Girrta</td>
<td>4</td>
<td>No</td>
<td>Yes</td>
<td>S, P</td>
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<tr>
<td>N’gui Kirja</td>
<td>6.5</td>
<td>No</td>
<td>Yes</td>
<td>S, P</td>
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<tr>
<td>Belbelwa</td>
<td>4</td>
<td>Yes</td>
<td>Yes</td>
<td>P</td>
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<tr>
<td>N’glenem Sani</td>
<td>4</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>N’guchiram</td>
<td>3.5</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
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<td>Faldjaram</td>
<td>5.5</td>
<td>No</td>
<td>Yes</td>
<td>-</td>
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<tr>
<td>Bakon Sada Kurra</td>
<td>3.5</td>
<td>Yes</td>
<td>No</td>
<td>S</td>
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<tr>
<td>N’gel Sedi</td>
<td>3</td>
<td>Yes</td>
<td>No</td>
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<td>Awareram</td>
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<td>Yes</td>
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<td>Limandi</td>
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<td>Yes</td>
<td>P, sa</td>
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<td>Geraffel</td>
<td>5</td>
<td>No</td>
<td>Yes</td>
<td>S, P, sa</td>
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<tr>
<td>Bal N’gra</td>
<td>7.5</td>
<td>No</td>
<td>Yes</td>
<td>S, P</td>
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</tbody>
</table>
Dune-landscape
Flat undulating relief with dunes
Grasses, bushes, scattered trees
Animals

Bas-fond
Flat relief with few small dunes
Millet-sorghum fields

Dune-landscape
Mobile dunes at bas-fond and cuvette transition

Cuvette
Flat relief, steep fringes
Several trees, doum palms
Fenced fields
Naked center
The place

A landscape composed of:

Moving sand dunes
Low lying valleys (basfonds)
Oases/depressions (cuvettes)
...

A border region to Nigeria
Most of the region is dominated by **dunes** – and scattered shrubs – e.g. Leptadenia
Dunes are used by pastoralist – and for cropping in drier years
**Bas-fonds** are valleys formed during previous humid tropical conditions – most suitable for cultivation in wetter years.
The dune landscape hosts small lakes/oases – cuvettes - a unique ressource – suitable for cultivation (Fr.: ‘culture contre saison’), dates, salt and natron – yet, depending on the ground water level
Cuvettes: a rich garden, and a source for natron excavation - but under threat because of lowering water table
Livehood: ranking exercise
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<tbody>
<tr>
<td><strong>Rainfall</strong></td>
<td>Good rains</td>
<td>From 1972 lack of rain</td>
<td>Mixed rain, good years in 1985 and 1987</td>
<td>Generally bad – 1997 is a good year</td>
<td>Generally bad</td>
<td>2010 is a good year – otherwise average</td>
</tr>
<tr>
<td><strong>Basfond vs dune cultivation</strong></td>
<td>Only basfonds are cultivated – land is abundant</td>
<td>Only dune landscape is cultivated – basfonds given up because of lacking water</td>
<td>Basfonds are re-cultivated in the good years 1985 and 1987</td>
<td>Primarily dune landscape is cultivated, basfonds not completely abandoned (fringes are cultivated – possible because the drought was not as severe as in 1970’s).</td>
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<td>All basfond fields are cultivated</td>
</tr>
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<td><strong>Population and food sufficiency</strong></td>
<td>Small population – all remained in the village. Immigration of workers to the natron and salt extraction (some permanent, others for 5 months only)</td>
<td>Significant emigration in 1973. Not many immigrants. Food was scarce – primary source of food was the production from horticulture in the cuvettes.</td>
<td>Population estimated to be 500 persons. Peopled stayed – food production was sufficient.</td>
<td>Many people have left on a permanent basis to Nigeria (ca. 40 individuals). Food production on millet/sorghum fields only sufficient to cover demands in 3 months.</td>
<td>2010 the production was sufficient to cover the demand for the year</td>
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<tr>
<td><strong>Livestock</strong></td>
<td>Significant loss of animals in 1973</td>
<td>Significant loss of animals in 1988</td>
<td>Since 1984 short term migration (4 months) to Nigeria (agriculture, fishery, bricks)</td>
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<td>Since 2004 emigrations to Libya (duration 2-4 years, employment in agriculture and brick construction)</td>
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<td><strong>Migration</strong></td>
<td>Emigrations to Nigeria and Chad</td>
<td>Since 1984 short term migration (4 months) to Nigeria (agriculture, fishery, bricks)</td>
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<tr>
<td><strong>Trade</strong></td>
<td>Important commodities: Wheat (to Nigeria) natron Salt Some animals dates</td>
<td>Important commodities: Wheat natron Salt Animals (most important in this era) dates</td>
<td>Sweet potatoes, sugar cane and manioc become Important dates</td>
<td>natron is more prominent because of the CFA devaluation Some horticulture products Animals dates</td>
<td>Cassava most important garden product natron animals dates</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- **1970-1980**: From 1972 lack of rain
- **1980-1990**: Mixed rain, good years in 1985 and 1987
- **1990-2000**: Generally bad – 1997 is a good year
- **2000-2010**: Generally bad
- **2010-2020**: 2010 is a good year – otherwise average
- **Population and food sufficiency**: Small population – all remained in the village. Immigration of workers to the natron and salt extraction (some permanent, others for 5 months only).
- **Livestock**: Significant loss of animals in 1973
- **Migration**: Emigrations to Nigeria and Chad
- **Trade**: Important commodities: Wheat (to Nigeria) natron Salt Some animals dates

**Important commodities: Wheat (to Nigeria) natron Salt Some animals dates**

**Important commodities:**
- Wheat
- natron
- Salt
- Animals (most important in this era) dates

**Sweet potatoes, sugar cane and manioc become Important dates**

**natron is more prominent because of the CFA devaluation**

**Some horticulture products**

**Animals dates**

**Cassava most important garden product**

**natron animals dates**
Continuity – climate preparedness – emerging ‘human-dimension of global change’ challenges

People have been remarkable flexible, finding ways of sustaining their livelihoods in a fluctuating environment.

The Sahelian livelihood is generically taking climate variations into account (e.g. use of different landscape units in the face of different rainfall regimes).

However, the land use portfolio has remained remarkably stable. Peoples’ decision making follows the same rationales, addressing the enabling and constraining conditions determined first and foremost by the climate variability; yet, people unanimous stress that live has become very difficult and poverty more pronounced in recent years.

Other sources have become more important to sustain the family – exposures to population pressure and globalization (market prices; migration) may need more attention by policymakers, than climate only.
A final reflection

The examples portray a contemporary situation where the human-environmental system is resilient (in the meaning of stable), but maybe also lack ability to enable a transformation from the current type of system to some other kind of system.

Sustainable development may entail changing the ways people make a living, developing new ‘goods and services’ and operating at different scales. Hence, transformation and transformability are emerging as critical areas of concern in the global change research.
Most of the region is dominated by **dunes**. Dunes are used by pastoralists – and for cropping in drier years.
The dune landscape hosts small **lakes/oases – cuvettes** - a unique resource - suitable for cultivation
Natron trade is directed towards Nigeria, yet means of transport has changed from camel caravans to trucks. Extraction has been accelerated by use of motor pumps.
Cuvettes: a rich garden, and a source for natron excavation - but under threat because of lowering water table
Agronomic assessments for development

Cuvettes are considered to have a significant potential for irrigated agriculture; African Development Fund assesses that there is scope for development of 300 hectares of irrigated agriculture. They suggest small motor pumps to harvest water for irrigation of the vegetable crops in the fields in the cuvette.
religion/population increase, Al-Qaeda, climate, remoteness
Short term improved resilience vs. long term collapse?

There are reasons to ask if an irrigation based strategy will be sustainable in a longer perspective:

- Farmers seem to agree (and worry about) that the water table in the wells is declining, even in years of abundant rainfall.
- No in depth information on the change in water tables are available
- The mechanism of the recharge of wells around the Lake Chad is not uniform, and not well documented – but the risk of facing a finite resource seems plausible
Lessons learned - Diffa

The cuvettes Diffa illustrate how people under pressure from climate changes, increasing population pressure and poverty have managed to cope by gradually modifying their agricultural strategies to employ water resources.

The contemporary emphasis of irrigation agriculture in the cuvettes seems *economically sustainable* in a short perspective.

If the perceived (over-) usage of the ground water corresponds to the hydrological realities, the use of motor pumps will only provide a short window of opportunity – but not ensure a resilient CHES in the longer run.
Selected, recent publications


Overskrift

Forskningen ved Institut for Xxxxxxxx belyser basale xxxx og xxxxxx processer, deres regulering og deres betydning for xxxxxxx funktion, interaktion og organisation i xx.

- Xxxxx yder undervisning inden for bl.a. xxxxxxxxxx, xxxxxxx, basal xxxxxx inkl. xxx, xxxxxxx, xxxxxxxx samt xxxxxxxx. M