

# Fatal Desertification?

*Can Agricultural Productivity subsume  
Environmental and Social Issues?*

Lessons from Projects Funded by Agence Française de  
Développement in Tunisia and Chad

**International Workshop on the Costs of Inaction and Investment Opportunities in Arid,  
Semi-Arid and Dry Sub-Humid Areas**

Rome, 4-5 December 2006 – FAO Headquarters



# Conservation Agriculture in Tunisia

10 000 to 15 000 ha of arable land  
are lost every year

The Free Trade Agreement with EU  
poses threats on the agricultural sector

Mountainous terrain, irregular and sometimes heavy rainfalls, unprotected  
soils, overgrazing of crop residues, unfriendly soil management practices  
=> erosion => **vicious circle of land degradation**





Due to erosion, both farmers' capital  
and public infrastructure are severely damaged



# ‘Mechanic’ Soil and Water Conservation: costly. Effective?



Euros 300 to 400/ha are invested in soil conservation techniques that decrease arable land area and organic matter content and make soils fragile...



# ‘Mechanic’ Soil and Water Conservation: costly. Effective?



...such conservation facilities remain extremely vulnerable to erosion. This choice results from a centralized, technical approach-which on the other hand allows local income distribution as well as disbursements for governments and donors.

# Conservation Agriculture By Direct Seeding Under Cover Crop

- **Managing the soil like in a forest ecosystem**
  - Developing biomass to boost soil life, increase organic matter content and thus improve water absorption and retention
  - Recycling biomass to provide mineral nutrients that can be fully utilized by crops
- **Protect soils by permanent cover**
  - dead mulch (crop residues) or live mulch (cover crops)
- **Implement successive crops**
  - combine cereals and other crops, including fodder crops
- **Direct seeding, no tillage**
- **Improve soil and water management in rainfed and irrigated agriculture**





# Direct seeding, no tillage





# Le Krib, Tunisia (wheat, seeding of 15 April 2003)

Without cover crop

With sorghum  
as cover crop







The area under  
conservation agriculture  
resists to erosion



The area under conventional  
soil management is severely  
damaged





Conventional cropping on the left, conservation agriculture on the right with a well-drained soil

# Adoption of Conservation Agriculture in Tunisia

<b>Years</b>	<b>1999- 2000</b>	<b>2000- 2001</b>	<b>2001- 2002</b>	<b>2002- 2003</b>	<b>2003- 2004</b>	<b>2004- 2005</b>
<b>Nb of Farmers</b>	11	31	38	43	49	62
<b>Nb of Direct Seeding Machines</b>	1	4	4	9	15	21
<b>Area under Conservation Agriculture (ha)</b>	51	167	312	1 008	1 799	2 893
<b>Area per farmer (ha)</b>	a	5	8	23	37	46
<b>Area per Direct Seeding Machine (ha)</b>	51	42	78	112	120	137



# Economic Analysis – Farmer's Viewpoint

- Operating **costs** reduced over the mid- and long term
- Reduction of **risks** arising from irregular rainfalls
- Stabilization followed by steady improvement of crop **yields**
- Longer use of crop residue for **pasture**
- **Systemic** effects: different crops, fodder production
- Time saved
- Better safety for soil works and better quality of the soil allowing to perform cultural interventions at optimal time
- Better use of water in **irrigated** agriculture

# Economic Analysis – Social Viewpoint(1)

## Macroeconomic Effets

- Growth and price stability
- **Current Account**
  - Short term: fuel savings: from 50 to 80 l/ha amounting to DT 20 to 30/ha
  - Long term: savings on imports of machinery and spare parts
- **State Budget:** potential savings on soil conservation techniques in cultivated areas owing to on-farm returns and positive externalities of conservation agriculture (win-win): DT 400/ha
- **Employment:** shifting to conservation agriculture saves labour costs equivalent to 0.5 to 1.5 full time job per farm => alternative opportunities in livestock, fruit or vegetable production



# Economic Analysis – Social Viewpoint(2)

- **externalities** : water storage, decrease in pollution by NO<sub>3</sub>, decrease in erosion, floods and dam siltation
  - **competitiveness**: WTO, EU Free Trade Agreement
  - potential water savings in **irrigated** agriculture, **biodiversity** protection
  - limitation of **carbon** release or carbon storage: 4 effects
    - soil under no tillage non longer releases C
    - lower fuel consumption
    - C storage through increase in soil organic matter content
    - more C is retained within soil due to lower erosion
- => At USD 10 per ton of C, given a storage of 14 t/ha/year over **10 years**, the net gain for a 200 ha farm is DT 28 000, equivalent to the cost of a **direct seeding machine**

# In North Cameroon as well...



Eleusine, mucuna et brachiaria sur un terroir au Nord



# In North Cameroon as well...



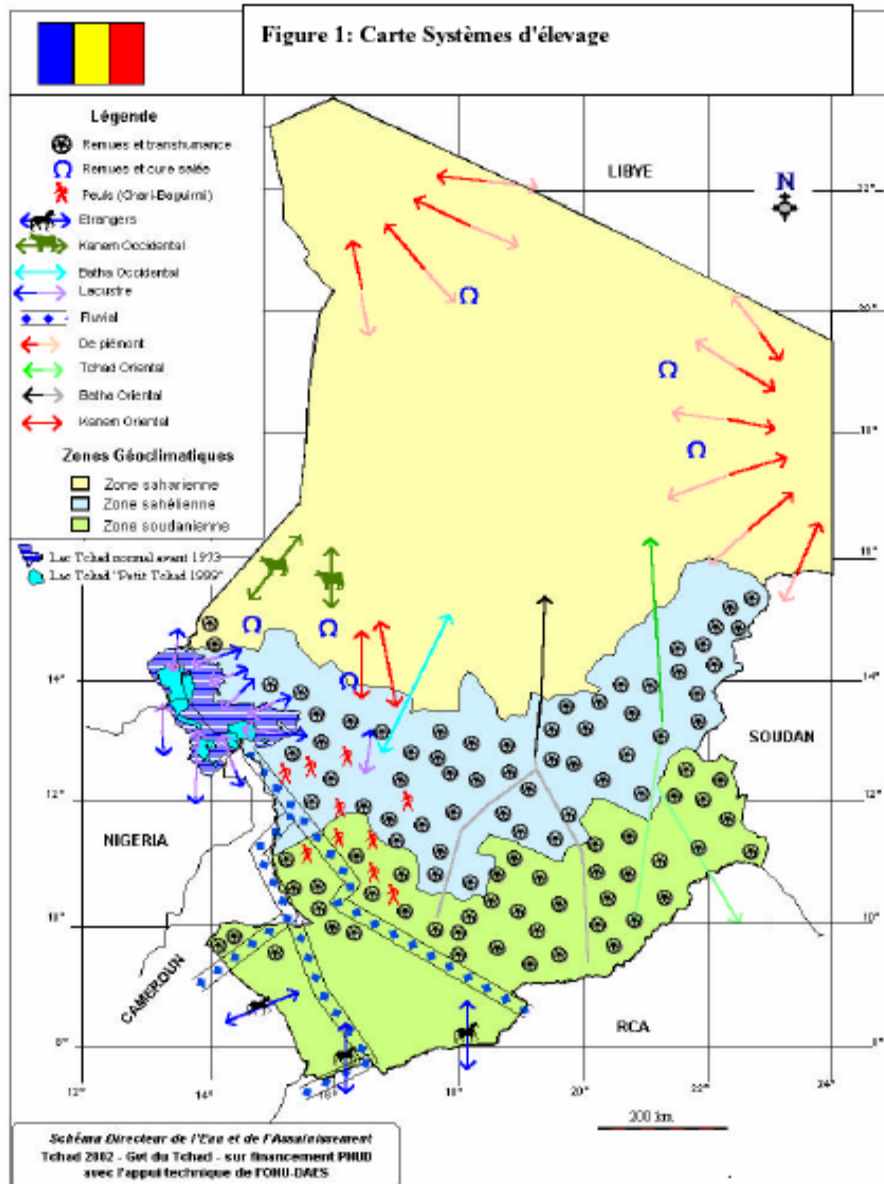
Cotton crop: when covered by mulch (down), the soil conserves humidity



On the right: cotton under direct seeding with cover crop

- **Win-Win** (private-social) systems
- **Developing rapidly** at world level in advanced, emerging and developing countries
- Require **investment** for testing/extension/training at farm level, aiming at meeting farmers' own needs => **cultural revolution**

# Water Supply for Pastoralism in Chad



## 5 pastoral systems

1. Sahara
2. Kanem and Lake Chad
3. Central Region
4. Eastern Region
5. Southern (Logone-Chari) Region

- Variety, diversity

- Economic significance: certain though not well known

⇒ **Carrying Capacity** paradigm?

⇒ **Sedentarity vs. Mobility** debate

⇒ **Which approach?**

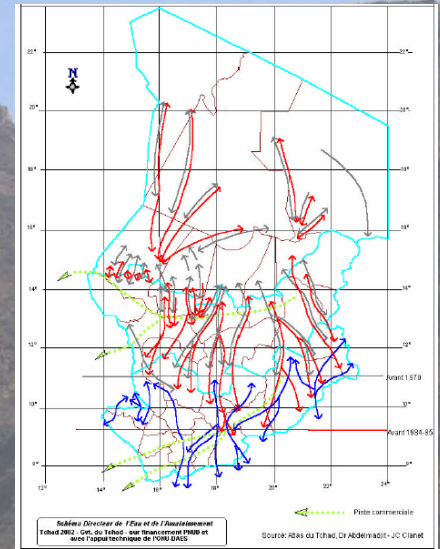


# Mobility: condition for productivity and survival

- **pasture resource use throughout the year**
- **many parameters:** pasture, water, sanitary conditions, price of cereals, habits and social features, political conditions...

**=> Constraints:** *pressure on land, water scarcity, control over boreholes, others (inputs supply, marketing, health, security...)*

**=> At stake:** *productivity, sustainable management, social/political rest*





# Water supply is the limiting factor

- Facilities sized in order to avoid overgrazing and sedentarisation -

Kinds of infrastructure implemented: boreholes – traditional...





...and improved (concrete-built)





Ponds,

Improvement and rehabilitation of ***Murhals*** (transhumance paths): including not only water facilities but also resting and grazing zones and corridors within agricultural areas





***Water supply and pastoralism (negociation, management of water facilities) components implemented in a coordinated manner***



# Impacts

- **Productivity** : gains in productivity; decrease in risks; flexibility; work and travelling made less cumbersome/dangerous
- **Resource base**: better balance in grazing areas => reverse ecosystem degradation, enhance ecosystem restoration, wood saving by substituting modern to traditional boreholes
- **Management Capacities at local level**:
  - Managing locally
  - Taking existing traditional rules into account and enforcing these through the modern law – when appropriate
  - Land rights – use rights properly articulated
  - Common property and equitable management
  - Coherent land management and conflict prevention

## **Economic Analysis** / natural, human and produced (infrastructure) capital

- **Without project**: produced capital unchanged, losses in natural capital and human capital
- **With project**: investment in PK => improvement in HK and NK, increased income
- **Impacts** on social capital (coherence, capability to manage conflicts...)



- **Acting on the 4 forms of capital ('What is important is what is not visible')**
- **=> Changing M&E systems accordingly**
- **... Working over the long term**



# Move from 'fight against...' to promoting people and the management of their resources

- Biological, technical, economic and institutional **solutions** are available
- **Economic analysis is key to decision-making** as far as investments are needed
- Move from cost analysis to **cost-benefit analysis** of investment projects / programmes
- **Rethink-redesign** approaches, M&E systems, timeframes