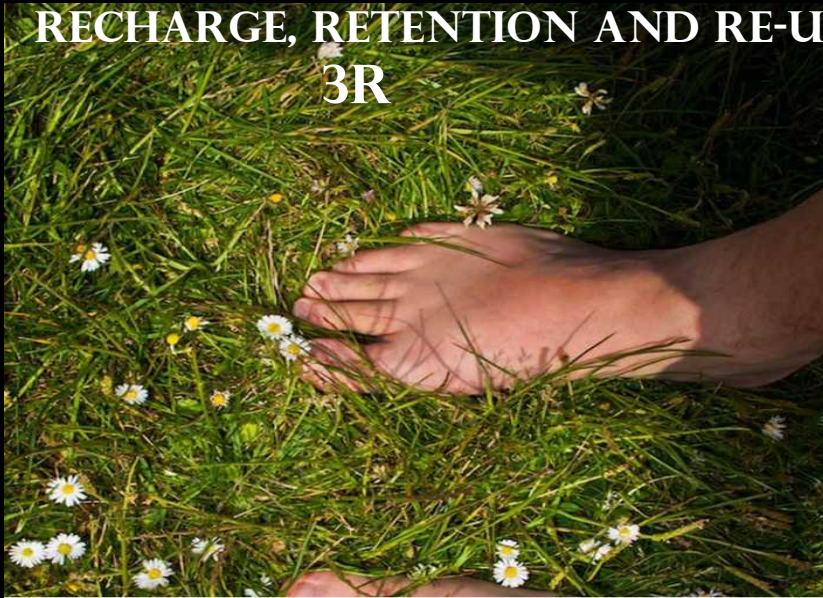


RECHARGE, RETENTION AND RE-USE 3R



PETER LETITRE (IGRAC)

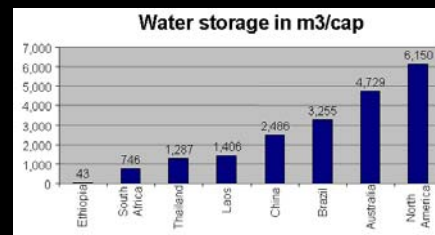
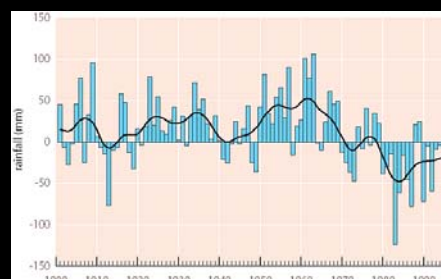
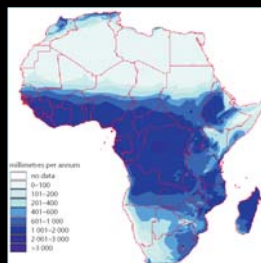
CLIMATE CHANGE:

**THE HIGHS AND LOWS INCREASE
AND THE ALL IMPORTANT
RAINY SEASONS
ARE BECOMING MORE ERRATIC**

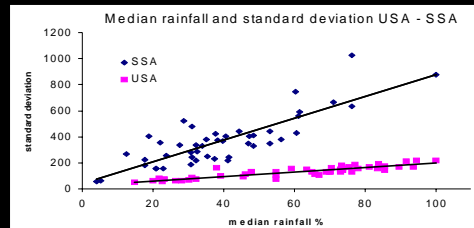
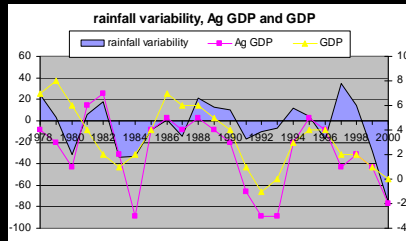


DEVELOPMENT CONTEXT

- SUBSTANTIAL DEVELOPMENT NEEDS
- RICH ENDOWMENT WITH SUBSTANTIAL WATER RESOURCES
- HYDROLOGIC VARIABILITY IS HIGH
- WATER STORAGE INFRASTRUCTURE UNDERDEVELOPED
- FOUNDATION FOR SUPPORTING GROWTH AND SERVICE DELIVERY

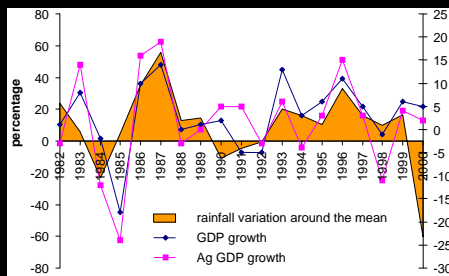


WATER AND ECONOMIC GROWTH



Ethiopia - 2003-2015 growth projections:

- 38% decline in avg. GDP growth
- 25% increase in poverty

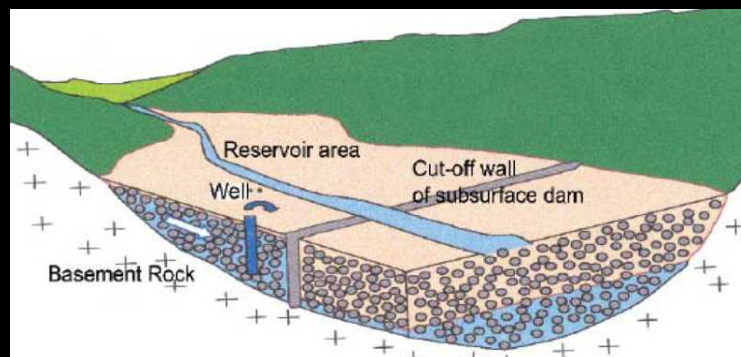


**TO ADAPT TO CLIMATE CHANGE
NEED TO MANAGE THE WATER BUFFER**



**GROUNDWATER STORAGE
AND LOCAL SURFACE STORAGE
BOTH FOR WATER AND FOOD SECURITY**

3R = RECHARGE, RETENTION AND REUSE



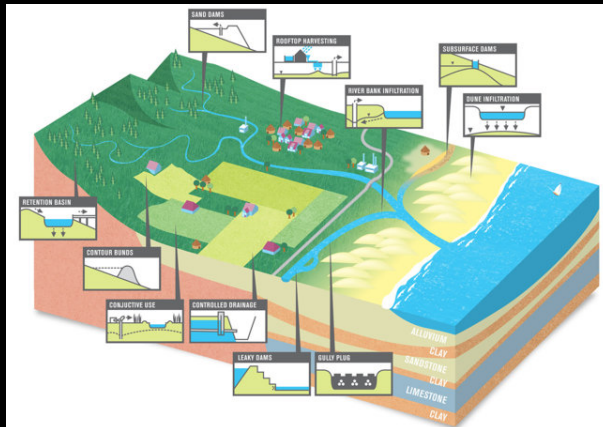
3 R - TECHNIQUES

- **RECHARGE: MANAGING NATURAL AND ARTIFICIAL RECHARGE**
- **RETENTION: CREATING WET BUFFERS IN THE BASIN**
- **REUSE: EXTENDING THE 'CHAIN OF USES'**



3R PROCESSES

- IDENTIFYING LOCAL NEEDS
- ASSESSMENT AT SCALE:
 - 3R POTENTIAL MAPPING
 - MEDIUM TERM CLIMATE INFORMATION
- LINK TO REGIONAL PLANNING
- IMPLEMENTATION AND FINANCING



**INTRODUCE BUFFER MANAGEMENT
AT SCALE - BASIN BY BASIN
NOT PIECEMEAL/SCATTERED**

BUFFER MANAGEMENT IN PRACTICE

- **UPSCALING OF SMALL SCALE SOLUTIONS AND**
- **IMPLEMENTING DIRECTLY AT SUBBASIN SCALE**
- **BUSINESS CASE**
- **NO REGRET MEASURES**

EXAMPLES

SAND STORAGE DAMS, KITUI, KENYA

**CAREFULLY CREATE – IN STAGES –
A SANDY AQUIFER BEHIND THE SAND DAM**

**STORE FLOODWATER
AND INCREASE LOCAL WATER LEVELS**



**SPATE IRRIGATION FOR AGRICULTURE
AND RECHARGE, YEMEN**

**SPREAD FLOODS OVER LARGE AREAS
FOR AGRICULTURE**

**MANAGE THE RECHARGE
BY LEAKY DIVERSION STRUCTURES
AND TAIL END SUPPLIES**



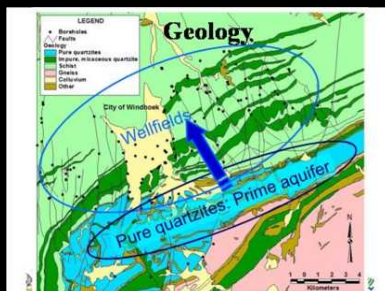
**RETAINING WATER IN VERY HUMID AREAS
(NORTH BENGAL INDIA)**

**GULLY PLUGS/ BUNDS TO RETAIN SHEET FLOW
AND ASSURE SOIL MOISTURE
INCREASE CROPPING INTENSITY
AND YIELDS OF RAINFED PADDY**



**CREATING A WATER BANK
(NAMIBIA)**

**EXCESS WATER FROM LOCAL DAMS
INJECTED IN AQUIFER
ASSURES WATER AVAILABILITY
FOR WINDHOEK CITY**



LARGE DIAMETER DEEP BOREHOLE



**RAINWATER HARVESTING IN SALT EFFECTED AREAS
(SENEGAL)**

**LARGE SCALE INTRODUCTION
OF ROOF TOP WATER HARVESTING
LOW COST ALTERNATIVE FOR DRINKING WATER
SUPPLY IN VERY DIFFICULT AREAS**



**CONJUNCTIVE USE IN LARGE SCALE IRRIGATION SYSTEMS
(MOROCCO)**

**MOST WATER IN LARGE IRRIGATION SYSTEMS IS
FROM REUSING SEEPAGE WATER**

**NEED TO PLAN BUFFER FUNCTIONS
INTO SURFACE IRRIGATION SYSTEM**





USING ROAD INFRASTRUCTURE FOR 3R

ROAD EMBANKMENTS RETAIN SURFACE RUNOFF/
COMPARTMENTALIZE SHEETFLOW

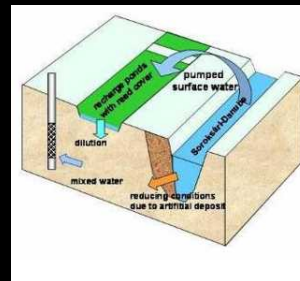
IRISH BRIDGES TO RETAIN SUBSURFACE FLOW
AND INCREASE GROUNDWATER LEVELS,

PERMEABLE SURFACES AND QUALITY ISSUES

3R IN ARID AND HUMID AREAS

3R FOR WATER AND FOOD SECURITY

3R FOR URBAN AND RURAL DEVELOPMENT



KEY ELEMENTS

- **PROVEN TECHNIQUES +**
- **NOT SO WELL KNOWN TECHNIQUES**
- **WORK AT SCALE**
- **LOCATION-SPECIFIC**
- **START FROM LOCAL PRIORITIES**
- **INTEGRATE WITH REGIONAL PLANNING, LAND USE PLANNING ETC**



VISION:

TO GIVE PEOPLE THE CONFIDENCE AND MEANS THAT THEY CAN PROTECT THEIR LIVELIHOODS AND DEVELOP THEIR ECONOMIES EVEN IN TIMES OF CLIMATE VARIABILITY AND CHANGE



SOMETIMES YOU ARE
STANDING ON A SOLUTION
WITHOUT EVEN KNOWING IT

