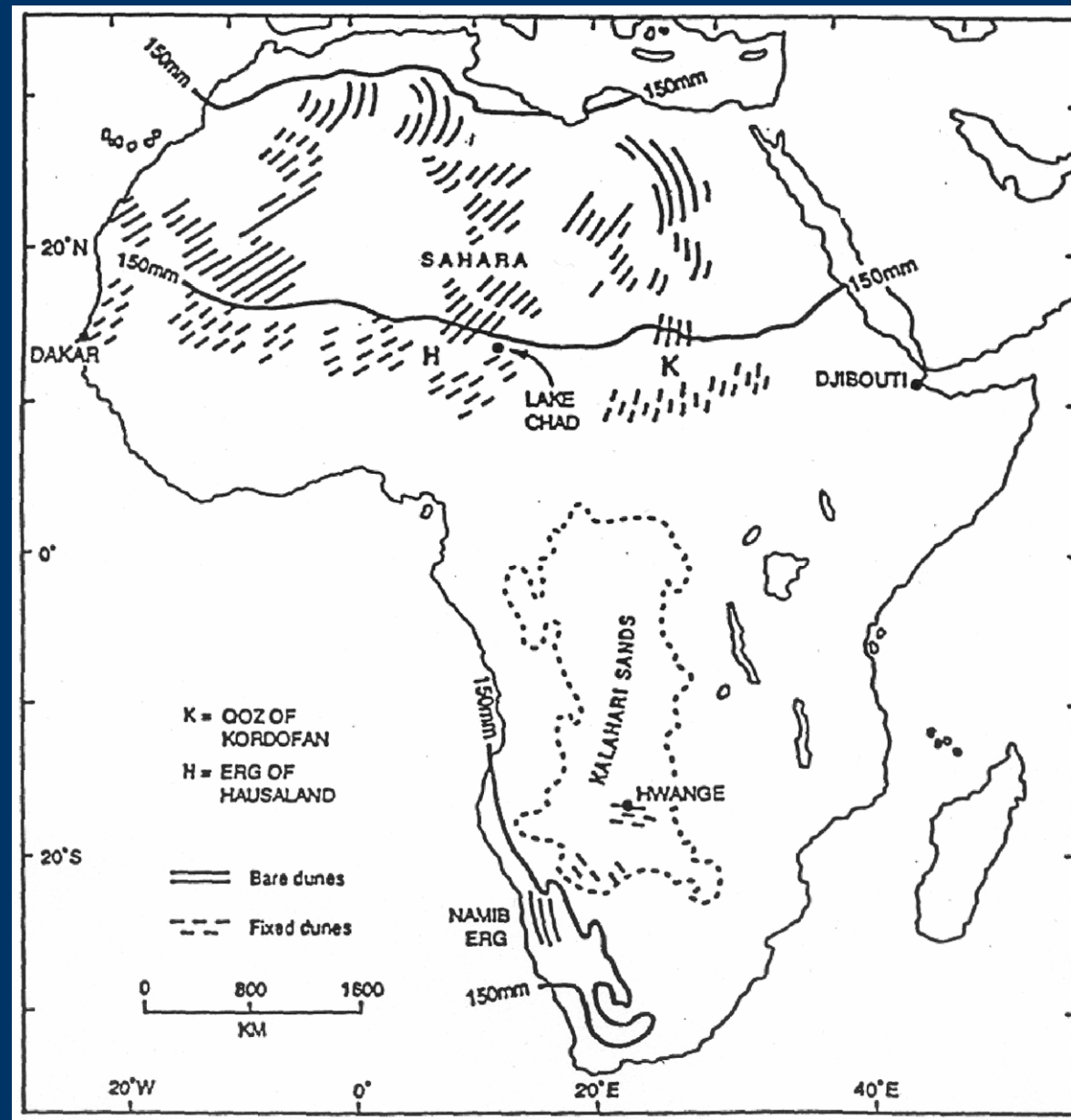


Desertification in the Sahel: climatic or human driven causes?

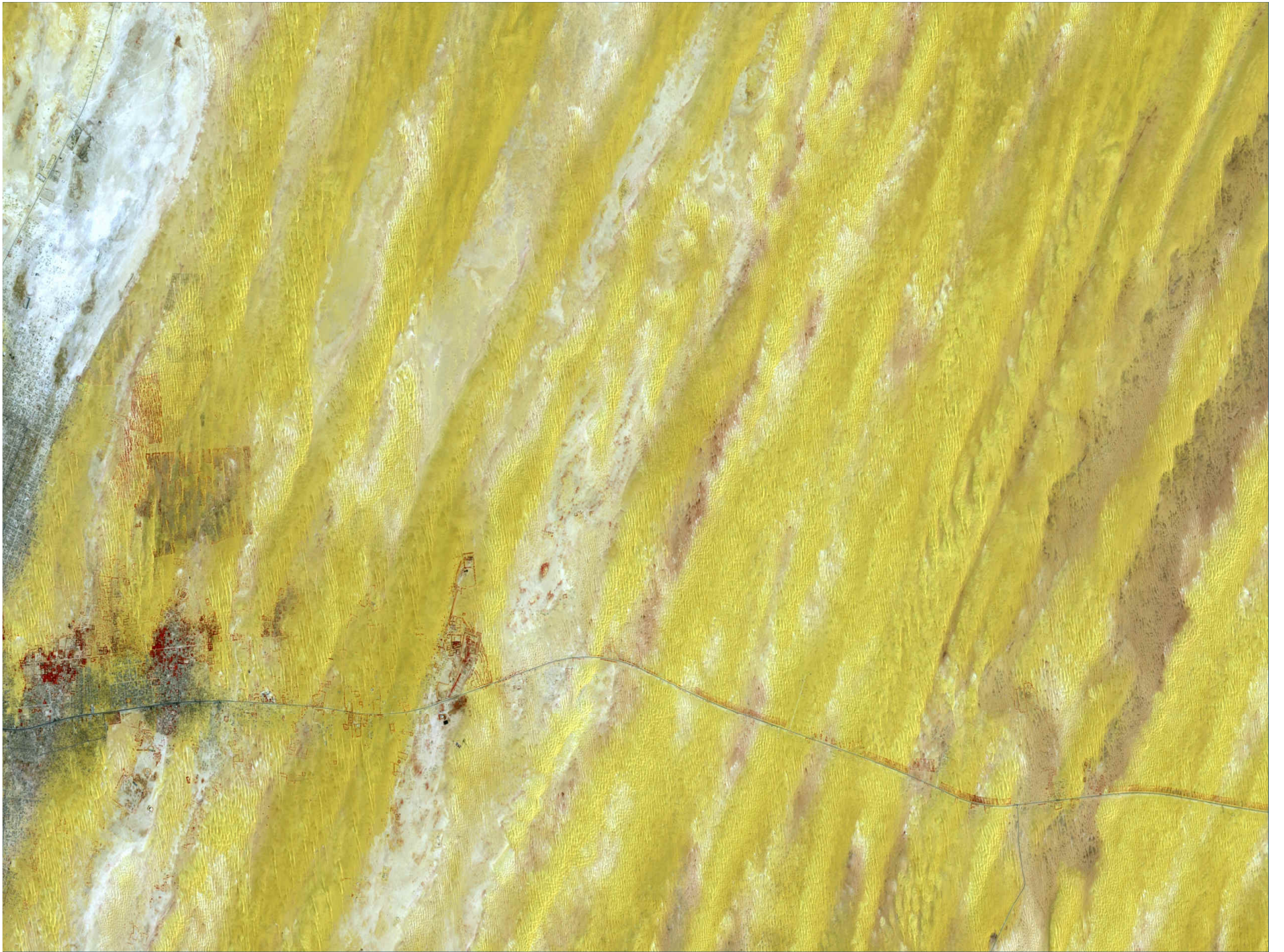
Pierre OZER¹ and André OZER²

¹ Environment Science & Management Dpt., pozer@ulg.ac.be

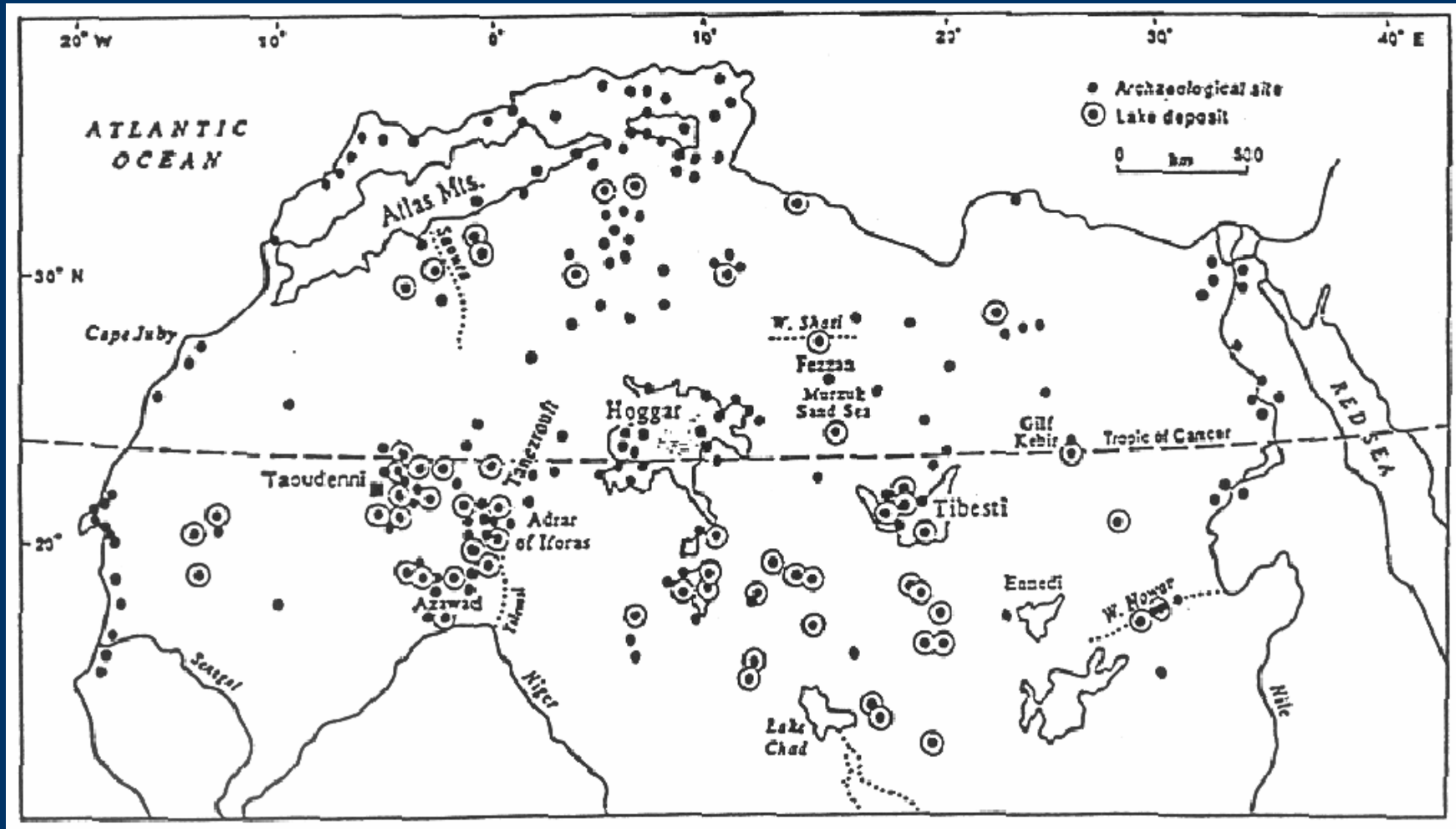
² Dpt. of Geography, aozer@ulg.ac.be



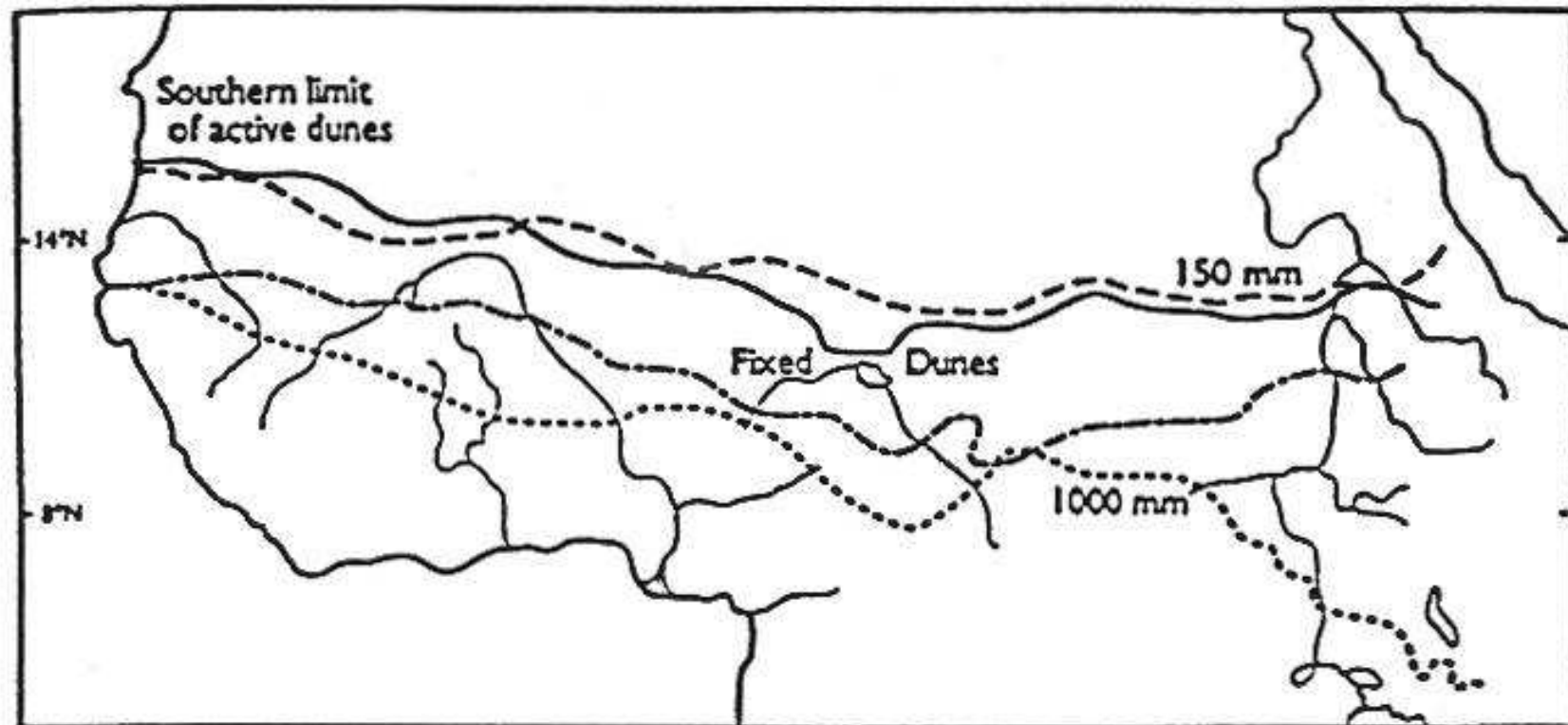
GOUDIE, 1996



Archeological sites and lake deposits (8000 B.P.)



PETT-MAIRE, 1991

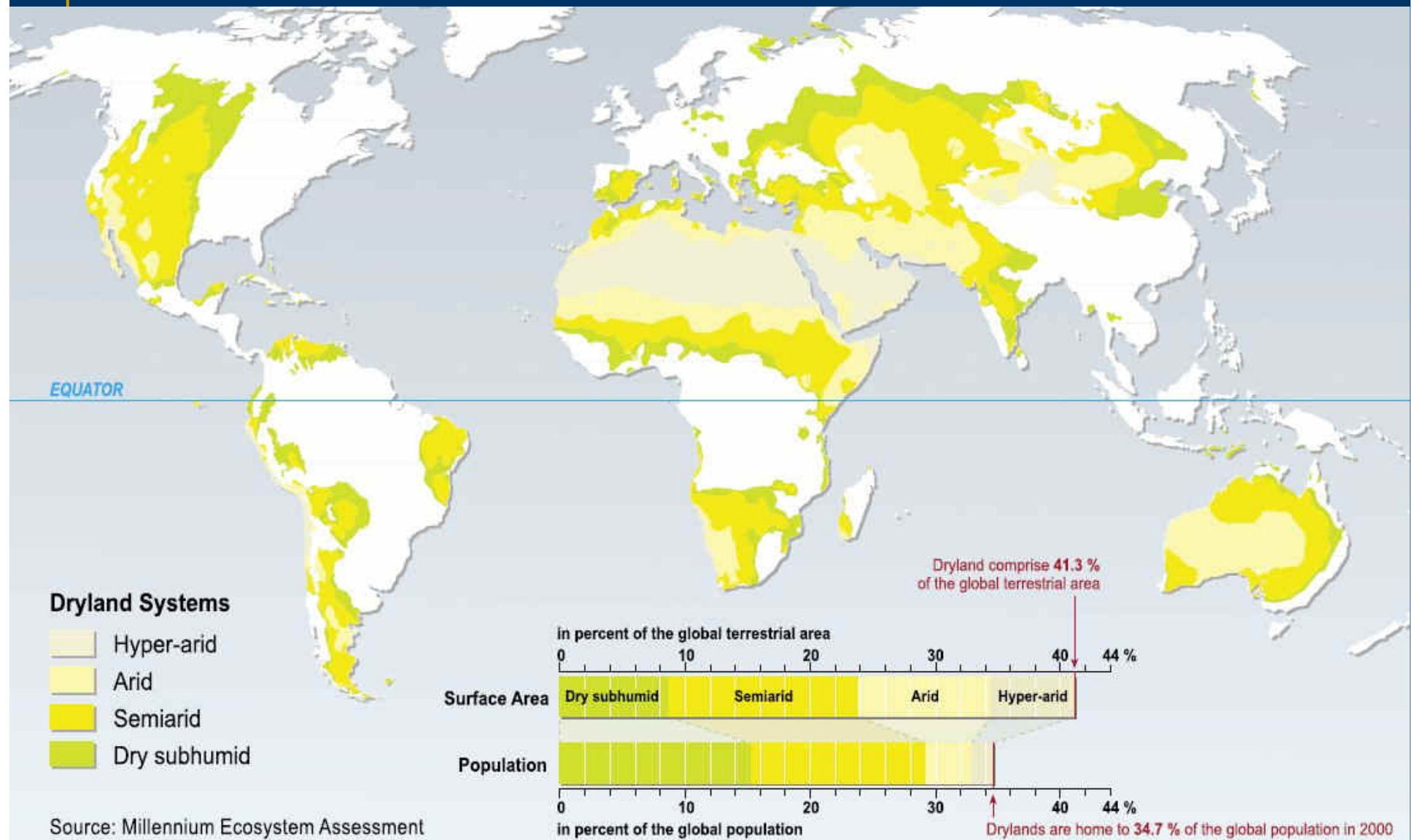




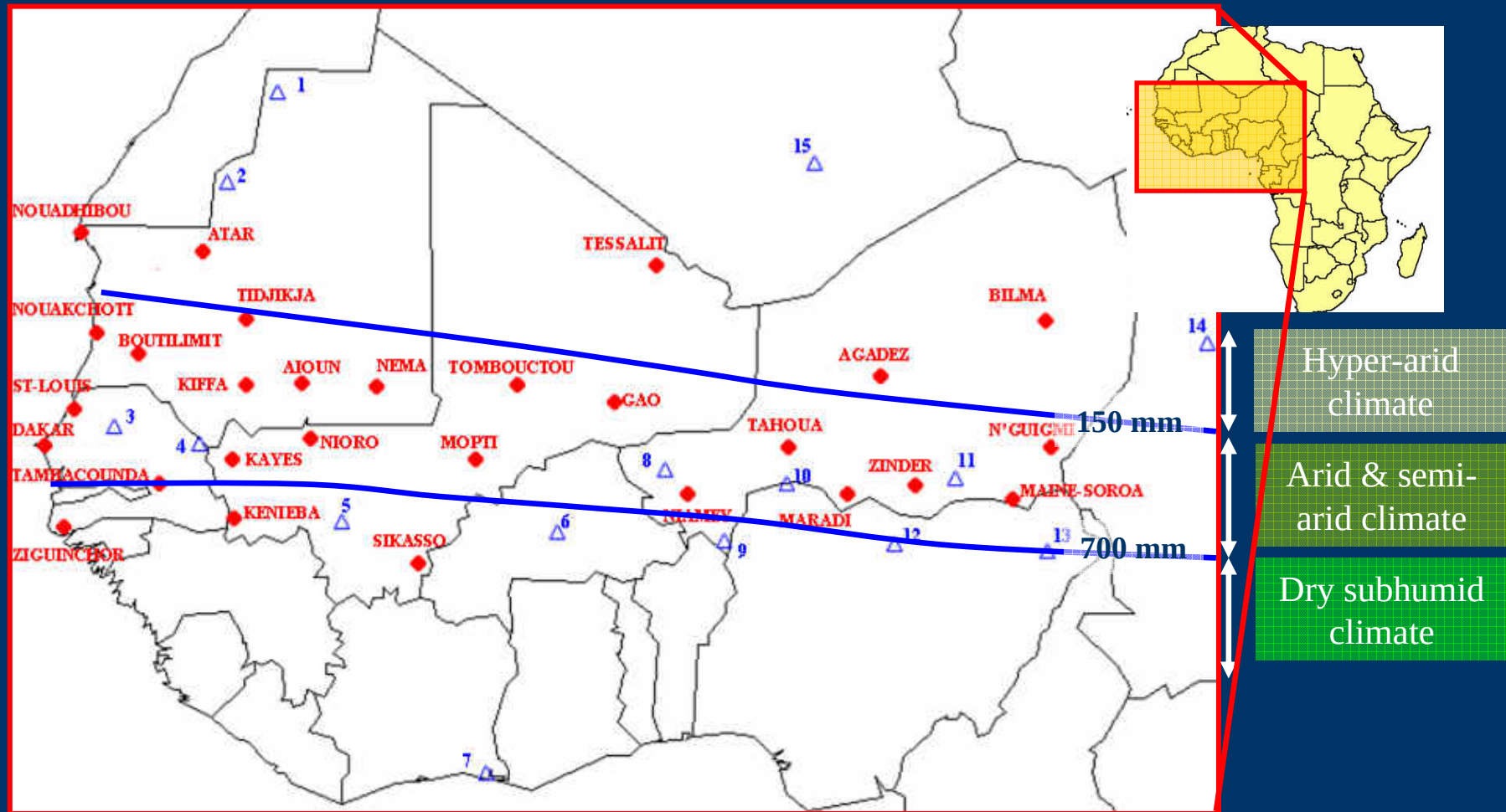
Introduction

Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. (UNCCD)

Desertification is taking place due to population pressure, socioeconomic and policy factors which lead to overgrazing, deforestation and poor agricultural practices. In addition, rainfall shortages enhance degradation in the fragile drylands ecosystems. (UNCCD)

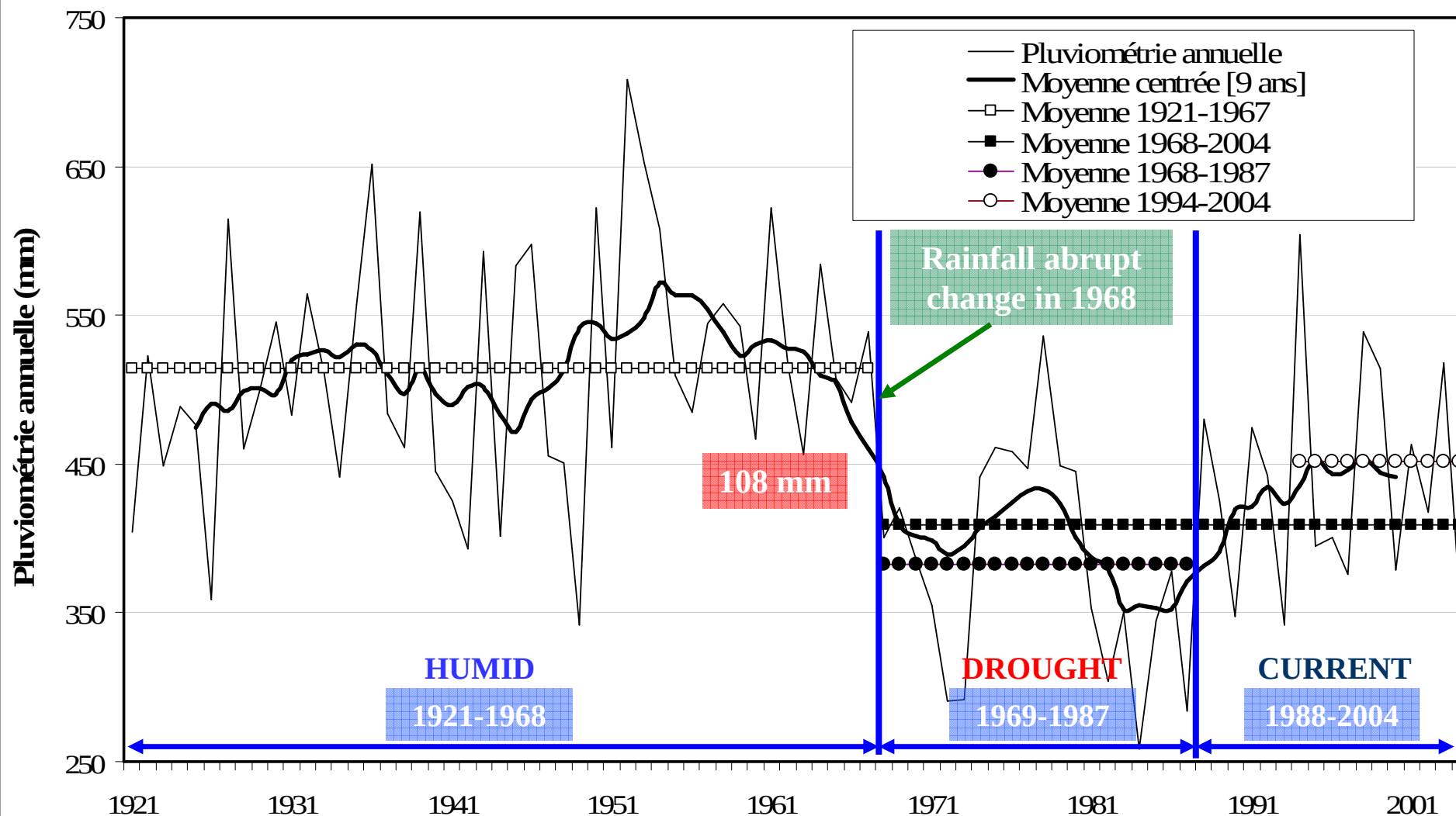


Focus on the Sahel



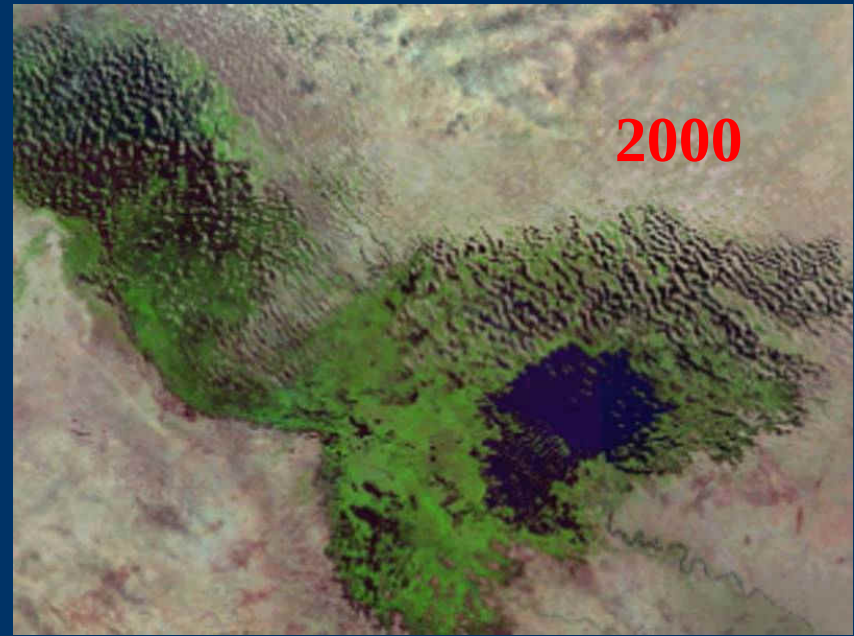
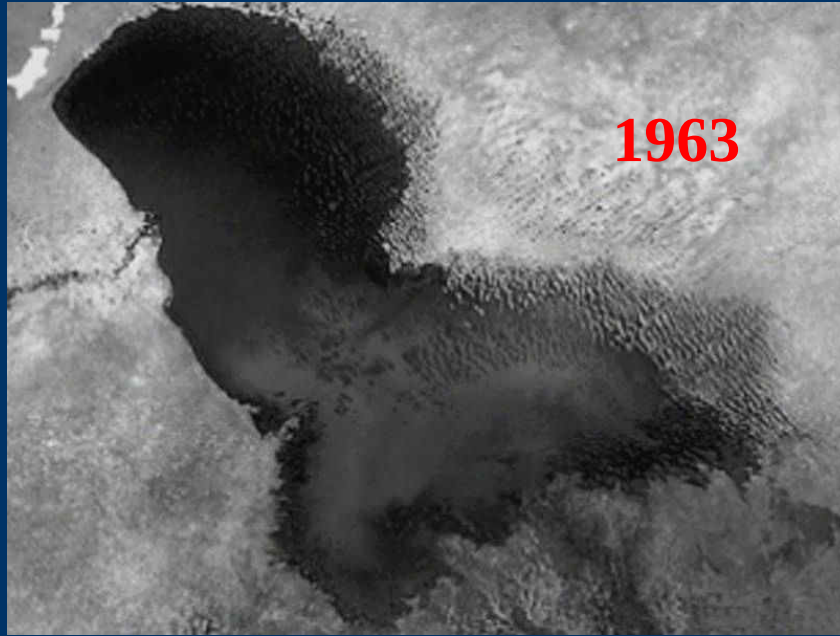
Climatic variations

Sahelian rainfall (1921 – 2004)



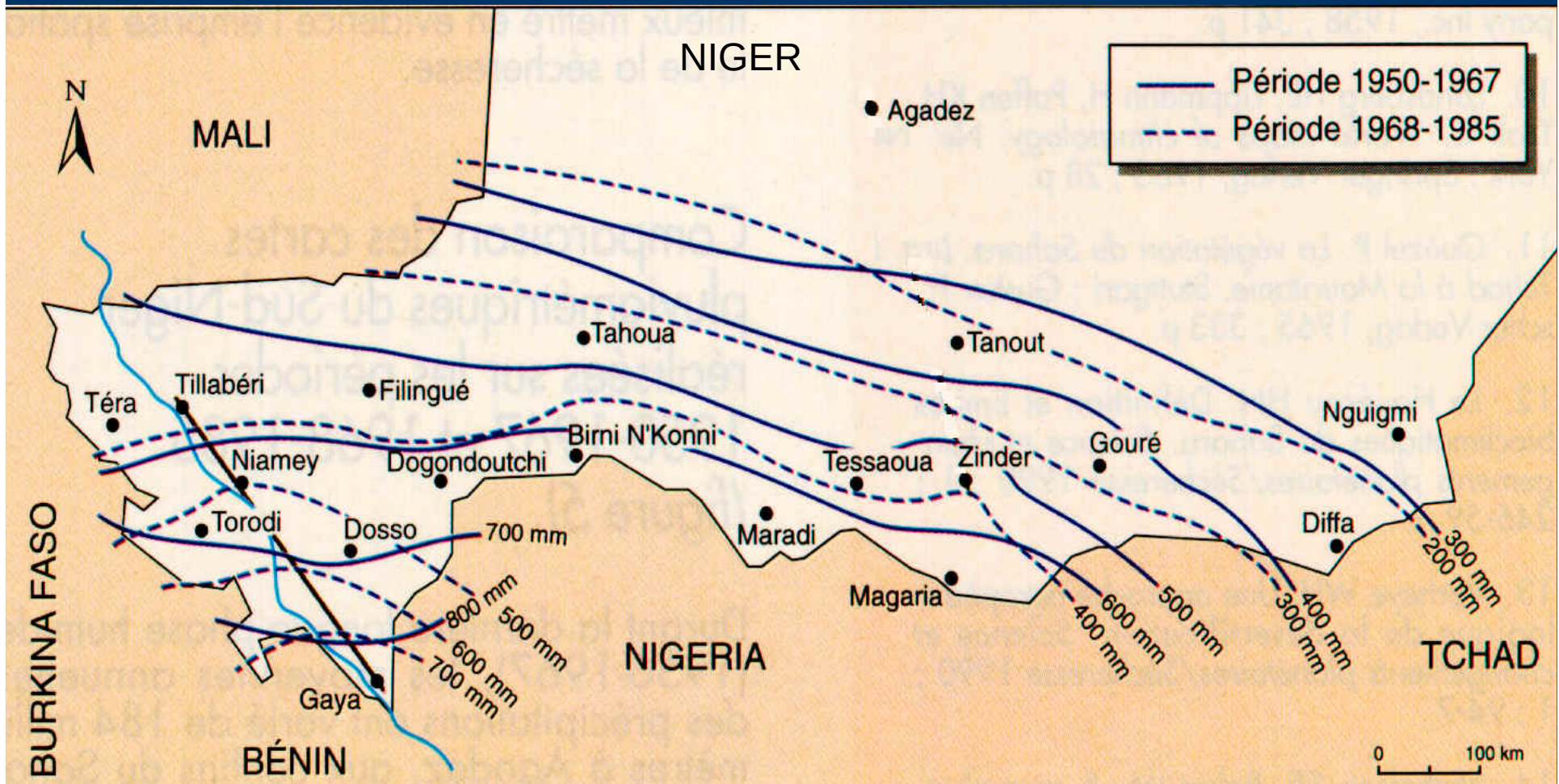


Drought...



In 1963, the size of Lake Chad was about 23500 km². After over 30 years of rainfall shortages (2000), its area was reduced to 1355 km².

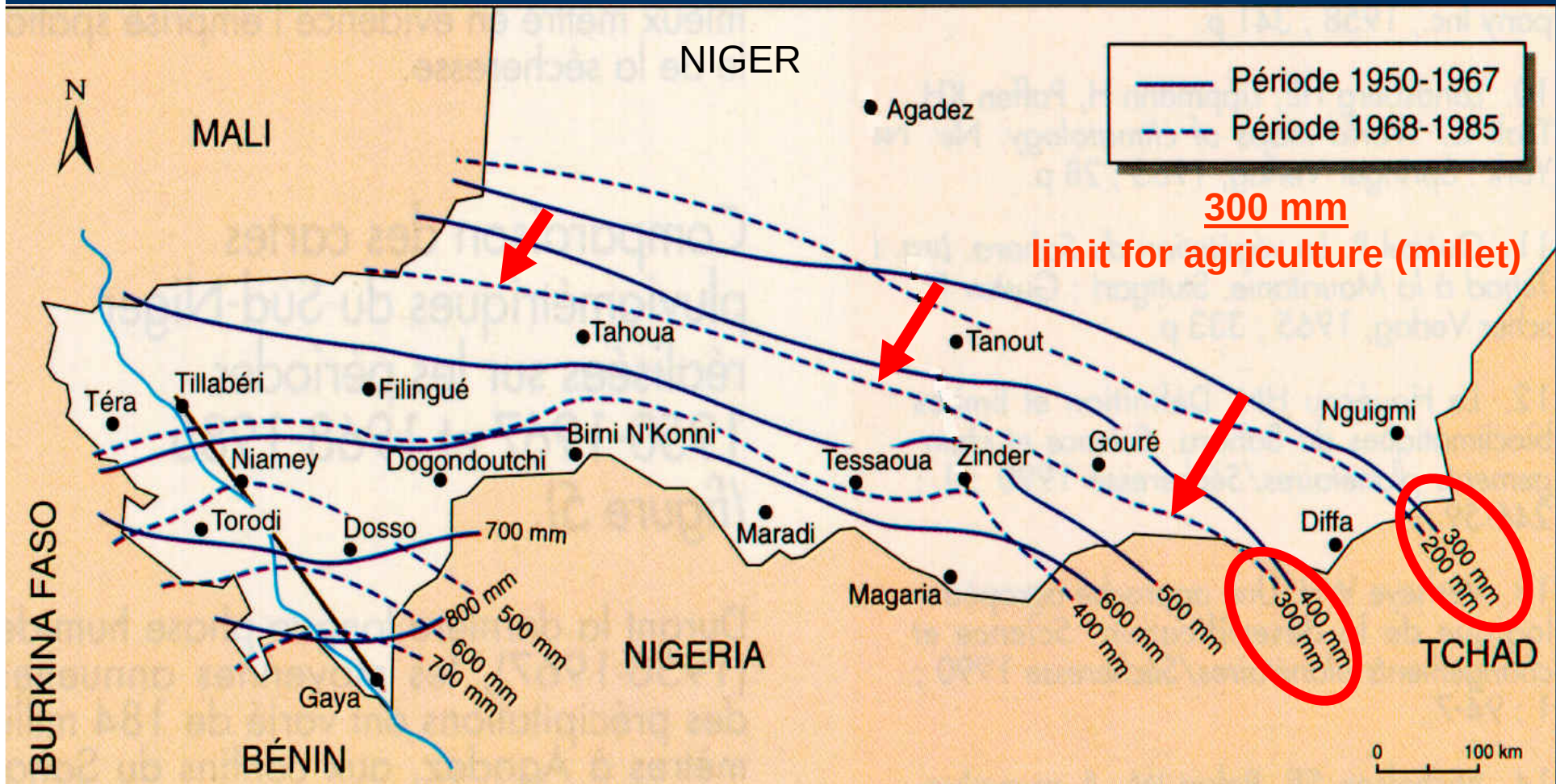
Drought... How large is the problem?



Ozer & Erpicum, 1995

Drought... How large is the problem?

Isohyets moved southwards by up to 200 km !

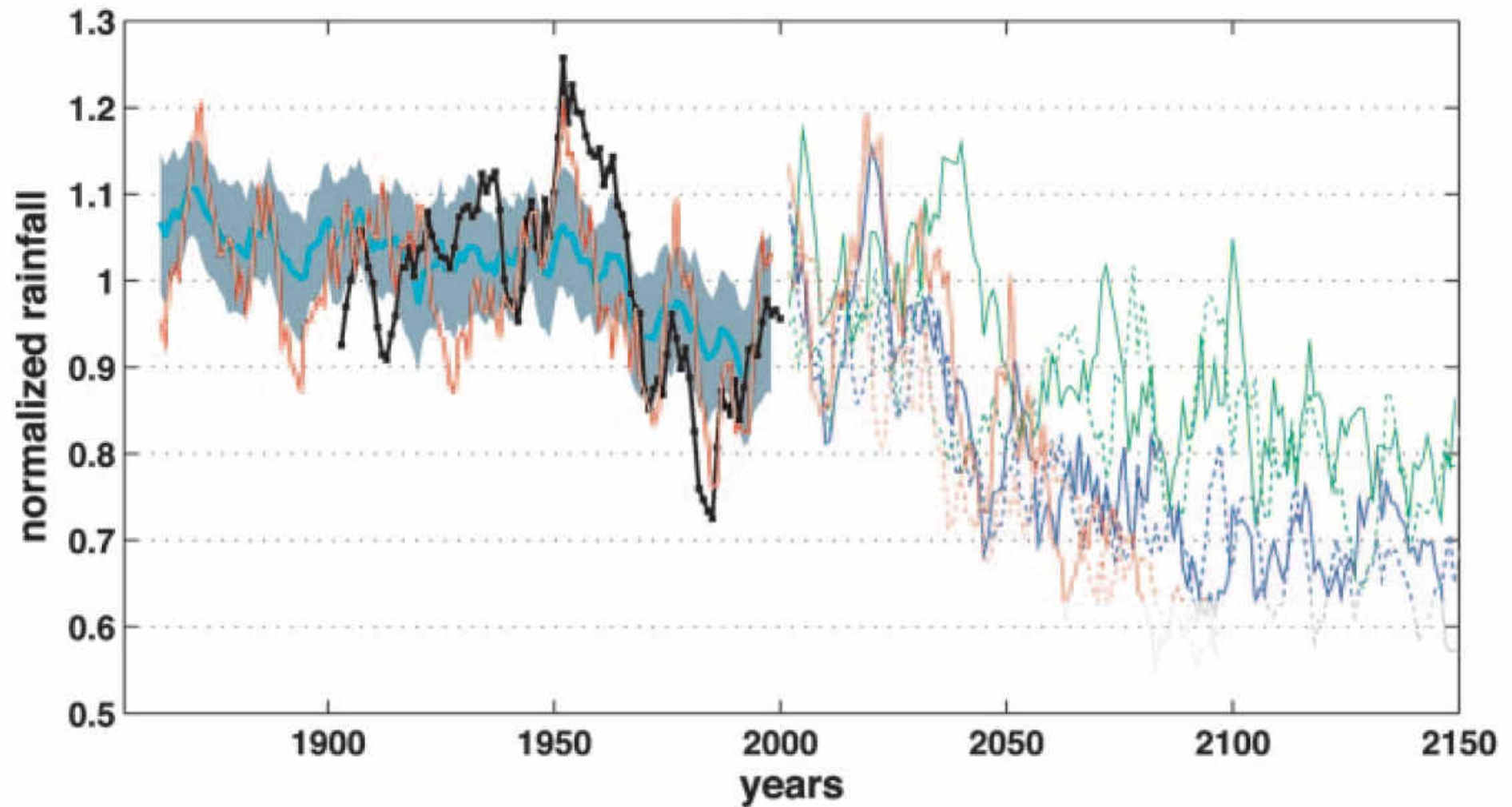


Ozer & Erpicum, 1995

Drought...

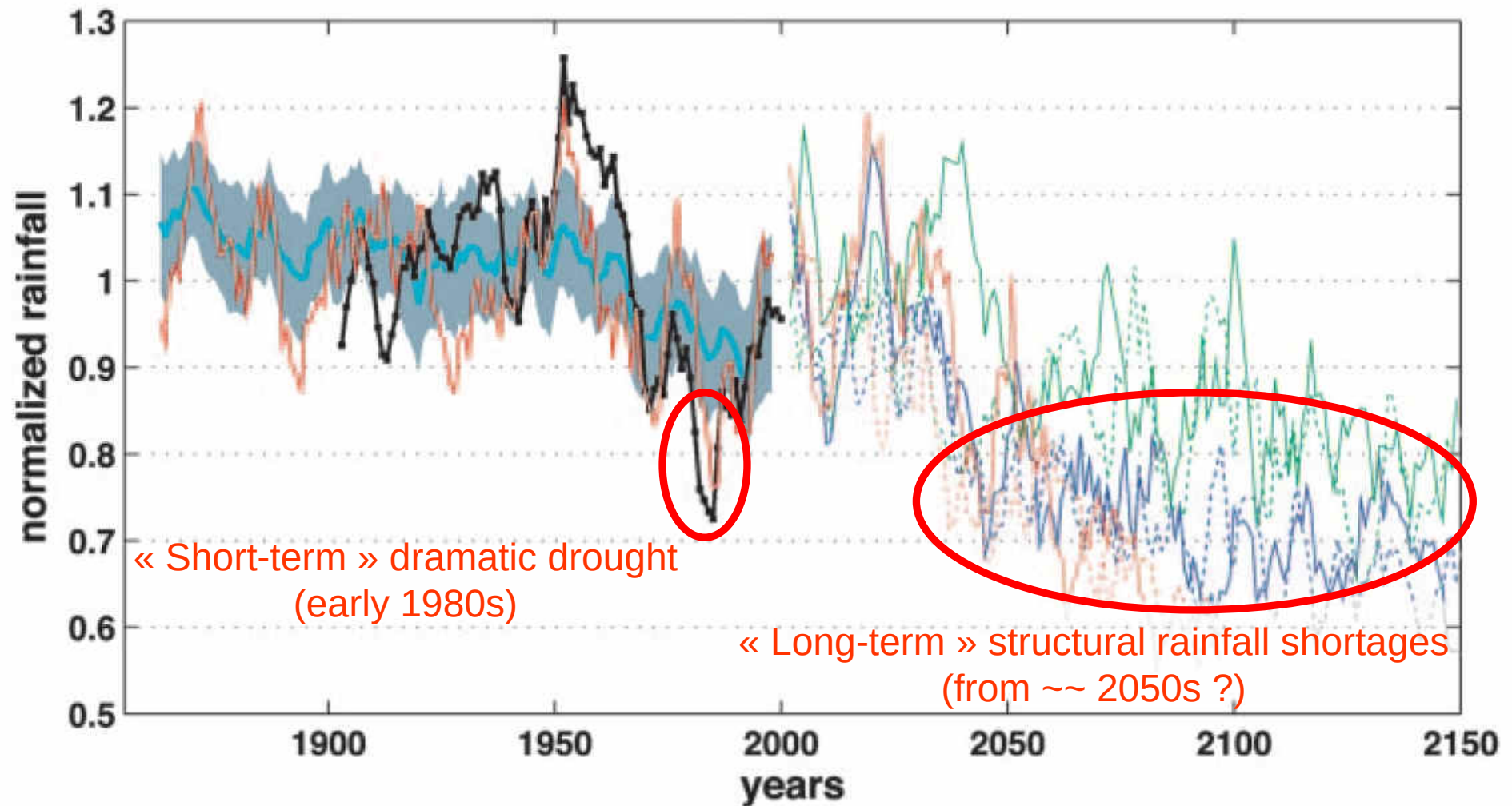
Where do we go ?

Will it rain tomorrow ?



Held et al., 2005

Will it rain tomorrow ?

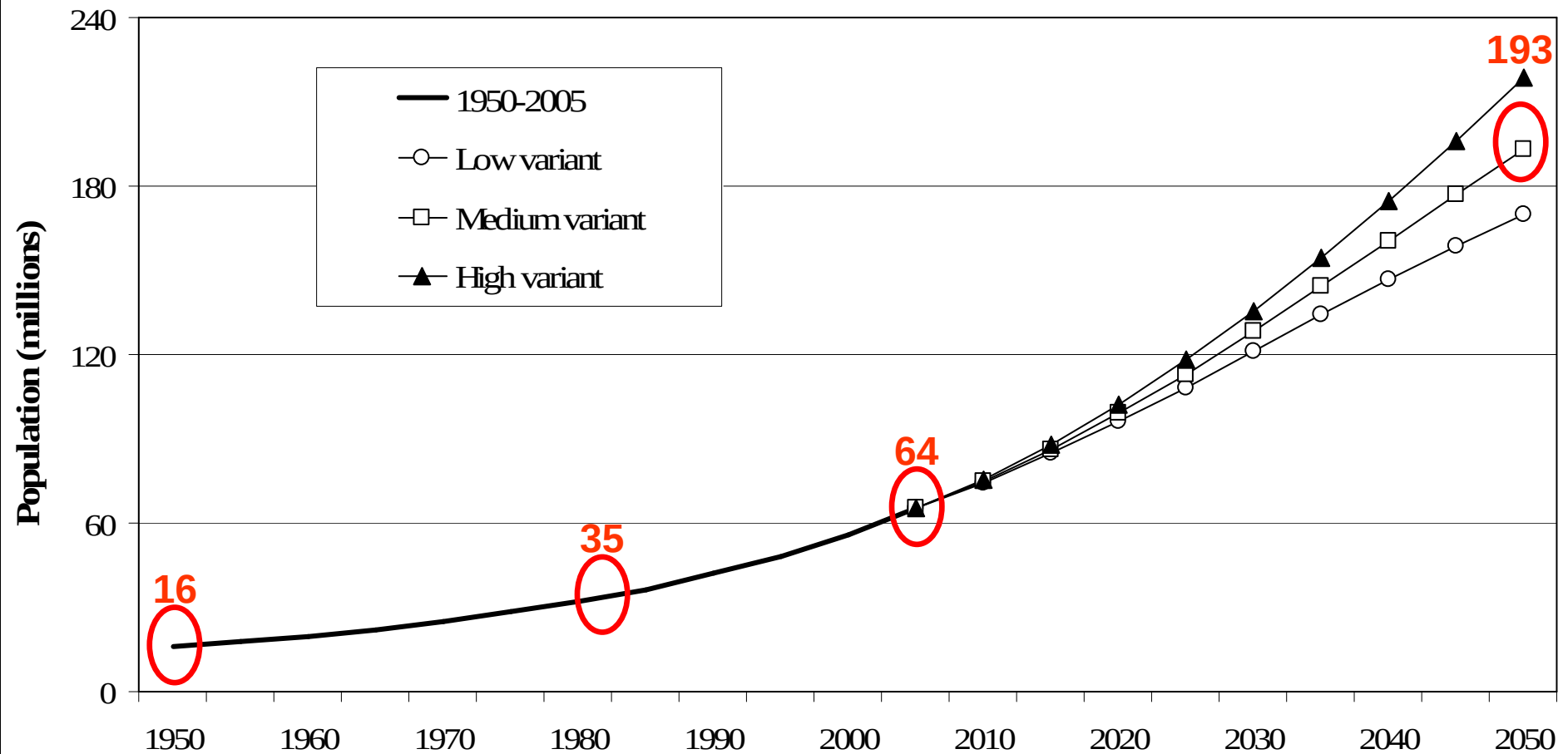


Held et al., 2005

Human activities

Who's with me ???

Human population in the Sahel (1950 – 2005) and projections



After UNPP, 2007

Increasing population leads to...



**... agricultural overexploitation
Maradi, Niger, ~500 mm**

Increasing population leads to...



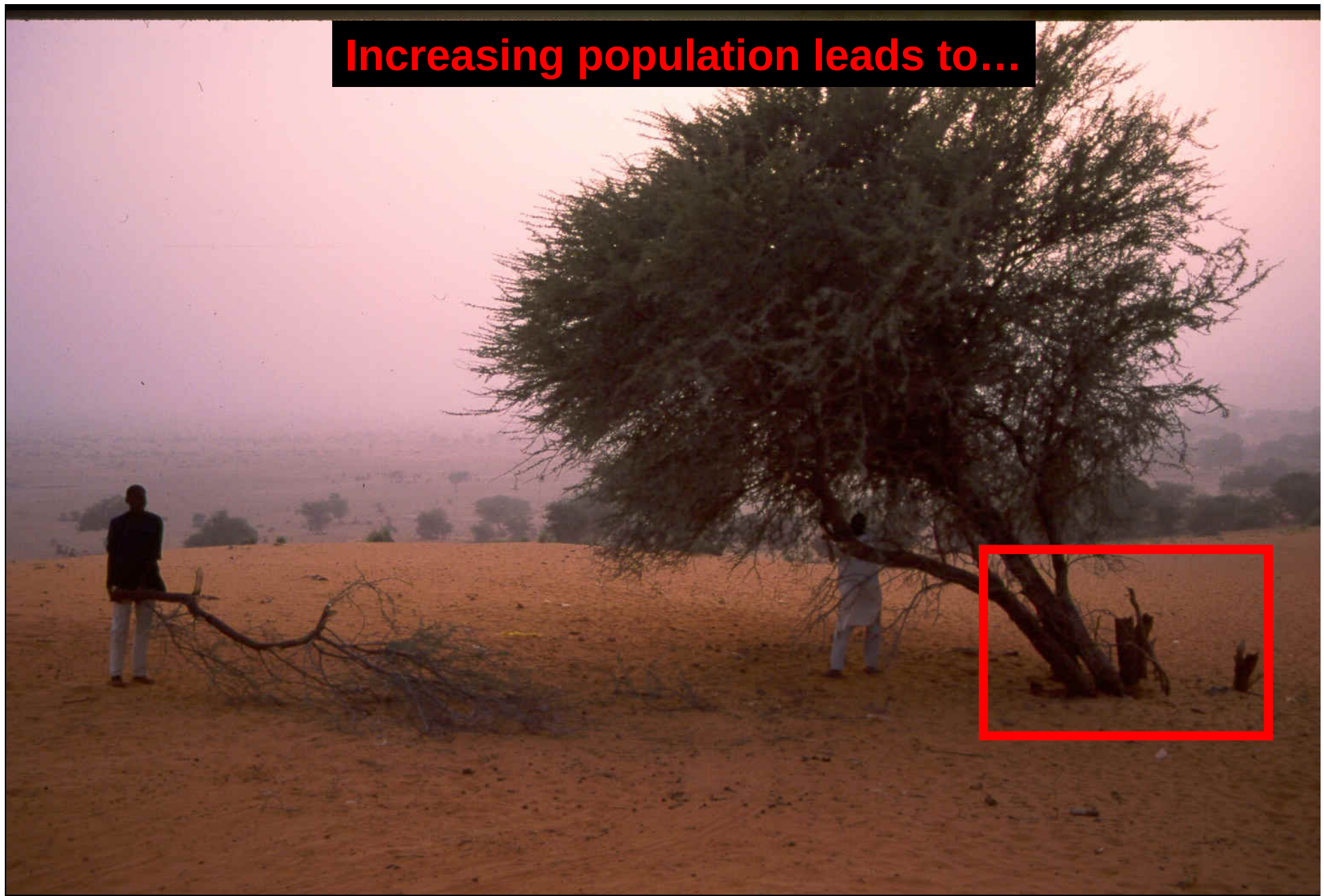
... overgrazing
Zinder area, Niger, ~400 mm

Increasing population leads to...



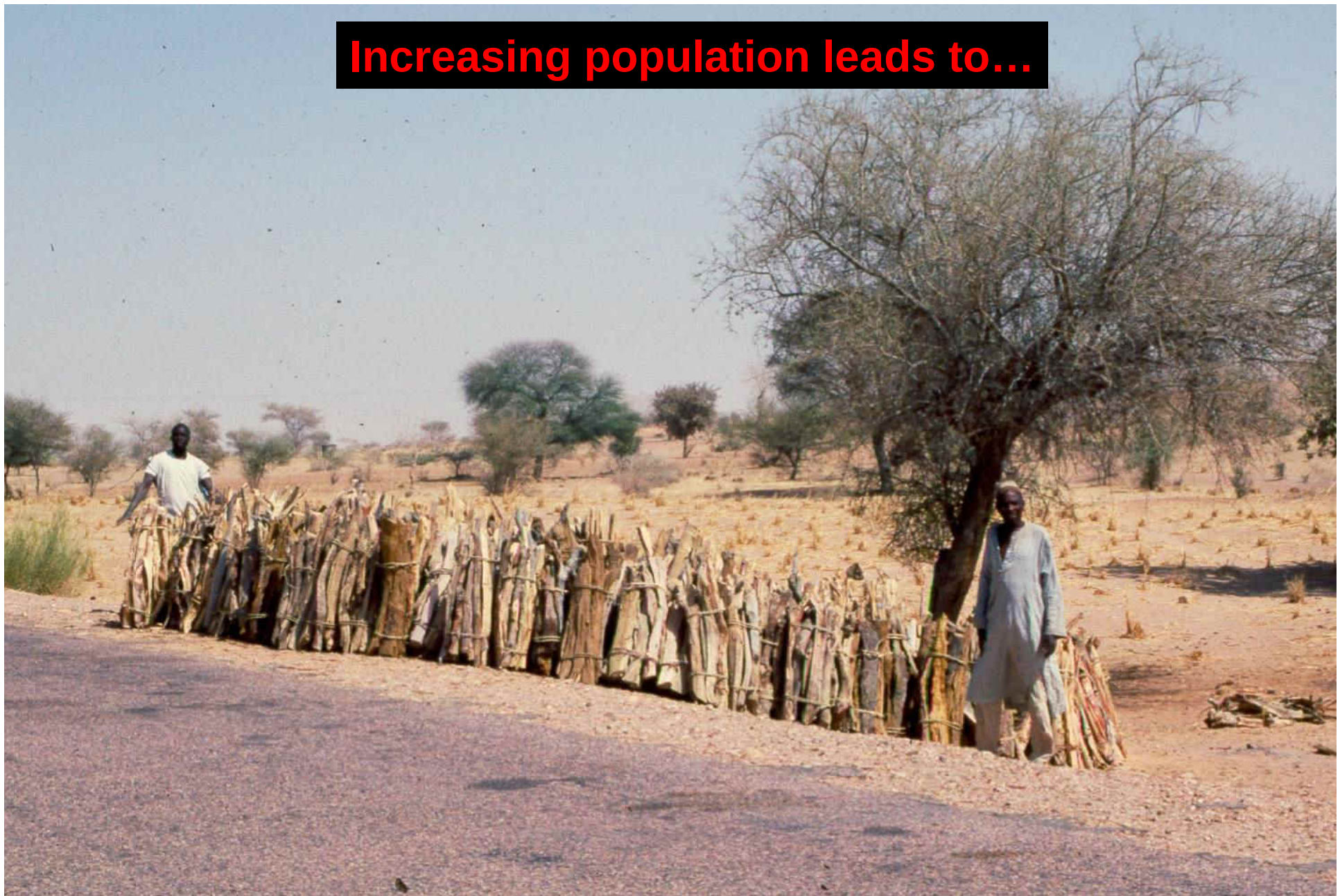
... overgrazing
Zinder area, Niger, ~400 mm

Increasing population leads to...



**...forest resources reduction for ... local use
Zinder area, Niger, ~400 mm**

Increasing population leads to...



**...forest resources reduction to feed enlarging cities in fuelwood
Zinder area, Niger, ~400 mm**

Increasing population leads to...



**...forest resources reduction to feed enlarging cities in fuelwood
Zinder area, Niger, ~400 mm**

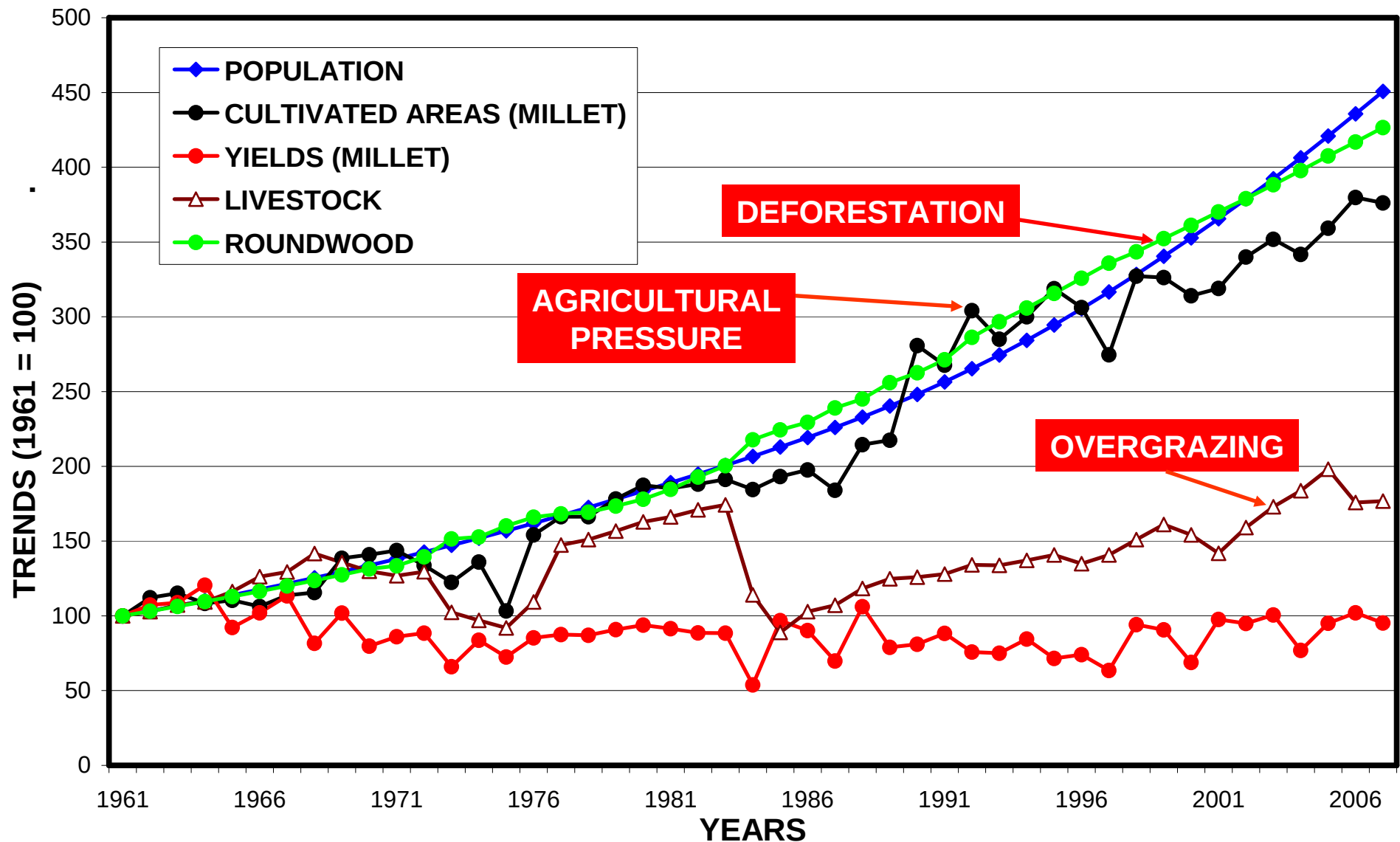
Increasing population leads to...



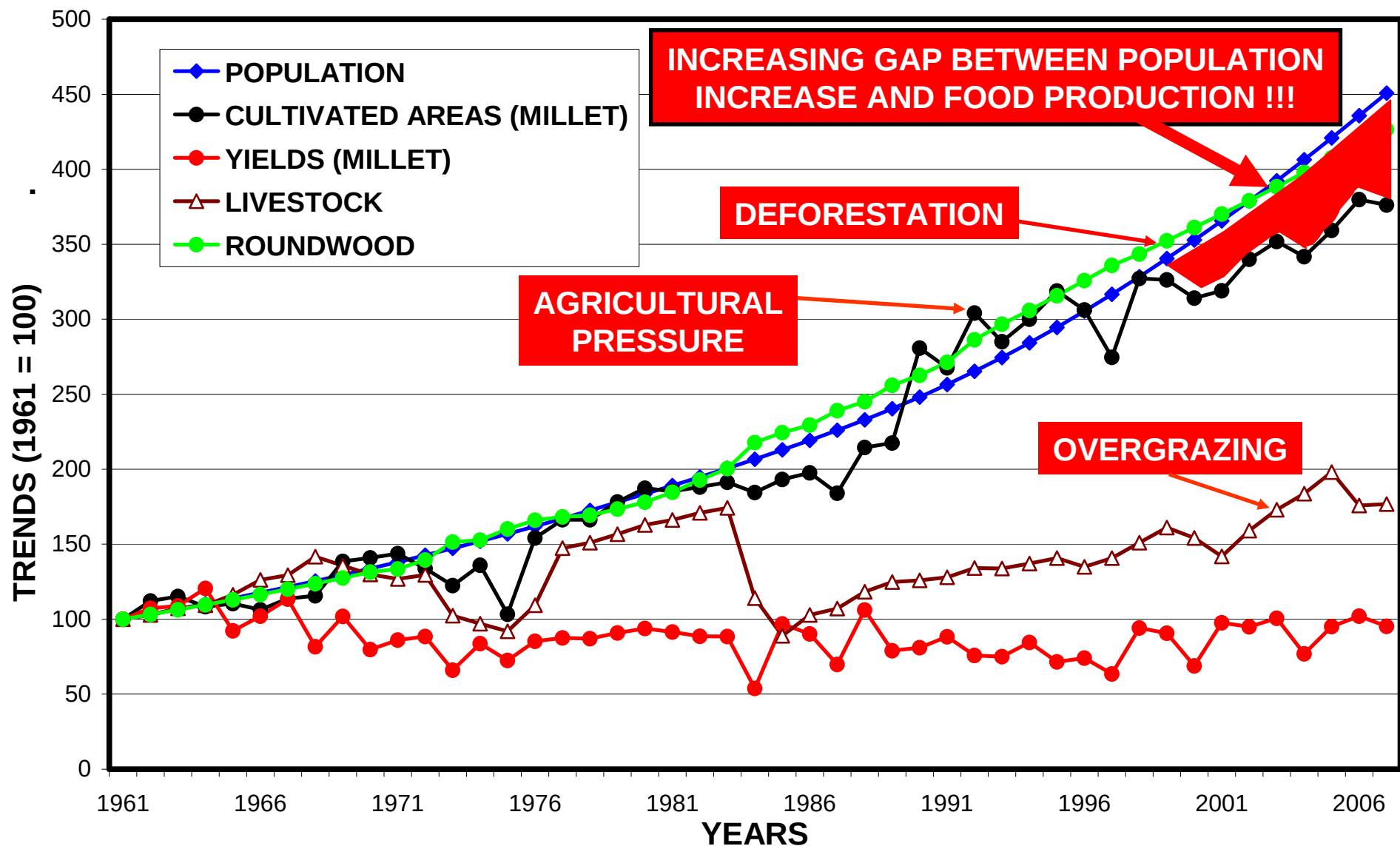
NIGER: 1990-2005: Change in extent of forest is -35%

**...forest resources reduction to feed enlarging cities in fuelwood
Zinder area, Niger, ~400 mm**

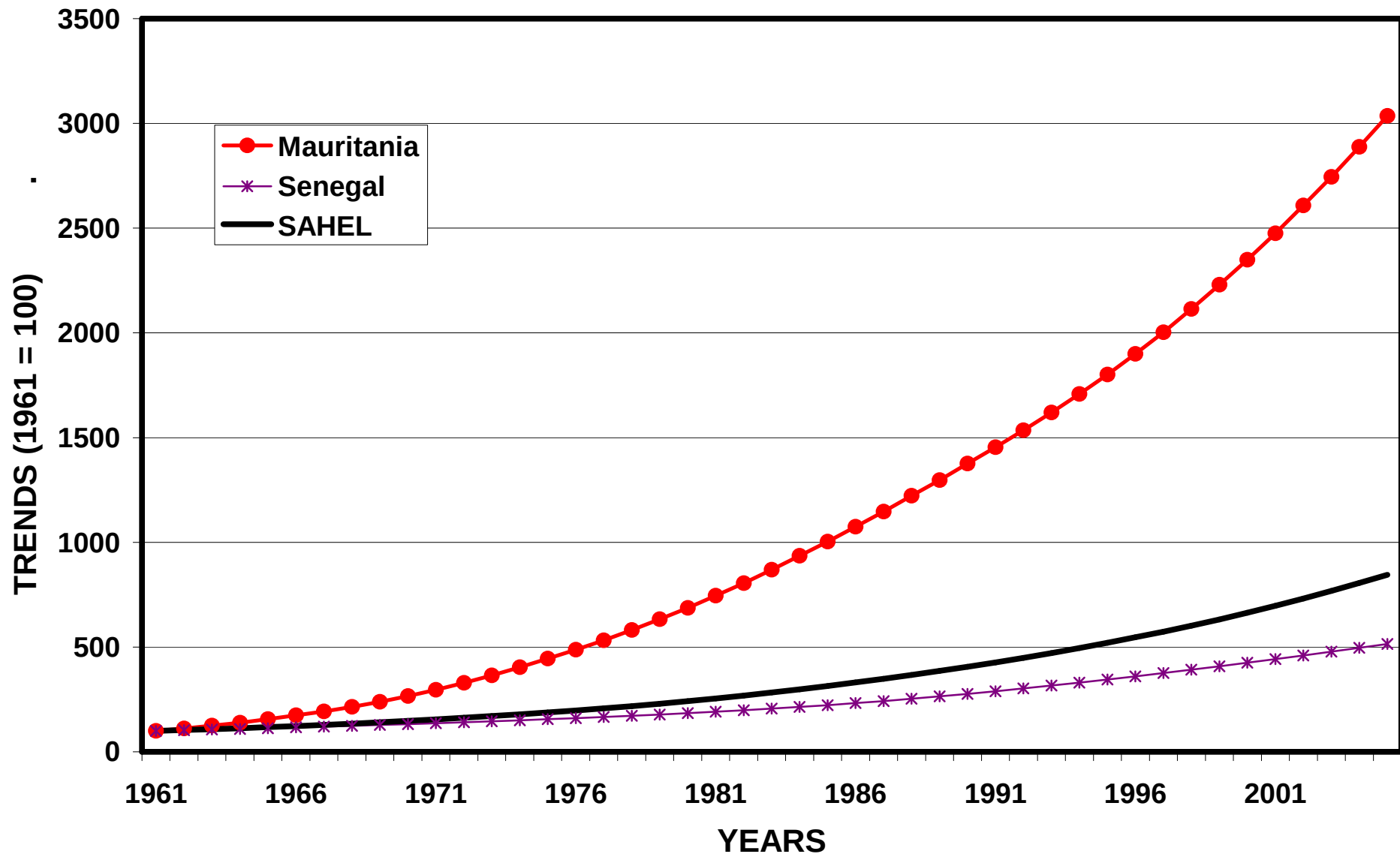
Human pressure trends in the Sahel (1961 – 2007) (1961 = 100)



Human pressure trends in the Sahel (1961 – 2007) (1961 = 100)



Urban population trends in the Sahel (1961 – 2005) (1961 = 100)



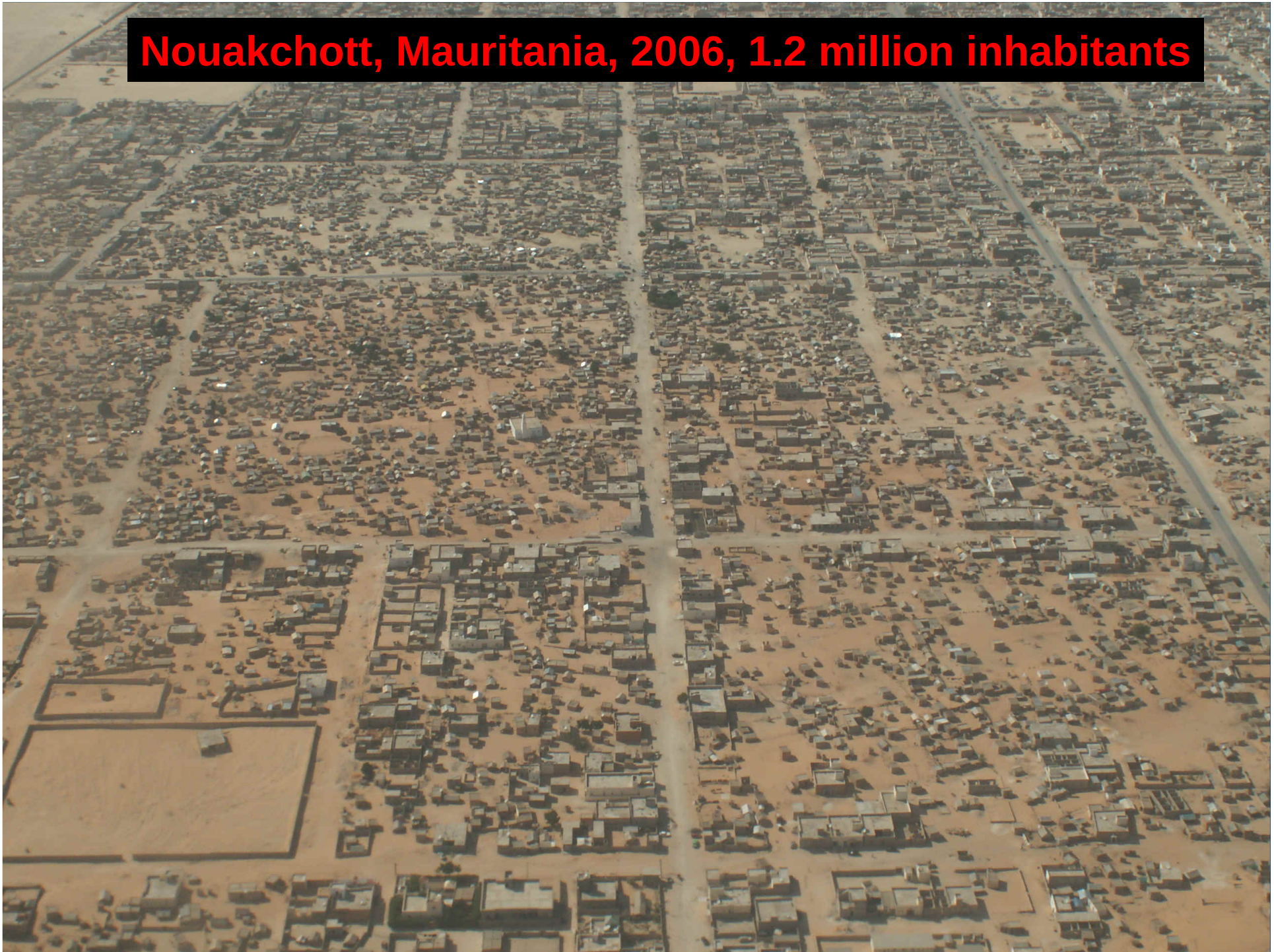
Nouakchott, Mauritania, 1951, small village



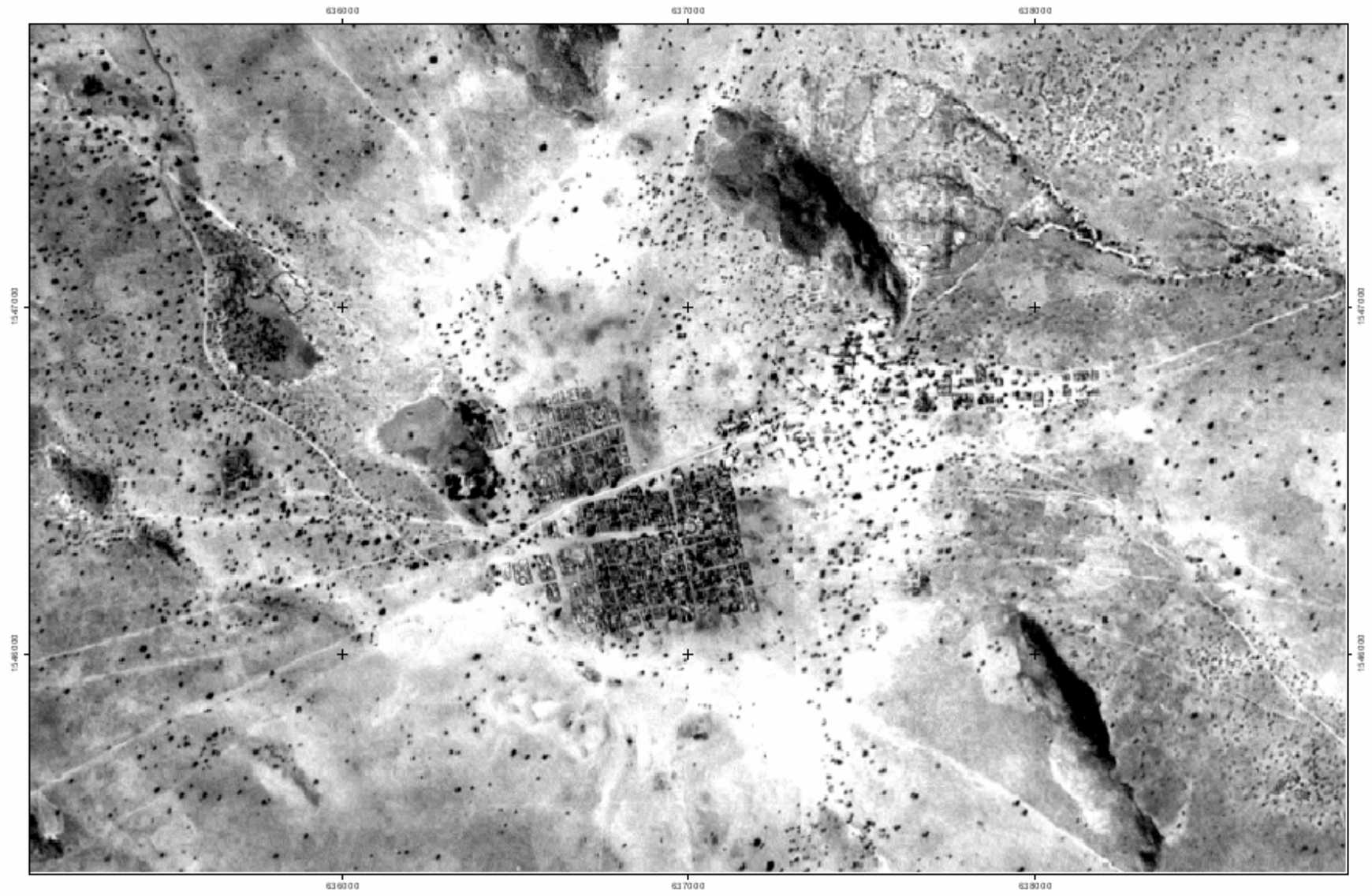
Nouakchott, Mauritania, 2006, 1.2 million inhabitants



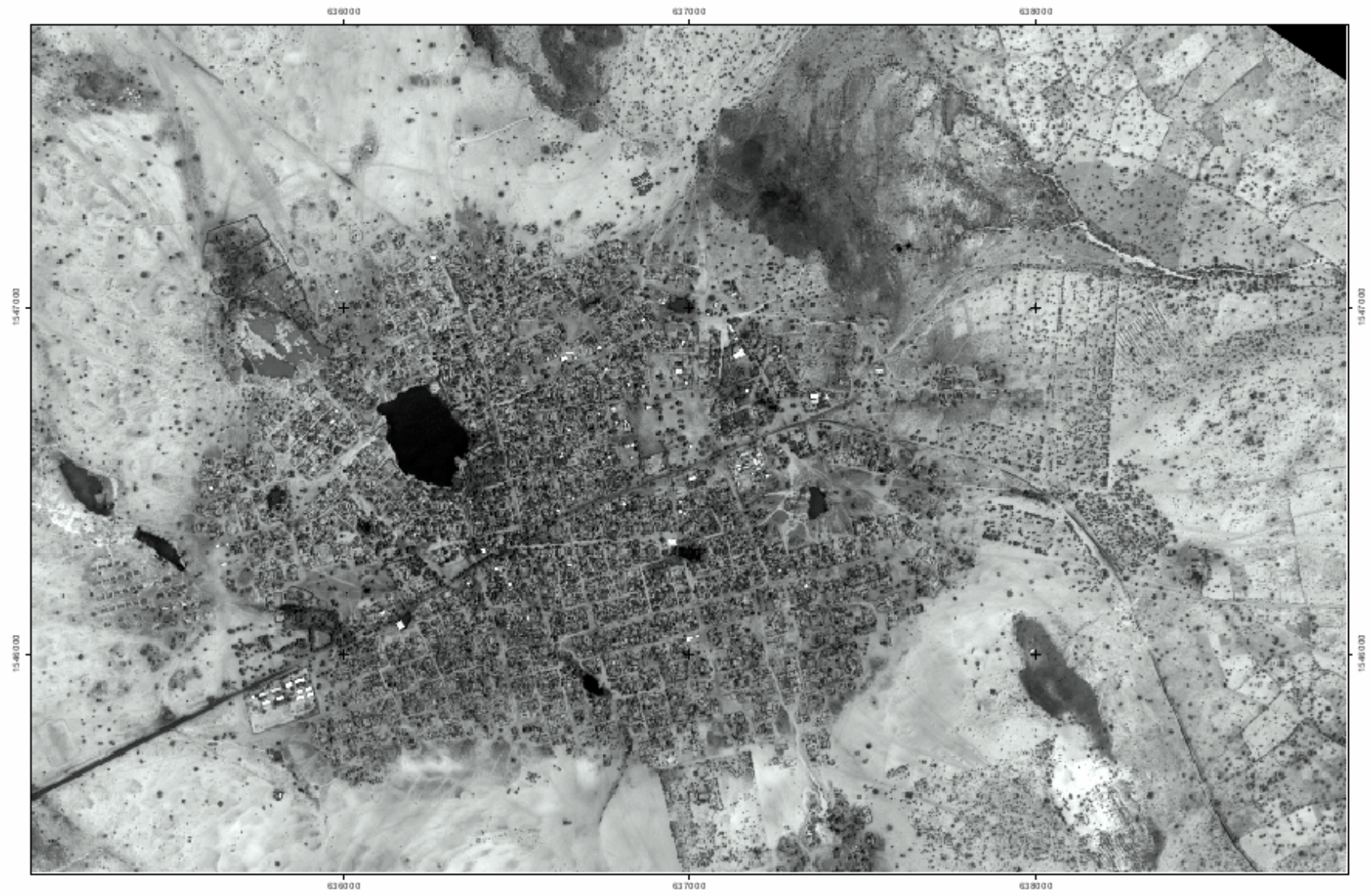
Nouakchott, Mauritania, 2006, 1.2 million inhabitants



Photos aériennes de 1957 (Gouré – Niger)



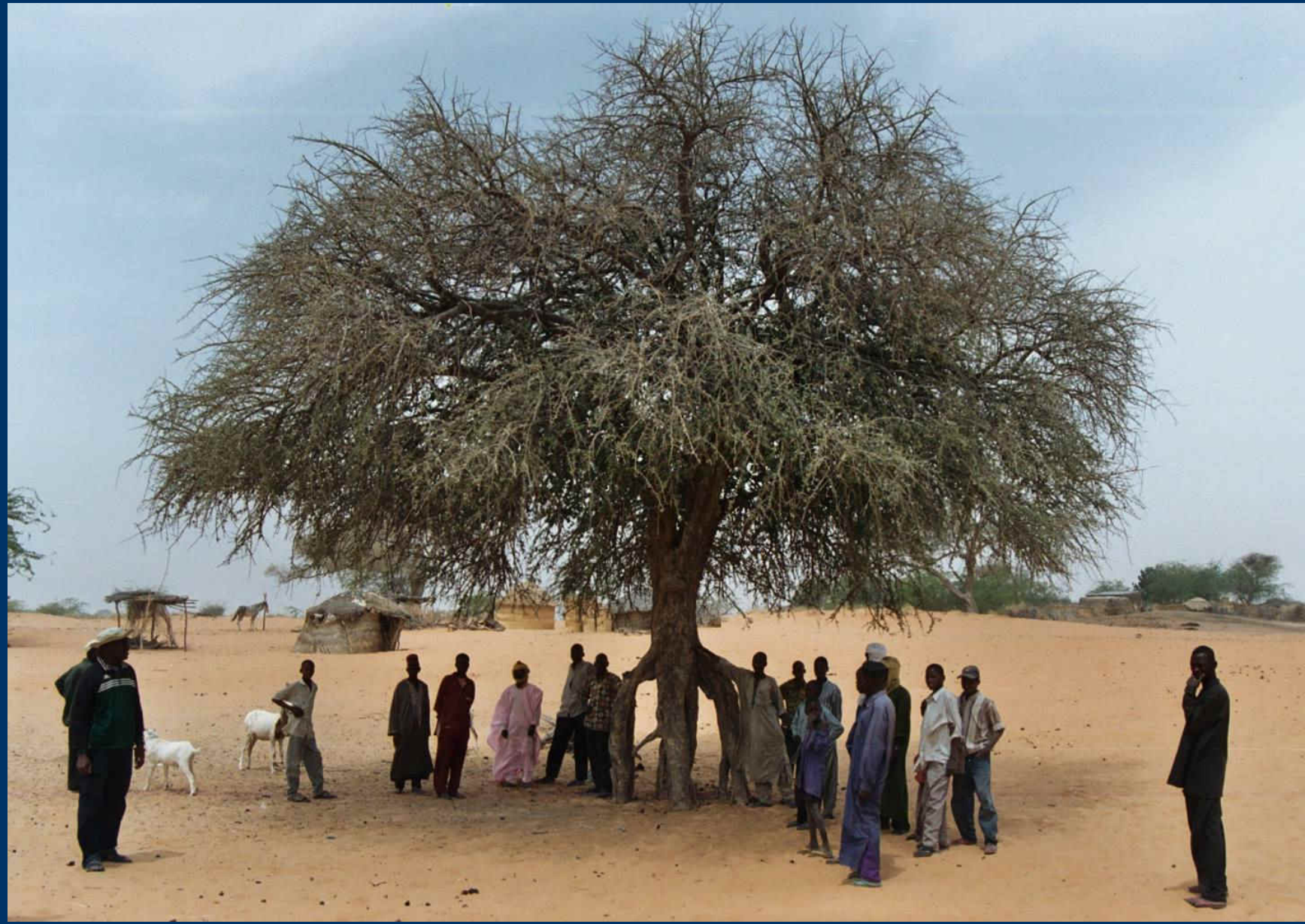
Quickbird (12.08.2002) (Gouré – Niger)



Geomorphological consequences



**...sand movement threatening infrastructures...
Gouré area, Niger, ~300 mm**



...soil erosion witnessed by tree roots...
Gouré area, Niger, ~300 mm



...sand movement threatening roads...
Gouré area, Niger, ~300 mm



...sand movement impacting roads...
Gouré area, Niger, ~300 mm



...totally degraded soils (sand sea)...
Maine-Soroa area, Niger, ~400 mm

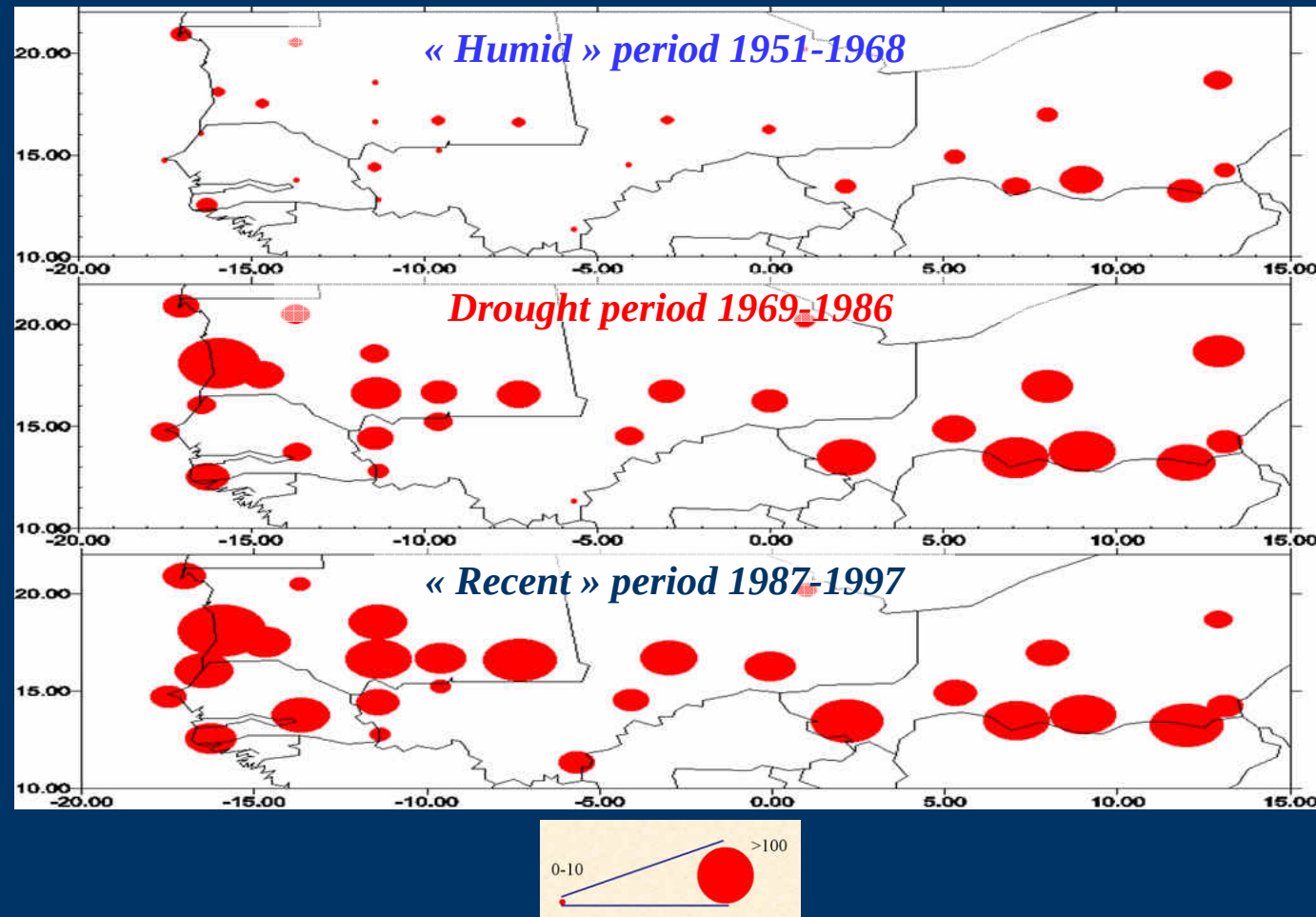


...sand dunes movement threatening oasis...
Maine-Soroa area, Niger, ~400 mm

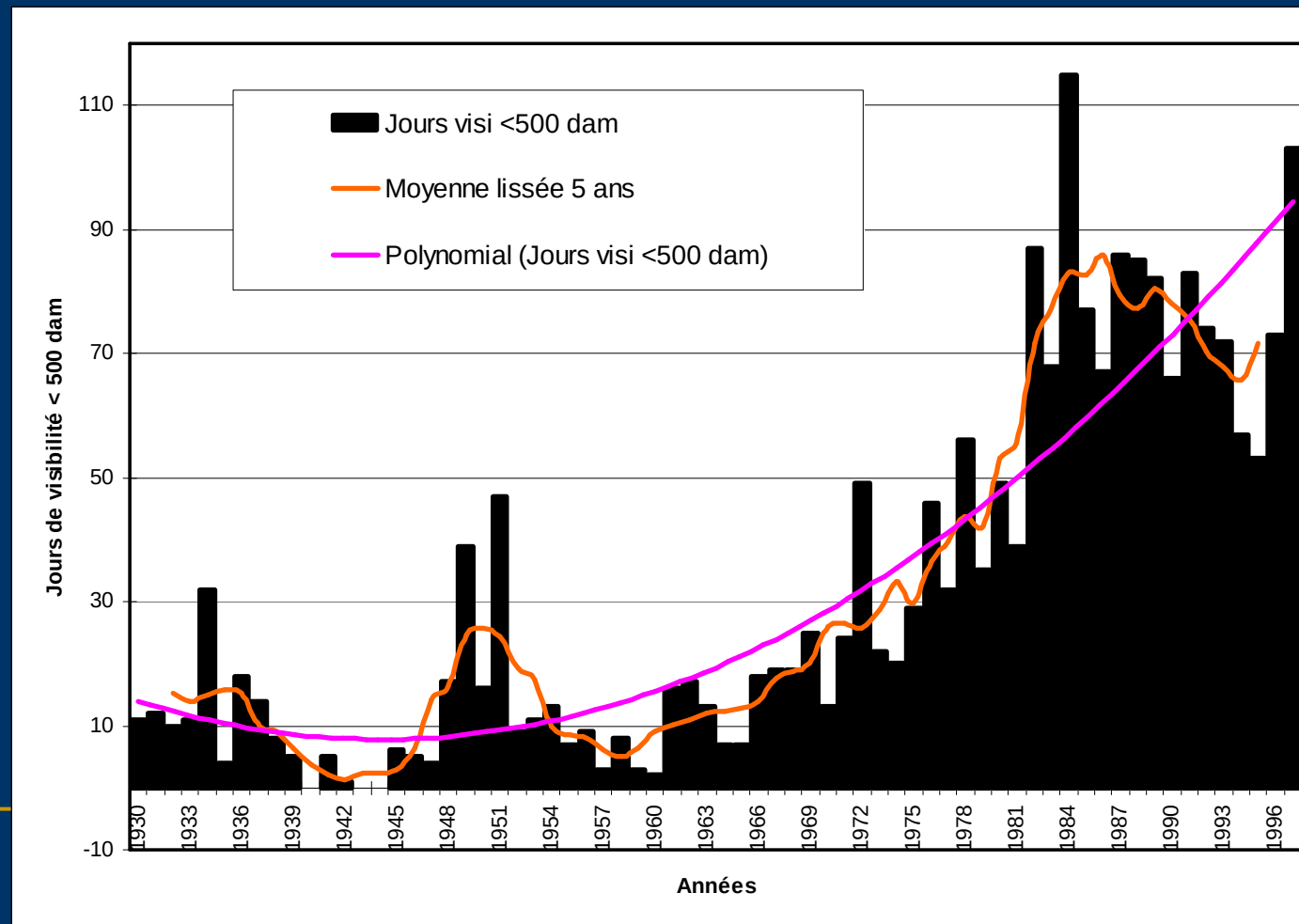


...sand dunes movement threatening oasis...
Maine-Soroa area, Niger, ~400 mm

Dust storm distribution during the dry season in the Sahel



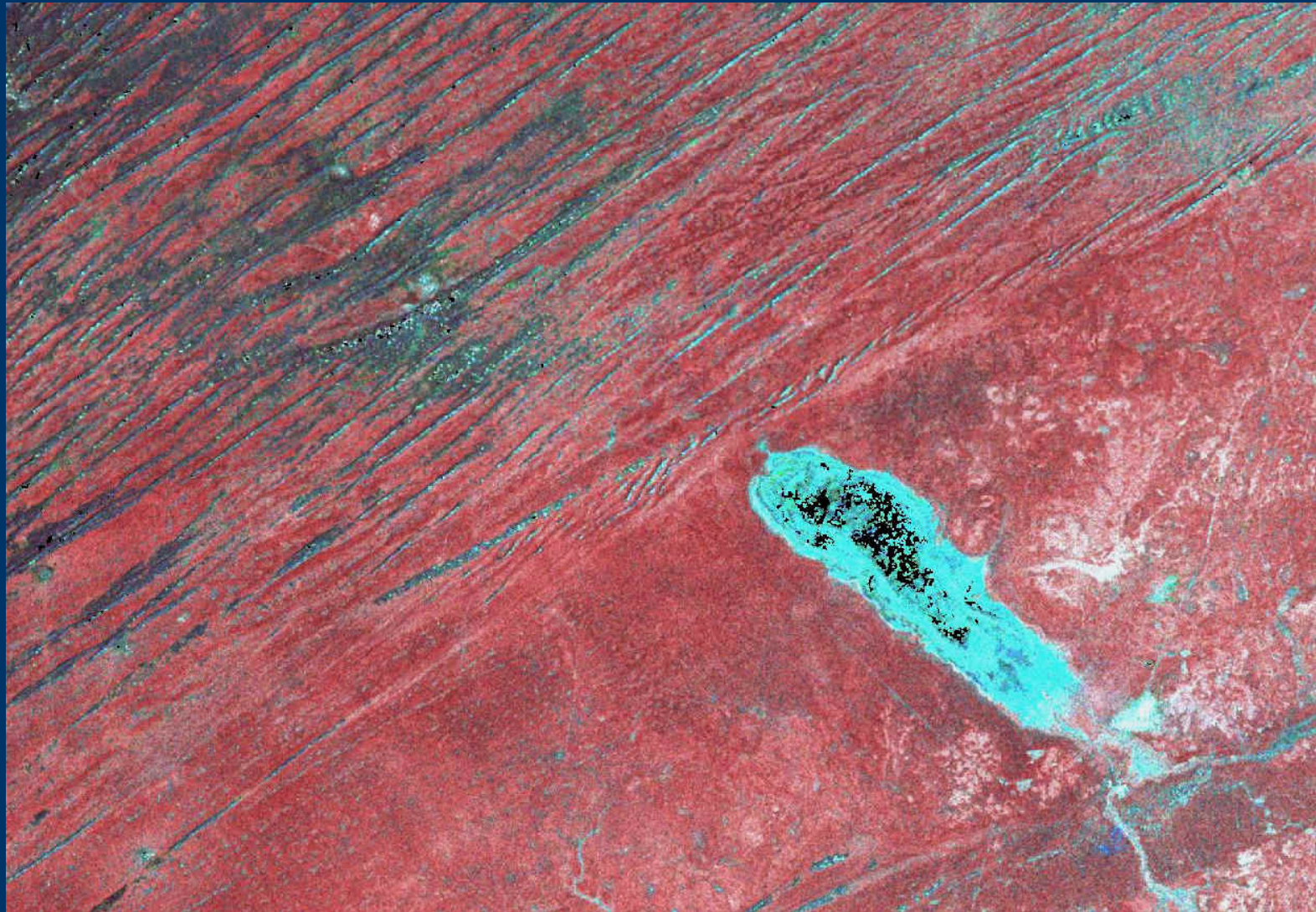
Evolution of the number of days affected by dust storms during the dry season (Tombouctou, Mali, 1930-1997)



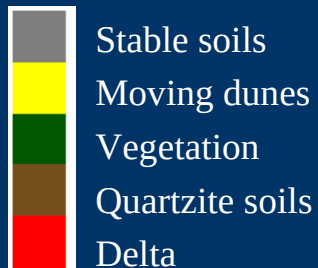
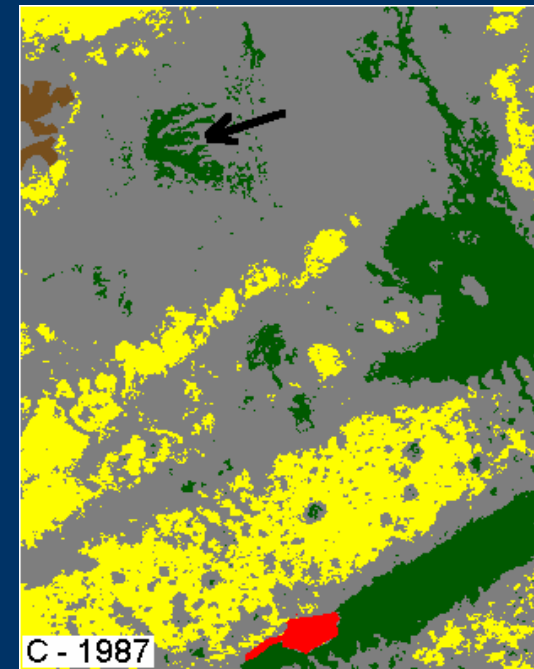
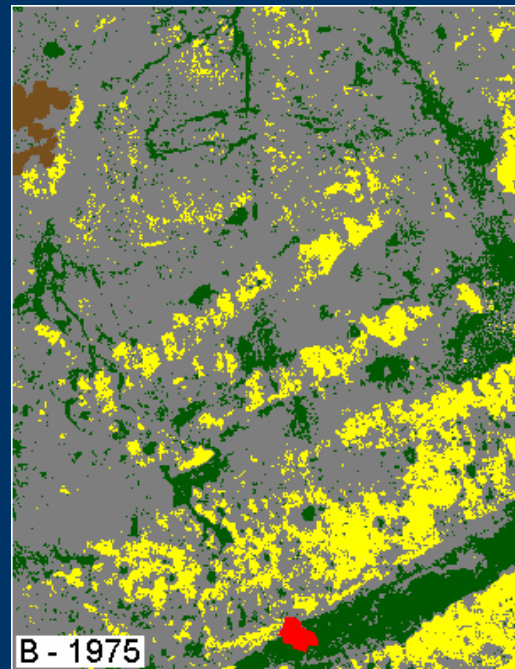
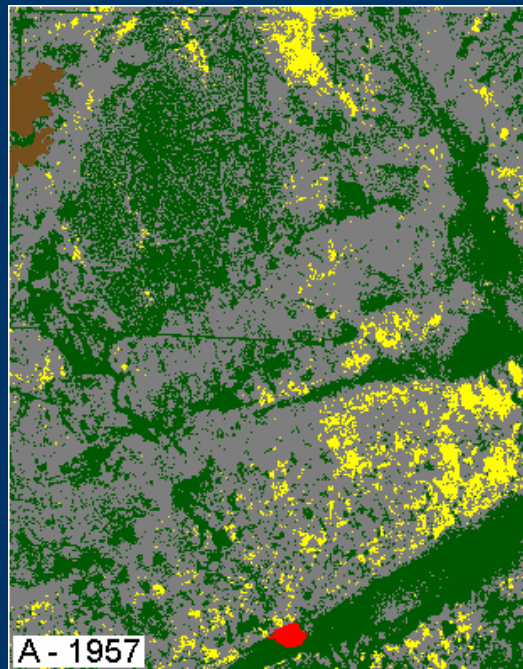




ERS 1/2 SAR (07/08.12.1995) – Interférométrie – Image de cohérence (Aleg – Mauritanie)



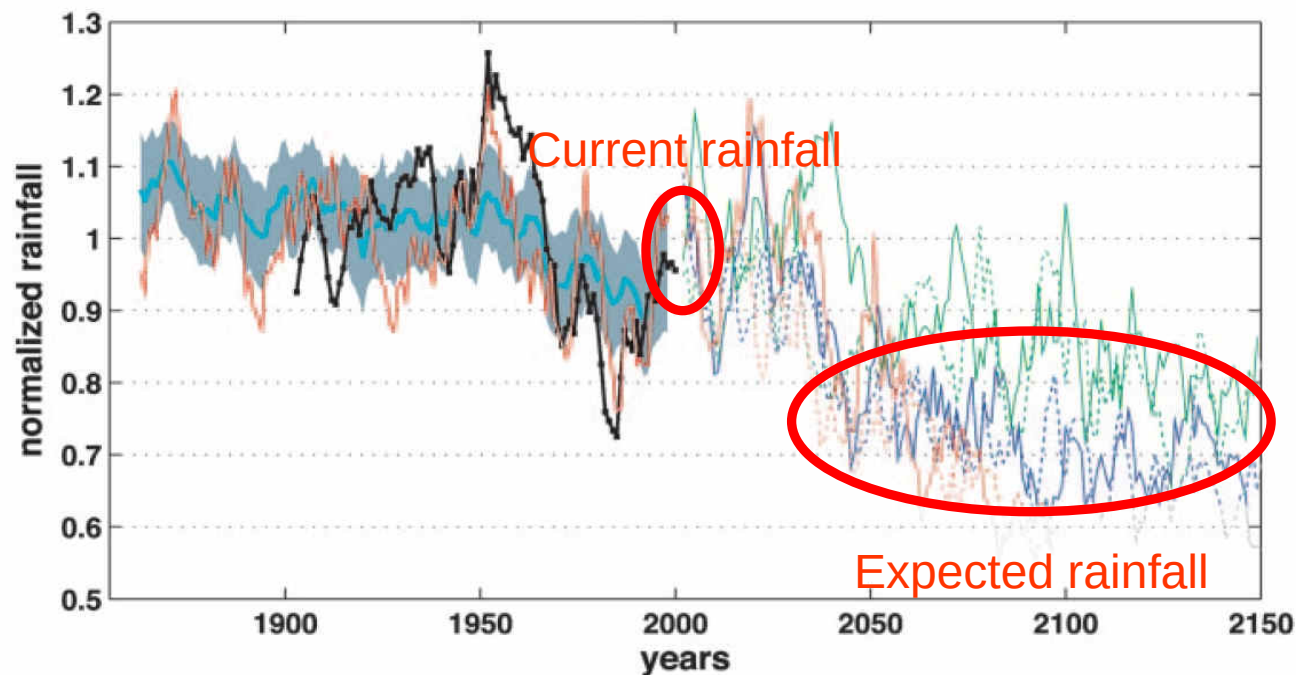
Evolution of the landscape in the Makaortchi-Gayi region (S-E Niger)



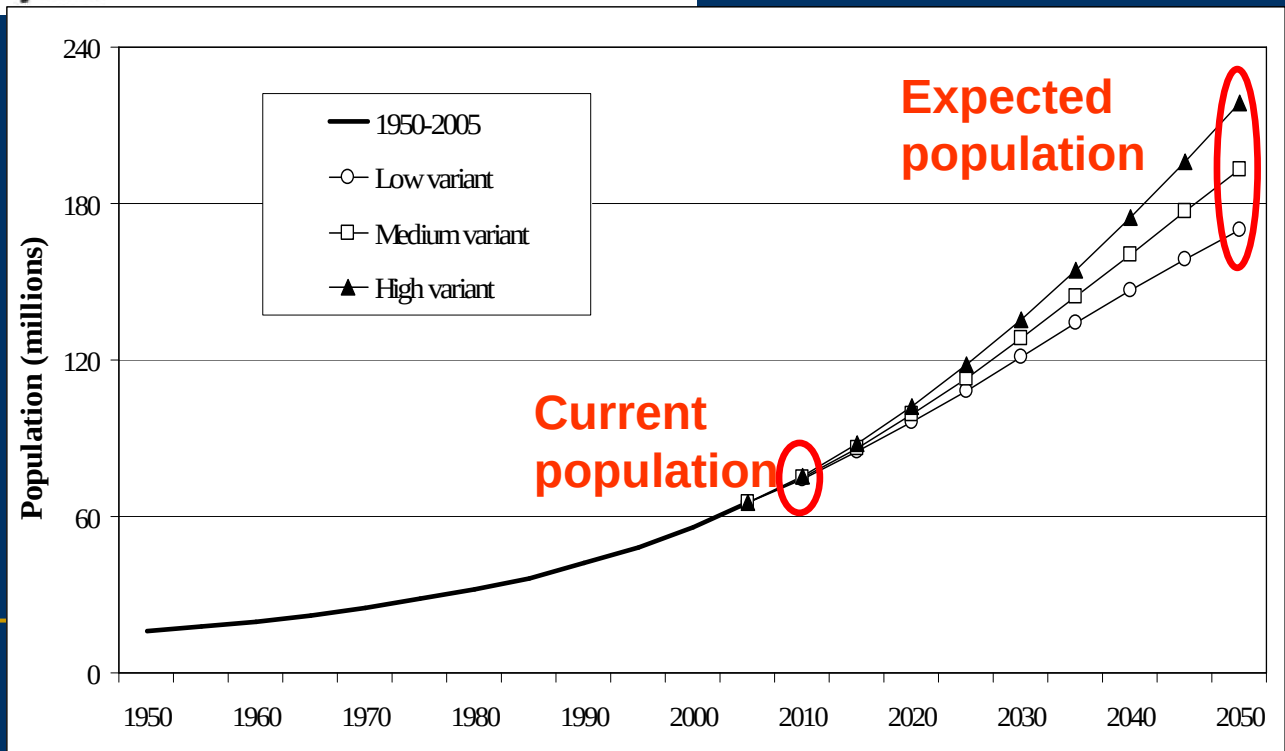
	1957-1958	1975	1987
Vegetation	36%	14%	8%
Moving dunes	6%	14%	23%
Delta	0.2%	0.24%	0.56%







So...
Desertification
in the Sahel in
the near future ?





That's the way it goes...