SUSTAINABLE MANAGEMENT OF AQUATIC ECOSYSTEMS AND FISH RESOURCES IN BURKINA FASO, WEST AFRICA

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CDR - Centre for Development Research

JASM

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BURKINA FASO
the country

Sub Sahelian landlocked country

27 4200 km² large

3rd poorest country in 2006

Population growth:

- Current rate of growth +4.4 %/yr
- 6.28 children born/woman

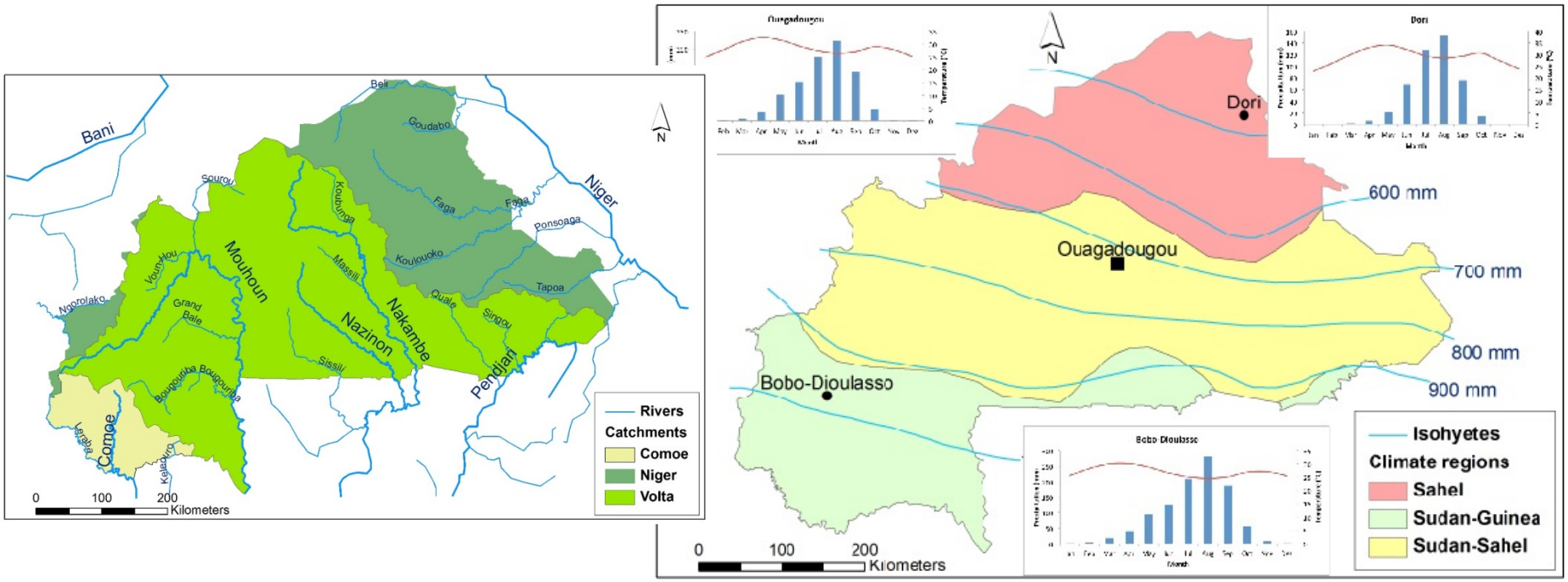
Spatial distribution of the population :

- Average : 37 inhabitants/km2,
- **> 100 in the central part,**
- 18.4 % in cities, 81.6% in rural areas

 # GO OUT OF THE COMFORT ZONE (M. Palmer)

Watersheds and CLIMATE

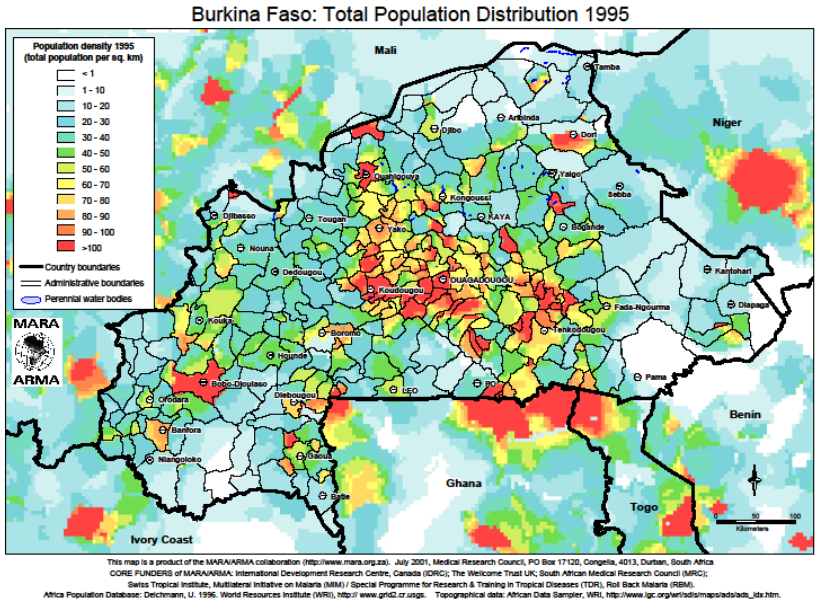
- Two distinct seasons – dry and rainy season
- High temperatures lead to evaporation rates of up to 2.000 mm/a
  (Baijot et al., 1994; Ouedraogo, 2010)

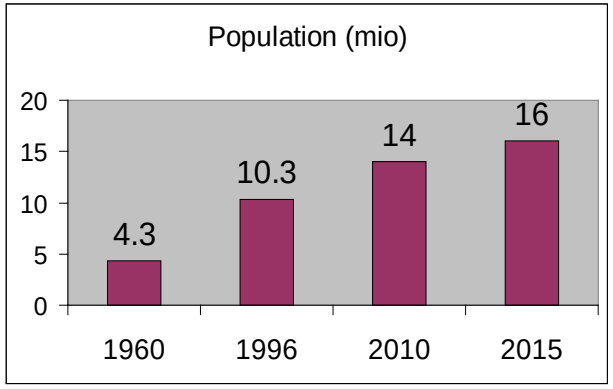


Mean annual temperature (°C) and precipitation (mm) of Ouagadougou (modified from Climate-Data, s.a.).

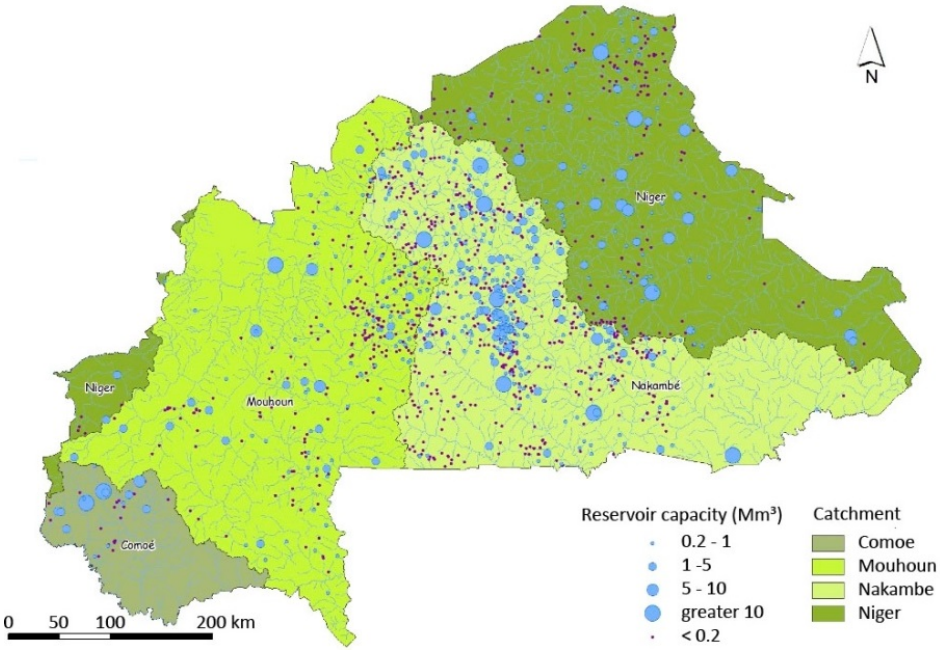
Population and reservoirs
pressure on freshwater ecosystems

Population annual growth rate 3%





Reservoirs, construction of N > 1 400 reservoirs to mitigate water scarcity and fight hunger



Why fish are important in Burkina Faso?

- Protein
- Nutrition
- Subsistance
- Farmers
- Gender
- Market
- Bio-Indicators
- Religion

Why fish are important in Burkina Faso?

Objectives

Build capacity to **study**, monitor **and manage sustainable fisheries.**

Develop **water management and assessment methods** based on fish that are applicable for use in Burkina Faso.

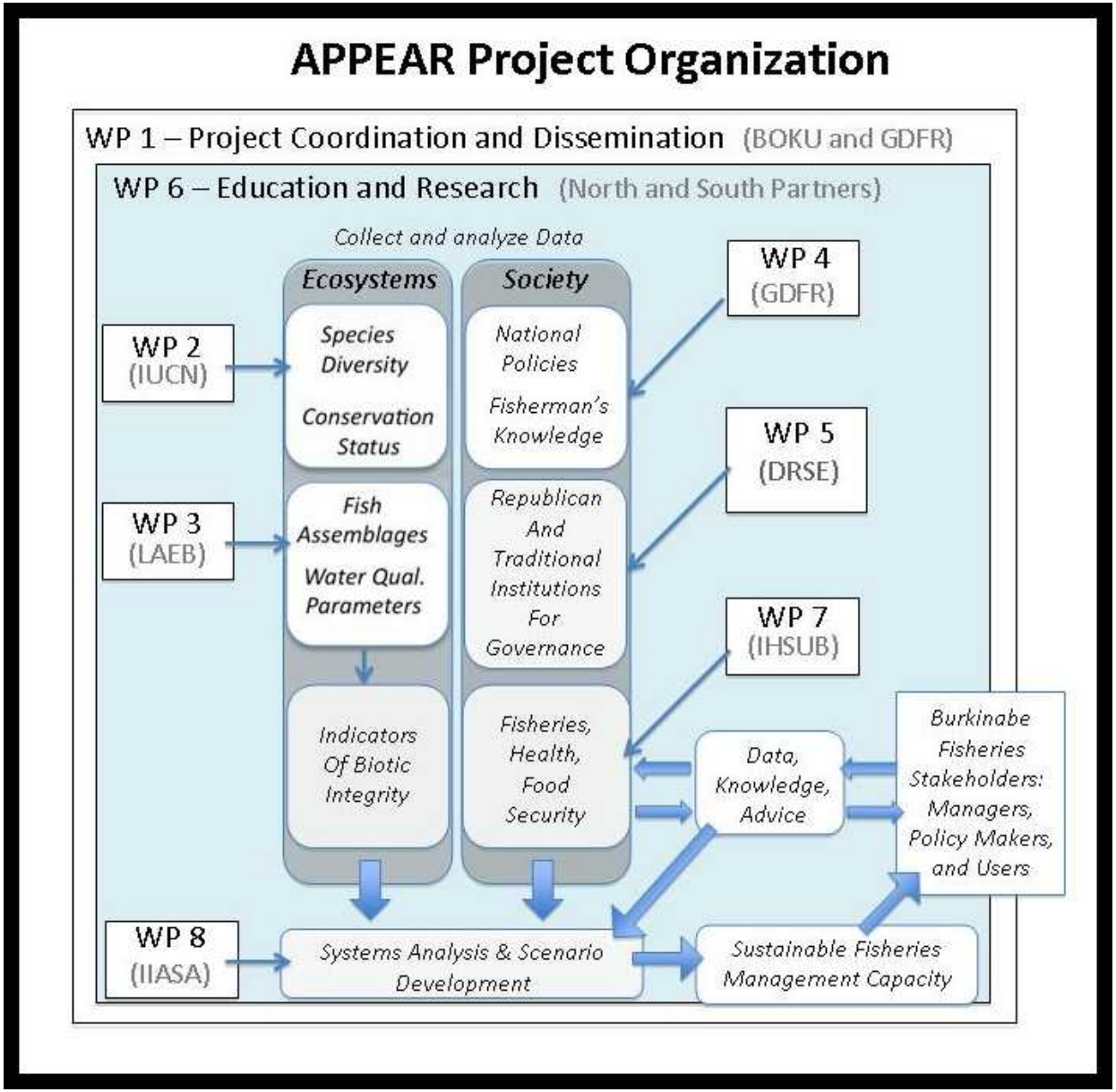
Identify, evaluate, and prepare existing data for fish, environment and pressures for a **national database.**

Analyze the **relationships** between **pressures** (incl. overfishing, land use, continuity) and the dynamics in **fish assemblages** and in **water quality.**

Develop **ecological awareness** by using appropriate case studies to demonstrate the importance of ecological services and biodiversity to the nation's food security and health care.

Support the implementation and dissemination of project results by **integration of the project results** in the **education policies** and on-going national programmes.

SUSFISH Structure



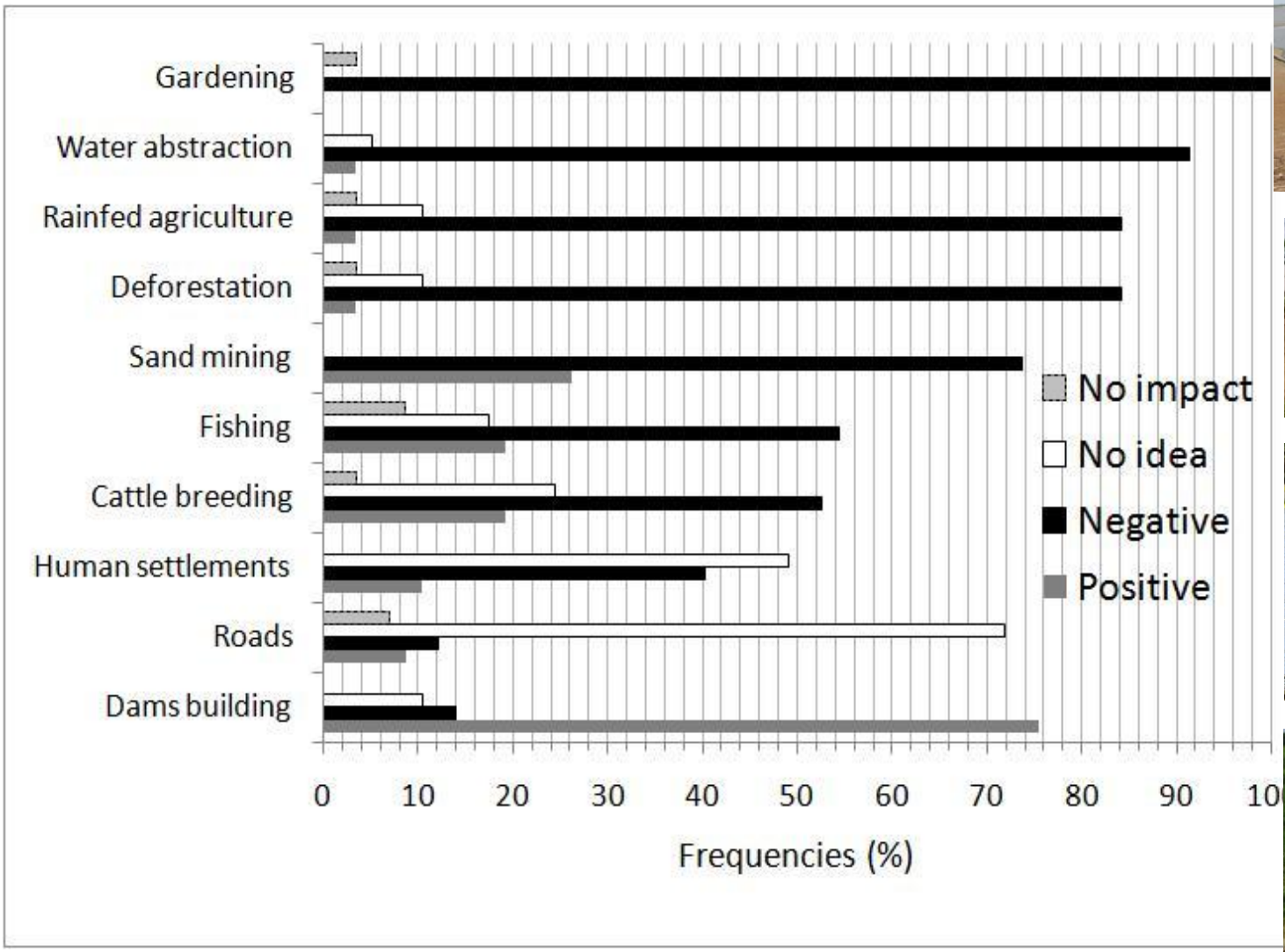
STUDY AREA

Rainy season …… farming
Dry season ……. fishing

STUDY AREA – RUNNING WATERS

STUDY AREA - RESERVOIRS

Anthropogenic threats to aquatic ecosystems: the fishers' opinions



CLASSIFICATION OF PRSESSURES

RUNNING WATERS – HUMAN INFLUENCE

NO	Close to natural conditions
LOW	Low density of human settlements; only pasture
MEDIUM	Medium/high density of villages; and/or high agricult. land use
HIGH	Urban area with severe impact on aquatic ecosystem

RESERVOIRS – AGRICULTURAL INFLUENCE

NO	Protected area
LOW	Low density of agricultural land use
HIGH	Dense agricultural land use at waters egde
HIGH + URBAN	High agricultural + urban pressures

- ENVIRONMENTAL Data
- Physicochemical paramters
- Temperature
- Substrate
- Habitat

xylal

velocity

shading

width

depth

FIELD PROTOCOL

- Adapted for BF
- Reservoir
- Running waters
- Human pressure
- Environmental parameters

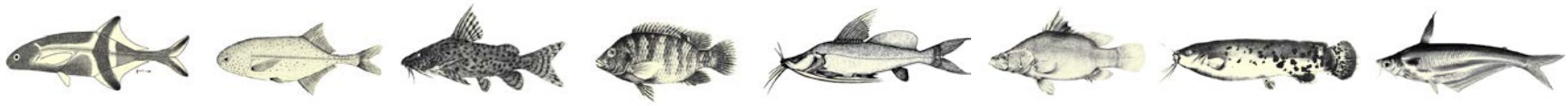
Field protocol - Benthic Invertebrates		
1 *ID*	**2** *Date* (dd.mm.yyyy)	**3** *Investigator*
4 *Site Name*	**5** *Start* (hh:mm)	**6** *End* (hh:mm)
7 *Waterbody type*	**8** *Artificial waterbody?* Yes No	**9** *Camera and photo number:*
10 *Longitude*	**11** *Latitude*	**12** *Weather:*
13 *Sampling method*		
In case of reservoir: **14** *Dam broken?* Yes No **15** *Inflow:* **16** *Outflow:* **17** *Age of the water body:*	**18** *Choriotop description:* **19** *Feeding system:* Rain fed? Spring fed?	**20** *Tributaries:* **21** *Connected reservoirs:* **22** *Perennial water body?* Yes No
23 *Activities:* O fishing O irrigation	O water abstraction O washing O lifes stock watering	O hydropower O other: _____
24 *bank structure :*	O flat <30° O steep >45°	O slanting O embanked
25 *Floating macrophytes* [%]: **27** *Wooded bank vegetation* [%]:	**26** *Reed* [%]: **28** *Unnatural bank vegetation* [%]:	**29** *Dam fixation :*
30 *Pollution:* O source pollution O non-source pollution	O sewage overflows O eutriphication O toxic substances	O acidification O liming O mining
31 *Waste disposal?* Yes No **32** *Specify waste:* _____	**33** *Reductions?* Yes No **34** *Foam?* Yes No **35** *Water color:* _____	**36** *Oudours (specify):* _____ **37** Flow velocity (m/s)?:
38 *Secchi depth (cm):*	**39** *Conductivity (µS/cm):*	**40** *pH:*
41 *Temperature (°C):*	**42** O_2 *(mg):*	**43** *O2 (%):*
44 *Floodplain land use [0=no, 1=present, 2=excessive]*		
[ ] dense forest [ ] light forest [ ] tree savannah [ ] bush savannah [ ] steppe [ ] desert [ ] naturally unvegetated [ ] wetlands	[ ] standing waters [ ] non-native forest [ ] hilly region [ ] crop land ( ) [ ] crop industrial (y/n) [ ] cotton (industrial y/n) [ ] rice (industrial y/n) [ ] vegetables (industrial y/n)	[ ] horticulture [ ] lifestock [ ] partial cutting [ ] clear-cutting [ ] urban sites (resid.) [ ] urban sites (industrial) [ ] villages [ ] mining ( ) [ ] others: _____


Electric fishing


Castnet


Castnet


Gilnet



Fish

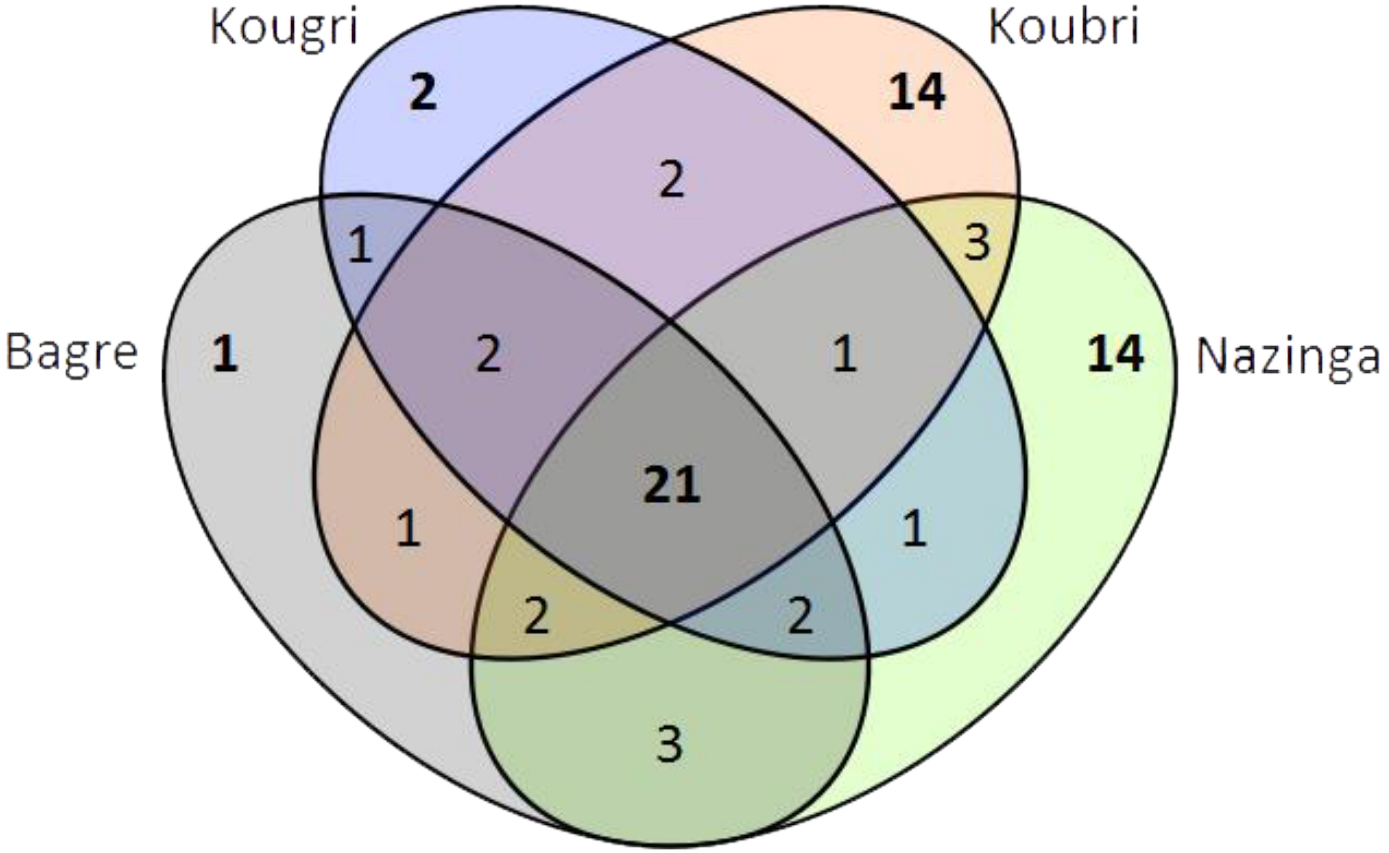
Family (N=16)	Number of genera	Number of species
ALESTIDAE	5	12
ANABANTIDAE	1	1
BAGRIDAE	1	2
CENTROPOMIDAE	1	1
CICHLIDAE	5	7
CITHARINIDAE	1	1
CLARIIDAE	2	3
CLAROTEIDAE	2	3
CYPRINIDAE	4	14
DISTICHODONTIDAE	1	1
MALAPTERURIDAE	1	1
MOCHOKIDAE	1	8
MORMYRIDAE	6	11
POLYPTERIDAE	1	1
PROTOPTERIDAE	1	1
SCHILBEIDAE	2	3
Total	**35**	**70**

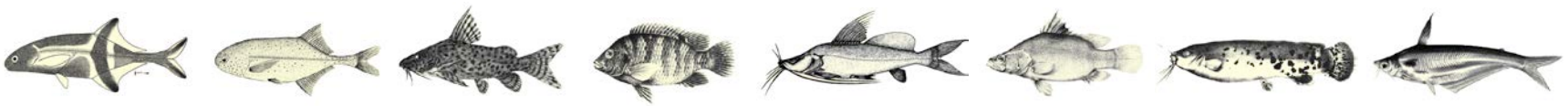
Hydrocynus forskali

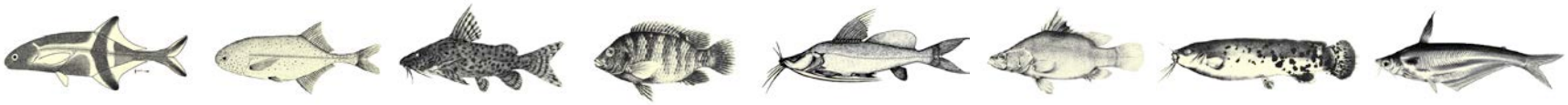
Labeo senegalensis

Mormyrus rume

Fish species SPATIAL Distribution

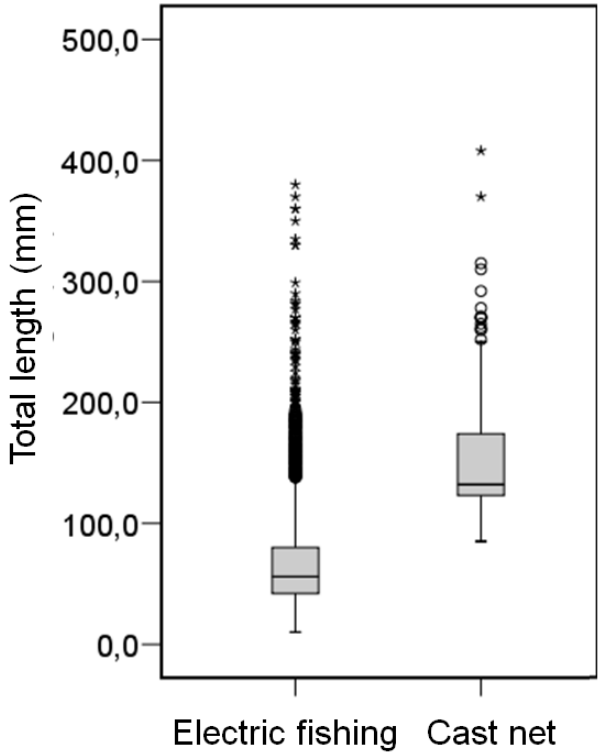






Method comparison

	Electric	Cast net
Number of individuals	8822	9199
Number of species	66	61
Exclusive species	18	11



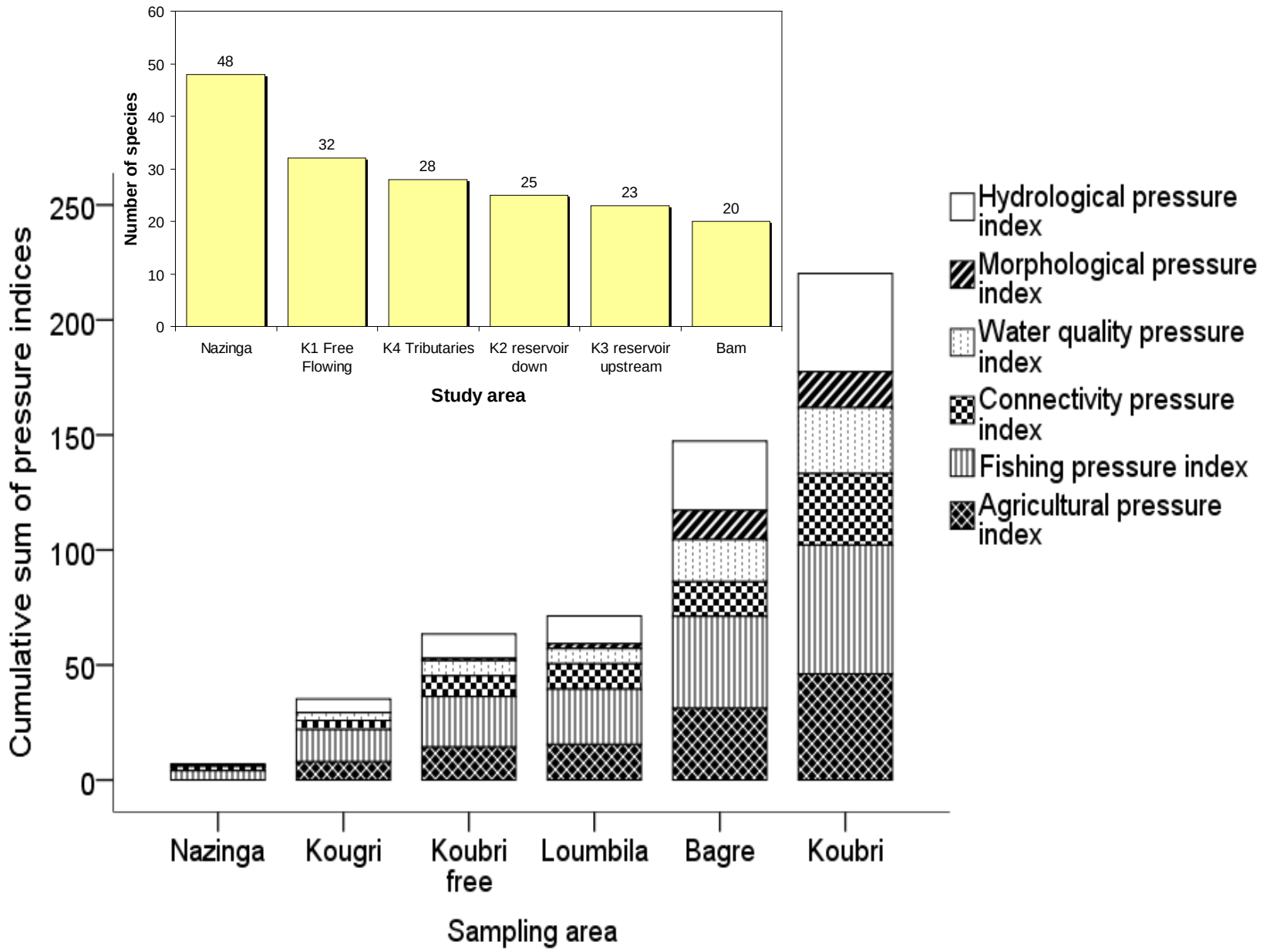
Method - Limitation

Limitations – REFEFERENCES and IMPACTS

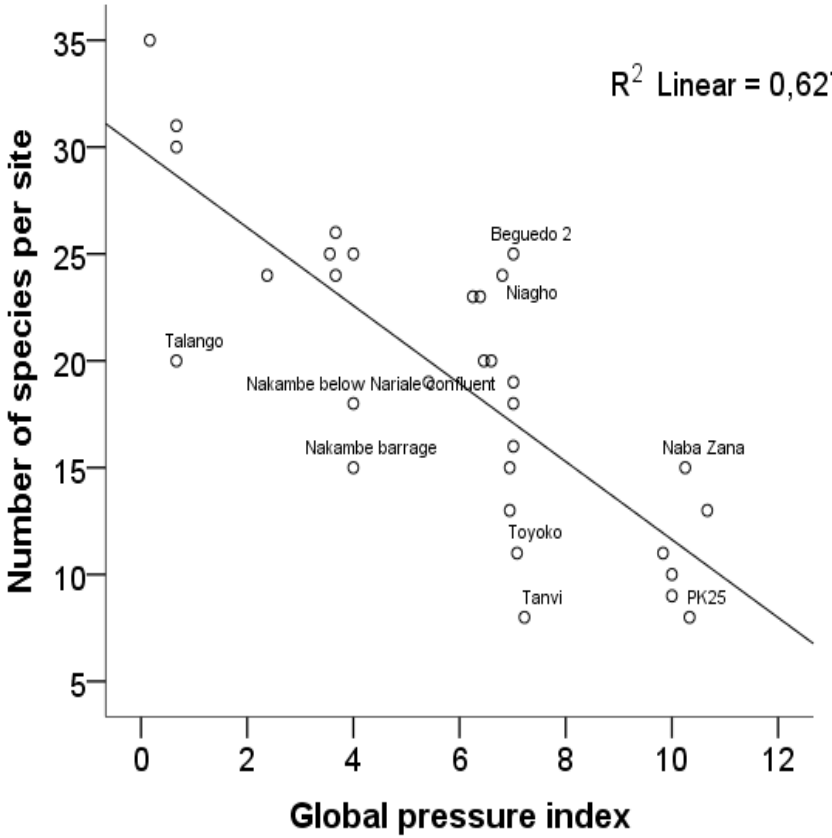
HUMAN PRESSURE CLASSIFICATION

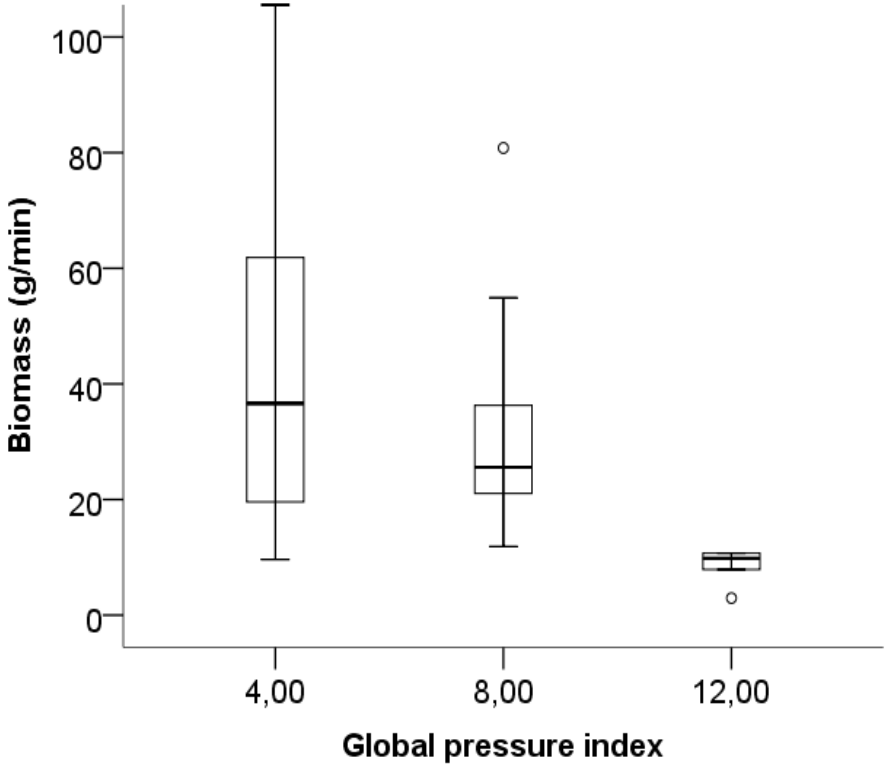
Human influence on running waters		
Investigation site	*Investigation area*	*Pre-classification*
Cascades	Bobo Dioulasso	no
Guinguette	Bobo Dioulasso	no
Bodjero	Nazinga	no
Bissiga-Nakambe	Ziga	low
Nagreongo	Ziga	medium
Segda	Koubri	medium
Kougri-Nakambe	Ziga	medium
Peele	Koubri	medium
Niango	Bagre	medium
Loumbila outflow	Loumbila	medium
Korsimoro outflow	Ziga	medium
Hostel channel	Ouagadougou	high
University channel	Ouagadougou	high

Cummulative number of pressures and loss of fish species

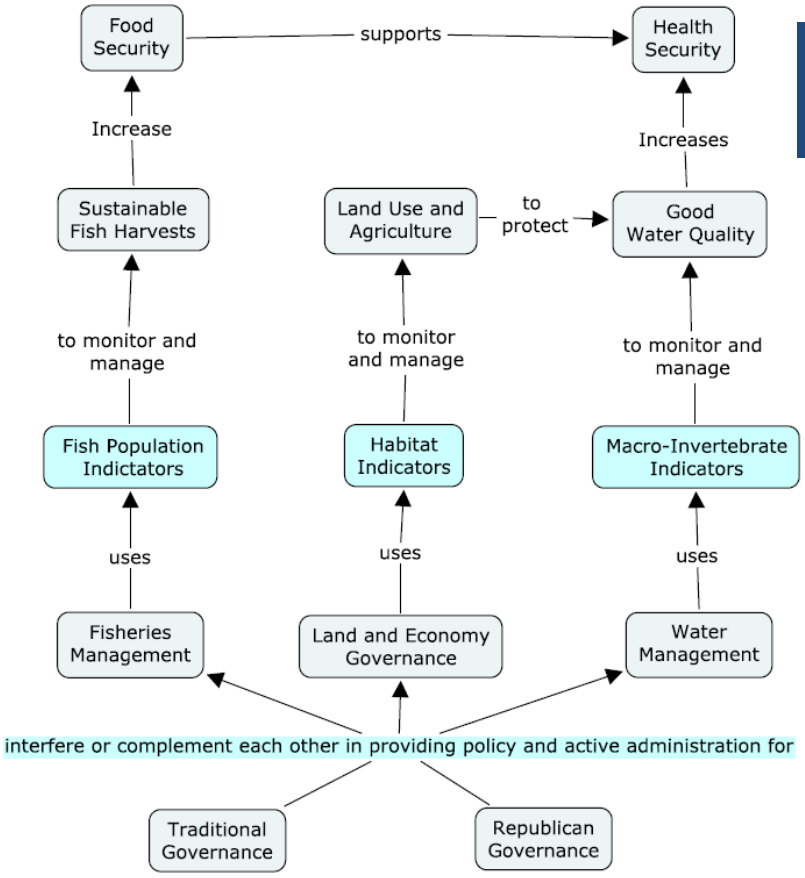


Intensity of human pressure and effects on FISH





HIGHER EDUCATION - MITIGATION – IMPLEMENTATION



ADAPTIVE MANAGEMENT

SUSFISH Research

Natural Science

Social Science

Summary

- **high traditional knowledge** on fish
- nearly **no scientific knowledge** on fish biodiversity
- **lack of gouvernance** concerning human pressures
- reservoirs and agriculture **limit fish** migration, abundance & size
- **ecosystem services** & climate change **to adaptive management**

- **socio economic value**, gender, partcipation
- **capacity building** and adaptive management as perspectives

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CONCLUSIONS

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SUSFISH

pêche-eau

Current questions in sustainable fisheries, water management and higher education

BOOK of ABSTRACTS

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