Process and Performance of River Basin Water Management Decentralization in Sub-Saharan Africa

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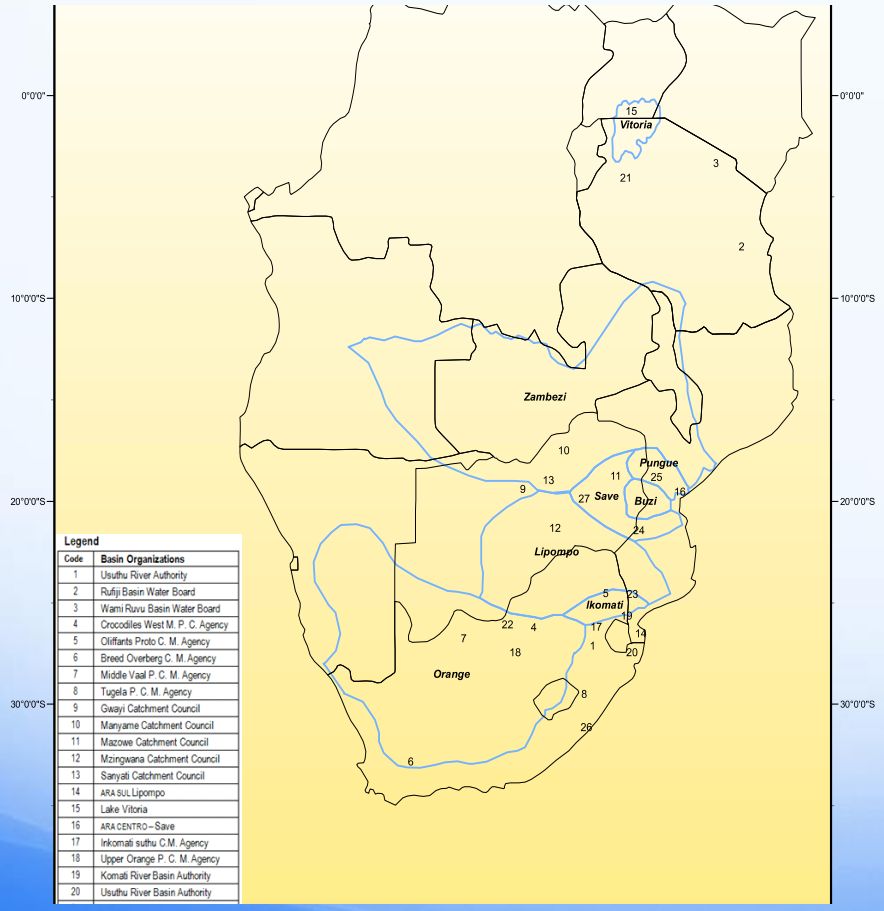
Motivation

- The WB Study “Integrated River Basin Management Through Decentralization”(Kemper, Blomquist and Dinar, 2007)
  - 83 Basins included (42% response), not from SSA
  - 51 basins in developing countries
  - Quite important findings about determinants of process and performance
  - SSA basins were not part of the study mainly because decentralization considerations started in SSA only in late 1990s
- Could be of interest to repeat and extend the study to SSA
  - Decentralization efforts in SSA underway
  - Comparison of the SSA results with previous work
    - Robustness (not
    - Role of international agreements (in SSA)

Basin Locations

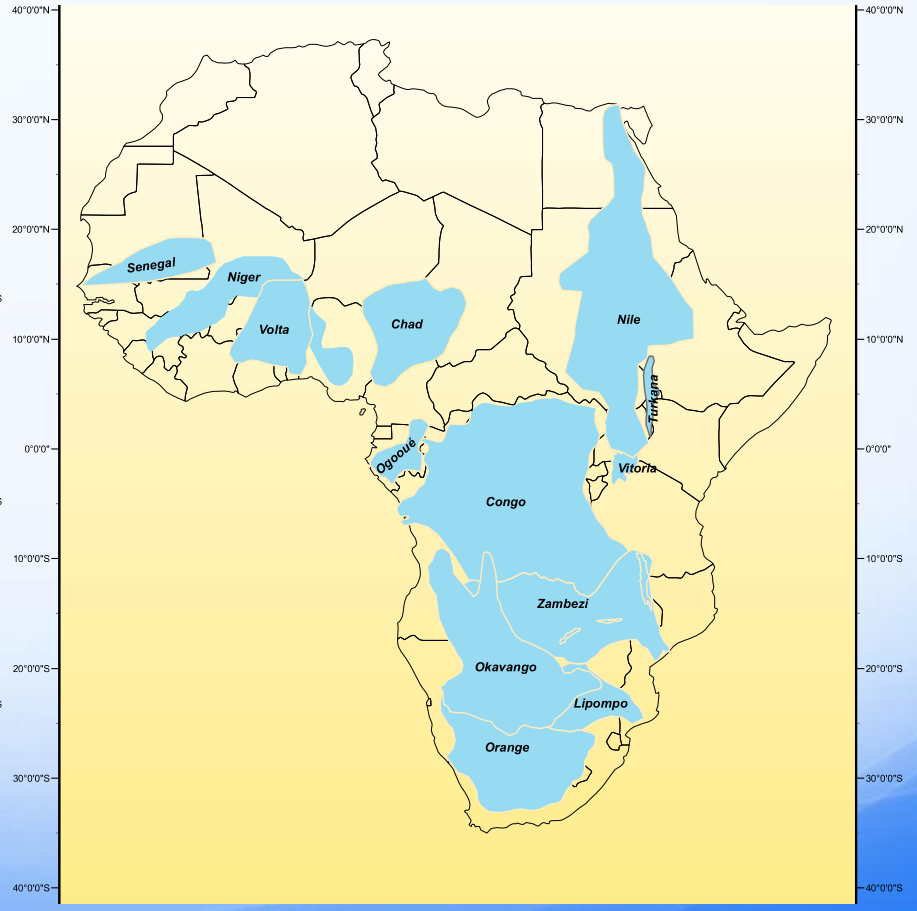
Basins in the Study



Legend

Code	Basin Organizations
1	Usuthu River Authority
2	Rufiji Basin Water Board
3	Wami Ruvu Basin Water Board
4	Crocodiles West M. P. C. Agency
5	Olifants Proto C. M. Agency
6	Breed Overberg C. M. Agency
7	Middle Vaal P. C. M. Agency
8	Tugela P. C. M. Agency
9	Gwayi Catchment Council
10	Manyame Catchment Council
11	Mazowe Catchment Council
12	Mzingwana Catchment Council
13	Sanyati Catchment Council
14	ARA SUL Lipompo
15	Lake Vitoria
16	ARA CENTRO – Save
17	Inkomati suthu C.M. Agency
18	Upper Orange P. C. M. Agency
19	Komati River Basin Authority
20	Usuthu River Basin Authority

Main International Basins in Africa



Initial Set of Identified Basins

Region	Number of Reported Basins
Southern Africa	34
West Africa	30
East Africa	14
Central Africa	21
Total	99

Source: ANBO AMCOW and GTZ 2012

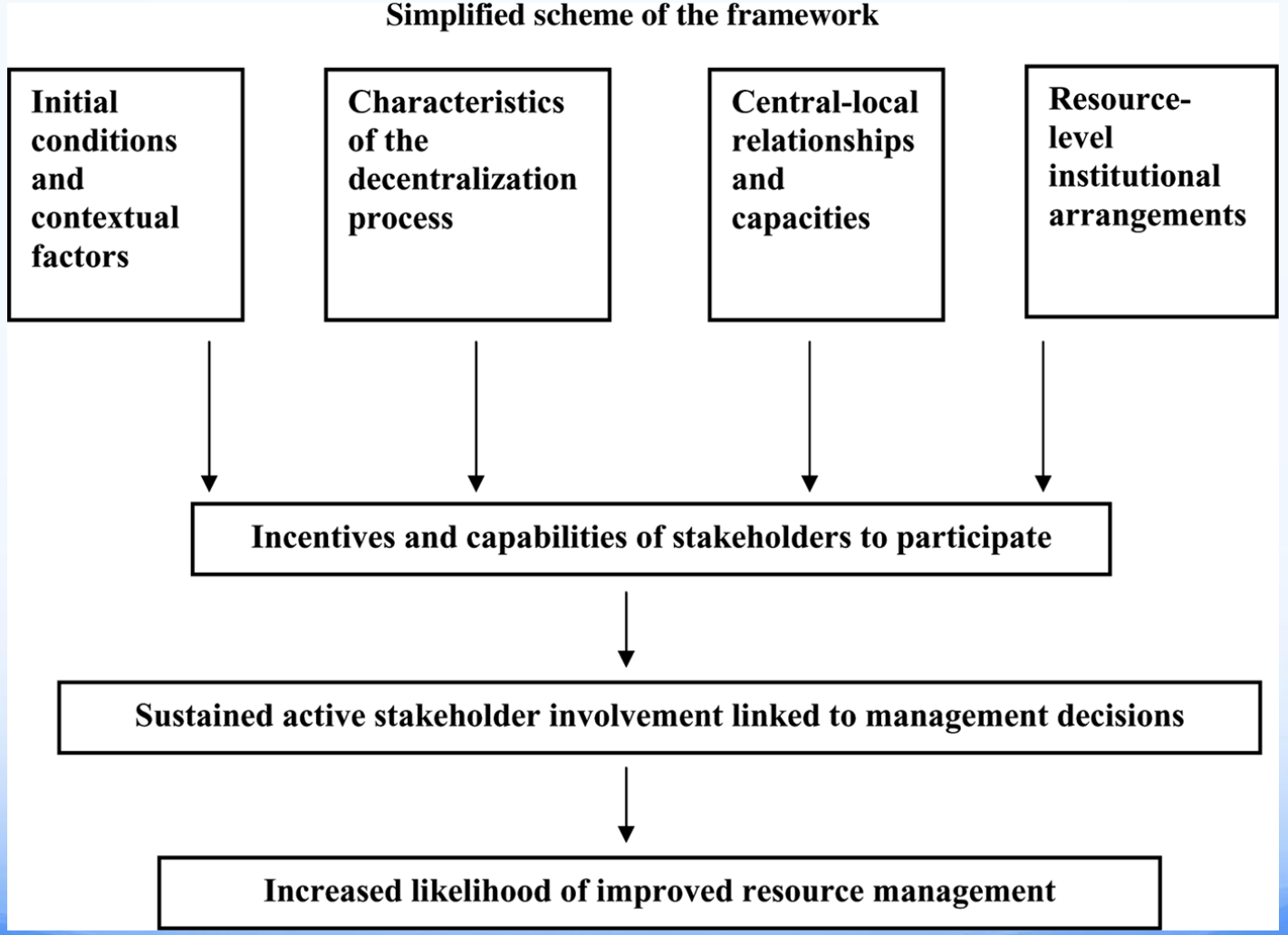
Second Phase of Basin Identification

Region	Decentr. Undertaken	Decentr. In Progress	No Decentr.	No Information	Total
Southern	23	29	19	0	71
West	0	0	4	8	12
East	9	5	2	8	24
Central	0	0	6	8	14
Total	32	34	29	26	121

Details on Basins in Sample

Country	Decentr. Undertaken	Decentr. in progress	Basins in Sample
Mozambique	13		5
Kenya		5	1
South Africa	2	17	10
Swaziland	1	2	2
Zimbabwe	7		6
Tanzania	9		3
Total in sample	30	26	27 (41%)
Total in region	32	34	N/A

Theoretical framework



The Empirical Framework

The set of equations used in the estimation of the first relationship takes the following shape:

[1] $\boldsymbol{P} = g(\boldsymbol{C}, \boldsymbol{R}, \boldsymbol{I} \mid \boldsymbol{V}, B, \boldsymbol{X})$

where:

P is a vector of characteristics of the decentralization process;
C is a vector of contextual factors and initial conditions;
R is a vector of characteristics of central government/basin-level relationships and capacities;
I is a vector of internal configuration of basin-level institutional arrangements;
V represents the climatic conditions (precipitation or runoff) in the basin;
B is a dichotomous variable indicating whether or not the basin is governed by an international river basin treaty/organization; and
X is a vector of "other" variables, identified as necessary.

A general relationship for decentralization success/progress, using the theory developed in this project is as follows:

[2] $\boldsymbol{S} = f(\boldsymbol{C}, \boldsymbol{P}, \boldsymbol{R}, \boldsymbol{I} \mid \boldsymbol{V}, B, \boldsymbol{X})$

where:

S is a vector of performance indicators of the decentralization in the river basin.
All other variables are as defined earlier.

Hypotheses on Decentralization Process

Dependent Var. / Independent Var.	WUAs Involvement	RBO Created	Institutions Dismantled
Budget per Capita	NI	NI	NI
Creation Bottom-Up	+	+	+
Disputes over allocation	–	+	NI
Governing Body	NI	NI	NI
International Treaty	+	+	+
Political Cost	+	+	+
Relative water scarcity	NI	+	+
Share of surface water	NI	NI	+
Water flow fluctuates	N/A	NI	+
WUA Involvement	NI	NI	NI
Years Decentralization	–	NI	NI

NI=Not Included

Hypotheses on Decentralization Performance

Dependent Var. / Independent Var.	Success over Objectives	Problems after Decentr.
Budget Per Capita	NI	+
Creation Bottom Up		+
Disputes over Allocation	NI	NI
Governing Body	+	NI
Institutions Dismantled	NI	NI
International Treaty	+	NI
Political Cost	−	−
RBO Created	NI	NI
Relative Water Scarcity	NI	NI
Share of SW	+/−	NI
Water Flow Fluctuates	−	NI
WUA Involvement	NI	NI
Years Decentralization	+	NI

NI=Not Included

Decision-making in water management at various levels before and after decentralization

Activity	Before	After	t-Statistic
Water Administration			
Local	2.235	2.692	0.8785
Basin	1.611	3.733	6.0498***
State	2.875	3.125	0.3369
Central Government	3.950	2.533	-2.7947***
Infrastructure Financing			
Local	1.917	2.400	0.9659
Basin	1.286	2.714	2.4019**
State	3.222	3.125	-0.1453
Central Government	4.714	4.667	-0.1166
Water Quality Enforcement			
Local	1.500	1.800	0.7069
Basin	1.529	3.273	3.7063***
State	2.750	2.500	-0.4229
Central Government	4.000	3.286	-1.8609*
Setting Water Quality Standards			
Local	1.200	1.000	-0.5311
Basin	1.333	2.333	2.3094**
State	2.083	2.714	0.9073
Central Government	4.600	4.571	-0.1031

Note: *** p < 0.01; ** p < 0.05; * p < 0.10.

Changes in severity of various water management issue between before and after decentralization

Problem Item	Before	After	t-Statistic
Floods	0.9545	0.7222	1.5396+
Water Scarcity	1.0952	0.4705	3.6246***
Environmental Quality	1.1052	0.2666	3.5794***
Water Conflicts	1.3888	0.2666	4.5825***
Land Degradation	1.0500	0.7500	1.6771*
Development Issues	1.3333	0.6153	3.5257**

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$; + $p < 0.15$.

Estimated Equations of the Decentralization Process

Estimation procedure	OLS	OLS	LPM Lin Prob Model	LPM	LPM
Explanatory Variable	WUAs Involvement	WUAs Involvement	RBO Created	RBO Created	Institutions Dismantled
Political Cost	1.1071 (4.41)***	1.1068 (5.00)***	0.4717 (3.32)**	0.5731 (4.79)***	0.2062 (4.04)**
Creation Bottom-Up	-1.0336 (2.19)*	-1.1089 (2.61)**	-0.2495 (3.36)**	-0.3075 (4.90)***	-0.0859 (7.99)**
Years Decentralization	-0.3671 (5.11)***	-0.36361 (5.73)***			
Disputes over allocation	-1.0308 (2.23)**	-0.8469 (1.98)*	0.4499 (3.22)**	0.7309 (4.67)***	
Relative water scarcity			0.9017 (3.16)**	1.1600 (4.84)***	0.9306 (14.08)***
Share of surface water					0.1589 (13.30)***
International Treaty		0.7457 (1.78)+		0.2751 (1.99)+	0.1759 (5.20)**
Water flow fluctuates					0.7785 (11.71)***
Constant	1.6701 3.03	1.0635 (1.75)+	0.8078 (2.97)**	0.5119 (2.15)*	-0.7899 (9.10)**
Number of obs	16	14	11	10	9
F-test	7.42	6.83	5.18	8.4	285.08
Prob > F	0.0038	0.0091	0.0377	0.0302	0.0035
R-squared	0.7295	0.8103	0.7754	0.9131	0.9988
Adj R-squared	0.6312	0.6918	0.6257	0.8045	0.9953

Estimated Decentralization Performance Equations

Estimation procedure	OLS	OLS	OLS	OLS
Dependent Variable	Success over Objectives	Success over Objectives	Success over Objectives	Problems after Decentralization
Share of surface water	0.5967 (3.39)**	0.5868 (10.37)***	0.5931 (9.74)***	
Years Decentralization	0.1928 (3.18)**	0.1395 (6.31)***	0.1450 (6.21)***	
Political Cost	-1.1042 (7.38)***	-1.0192 (20.25)***	-1.0093 (16.80)***	-1.0715 (8.50)***
Governing Body	0.9838 (6.18)***	0.9541 (18.72)***	0.9483 (15.83)***	
Creation Bottom Up				7.2967 (8.04)***
Budget per Capita				0.9797 (7.79)***
Water Flow Fluctuates		-0.1080 (0.75)		
International Treaty			-0.0120 (0.10)	
Constant	1.6087 (1.2)	2.1236 (4.37)**	1.9694 (4.02)**	-3.6314 (5.31)***
Number of obs	10	9	9	7
F-test	33.71	276.39	233.62	26.84
Prob > F	0.0008	0.0003	0.0004	0.0114
R-squared	0.9642	0.9978	0.9974	0.9641
Adj R-squared	0.9356	0.9942	0.9932	0.9282

Interpretation of some Results and Conclusion

- The greater the extent of the initial decentr in the basin the less time the decentr process took
- The greater the number of major problems in the basin prior to the decentr the greater the extent of reported improvements
- The greater the reliance on SW the higher the degree of WUA involvement; the larger the number of institutions that were created during the decentr; the greater the political transaction costs; and the greater the extent of reported improvement between before and after decentralization
- The greater the water scarcity the less time decentr took; the greater the extent of reported success

Conclusions and Caveats

- **Our observations consist about 40 percent of the river basins in SSA that initiated decentralization. The analytical framework of water management decentralization we used is robust enough to explain the decentralization process and progress even in the presence of a limited sample**

- **It appears that the success and stability of the decentralization process depends on the way the new framework distributes the *Political Cost* and compensates those who carried its burden**

- **As for the *Method of Creation*, it seems that a grass-root initiative, despite all the benefits it may capture in terms of legitimacy and use of pre-existing community arrangements is insufficient if not properly supported by government transfers of skills, or know how, budget responsibilities and technical knowledge**

- **The similar impact of *WUAs Involvement* amplifies the above conclusion.**
  - **For SSA this conclusion is probably the most relevant one, with policy implications. Training the WUAs prior to the initiation of the decentralization process is essential for high efficacy of the decentralization. Otherwise the social investment in institutional reforms in the water sector would be wasted**

Conclusions and Caveats

- **the results of the variables *Method of Creation*, *Creation Bottom-Up*, and *WUAs Involvement*, in a previous study with similar analytical framework applied to regions other than SSA were the opposite, suggesting that in SSA grass-root efforts have to still be nourished**

- **Interpreting the opposite signs of the coefficients of major variables that are included in estimates of decentralization process and performance equations (*Creation Bottom-Up, Political Cost, Years Decentralization*) could mean that while the implementation of decentralization processes in the water sector in SSA does not guarantee success, on the other hand, factors that improve the performance of decentralization do not necessarily facilitate its implementation**

- **the best performances of decentralized basins seem to refer to solutions for infrastructural problems (floods, and land degradation control), while the socio-economic problems, perceived before decentralization (conflicts, development), have been addressed less frequently**