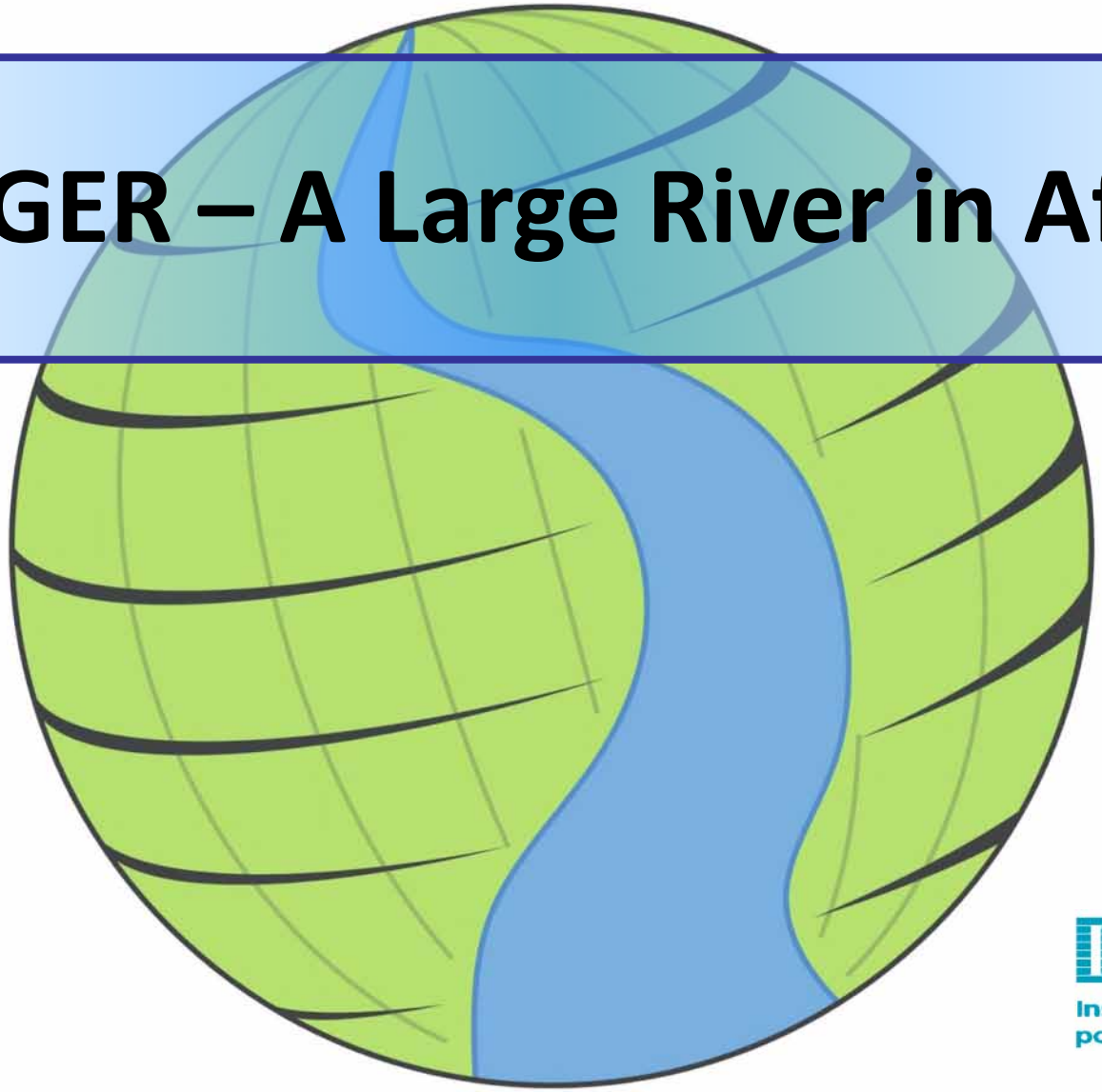
NIGER – A Large River in Africa



HydroSciences Montpellier

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GADO DJIBO Abdouramane
Gil MAHE

OUTLINE

I – BRIEF OVERVIEW OF THE NIGER BASIN AUTHORITY AND THE PHYSICAL AND ENVIRONMENTAL CONTEXT OF THE NIGER BASIN

II – DATA AVAILABILITY AND STRATEGY FOR COLLECTING AND DISSEMINATING DATA AND INFORMATION

IV – CHALLENGES & PERSPECTIVES

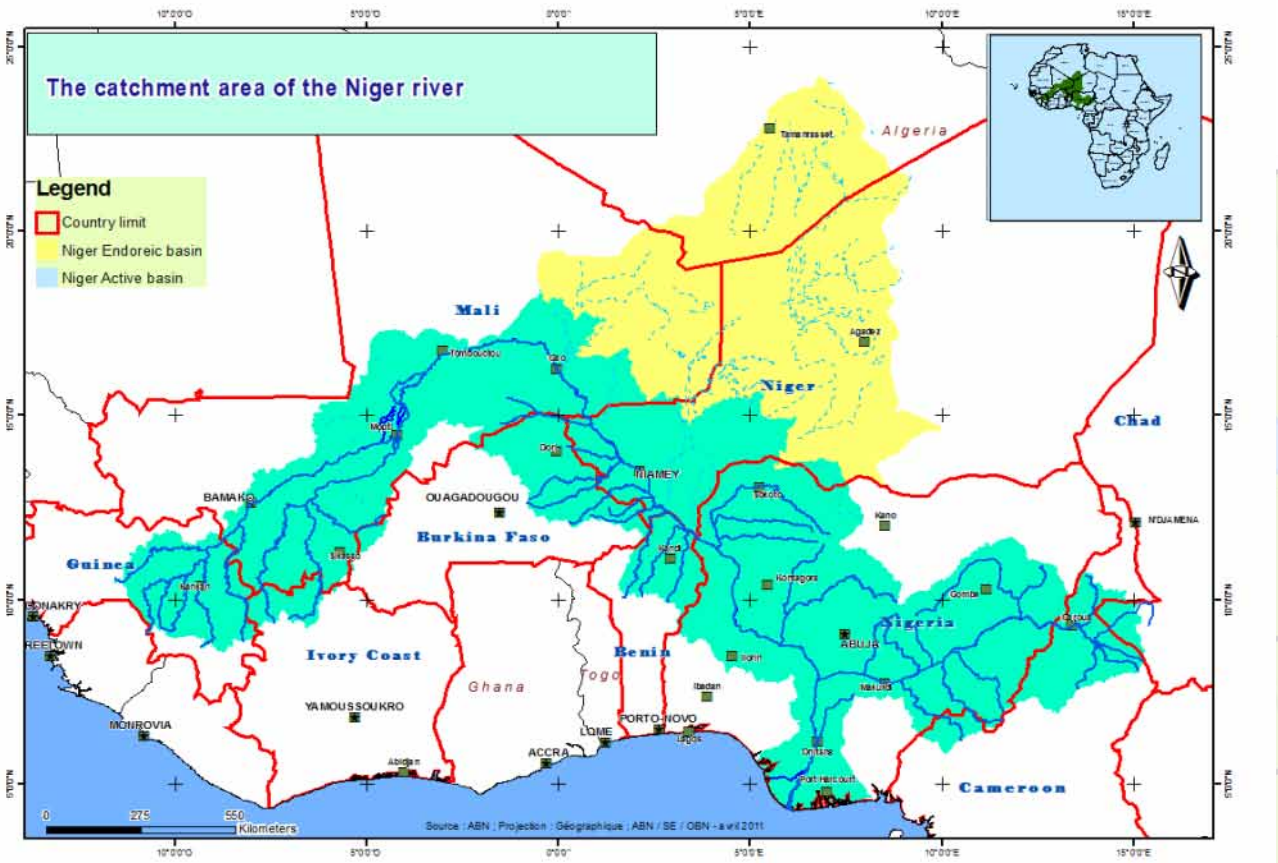
V – CONCLUSIONS

1.1- Physical and environmental context of the Niger Basin

- Niger Basin is located in the heart of West Africa covers 10 countries.

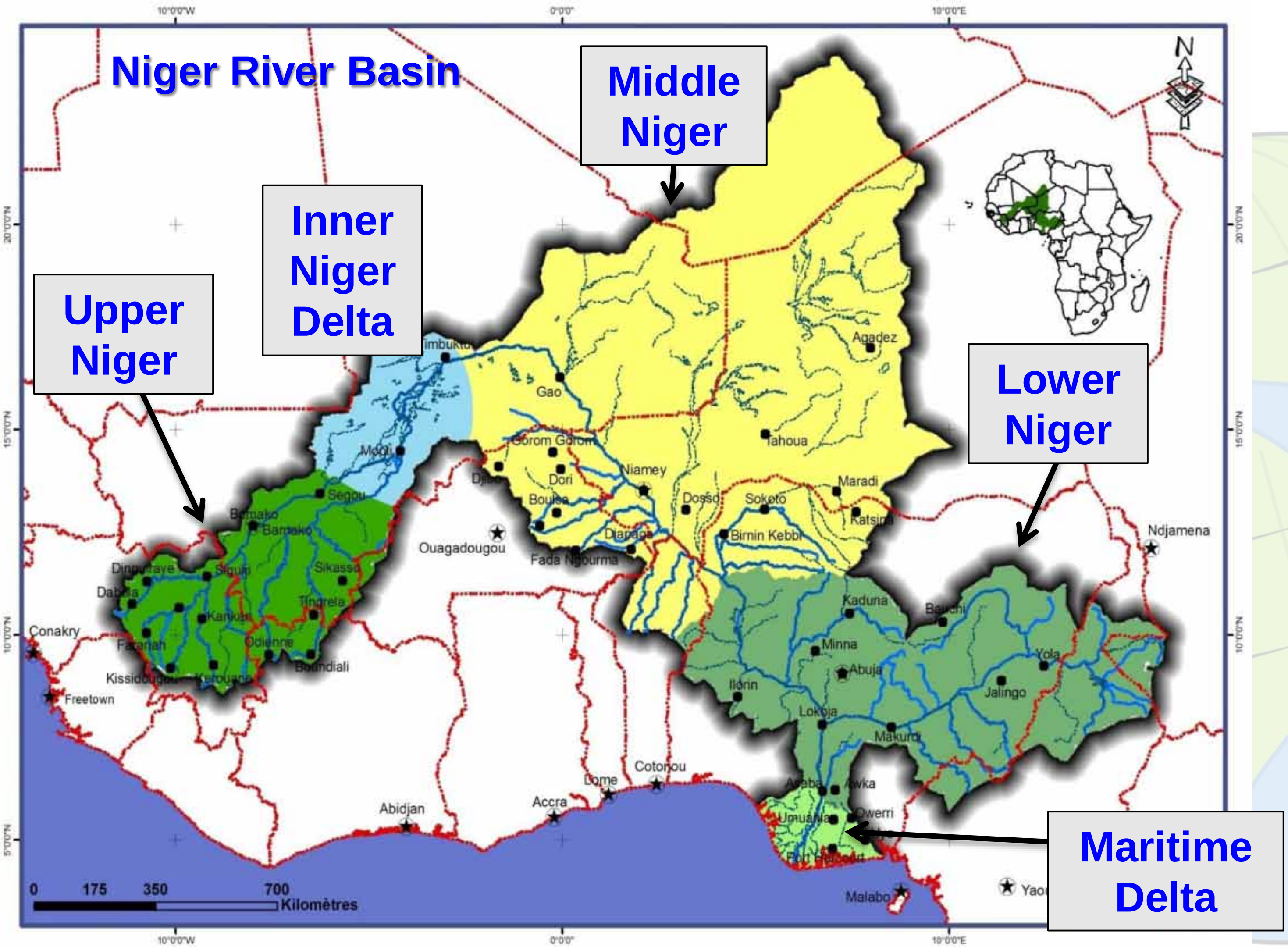
- Niger River has a length of 4200 km and is :
  - the 3rd in Africa
  - the 9th in the Wolrd

- Its theoretical area is 2170000 Km² with an active part of 1500000 Km² spread over the 9 founding countries of the Niger Basin Authority.



Guinée **(6%)** Mali **(26%)** **Niger (23%)** Bénin **(2%)** Nigeria **(33%)**

Burkina Faso **(4%)** **Côte d'Ivoire (1%)** Cameroun **(4%)** Tchad **(1.0%)**



Niger River Basin
Middle Niger
Inner Niger Delta
Upper Niger
Lower Niger
Maritime Delta
Timbuktu
Agadez
Gao
Tahoua
Mopti
Gorom Gorom
Niamey
Dori
Segou
Maradi
Dosso
Sokoto
Katsina
Bamako
Birnin Kebbi
Ouagadougou
Fada Ngourma
Ndjamena
Sikasso
Kaduna
Bauchi
Conakry
Faranah
Minna
Abuja
Yola
Jalingo
Boundiali
Ilorin
Freetown
Lokoja
Makurdi
Cotonou
Lome
Abidjan
Accra
Awka
Owerri
Malabo
0 175 350 700 Kilomètres

1.2- Niger Basin Authority

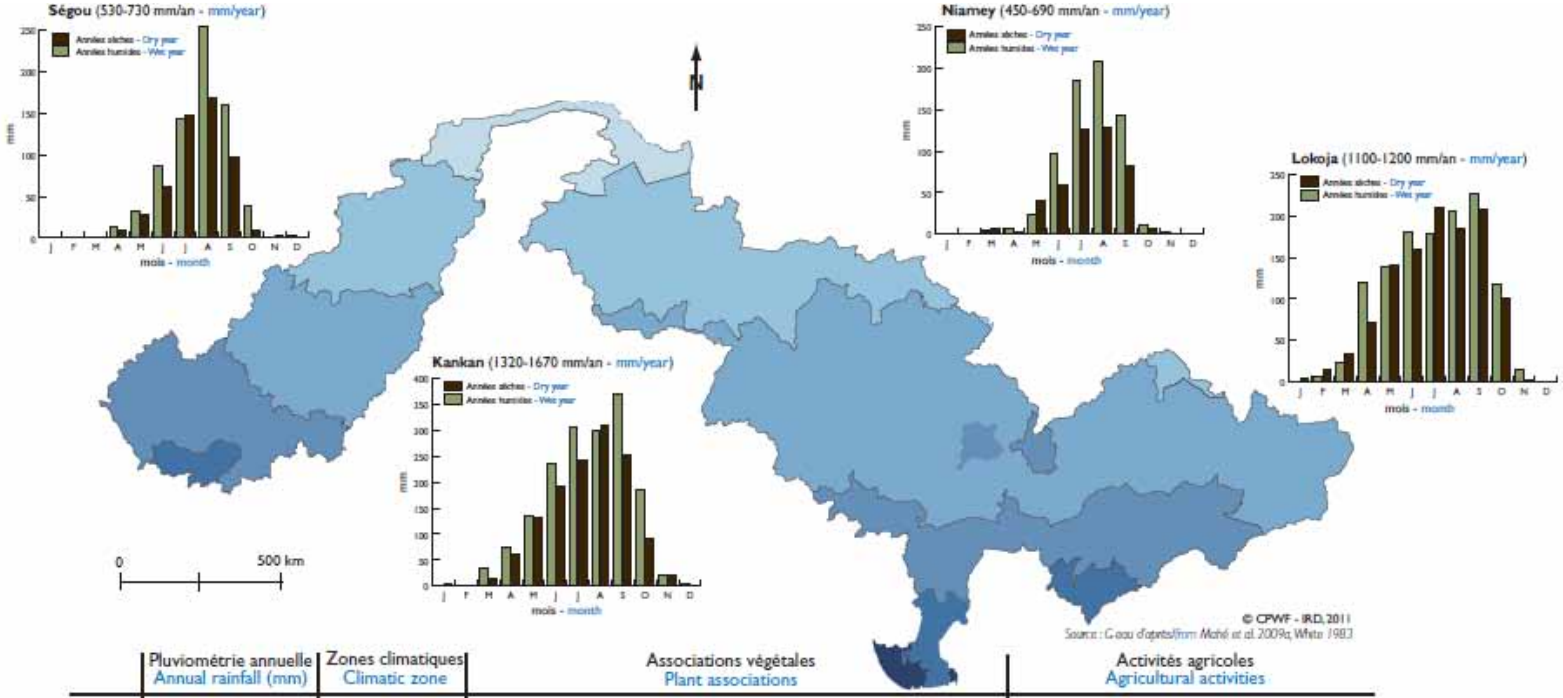
► The Niger Basin Authority (NBA) was created on 21 November 1980 in Faranah (Guinea) by nine (9) countries sharing the basin: Benin, Burkina Faso, Cameroon, Ivory Coast, Guinea, Mali, Niger, Nigeria and Chad

► Mission: «Promote cooperation among member countries and ensure integrated development of the Niger Basin through the development of its resources in the fields of :

- Hydraulics, Energy
- Agriculture, livestock, Fisheries
- Forestry and logging
- Transports and communications».

Hydrology and Hydraulics

RAINFALL AND AGROCLIMATIC ZONES



	Pluviométrie annuelle Annual rainfall (mm)	Zones climatiques Climatic zone	Associations végétales Plant associations	Activités agricoles Agricultural activities
	< 300	Saharienne Saharan	Steppes désertiques Desert steppe	Pas de cultures, pâturages saisonniers occasionnels No crops, occasional seasonal pasture
	301 - 750	Sahélienne Sahelian	Savanes et steppes, herbeuses, arborées et arbustives Semi-desert grassland, shrubland and bushland	Mil aléatoire, pâturages saisonniers Occasional millet, seasonal pasture
	751 - 1 200	Soudanienne Sudanese	Savanes herbeuses, boisées/arborées et savanes parcs Grassland, woodland and savannah parkland	Mil, sorgho, haricot, arachide et sésame Millets, sorghum, green beans, groundnut, sesame
	1 201 - 1 800	Guinéenne Guinean	Forêts humides sempervirentes, ou à feuilles caduques, et savanes secondaires Semi-evergreen rainforest, or woodland, and secondary grassland	Sorgho, maïs, arachide, taro, pois de terre Sorghum, maize, groundnut, coco yam, peas
	1 801 - 2 500	Sub-équatoriale Subequatorial	Forêts humides sempervirente et marécages. Prairies au dessus de 1 000 m Lowland rainforest and swamp forest. Grassland above 1 000 m	Maïs, coton, canne à sucre, patate douce, igname Maize, cotton, sugar cane, sweet potato, yam
	> 2 500	Equatoriale côtière Equatorial coastal	Forêts ombrophiles, mangroves et savanes herbeuses Secondary forest, mangroves and grassland	Fruits, manioc, canne à sucre, thé, banane plantain Fruits, cassava, sugar cane, tea, plantain

DAILY RIVER FLOW HYDROGRAPHS

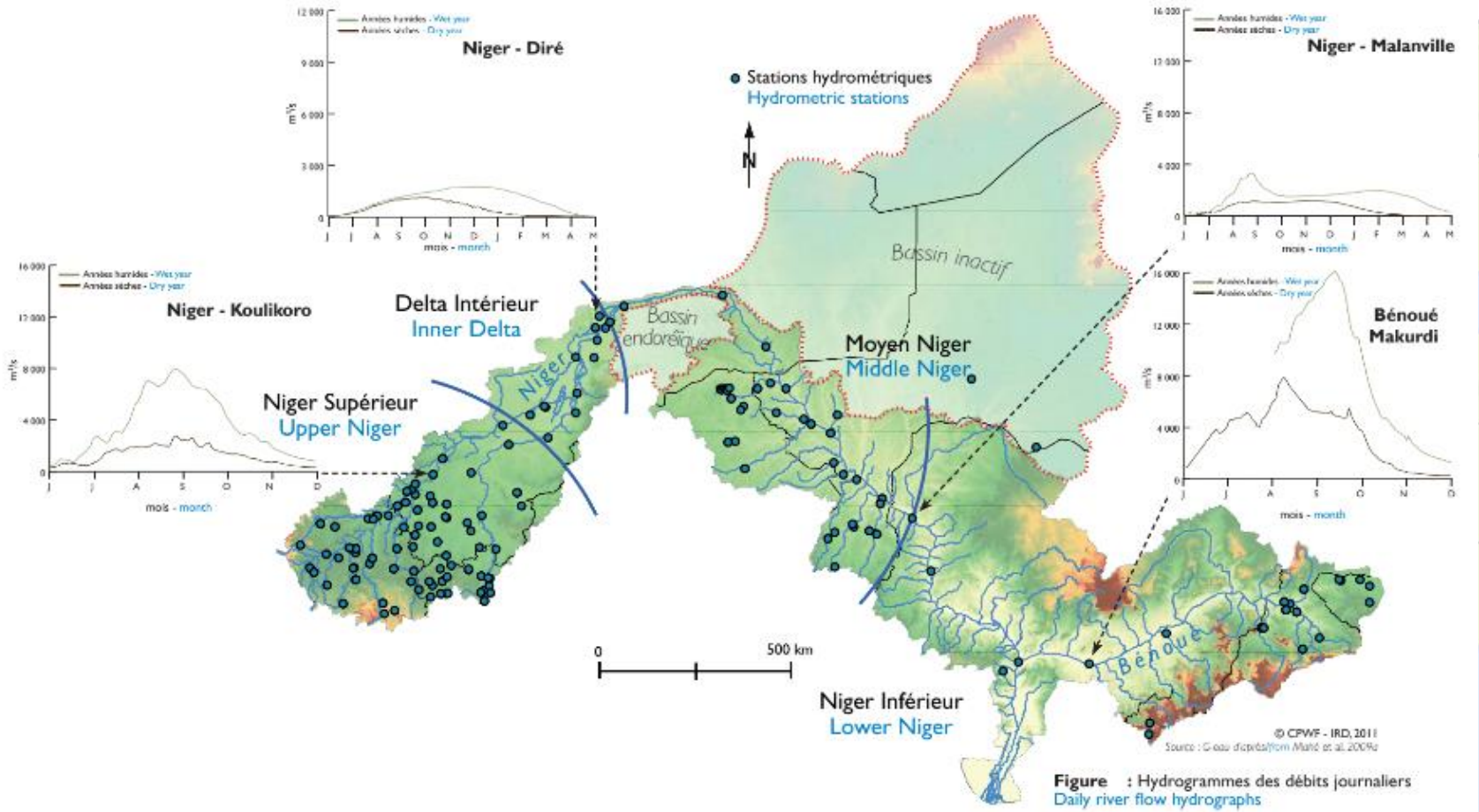
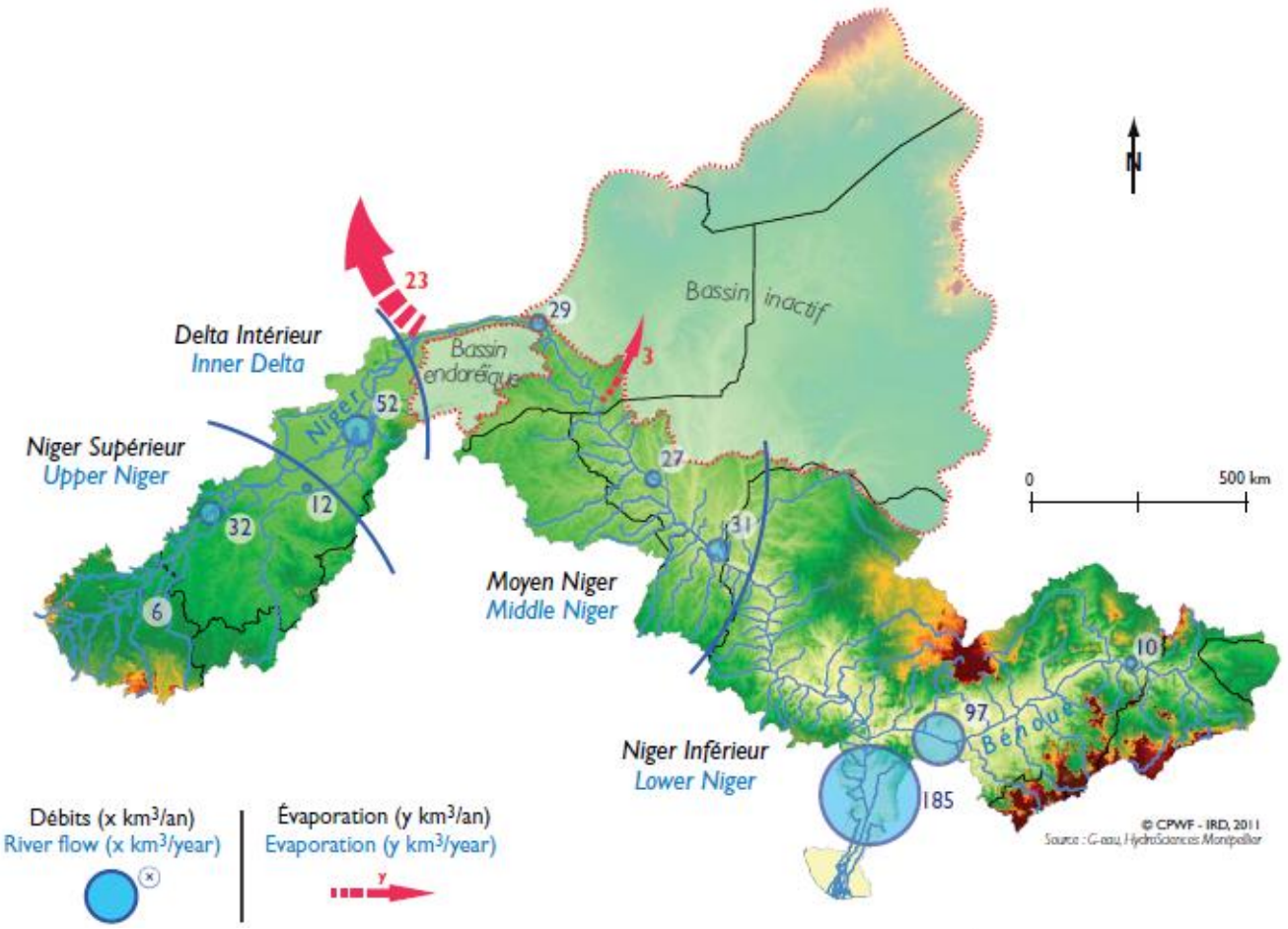


Figure : Hydrogrammes des débits journaliers
Daily river flow hydrographs

L'HYDROGRAPHIE ET LES DÉBITS ANNUELS – RIVER HYDROGRAPHY AND ANNUAL FLOWS

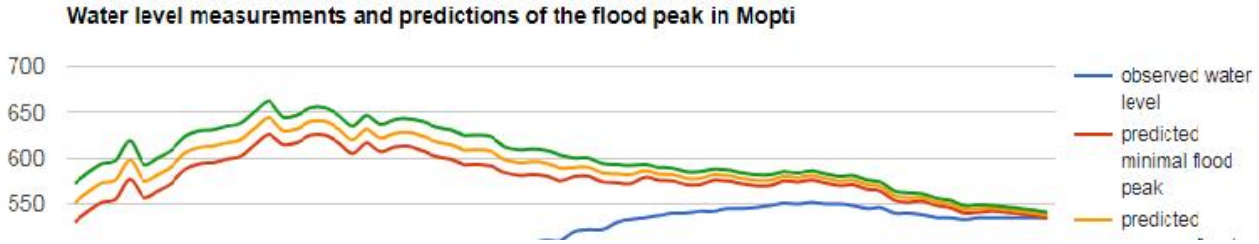


Sediment Transport & Morphodynamics

OPIDIN: https://www.opidin.org/en/floodforecast

Flood forecast 2017

The graph below shows for this year the predicted peak flood level (± confidence interval) in the Inner Niger Delta. The prediction is based on the current measurements of the water level in Mopti combined with the recent rainfall in the Upper Niger Basin. The predicted flood peak is expected to be higher than minimum and lower than maximum and likely near to mean. The prediction of the peak flood level changes during the course of August and September and becomes more accurate in course of time.



LIVESTOCK AND FISHERIES WATER PRODUCTIVITY

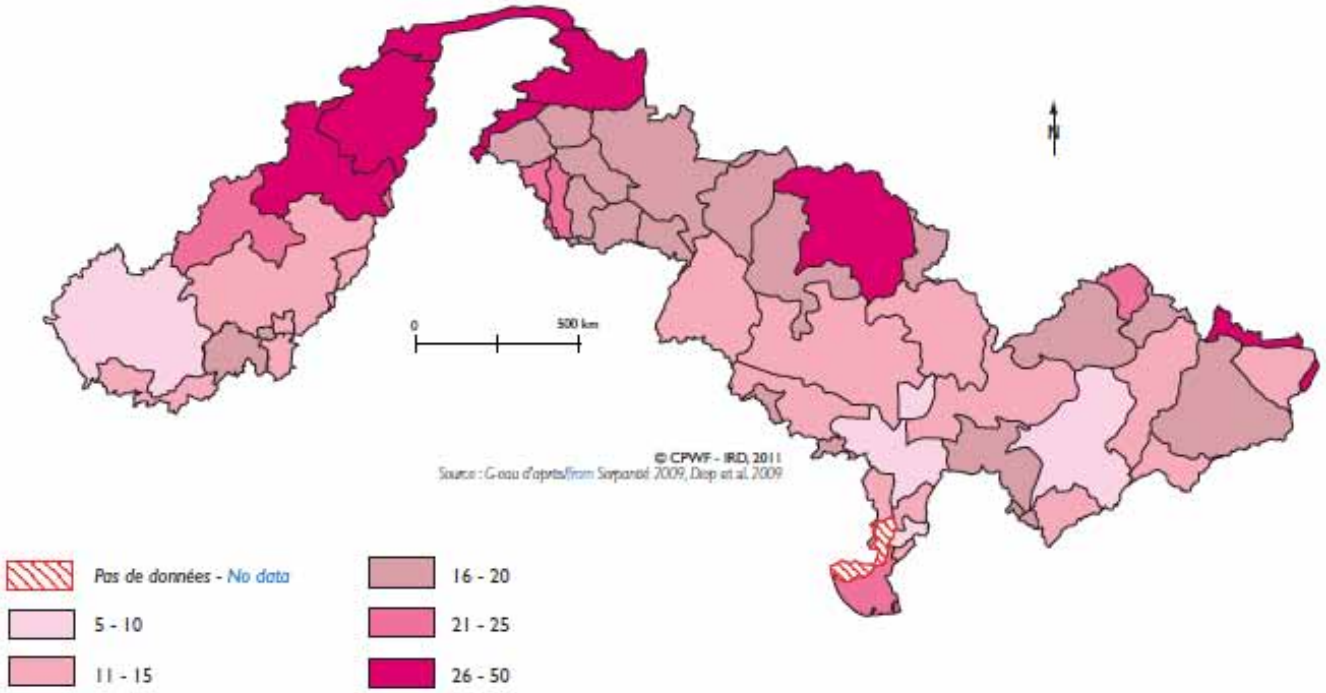
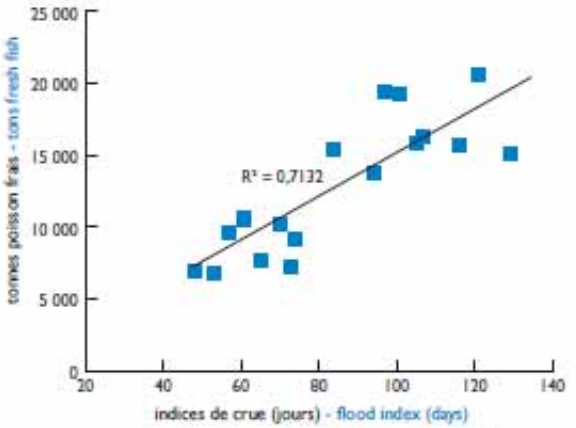


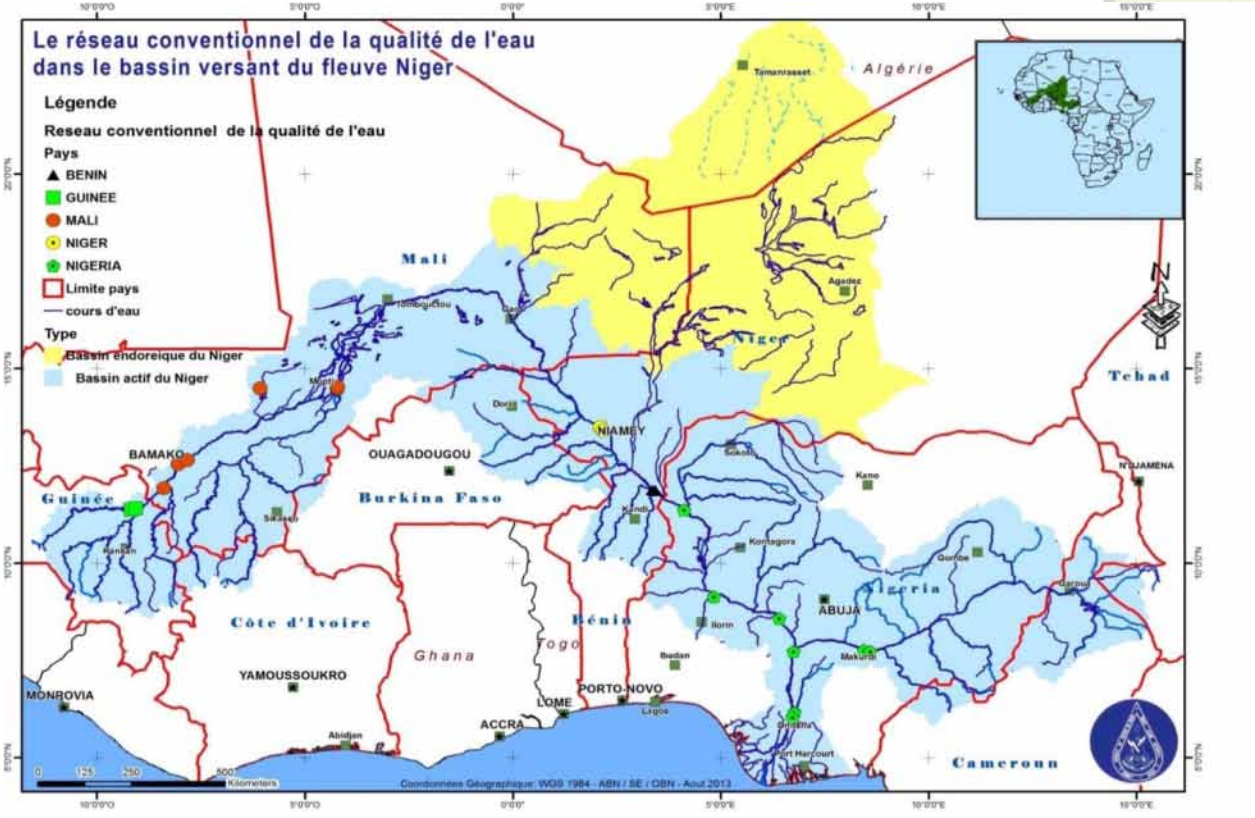
Figure : Productivité de l'eau de l'élevage par provinces (g de poids vif/m³, 1999).
Livestock water productivity per province (g of live weight/m³, 1999)



Quantités de poisson commercialisées à Mopti (année n ; n+1) selon indice de crue (année n)
Fish marketed in Mopti (year n; n+1) according to flood index (year n)

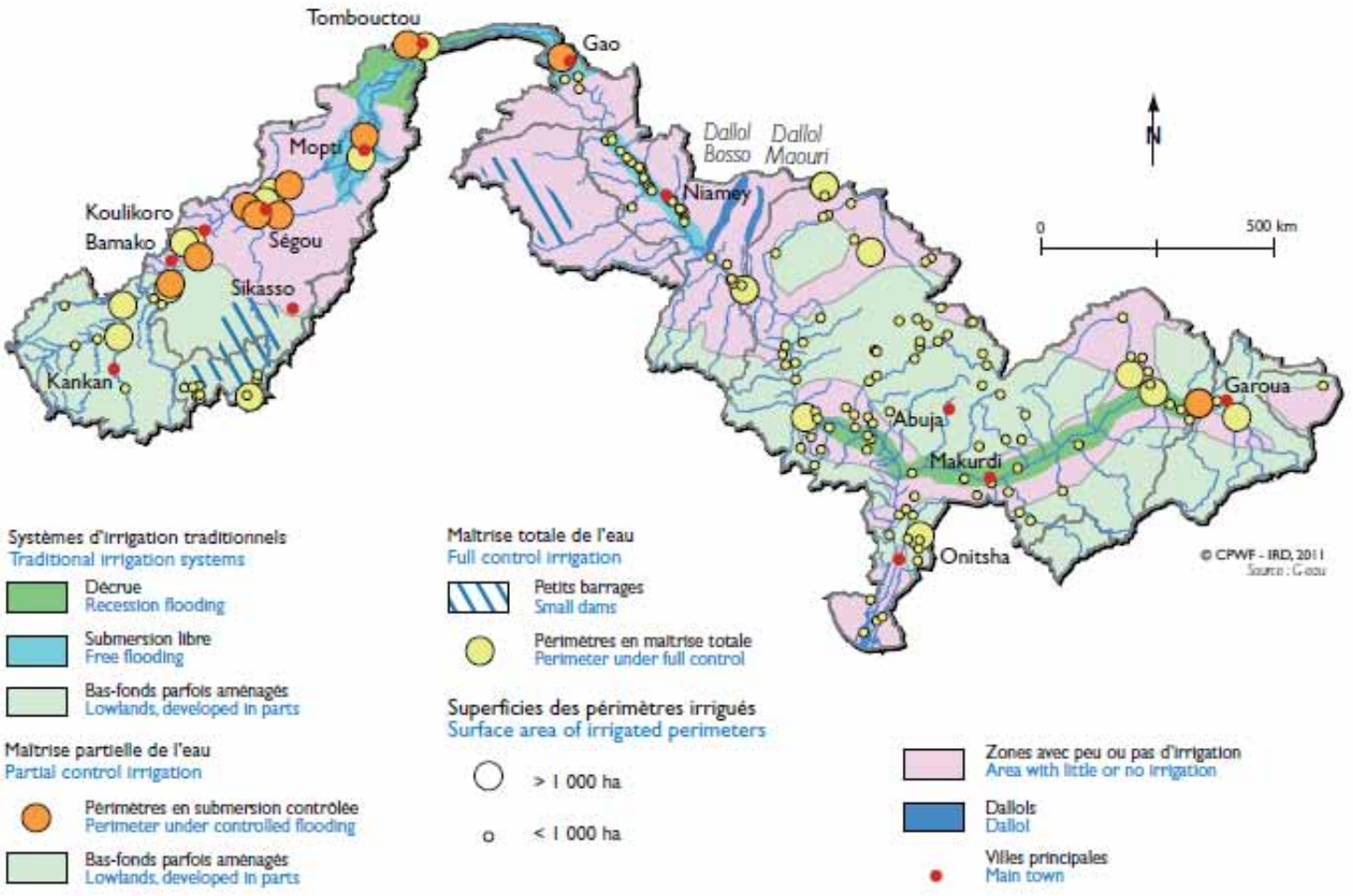
Water Quality and Ecology

Software platform for water quality data management (AXIONNE), updated by physico-chemical parameters from 22 measurement sites located on the main course of the Niger River (primary network)

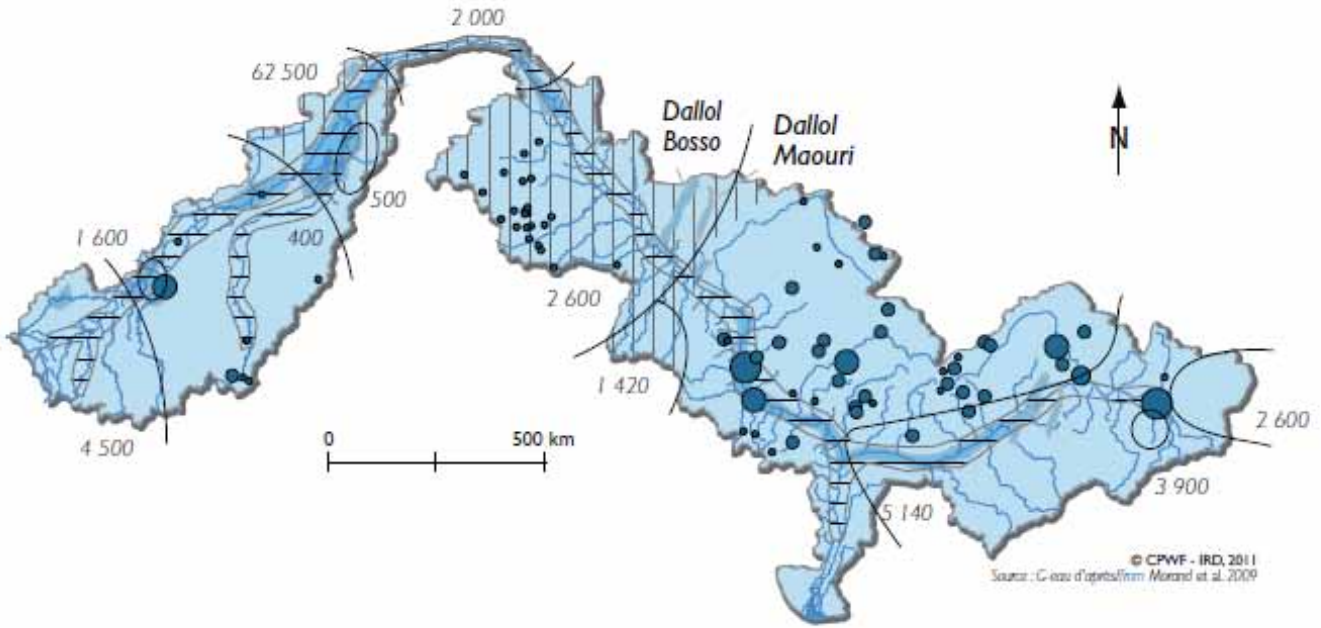


River Management & Socioeconomics

IRRIGATED AGRICULTURAL SYSTEMS



Fishers and fish catch



Quantités de poissons capturées - Fish catch

- Retenues et barrages - Dam and impoundment
  60 à 120 kg/ha/an - 60 to 120 kg/ha/year
- Systèmes fleuves-plaines d'inondation et lacs naturels
  Floodplain and natural lakes
  50 kg/ha/an - 50 kg/ha/year
- Autres systèmes aquatiques - Other aquatic system
  < 50 kg/ha/an - < 50 kg/ha/year

Superficies des réservoirs
Reservoir surface area

- Pas de données - No data
- 0 - 50 km²
- 51 - 200 km²
- 201 - 500 km²
- > 500 km² (Max = 1 270 km²)

Populations de pêcheurs
Fisher groups

- Bozo
- Bozo, Salenga, Sorogo, Somono
- 400 — Nombre de pêcheurs / Number of fishers

WATER, AGRICULTURE & POVERTY LINKAGES

Poches de grande pauvreté (selon mortalité infantile, morbidité infantile et indice de richesse relative) Poverty hotspots (according to child mortality, child morbidity and relative wealth index)	Statistiques liées à l'eau Water-related variables				Statistiques non liées à l'eau Non water-related variables						
	Accès à l'eau Water access	Points d'eau non protégés* Unprotected water*	Irrigation	TARWR	Education	Téléphones Telephones	Malaria	Dégradation environnementale Environmental damage	Densités humaines Population density	Electricité Electricity	Accès aux villes Access to towns
NW Nigeria	X	X	X	X	X	X					
Mali Central et Delta Intérieur - Central Mali and Inner Delta		X			X	X	X				
E Burkina Faso		X			X			X			
E Nigeria & N Cameroun		X			X		X		X		
Nigeria Sud & Central ("poches de richesse relative") South & Central Nigeria ('wealth hotspot')		X			X	X				X	X

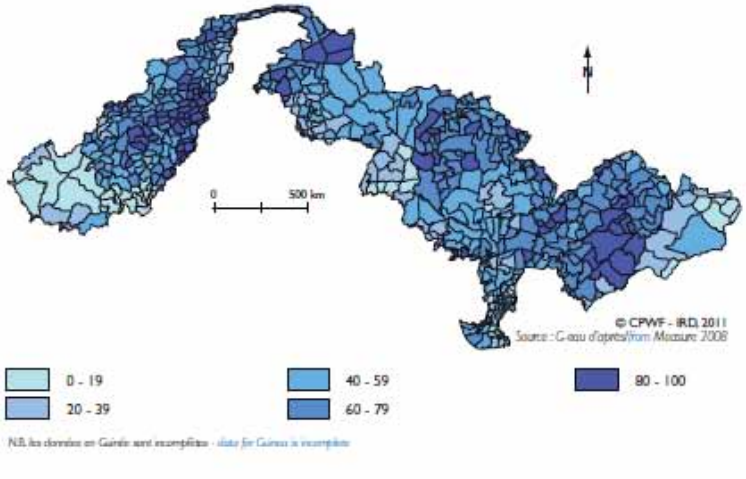


Figure : Pourcentages de personnes utilisant des puits non améliorés ou des eaux de surface – Percentage of people using unprotected wells or surface water

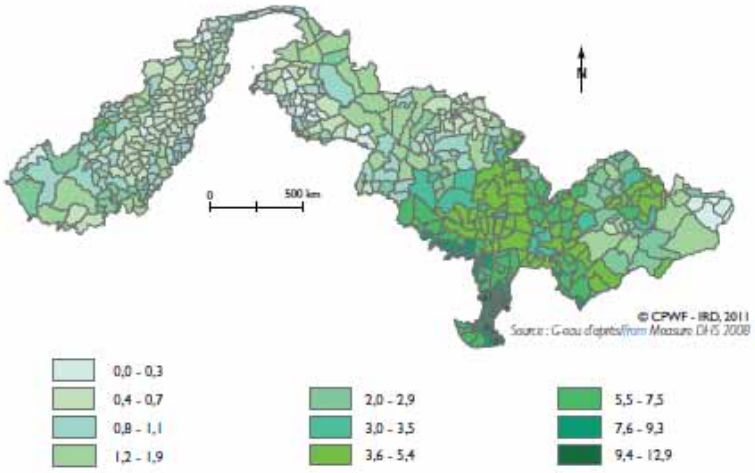
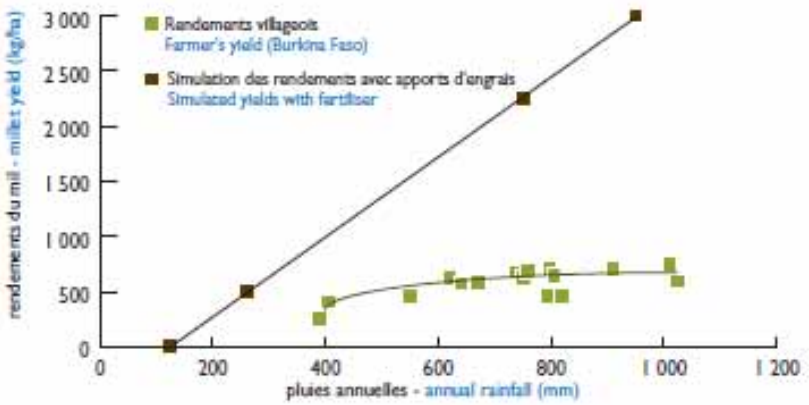
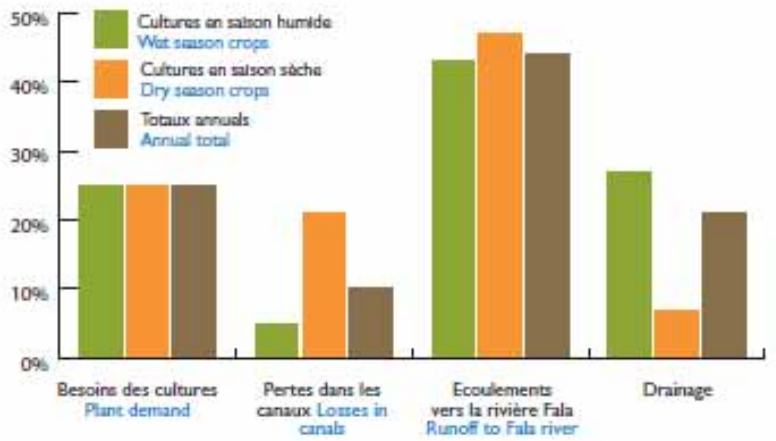


Figure : Niveaux d'éducation (années de scolarité)
Education level (years of schooling)

LIMITS OF WATER PRODUCTIVITY

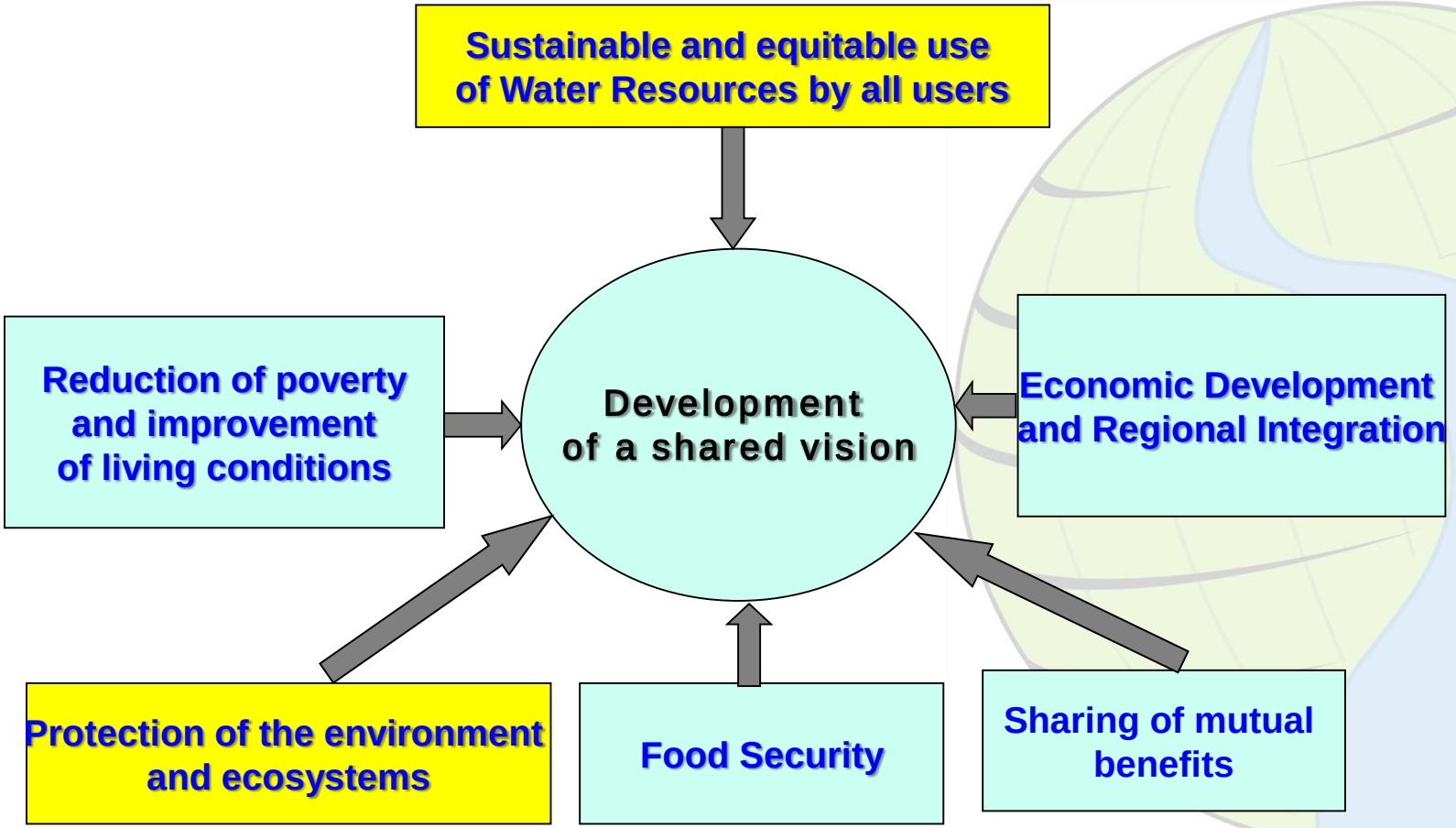


Influence des engrais sur le mil pluvial (dans la zone soudano-sahélienne)
Influence of fertiliser on rainfed millet (in Sudanese-Sahelian region)
Source: Serpantié 2009

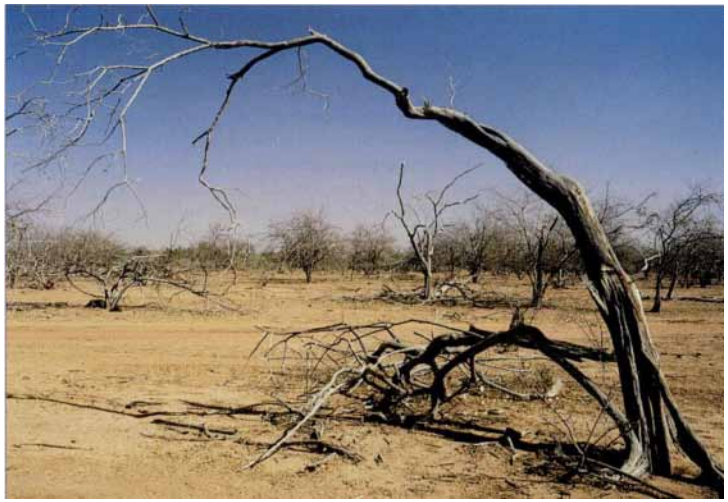


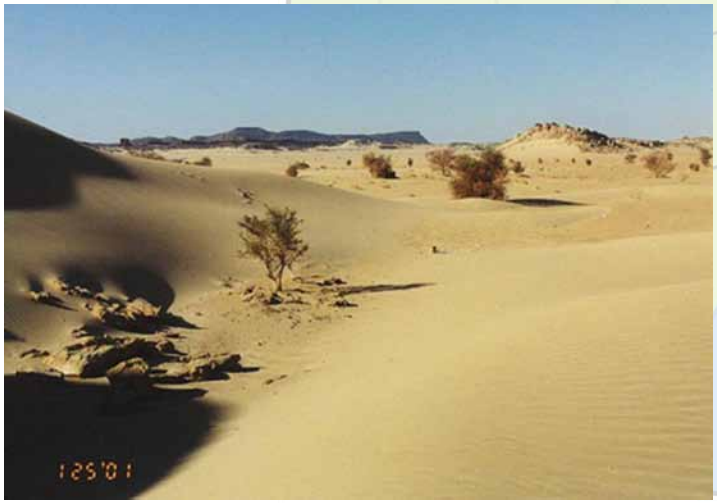
Destinations des prélèvements en eau dans l'Office du Niger
Destination of water withdrawals in the Office du Niger
Source: G-eau d'après/from Barbier et al. 2009

Major Challenges in the Niger River Basin



Land and Water Degradation





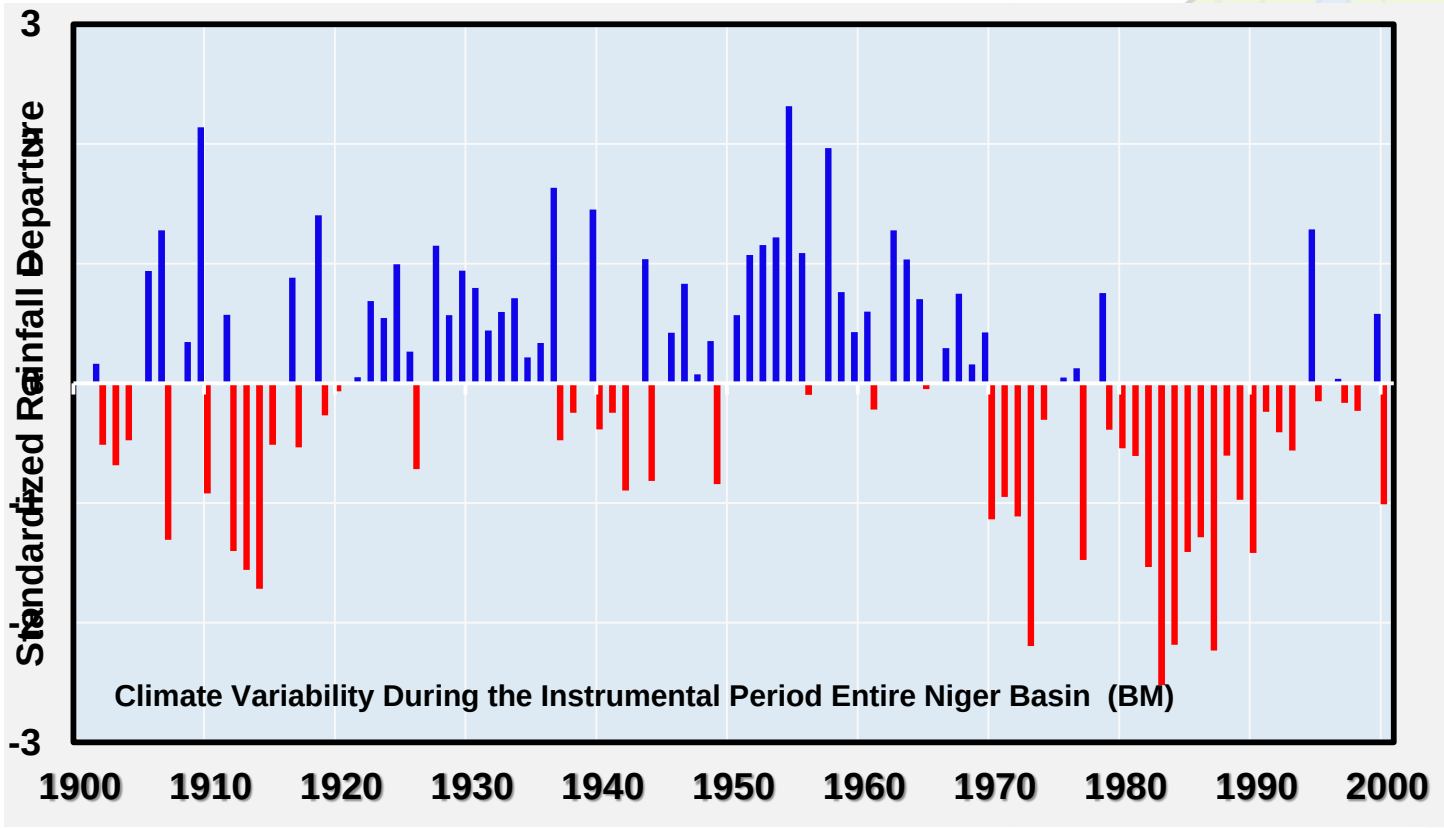
Erosion and silting of watercourse beds

Proliferation of invasive plants

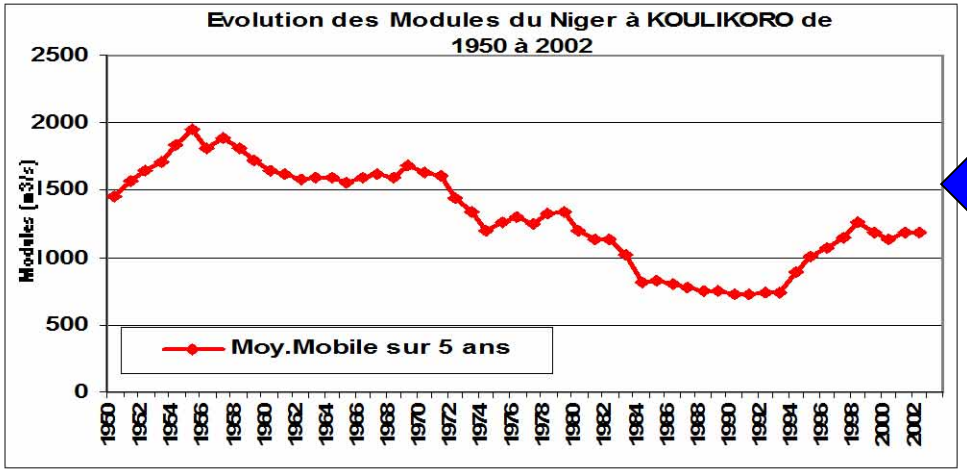
Pollution from various origins

Climate Change in the Niger Basin: Environmental Issues

(1)- Downward trend in rainfall from 20 to 30% from 1969-1970

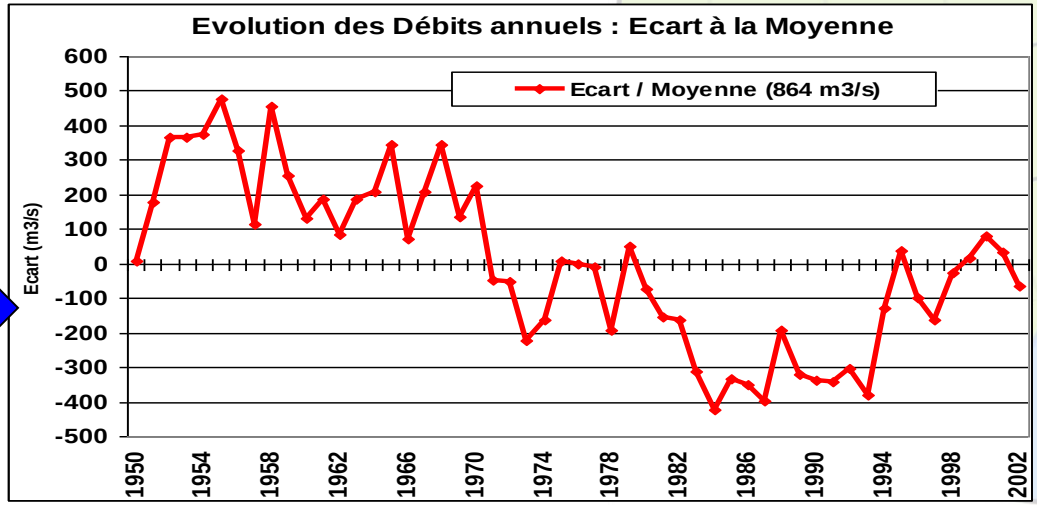


(2)- Trend decrease of flows: 20 to 55%

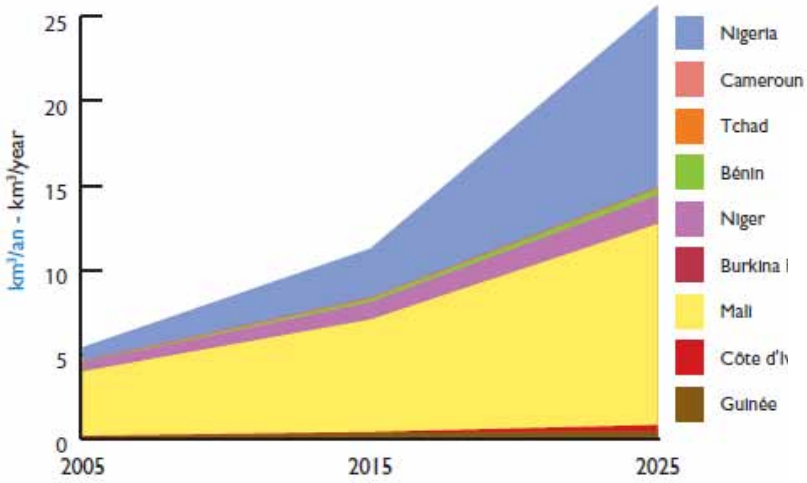


The Niger River at Koulikoro (Flow reduction: 23%)

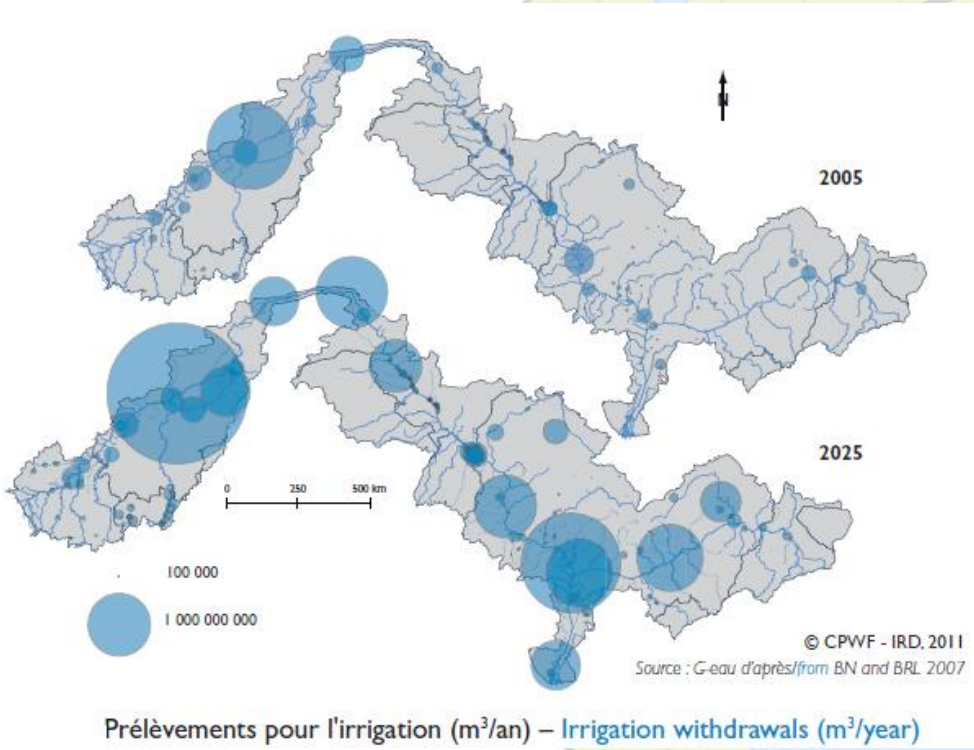
The Niger River at Niamey (Flow Reduction: 36.2%)



CLIMATE CHANGE AND HYDROLOGIC EQUILIBRIUMS

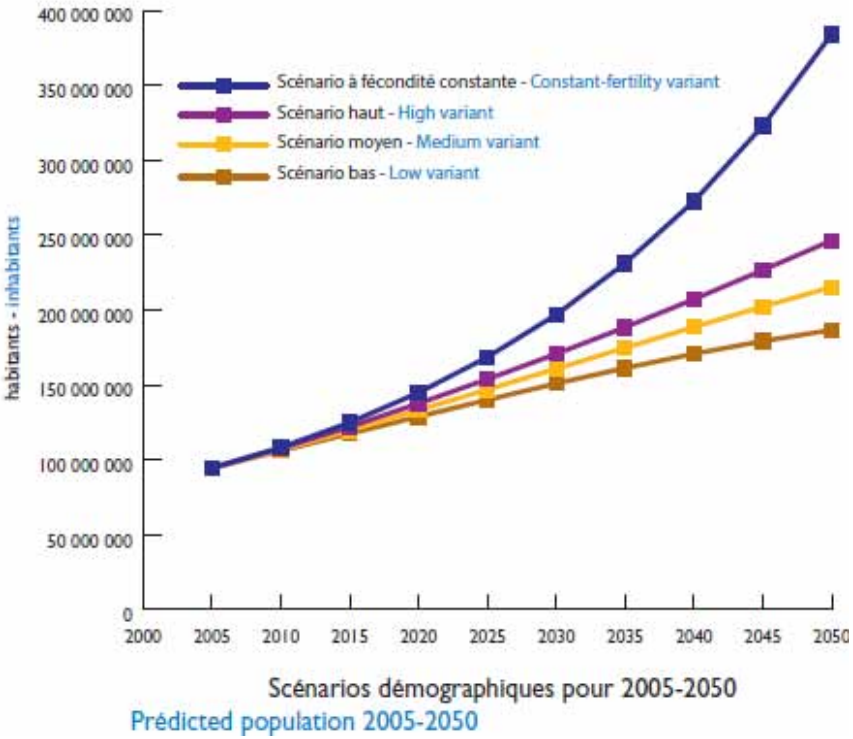


Prévisions des prélèvements nationaux pour l'irrigation
Predicted irrigation withdrawals per country
Source: G-eau d'après/from ABN and BRL 2007



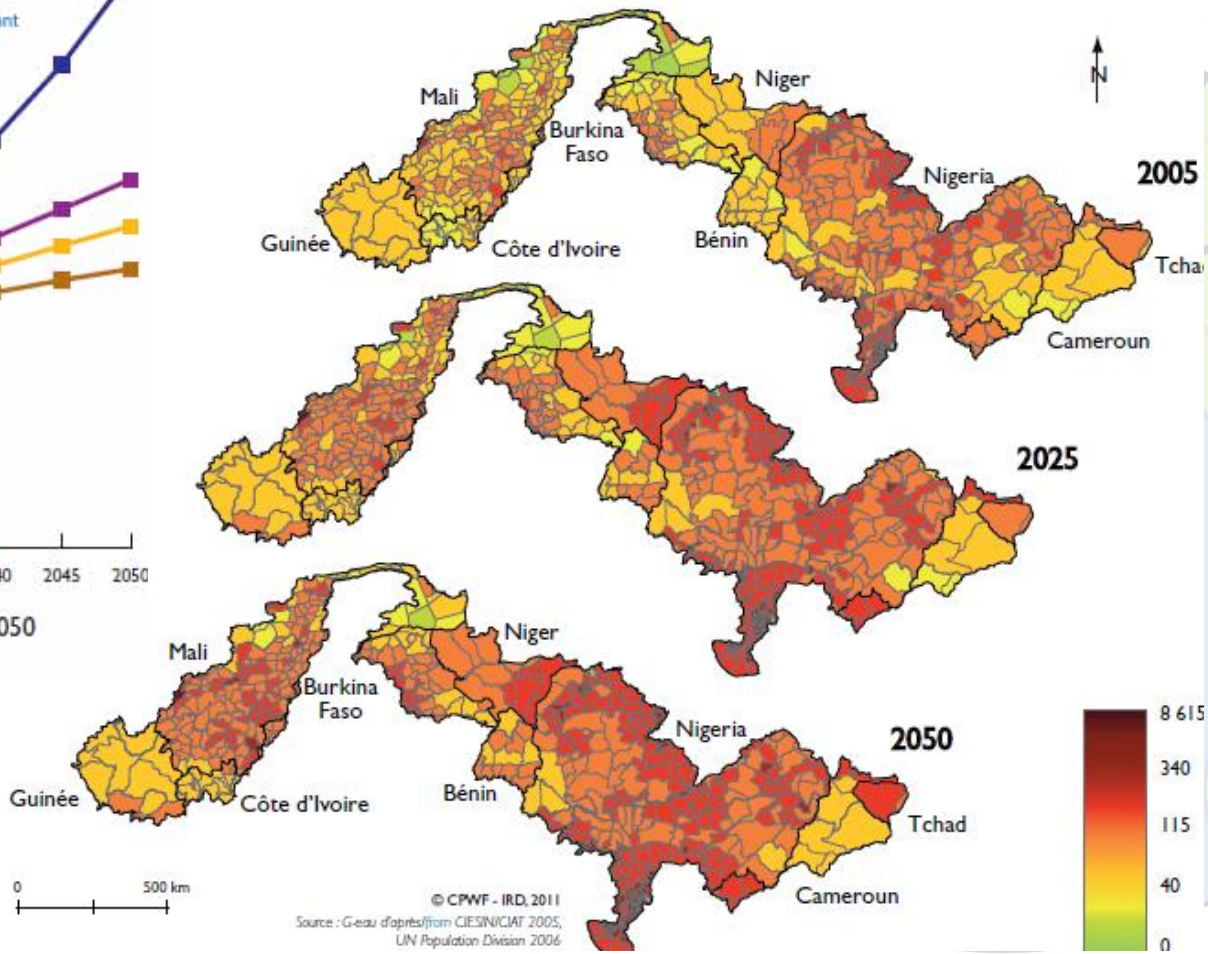
Prélèvements pour l'irrigation (m³/an) – Irrigation withdrawals (m³/year)

POPULATION GROWTH



Scénarios démographiques pour 2005-2050

Prédicted population 2005-2050



Websites and applications hosted at NBA

N°	Website/ Application	Link
01	**Institututional website of ES/NBA**	http://www.abn.ne
02	**environnemental and socioeconomic information System (SIE)**	http://sie.abn.ne/sie
03	**Intranet SE/ABN**	https://intranet.abn.ne
04	**Hydrology Information System**	http://nigerhycos.abn.ne/portal
05	**Monitoring and evaluation system**	http://sesame.abn.ne/SESAME-ABN/
06	**Computer system for coordinated management of dams**	http://geodashboard.abn.ne/geodashboard-abn/
07	**georeferenced digital library**	http://georepertoire.abn.ne/geonetwork/

Conclusion

- The continuation of the collection of information and basic data on the physical and human environments in order to have an updated reference system on the state of the basin environment by federating data producers.
- Development / Strengthening of partnership with sub-regional and regional institutions (CILSS, ACMAD, AGRHYMET, ICRISAT, IUCN, Wetlands International, etc.), academic institutions and Civil Society Structures (OIE, NGOs, etc.) and their involvement in development activities in the basin.
- Need to develop and consolidate synergy with institutions holding data and information.

THANK YOU FOR YOUR KIND ATTENTION