

4th AMMA International Conference

***Interactions Society, Environment and
Climate: lessons learned from AMMA
project and prospects for the future***



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Acknowledgements

- International Governing Board (IGB)
- International Scientific Steering Committee (ISSC)
- International Implementation and Coordination Group (ICIG)
- AMMA-Africa, AMMA-France, AMMA-Germany, AMMA-UK, AMMA-US, etc.
- All Universities, All Research Institutes
- All WPs Leaders
- All Researchers
- **West African People**





One AMMA challenge

**Make the best use of the field program
data**

for impact studies

ISEC in the AMMA project

- 2004: Impacts workpackages 3.X of AMMA-IP
- **2007: AMMA-TTC (Bamako workshop) was the real starting point for the African community**
- AMMA coordination WPs has been changed (co-leadership)
- Better display of interactions between the 3 components (Society, Environment & Climate)
- **RIPIECSA brings another support to complete AMMA works**

AMMA ISEC studies on...

Agriculture



Human dimension



Livestock



Water resources



Health



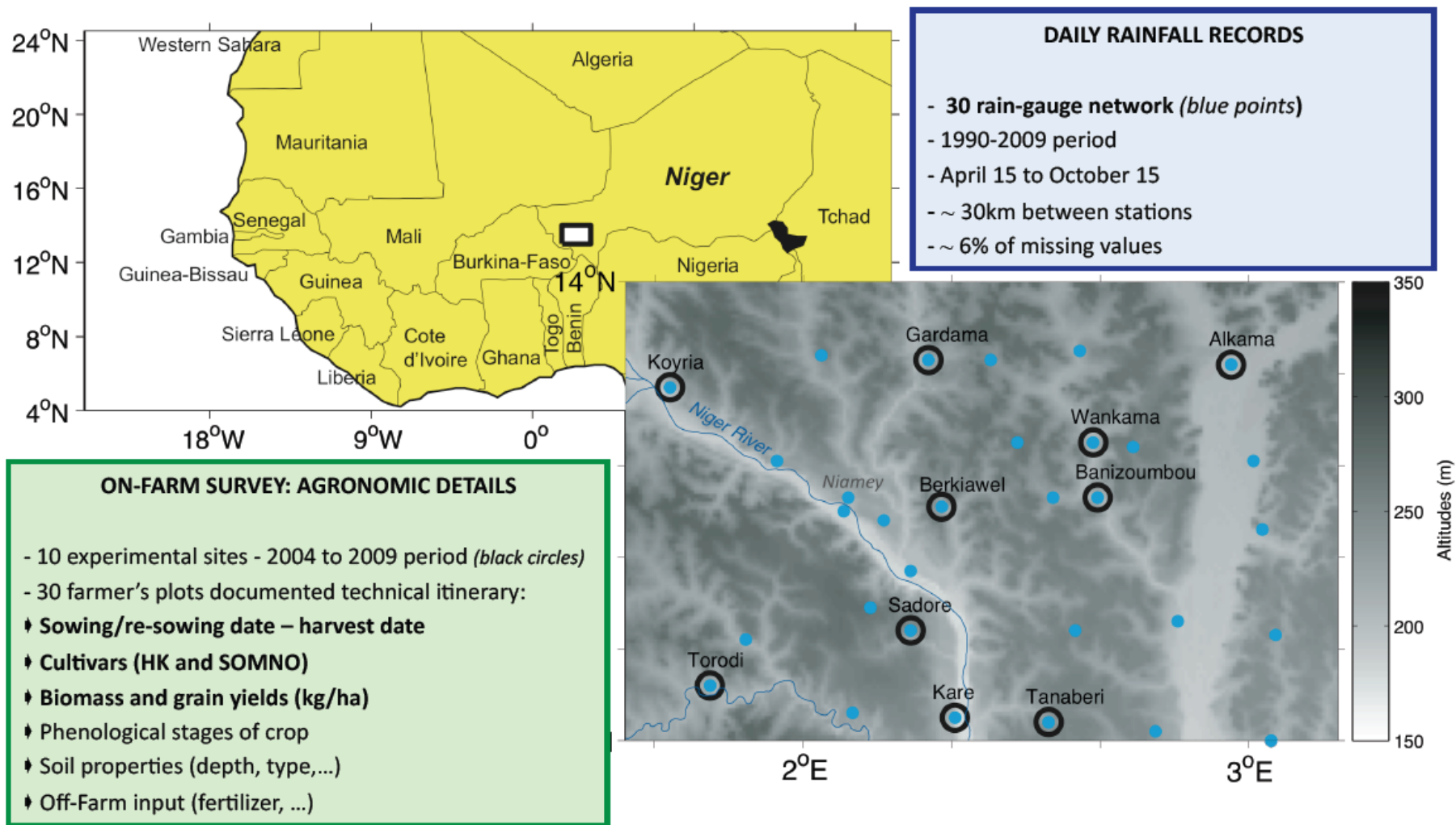


Agriculture





Agriculture and climate surveys in Niger

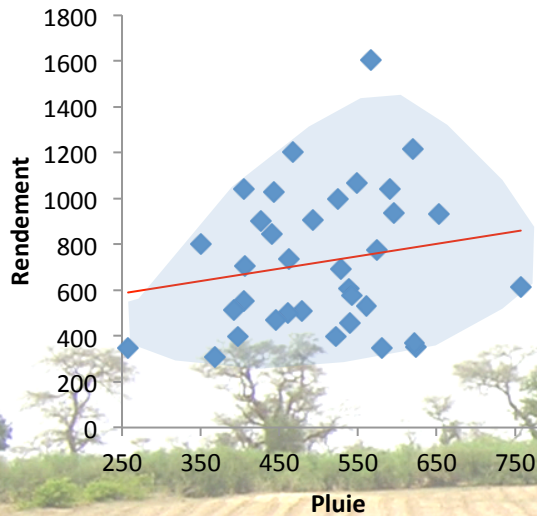


Collabor. CIRAD, AGRHYMET (Traoré et al. 2010)

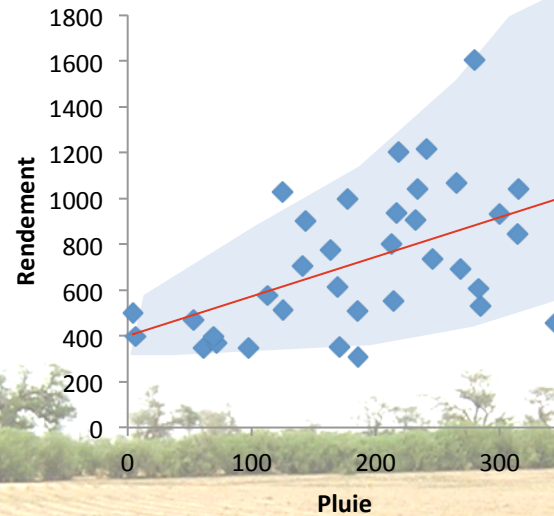
Data collection is extended up to 2011

Importance of intra-seasonal timescale

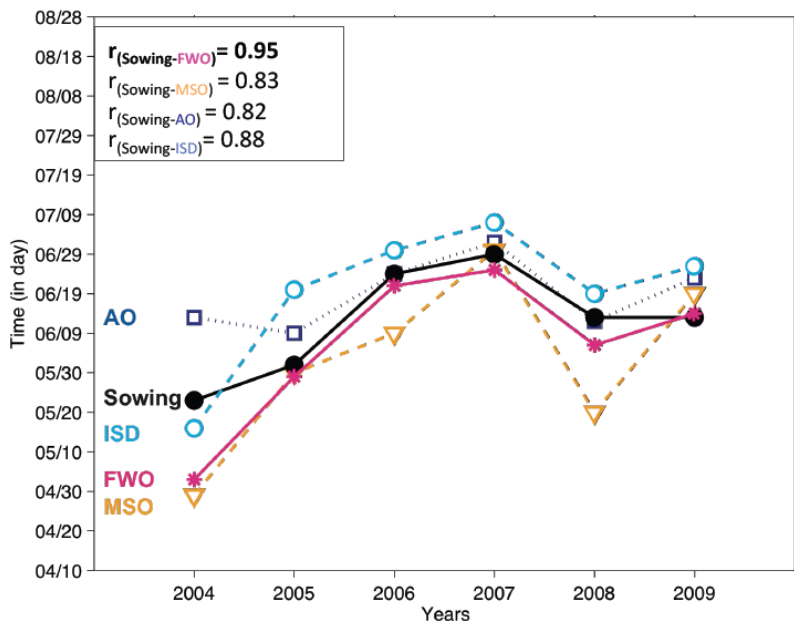
Seasonal rainfall



Rainfall during critical stages



At local scale, **intra-seasonal variability** of rainfall is determinant for crop yields



The sowing date follows **the onset of the monsoon**

Around 1/4 of the sowings failed because of a false start of the monsoon

Marteau et al. (2011)



Process based model

The crop model SARRAH

SarraH

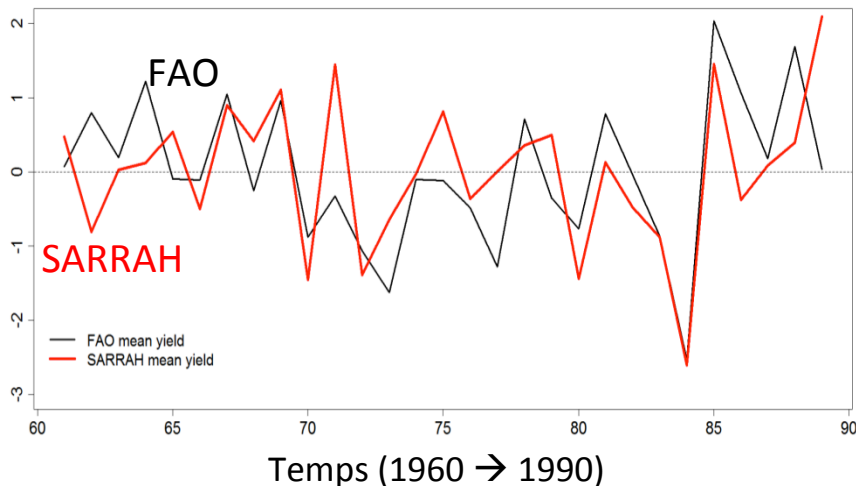


Dingkuhn et al. (2003)

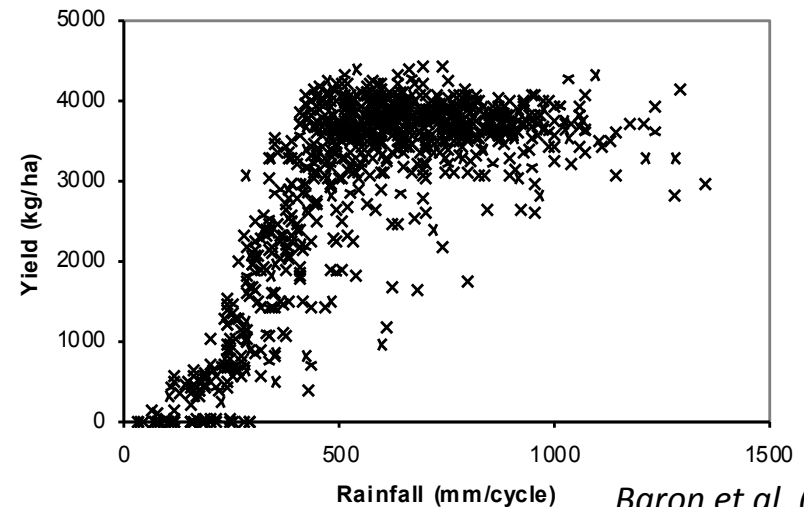
→ **Water balance model** (water demand, soil water availability, stress index, critical phases)

→ **Carbon assimilation and partitioning** (radiation use efficiency, phenology, evolution of biomass and LAI)

Capture the variability of crop yields in West Africa



Able to capture non-linear effects





Human adaptation



Methodology

15 sites in 5 countries

2-3 group interviews in each site with:

- Men >30
- Women >30
- Young people (mixed)

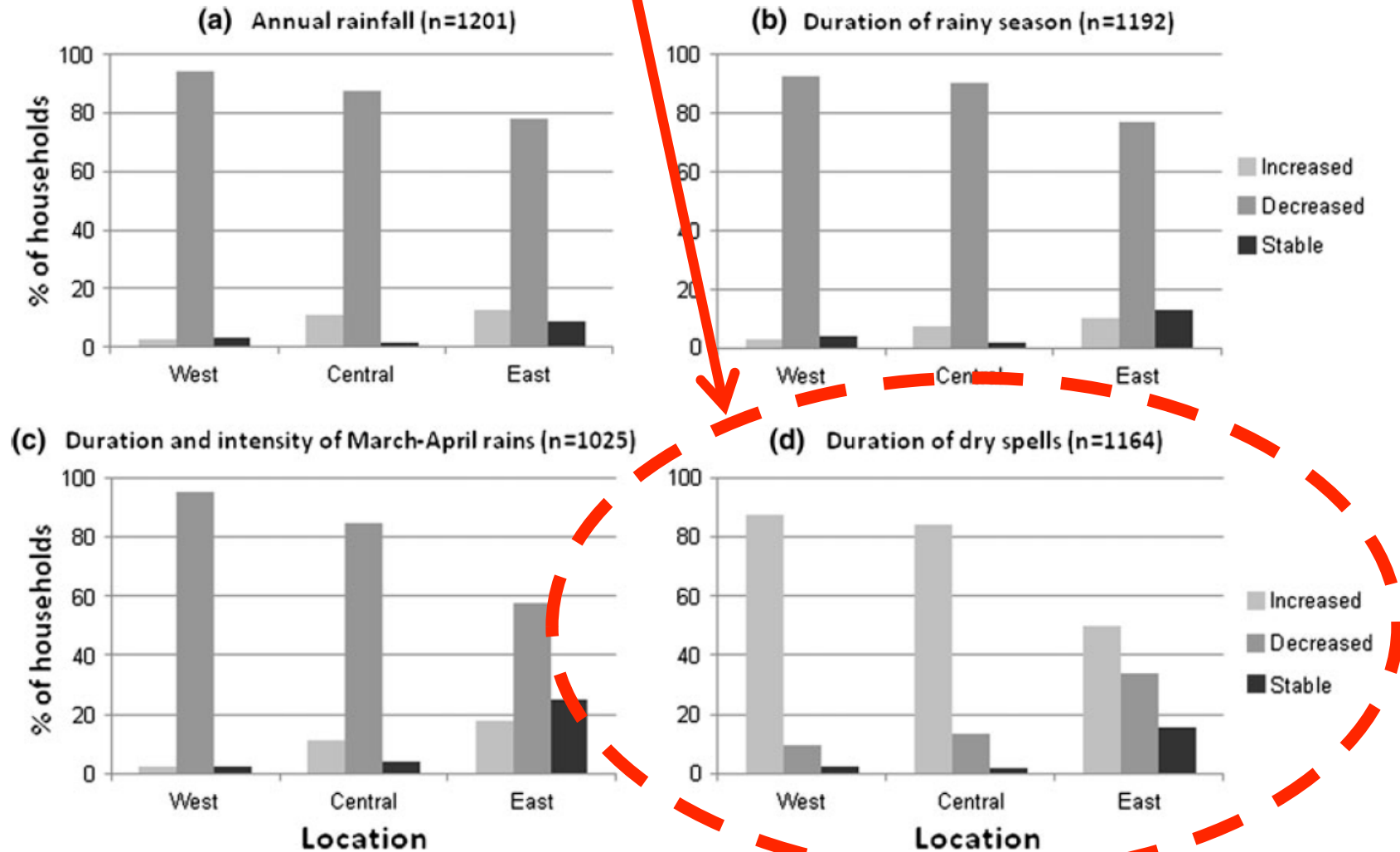


1249 household questionnaires
 – analysis according to 'ecological'
 north-south & east-west gradients



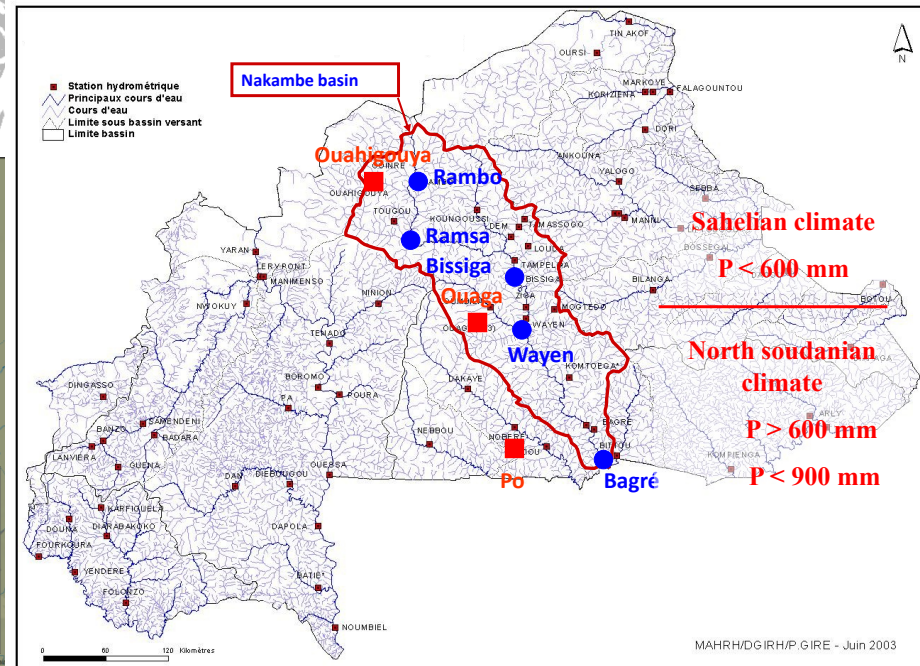
Courtesy: O. Mertz

Household perceptions of changes in (a) annual rainfall, (b) duration of rainy season, (c) duration and intensity of March-April rains, and (d) duration of dry spells during the past 20 years along a west-east gradient (Mertz et al, 2012)





Water resources



Studied basins in WP3.3

Senegal basin (350 000 km²): regulated, hydro-power, irrigation, flooding, semi-arid and sub-humid.

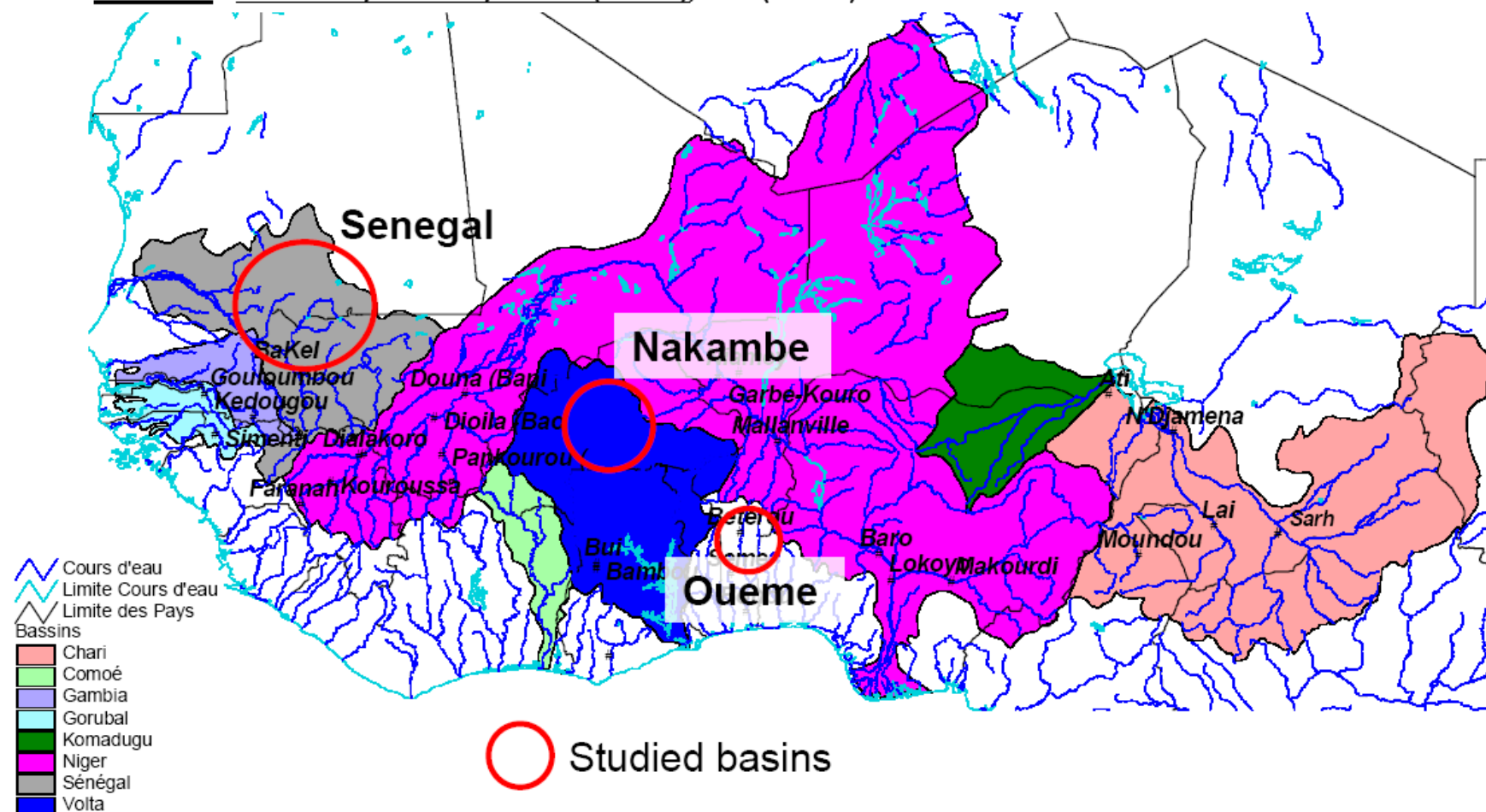
Partners : UCAD (Senegal), IGUC (Denmark), IRD (Niger), UPCT (Spain), UAM (Niger), CSE (Senegal), DNM (Conakry Guinea), University Bamako (Mali)

Nakambe (40 836 km²): great human activities, hydro-power, agriculture, densely populated, semi-arid .

Partners : 2iE (Burkina), UAM (Niger), Meteorological Agency (Ghana)

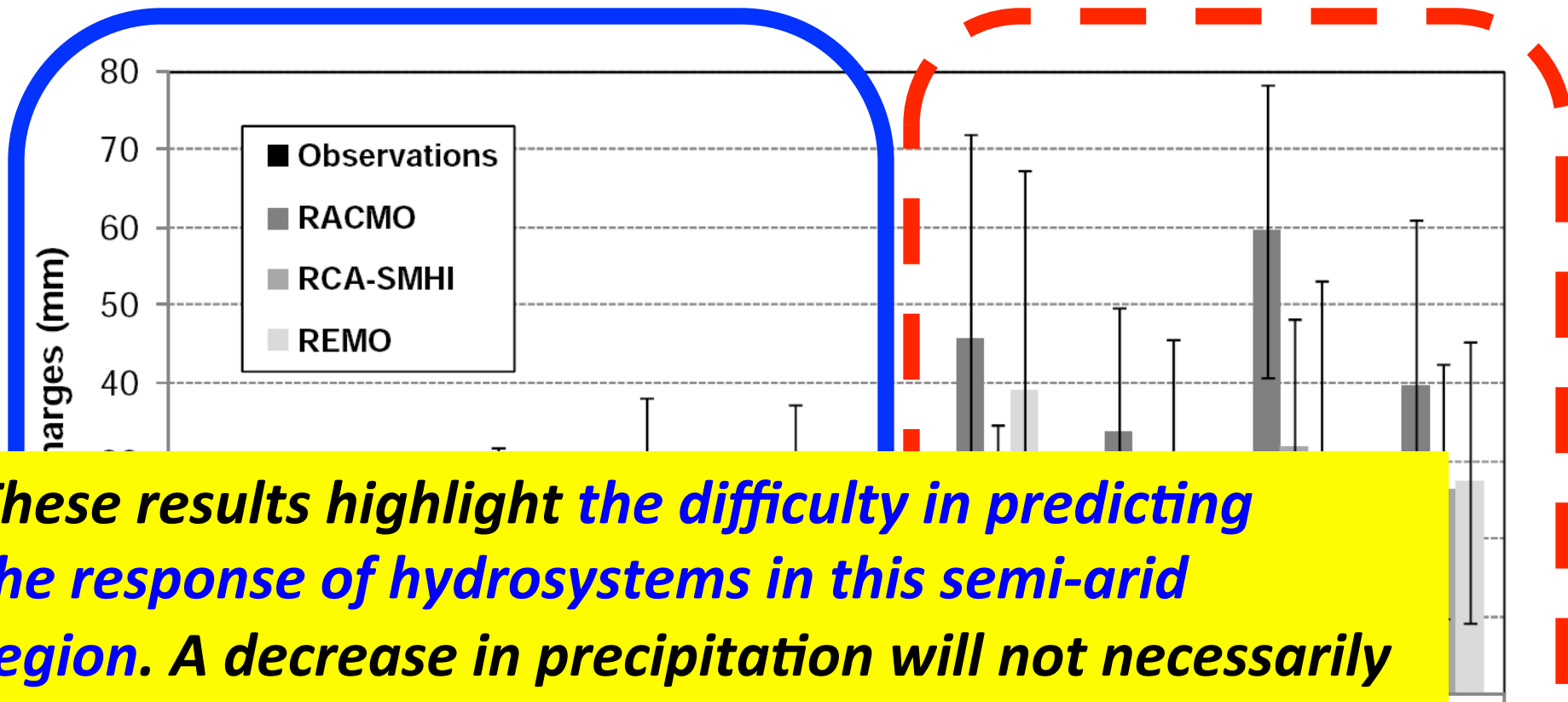
Oueme (14 600 km²): humid region, super site of AMMA, dense measurement network.

Partners : University Abomey Calavi (Benin), IRD (Benin).



Courtesy: S.Garcia, H. Karambiri and J-D Giraldo

Decadal water discharges (observed and predicted) on Nakambe basin



These results highlight the difficulty in predicting the response of hydrosystems in this semi-arid region. A decrease in precipitation will not necessarily induce a decrease in runoff and river discharges (Karambiri et al, 2011).

The land use changes issue in the Sahel context?



Health issues



* CHEZ LES ANIMAUX
BEAUCOUP D'AVORTEMENTS
- INA HEEWI ADDUDE WOPPERE (WERLERE)
- FORTE MORTALITÉ DES AGNEAUX
CHEVREAUX ET VEAUX.

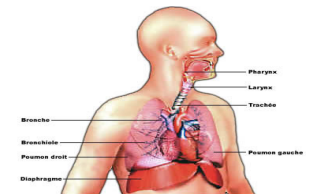


- INA HEEWI WARDE JAWDI WALLA
NDAMMIRI TOKKOSIRI NDII

* CHEZ L'HOMME
* TO NEDDO TOO
- FORTE FIÈVRE RESSEMBLANT
AU PALUDISME OU À LA FIÈVRE
JAUNE.



BANNDU WULA
YILLEE HAA WAYA
NO GARADDO
JONTINOOJE



*Neisseria
Meningitidis*



- Climate sensitive disease
- Environment sensitive disease

Societal factor

Climate factor

Interactions

Environmental factor

Courtesy: L. Eymard

For success, a multidisciplinary approach is required!

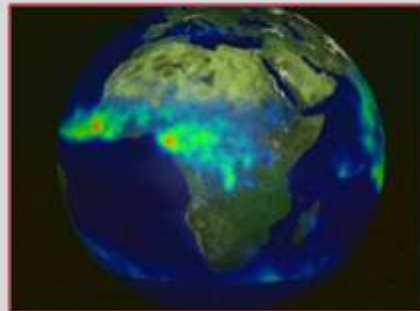
CLIMATE

retroactions

AEROSOLS

MONSOON (SUMMER)

HARMATTAN (WINTER)



*Rainfall in Africa
(TRMM, September 1998)*

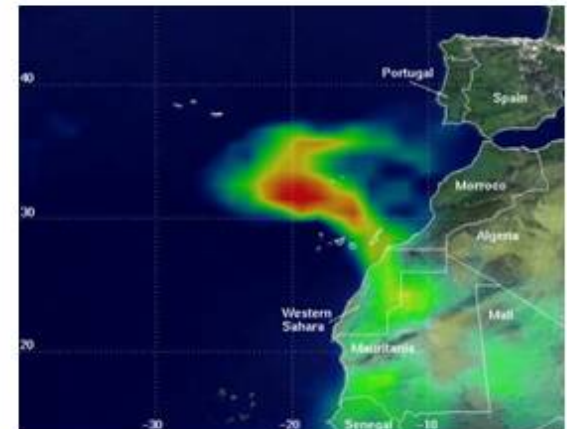


*Wind in West Africa
(MODIS, February 2008)*

Large scale

Local scale

Temperature,
Humidity



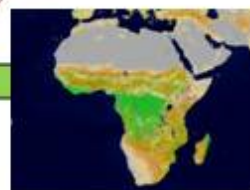
*Dust in Africa
(TOMS, February 2000)*

SOCIETY

MENINGITIS



*Surface state in Africa
(MODIS, March 2003)*



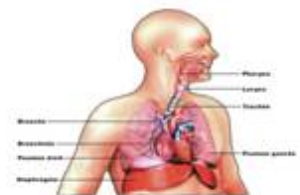
Land Cover



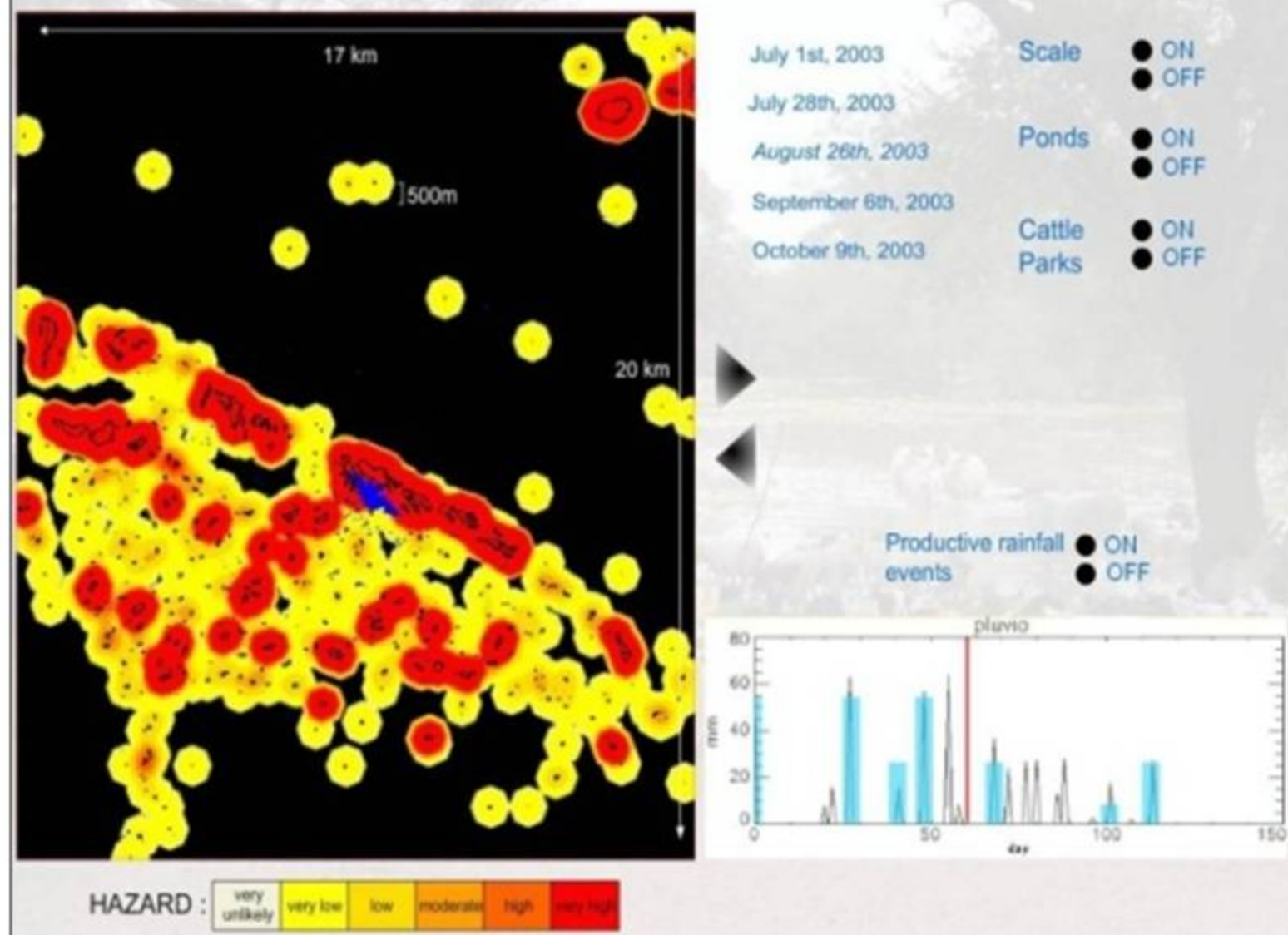
*Socio-economic
factors*



*Neisseria
Meningitidis*



Dynamical ZPOM and associated risks



Relationships between productive rainfall events and percentage of parks within the ZPOM and with animals under risks (Vignolles et al, 2009).

Simulation available online: <http://www.geospatialhealth.unina.it/fulltext.php?ida=75>



Lessons learned



© Lebel, Feb 2007



© Fleury, Jul 2009



© Bationo, Oct 2009



© Caniaux, Feb 2010

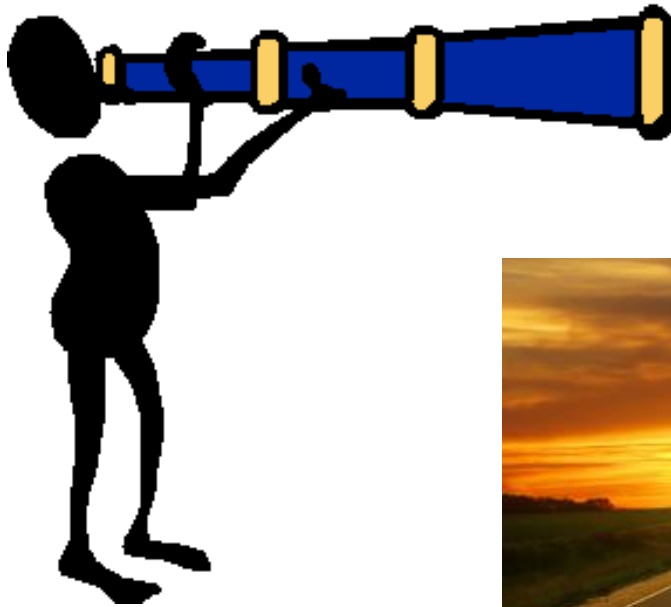


© AMMA, Aug 2006

- Improved environmental observations and observing networks
- Improved knowledge and understanding of processes on west african monsoon
- A multidisciplinary approach for advancing prediction and EWS (**strong contribution coming from ISEC studies!**)
- Increased west african critical mass (*+ than 650 peer review papers, PhD (120), MsC, Summer schools, etc.*)
- Rise of a community (**one major legacy of AMMA!**)
- AMMA database (another major legacy of AMMA): *in situ observations, satellite products, model outputs...*



What's next?



© Fleury, JuL 2009



N. Knodler

African Monsoon Multidisciplinary Analyses
Afrikaniske Monsun: Multidisiplinære Analyser
Afrikaanse Moesson Multidisciplinaire Analyse
Analisi Multidisciplinare per il Monsone Africano
Afrikanischer Monsun: Multidisziplinäre Analysen
Analisis Multidisciplinar de los Monzones Africanos
Analyses Multidisciplinaires de la Mousson Africaine

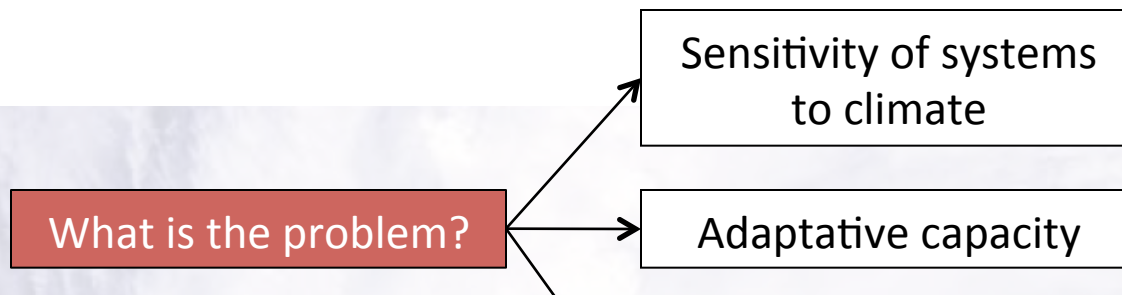
African Monsoon Multidisciplinary Analyses
Afrikaniske Monsun: Multidisiplinære Analyser
Afrikaanse Moesson Multidisciplinaire Analyse
Analisi Multidisciplinare per il Monsone Africano
Afrikanischer Monsun: Multidisziplinäre Analysen
Analisis Multidisciplinar de los Monzones Africanos
Analyses Multidisciplinaires de la Mousson Africaine

The International Science Plan for AMMA
2010-2020
Executive Summary

Plan Scientifique International pour AMMA
2010-2020
Résumé Exécutif

There is a road map: the ISP2

But there is a need?

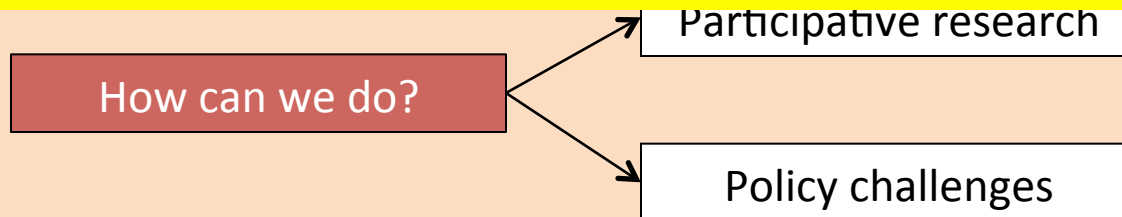


1. Assess the vulnerability of systems

→ **A prerequisite for prioritizing actions on**

More than ever, climate change and adaptation is a major issue for Africa:

How to tackle this issue?



3. From knowledge to actions

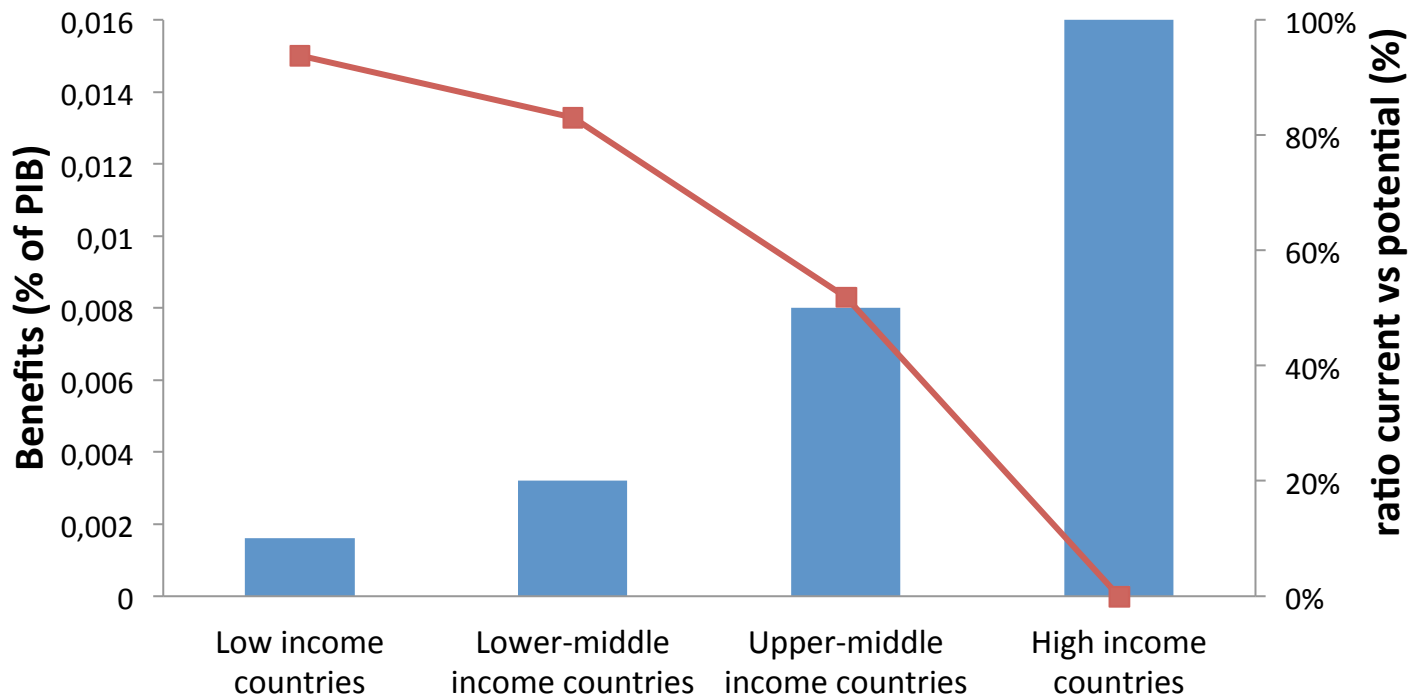
From Knowledge to Action!



- ✓ Dissemination towards operational systems
- ✓ Operational EWS
- ✓ Application and knowledge transfert

Improving the quality of hydromet services and early warning systems can really make the difference in developed countries

Potential benefits from avoided asset losses thanks to early warning (with European-standard hydro-meteorological services)



Adapted from Hallegatte, World Bank (2012)

Some concluding remarks

- Catch new financial opportunities, new scientific programmes (ESCAPE, SREC, WASCAL, CCAFS, CORDEX, etc.)
- Preserve and enhance the organisational dynamics
- Better integration with human and social sciences (*how to talk to human and social sciences?*)
- Participatory research
- Preserve a balance between regional dimension and local scale (upscaling issue!)

Thank you for your attention!

