

STOCKHOLM 2010

3R WATER QUALITY

3R
MANAGING THE WATER BUFFER



Rainwater Harvesting
Implementation Network



3R TECHNOLOGIES AT WORK: THE CASE OF RWANDA

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IN COLLABORATION WITH:



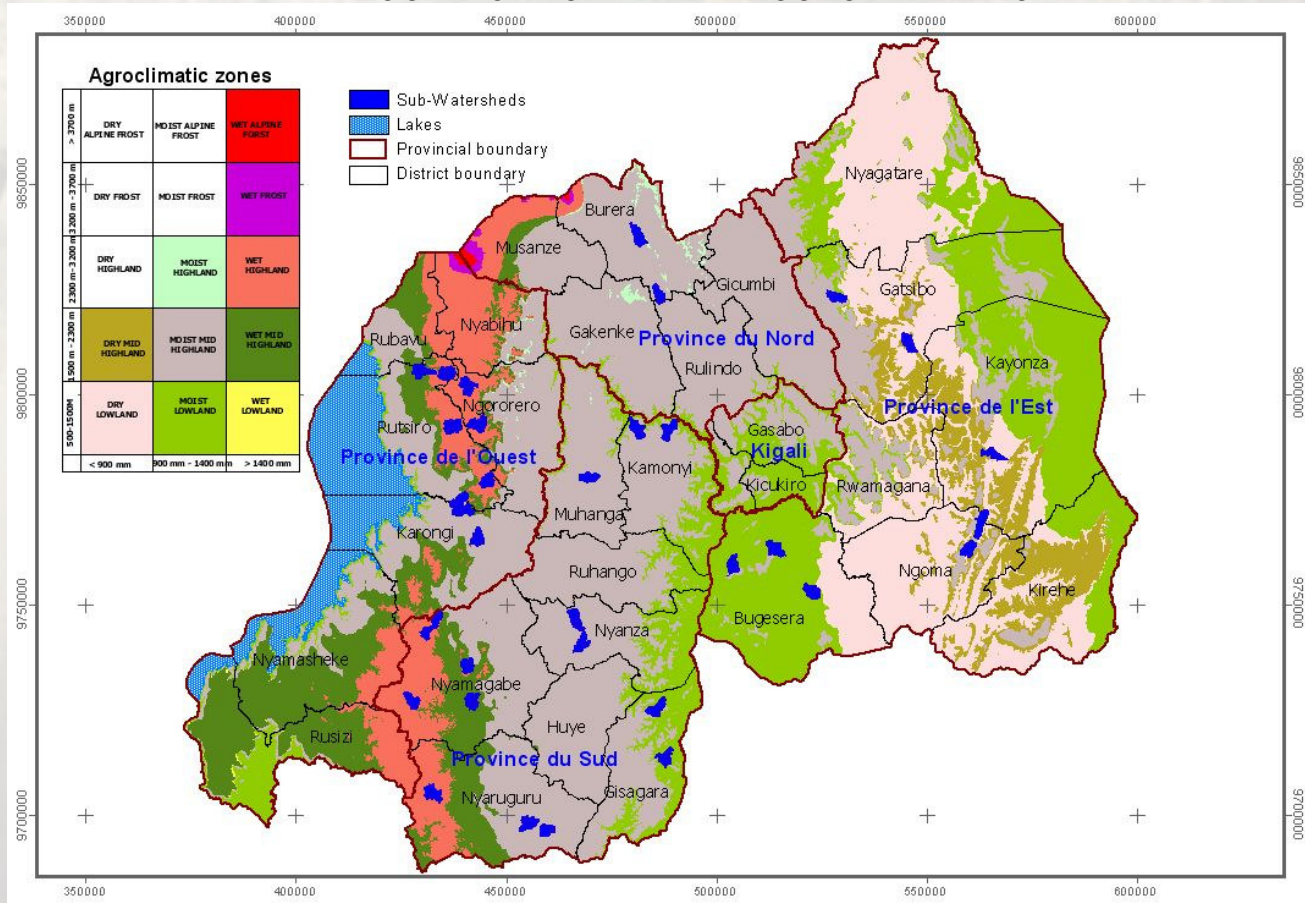
and



MINISTRY OF AGRICULTURE AND ANIMAL RESOURCES (MINAGRI), REPUBLIC OF
RWANDA



LOCATION OF THE PROJECT AREAS

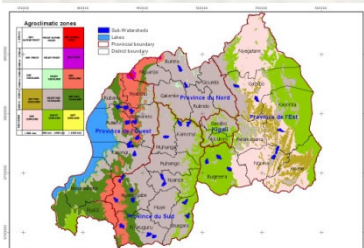


Some 101 project sites are identified. The first 32 are indicated in 17 districts. However, all districts will be covered by the program. Currently 8 project sites are under implementation. The 8 are being financed by WB, GAFSP, CIDA, US AID and JICA.

3R SOLUTIONS TO IMPROVE WATER QUALITY AND QUANTITY



MAJOR ISSUES (CHALLENGES FACED)



Agroclimatic zones

> 3700 m	DRY ALPINE FROST	MOIST ALPINE FROST	WET ALPINE FROST
3700 m - 3200 m	DRY FROST	MOIST FROST	WET FROST
3200 m - 2300 m	DRY HIGHLAND	MOIST HIGHLAND	WET HIGHLAND
2300 m - 1500 m	DRY MID HIGHLAND	MOIST MID HIGHLAND	WET MID HIGHLAND
1500 m - 500-1500M	DRY LOWLAND	MOIST LOWLAND	WET LOWLAND
	< 900 mm	900 mm - 1400 mm	> 1400 mm

These are in Wet zones (>1400 mm /year). Flood, siltation and landslide threaten the very existence of the social and biophysical environment.

These are in Moist zones with >900 to <1400 mm/ year). Water enough during the rainy season. Continued production supply and livelihoods at risk.

These agroclimatic zones are in Dry zones (<900 mm per year). Limited production, draught, migration, unstability.



CHALLENGES CONTINUED....

The problem is exacerbated due to poor quality of the storage medium

1. The lands are too steep to apply retention, recharge and even re-use
2. The soils are too leaky to store water effectively
3. Soils are too acidic to encourage vegetation which help recharging
4. Fertility is too impoverished to allow for maximum production from single rainy seasons



STUDY CONSIDERATIONS

- Agroclimatic zone of the specific sites (water excess, just enough and deficit zones)
- Joint effect of soil depth and slope categories for determining sensitivity to water and land management technologies and user-interference
- Soil types with their pH, micro nutrient content, and water holding capacity
- Environmental resilience to broadly defined land use types
- Ease of implementation and continued management (possibilities for homogenizing into blocks)

Agroclimatic zones

> 3700 m	DRY ALPINE FROST	MOIST ALPINE FROST	WET ALPINE FROST
3000 m - 3700 m	DRY FROST	MOIST FROST	WET FROST
2500 m - 3000 m	DRY HIGHLAND	MOIST HIGHLAND	WET HIGHLAND
1500 m - 2500 m	DRY MID HIGHLAND	MOIST MID HIGHLAND	WET MID HIGHLAND
500 - 1500 m	DRY LOWLAND	MOIST LOWLAND	WET LOWLAND
	< 900 mm	900 mm - 1400 mm	> 1400 mm

APPROACH FOR WET ZONES

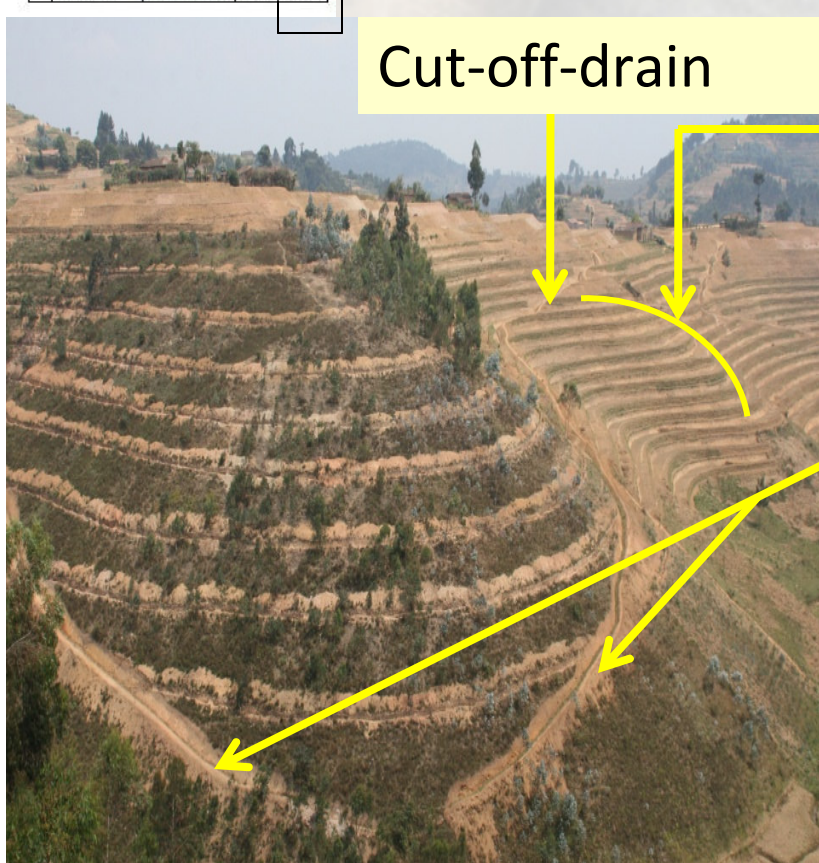
Appropriation of water to moist or dry zones by way of modified and graded terraces that are connected to cut-off-drains which are connected to waterways which finally end up into storage reservoirs for re-use.

Cut-off-drain

Modified terraces: level along the contour and graded towards up-slope to drainage

Waterways appropriating water to retention sites

Water retained in down stream for re-usage



Agroclimatic zones

> 3700 m	DRY ALPINE FROST	MOIST ALPINE FROST	WET ALPINE FROST
3700 m - 3200 m	DRY FROST	MOIST FROST	WET FROST
3200 m - 2800 m	DRY HIGHLAND	MOIST HIGHLAND	WET HIGHLAND
2800 m - 2300 m	DRY MID HIGHLAND	MOIST MID HIGHLAND	WET MID HIGHLAND
2300 m - 1500 m	DRY LOWLAND	MOIST LOWLAND	WET LOWLAND
1500 m - 500 m			
< 500 m			
	< 900 mm	900 mm - 1400 mm	> 1400 mm

APPROACH FOR MOIST AGROCLIMATIC ZONES

Construction of level terraces interspaced by cut-off drains that convey excess water during rainy seasons to water-ways which end up in a valley dam reservoir in the same Moist Zones for re-use in dry seasons



Cut-off-drains



Level terraces are carved out from hillsides. These are treated with compost and lime for improved water absorption and retention.



Agroclimatic zones			
	DRY ALPINE FROST	MOIST ALPINE FROST	WET ALPINE FROST
> 3700 m			
3300 m - 3700 m	DRY FROST	MOIST FROST	WET FROST
2300 m - 3300 m			
1500 m - 2300 m	DRY HIGHLAND	MOIST HIGHLAND	WET HIGHLAND
500 m - 1500 m	DRY MID HIGHLAND	MOIST MID HIGHLAND	WET MID HIGHLAND
500 m - 1500 m	DRY LOWLAND	MOIST LOWLAND	WET LOWLAND
	< 900 mm	900 mm - 1400 mm	> 1400 mm

Construction of water retaining land management measures such as level structures with tie-ridges treated with compost and lime as needed, plus supplementary irrigation from external water sources



3R TECHNOLOGIES AND ENVIRONMENT

Lands are categorized into different land uses in accordance with their resilience capacity classes. 3R technologies are prescribed for each.

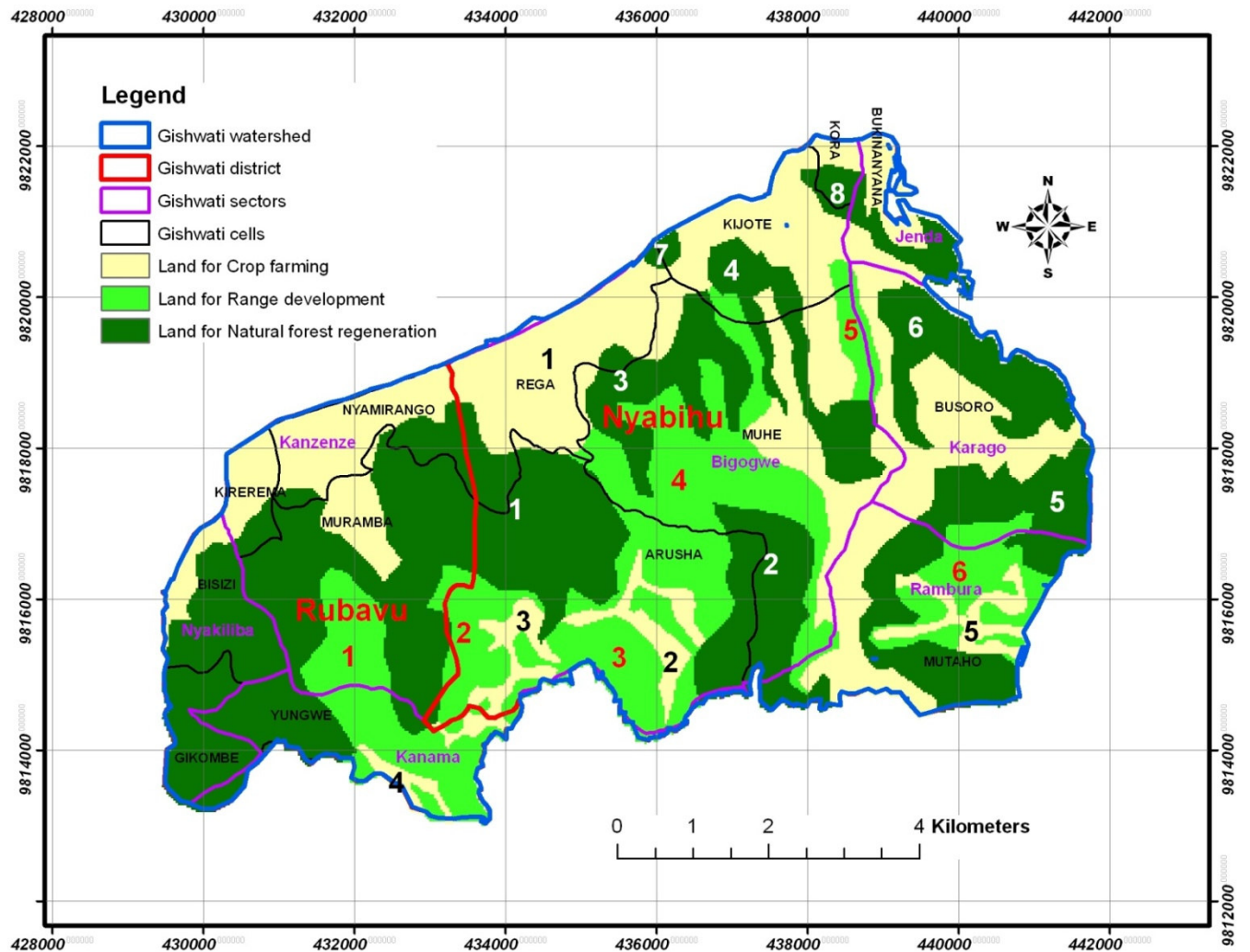
Soil depth	Slope categories				
	0 -6%	6 - 16%	16 - 40%	40 - 60%	>60%
0 – 50 cm	9	10	11	12	N. F. 15
50 – 100 cm	2	4	6	8	E Co 14
> 100 cm	1	3	5	7	n. 13

Rangelands

Croplands

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3R AND ENVIRONMENT ----



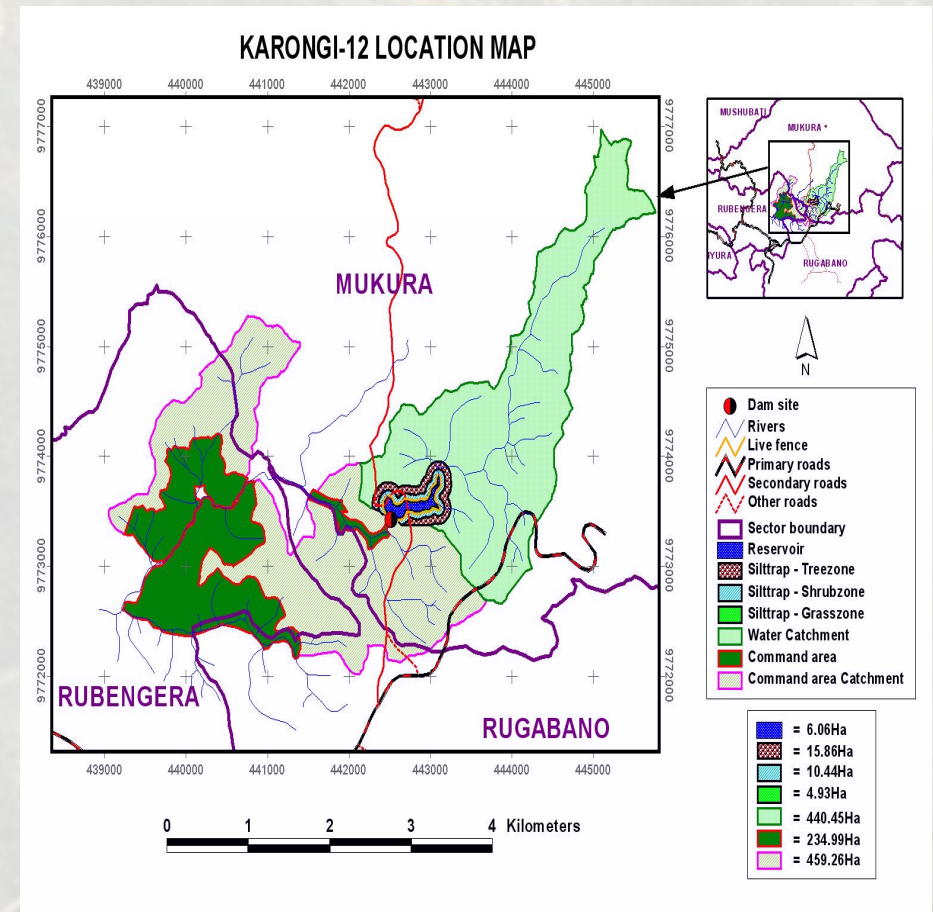
FRAGMENTED LAND RESILIENCE
CLASSES ARE HOMOGENIZED INTO
LAND-USE TYPE BLOCKS FOR EASE
OF IMPLEMENTATION

3R SOLUTIONS TO IMPROVE WATER QUALITY AND QUANTITY



ADDITIONAL MEASURES IN 3R TECHNOLOGIES

1. All land treatments are decided to be watershed-based.
2. Lime and compost are applied at each plot at the rate needed for each.
3. Stabilizing measures such as planting with grasses and herbaceous legumes are being applied on terrace risers, gully banks and floors and embankments of drainage structures



SAMPLE RESULTS OBTAINED



Irish potatoes growing well after terracing and water retaining treatments have been implemented in Moist Zone.



Maize farms after carving out terraces and applying all moisture recharging and retaining measures in Dry Zone.

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FLOOD AND
DROUGHT

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