

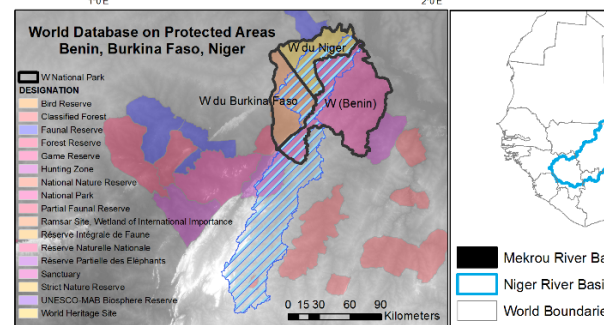
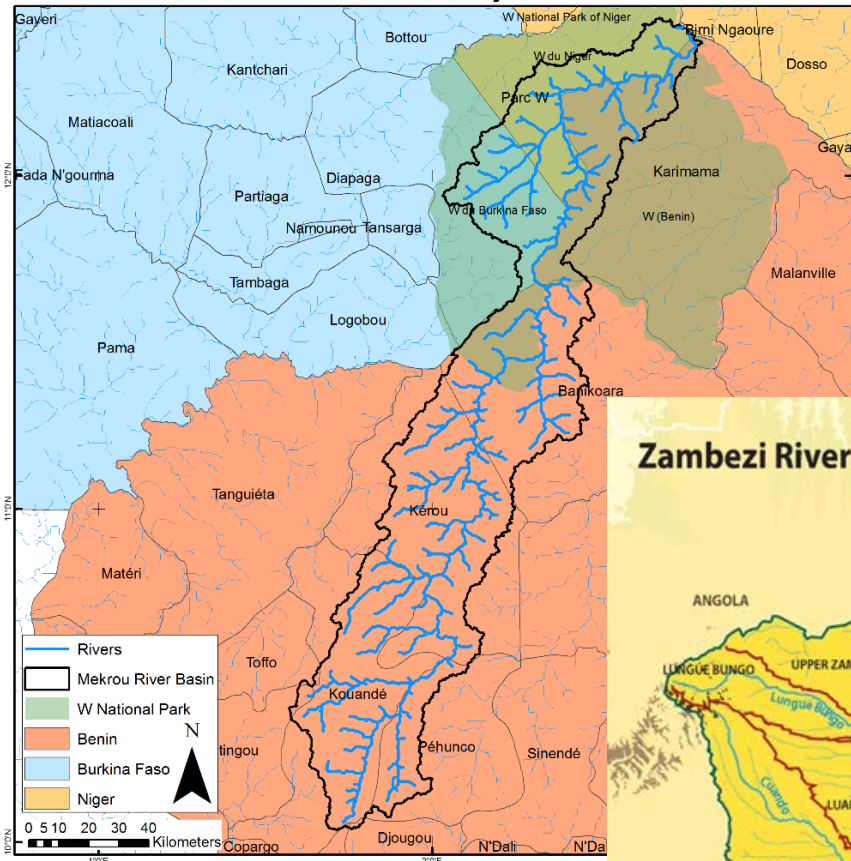


The European Commission's science and knowledge service

Joint Research Centre

ASSESSING WEFE NEXUS IN AFRICA: tools, projects, perspectives

Mekrou Transboundary River Basin



Zambezi River Basin

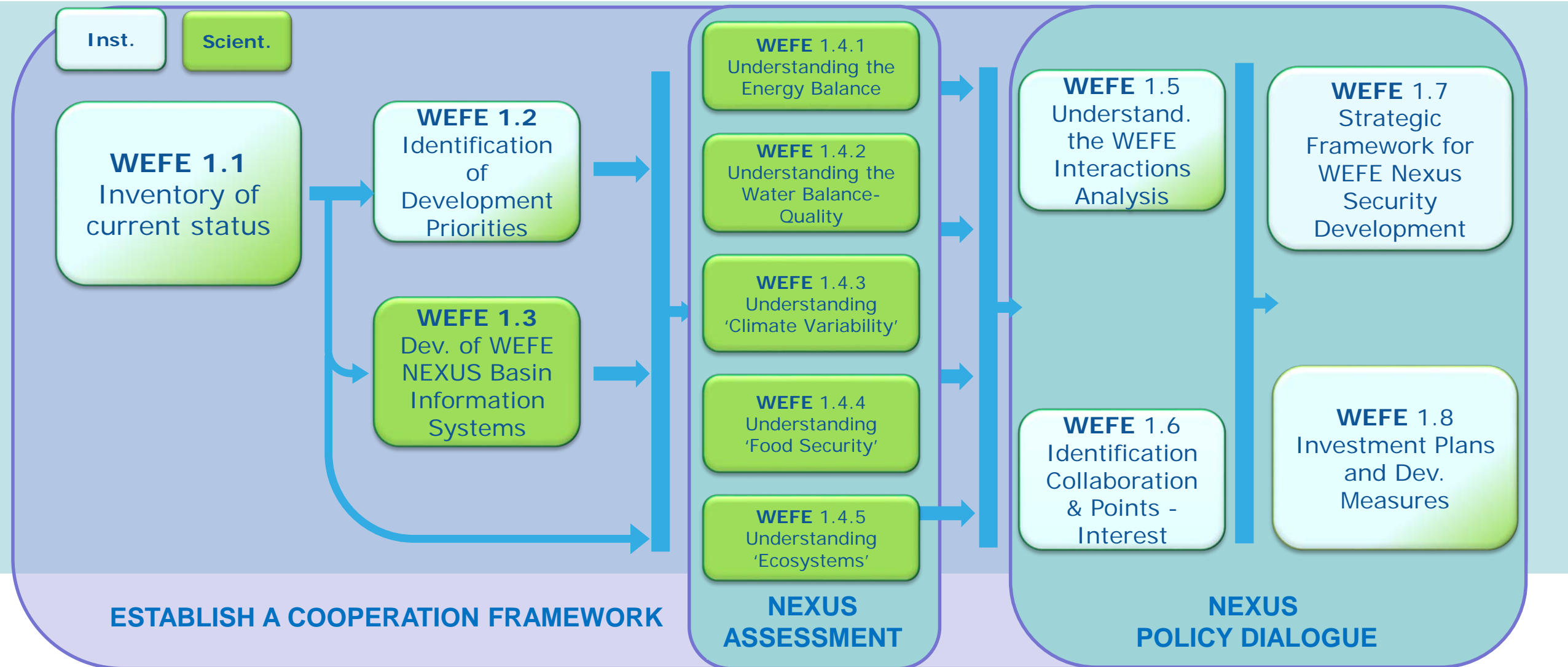


Paolo Ronco

Joint Research Centre
Water Resources Unit
European Commission

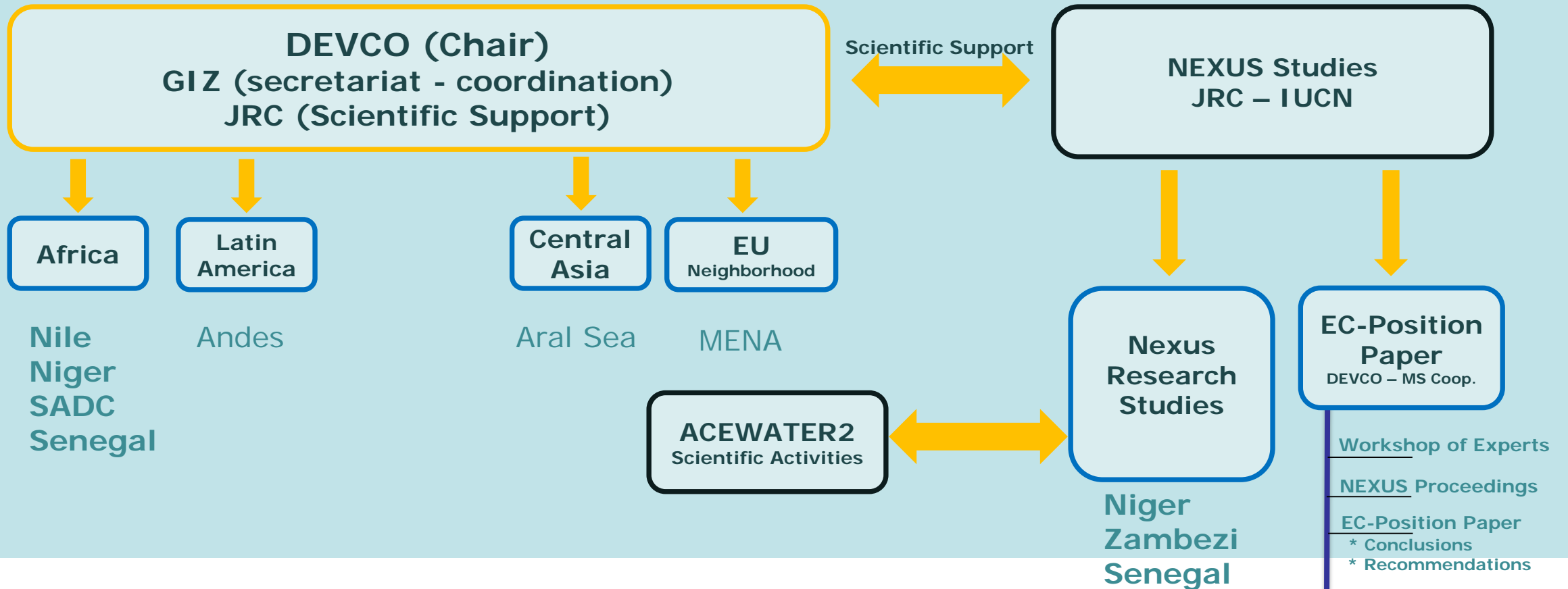
UNECE NEXUS task force meeting,
Geneva, 18/10/2017

WEFE Nexus methodological approach: establishing effective Cooperation Framework



EC Nexus Dialogues Programme

Project Organization



EC Nexus Dialogues Programme

OUTLINE of the EC POSITION PAPER

OBJECTIVE: provide recommendations to DEVCO and cooperation agencies of Members States on priorities and needs in WEF Nexus.

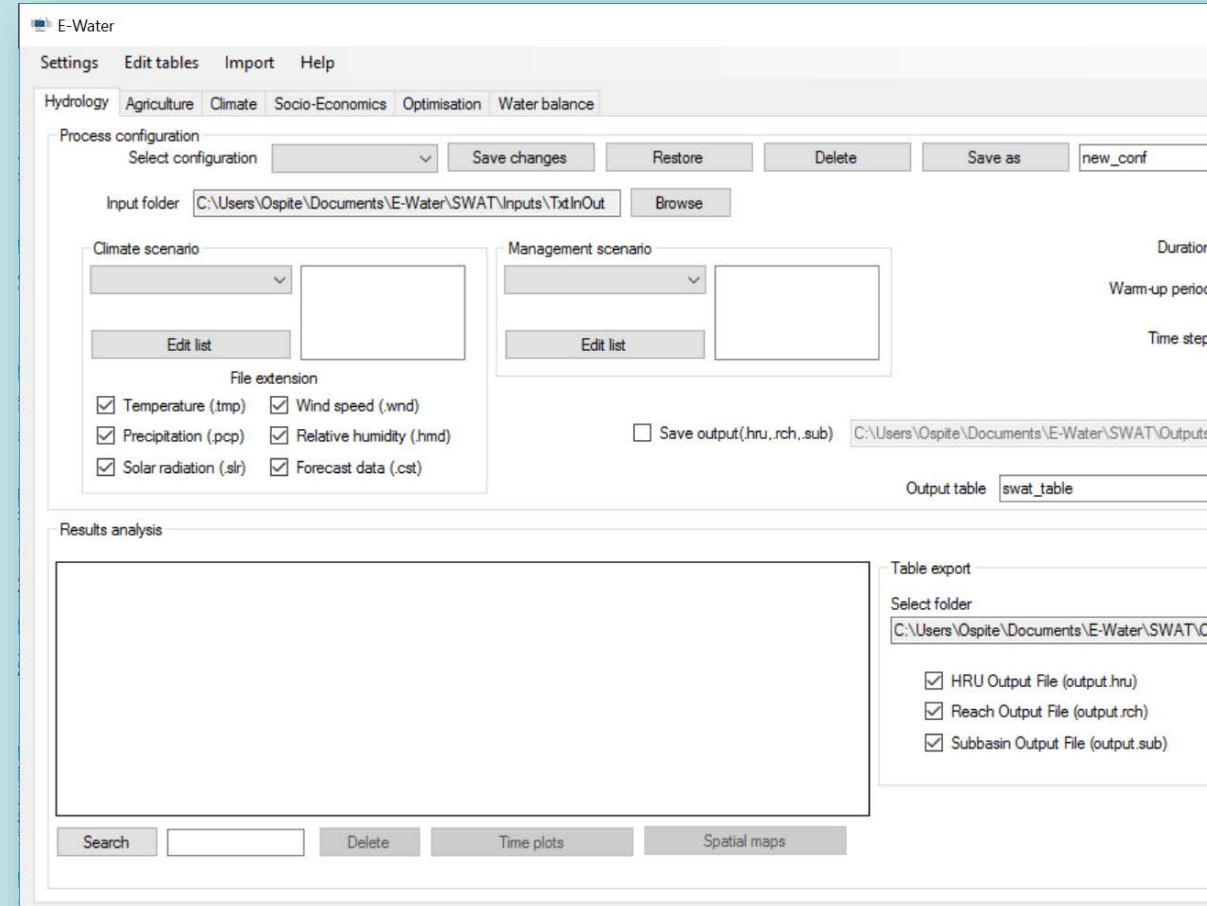
1. Applying WEF Nexus in policy and practice: guidelines and challenges based on Nexus experiences
 - 1.1 WEF NEXUS Governance and Cooperation Frameworks
 - 1.2 Data, Models and Tools assessing WEF Nexus
 - 1.3 Sustainable Technological Approaches and Solutions: Facilitating the most appropriate technologies in various scales
 - 1.4 Nexus financing and feasibility
2. Study Findings and Recommendations, opportunities and the Way Forward

CONTRIBUTORS of the EC Nexus POSITION PAPER

- | | |
|----------------------------------|-----------------------------------|
| 1. JRC | 9. WORLD BANK (TBC) |
| 2. IUCN UNESCO-IHP | 10. Arabian Gulf University (AGU) |
| 3. Texas A&M University | 11. GIZ |
| 4. American University of Beirut | 12. CEPAL |
| 5. FAO (TBC) | 13. GWP |
| 6. Central Asia University | 14. IIASA |
| 7. MEDRC Water Research Oman | 15. UNU FLORES |
| 8. SIWI | 16. UNECE (TBC) |

e-NEXUS Decision Support Tool assessing WEFE Nexus features

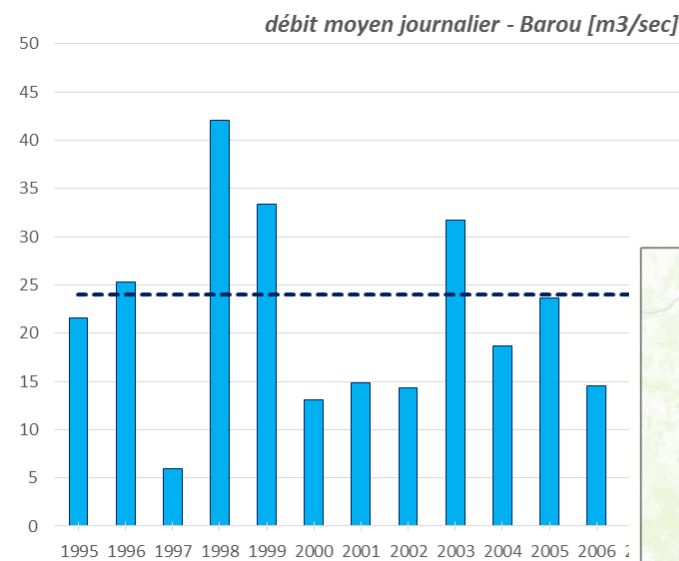
1. Generation of optimal scenarios to **support RB Policy Makers** with the preparation of the **Strategic Development and Investment Plans**
2. Developed with technical services and Universities of **Benin, Burkina Faso and Niger**
3. Flexible user (friendly) **interface**
4. **Thematic layers** with robust modelling of
 - Hydrology
 - Agriculture
 - Climate
 - Water Balance
 - Socio-Economic
4. Optimization based on **Multi-Criteria Decision Analysis (MCDA)** to scenario based Water Balance



e-NEXUS Decision Support Tool

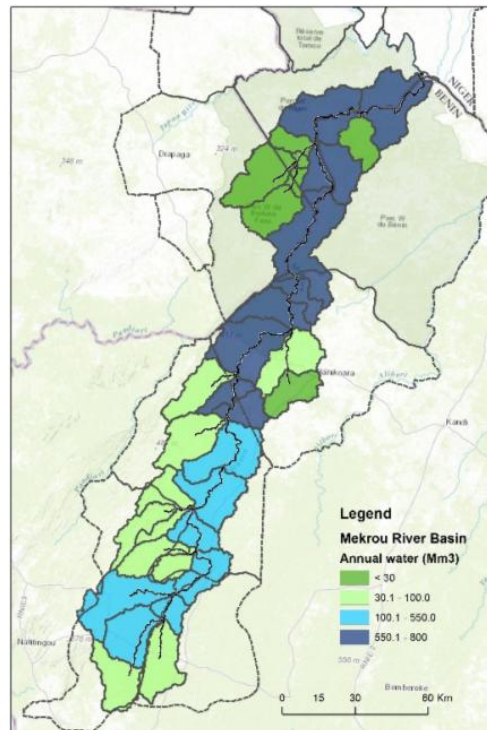
understanding and simulating future Water Balance

HYDROLOGY LAYER: develop scenarios of Water Demand vs Availability according to the different competitive uses (SWAT based)



Simulation of mean discharge (m3/sec)
1995-2012 (SWAT)

Annual Discharge (Mm³) in different sub
basins of Mékrou (ref 1995-2012)



E-Water

Settings Edit tables Import Help

Hydrology Agriculture Climate Socio-Economics Optimisation Water balance

Process configuration

Select configuration [v] Save changes Restore Delete Save as new_conf

Input folder C:\Users\Ospite\Documents\E-Water\SWAT\Inputs\TxtInOut Browse

Climate scenario [v] Edit list

Management scenario [v] Edit list

File extension

- ☒ Temperature (.tmp) ☒ Wind speed (.wnd)
- ☒ Precipitation (.pcp) ☒ Relative humidity (.hmd)
- ☒ Solar radiation (.slr) ☒ Forecast data (.cst)

☐ Save output (.hru, .rch, .sub) C:\Users\Ospite\Documents\E-Water\SWAT\Outputs

Output table swat_table

Results analysis

Table export

Select folder C:\Users\Ospite\Documents\E-Water\SWAT\Outputs

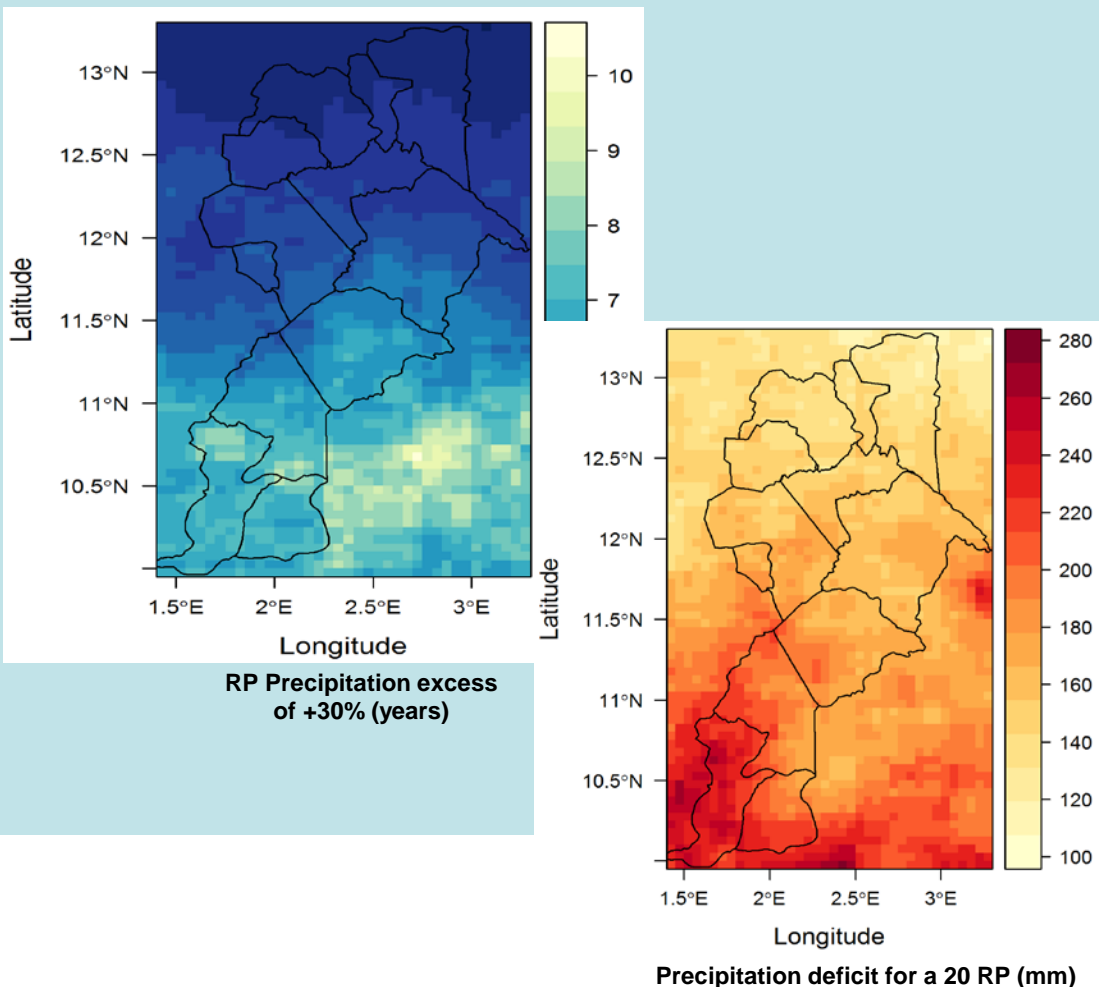
- ☒ HRU Output File (output.hru)
- ☒ Reach Output File (output.rch)
- ☒ Subbasin Output File (output.sub)

Search [] Delete Time plots Spatial maps

e-NEXUS Decision Support Tool

impact of climate variability

CLIMATE LAYER: Analyzing the recurrence of extreme events (precipitations/heat waves...)



E-Water

Réglages Éditer tables Importer Aide

Hydrologie Agriculture **Climat** Socio-Économie Optimisation Bilan hydrique

Sélectionner configuration Enreg. changem. Restaurer Supprimer Enregistrer sous new_conf

Sélectionner Fichier E:\mekrouUpdate_sept\atelier20-23 Sept2017\cleUSB MEKF Parcourir

Source données cl
☒ Fichier NetCDF
☐ Base de données

Table	Champ	Variable	Unité	Date de début	Date de fin	Pas
-------	-------	----------	-------	---------------	-------------	-----

Rechercher Champ Pas de temps

Date de début 01/01/1981 Shapefile d'entrée E:\mekrouUpdate_sept\atelier20-23 Sept2017\clel

Date de fin 31/12/2015 Dossier de sortie C:\Users\Ospite\Desktop

CHIRPS Prétraitement des entrées (Maximums Annuels/Mensuels)

Précipitations Température

Agrégation temporelle
☒ Journalière
☐ Max. mensuel
☐ Max. annuel

Unité de temp.
☒ K
☐ °C

Index
☐ Période de retour
☒ Vagues de chaleur

Jan Avr Juil Oct
Fév Mai Août Nov
Mar Juin Sep Déc

Sél. tout Désél. tout

Période de retour (ans)
☒ 2 ☒ 20
☒ 5 ☒ 50
☒ 10

Sél. tout Désél. tout

Période de référence
Année de début 1981
Année de fin 2010

Résumé
nb. ann
HWM

Démarrer

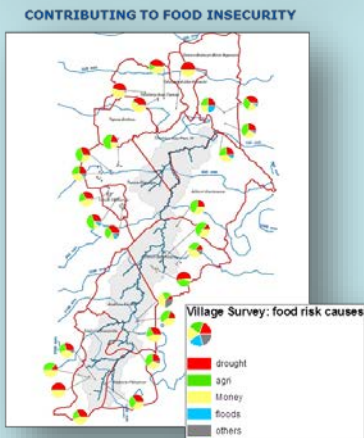
Connexion localhost:postores

e-NEXUS Decision Support Tool

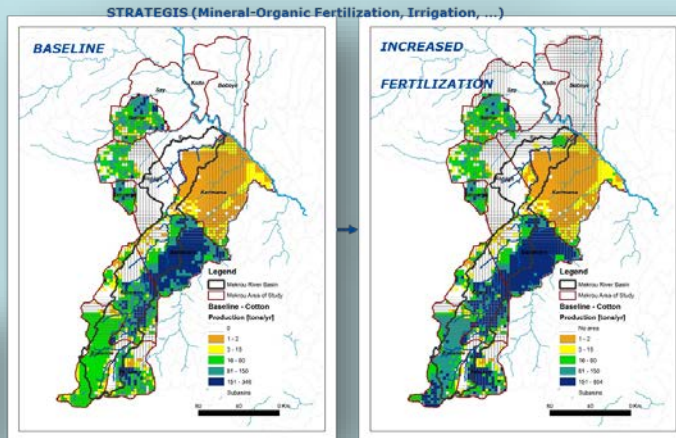
building scenarios on agricultural production according to objectives, climate pattern and management practices

AGRICULTURE LAYER: developing scenarios on agricultural/livestock production and related needs (water, nutrients, practices...) with EPIC and Climatic Scenarios CORDEX

IDENTIFICATION OF AREAS WITH LOW PRODUCTION



CROP PRODUCTION AS AFFECTED BY DIFFERENT MANAGEMENT



E-Water

Réglages Éditer tables Importer Aide

Hydrologie **Agriculture** Climat Socio-Économie Optimisation Water Demand

Configuration du processus

Sélectionner configuration Mgt1 Enregistrer Restaurer Supprimer Enregistrer sous Mgt1

Select by
☐ Region ☒ Site ID

Année de début 1980 Année de fin 2012

Mode d'échauffement (n° années) 10

Management Mode
☒ Current MGT_EX_1 ☐ Potential Edit list

Output Mode
☒ SUM with Annual Hydro ☐ SUM with Annual Hydro+Crop

Daily meteo table current Edit list

Site crops table current Edit list

Table de sortie Out_MGT1

☒ Save EPIC repository C:\Users\pastomc\Desktop

Démarrer

Table export

Select folder C:\Users\pastomc\Documents\E-Water\EPIC\Outputs Parcourir

☒ SUM Table ☒ ANN Table ☒ ACY Table Exporter

View Crop Table

Region Banikoara Load Table

Crop Alfaalfa [ALFA]

Table

	SUM	ANN	ACY
--	-----	-----	-----

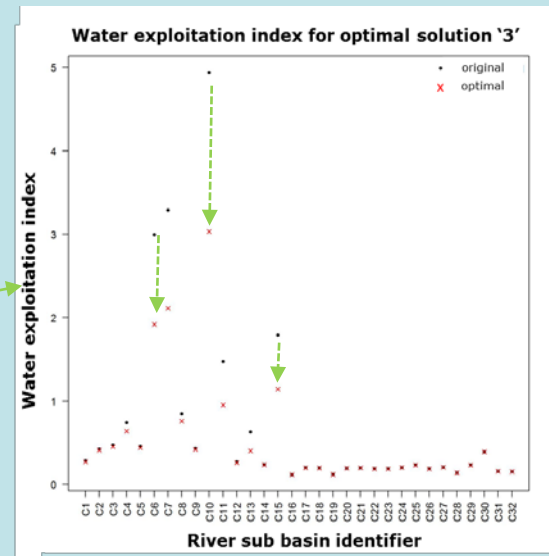
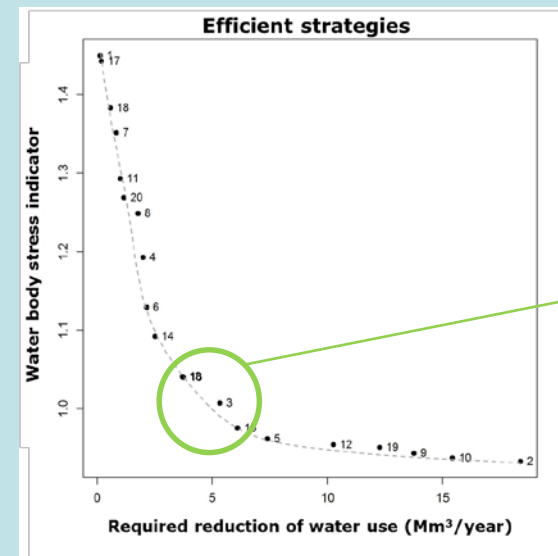
Rechercher Supprimer Graphiques temporels Plans spatiaux

Connexion localhost postgres

e-NEXUS Decision Support Tool

Multi-Objective Optimization to develop alternative scenario on water resources management

OPTIMIZATION LAYER: Finding multiple optimal solutions considering several objectives: food security, reduction of water resources demands, farmers economic benefit, crop surface allocation, optimal fertilization



Identification of optimal solutions according to set

E-Water

Réglages Éditer tables Importer Aide

Hydrologie Agriculture Climat Socio-Économie **Optimisation** Bilan hydrique

Éditer Scénario

Select. scénario C:\Users\jrc-admin\Documents\MOO_AGF Parcourir

Éditer

Zone de culture Diète Alimentaire

Fertilisant Prix de Vente Cultures

Irigation Modèle de Croissance

Population Facteur de Sécurité

Accroissement

Taux Croiss. Fertilisation

Taux Croiss. Irigation

Lim. d'Exports des Récoltes par Rég.

Taux Croiss. Population

Groupe de cultures <Tous>

Sélect. région Sélect. culture Culture <Tous>

Région <Tous>

Taux Croiss. Population

Region Name	Region ID	Population Increasing Rate (%)
Banikoara	1062	0
Karimama	1063	0
Kerou	1064	0
Kouande	1065	0
Pehunco	1066	0
Botou	1067	0
...

Param. toutes valeurs 0 Annuler changem. Enreg. ch

Notes Nouvel scénario new_scénario

Gestion de Scénario

Optimiser par

☒ Zone géo

☐ Fertilisation

☐ Irigation

☐ Fert. + Irig.

Select. scénario

Contrainte

☒ Région ☐ Pays ☐ Global

Démarrer

Connexion localhost:postgres

Analyse de Scénario

Select. scénario

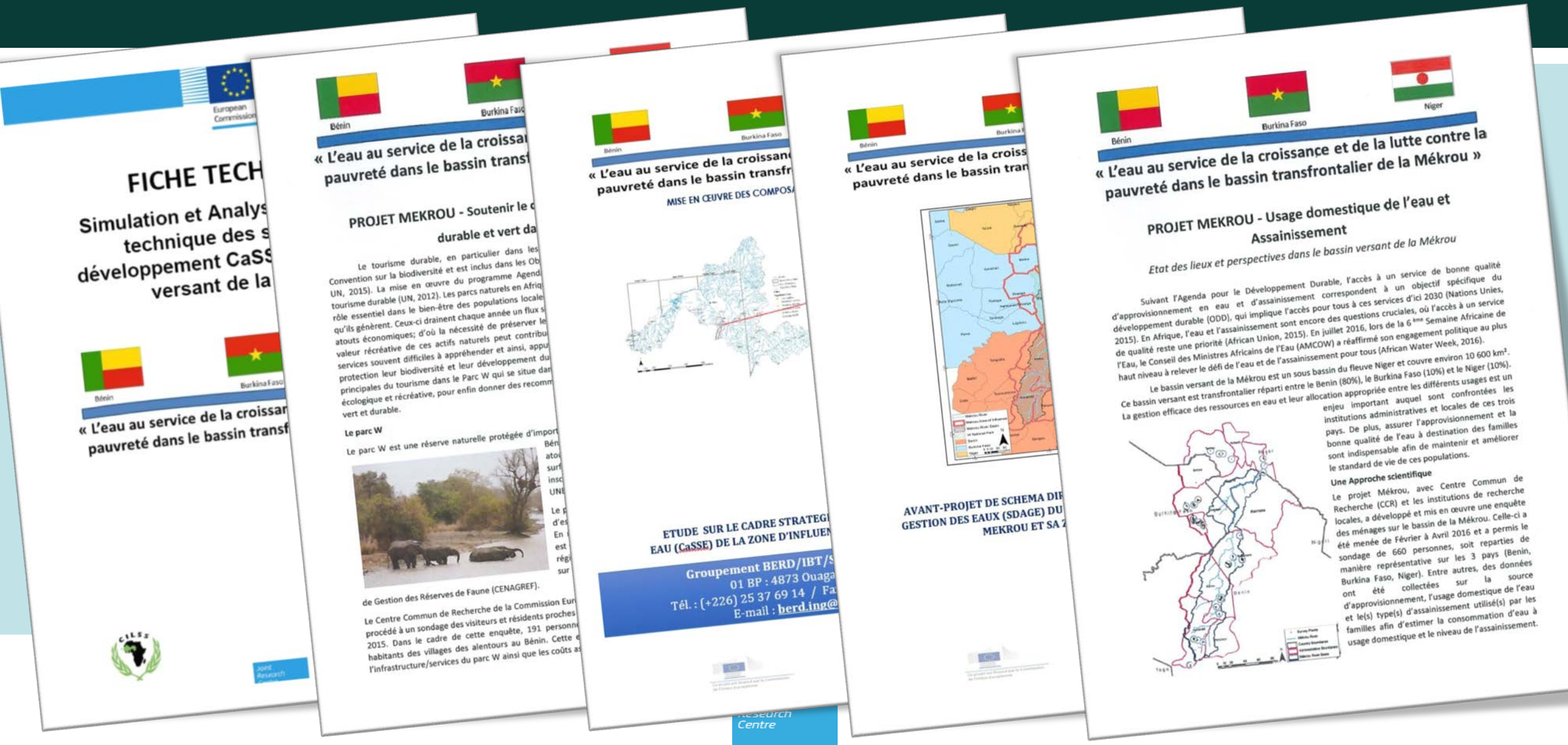
Pour cent (%)

☒ Rapport scénario simple

☐ Rapport MO

From 20 To 130 Pas 10

e-NEXUS Decision Support Tool OUTCOMES strategic development plans at river basin scale



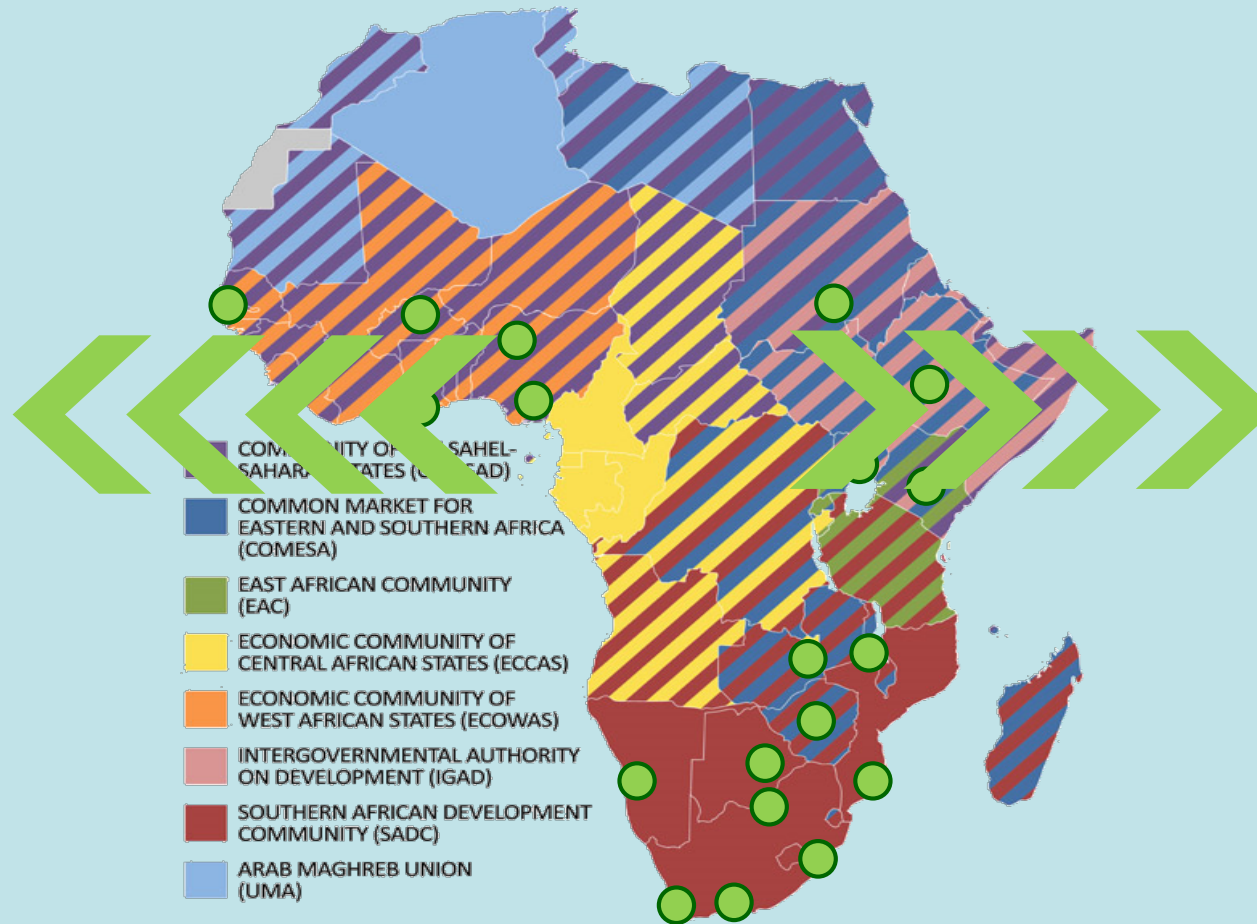
AU-NEPAD African Networks of Centers of Excellence on Water

Dynamic of the science – policy dialogue

Scientific level



1. Development of Scientific knowledge, expertise and (demand-driven) tools
2. Support to capacity building and skills development in the water sector



Policy level



1. Identification of needs and priorities
2. Development of (sustainable) strategies and policies
3. Regional Exchange

Centers of Excellence Network is a platform for regional dialogue and collaboration with policy representatives

AU-NEPAD African Networks of Centers of Excellence on Water addressing the WEFE nexus assessment in large river basins

Western African CoE Network

1. University of Cheikh Anta Diop (Senegal)- Coordinator
2. International Institute for Water and Environmental Engineering (Burkina Faso)
3. University of Benin (Nigeria)
4. National Water Resources Institute (Nigeria)
5. Kwame Nkrumah University for Sciences and Technology (Ghana)

NIGER
SENEGAL

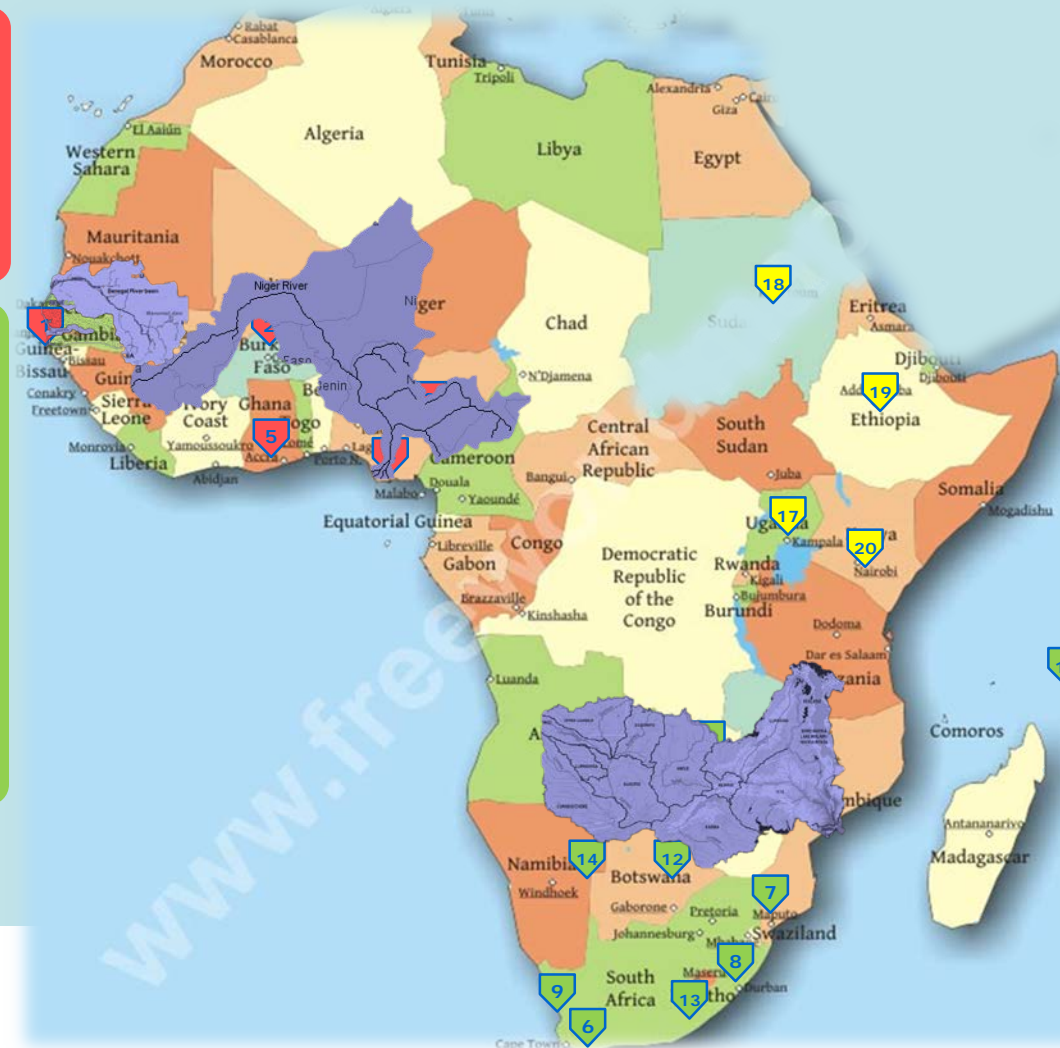
Southern African CoE Network

6. Stellenbosch University (South Africa) – Coordinator
7. International Centre for Water Economics and Governance in Africa (Mozambique)
8. University of KwaZulu-Natal (South Africa)
9. University of Western Cape (South Africa)
10. University of Malawi
11. University of Zambia
12. University of Botswana
13. The Council for Scientific and Industrial Research, CSIR (South Africa)
14. Namibia University of S&T
15. National University of S&T (Zimbabwe)
16. University of Mauritius

ZAMBEZI

Eastern and Central Africa CoE Network (since aug.2017)

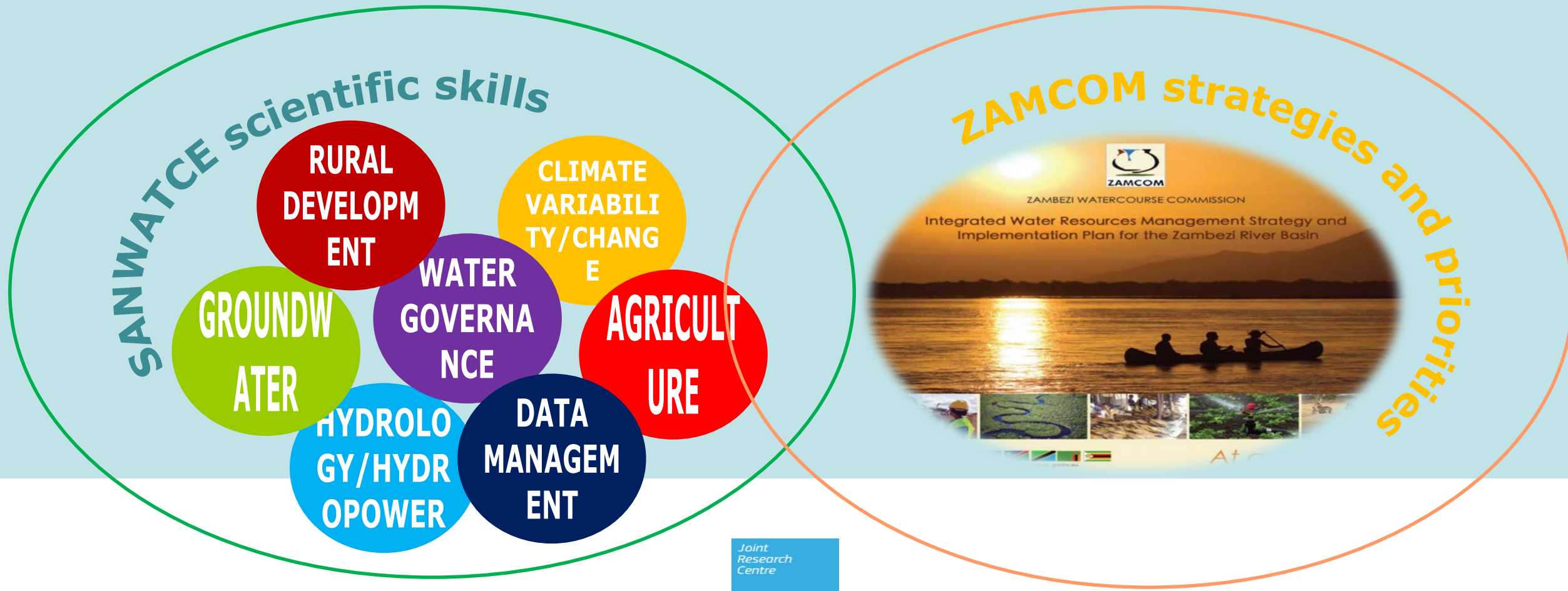
17. Makerere University (Uganda)
18. Water Research Center, University of Khartoum (Sudan)
19. Ethiopian Institute of Water Resources, Addis Ababa University (Ethiopia)
20. IGAD Climate Prediction and Applications Centre (Kenya)



Southern African CoE Network - SANWATCE

Water and Cooperation within the Zambezi River Basin (WACOZA)

METHOD: identification of priorities, needs, and consequent specific objectives and activities have been performed taking into account:





Thanks

Contact: cesar.carmona-moreno@ec.europa.eu
paolo.ronco@ec.europa.eu