Ten Years of the drying up of the Great Ruaha River: Institutional and Legal Responses to Water Shortages.

Charles S. Sokile and Barbara van Koppen and Bruce Lankford

Abstract

This is the tenth year since the Great Ruaha River (GRR) dried up in December 3 for about a month, in the Ruaha National Park, within a stretch of about 75 Km between the Ihefu swamp and the Mtera dam. This has raised a lot of domestic and international concerns from politicians, economists and environmentalists. Since then there has been several direct institutional responses towards the same, and the indirect or coincidental institutional development that have also been linked with the drying up of the Great Ruaha River. This paper gives an overview of the Great Ruaha River, background to the drying up, and the institutional responses . The paper focuses on the organizational and legislative development and local institutional responses their effects in water management at large. The paper specifically reviews the gate closure program, water managers' meeting, introduction of water user fees and linking the fees with water rights as well as a series of key policies and acts that have been revised and/ or enacted during or after the drying up of the Great Ruaha River. Finally, the paper asks some fundamental questions regarding the objectives of water management in the GRR and recommends a way forward for institutional and legal responses.

1.0 Introduction

The Great Ruaha River dried up in January 1994 for about a month in a season that had started in November 1993 (is this timing accurate?). This came when the concern over the decreasing water volumes at the Mtera dam has just started, culminating into a severe power rationing in 1992 (are you sure about these dates – see SMUWC baseline report where on page 98 it says 1995 was the power rationing date – the timing is important because it was only after power rationing that the govt decided that something needed to be done and not before even though ruaha national park was trying to alert the authorities)

thus raising several political and economic concerns. The drying up of the Great Ruaha River between along the Ruaha National park and between the Ihefu wetland and the dam therefore attracted further environmental and social concerns.

Since the dry up of the Great Ruaha River, several institutional developments have taken place, some deliberately as response to the drying up and some coincidentally, adding on some influence on the current water management in the Great Ruaha River basin.

This paper traces the background to the drying up of the Great Ruaha River and analyses the diverse direct and indirect institutional responses for the same. The paper is divided into three major parts. The first part gives the context and the background of the Great Ruaha River, with its diverse water uses; the second part highlights the trend and duration of the drying up and the last part analyses the development of various organizations and their performances so far, as well as legislative initiatives that have been carried out, giving a gist of the their status and implications so far. Specifically, the paper focuses on the activities of the RBWO and other actors, especially towards the introduction, review and implementation of the water rights and water tariffs. Finally the paper recommend some basic considerations that have to be taken, to facilitate the sound management of water resource, (my personal opinion: - but phrase it as YOU prefer) even if this implies that the revival ofthe perennial flow of the Great Ruaha River is simply unrealistic in the developing society with growing water needs of the Upper Ruaha basin. Am not sure I agree with this – it is probably better to phrase this as a question - "to facilitate the sound management of water resources so that priorities for water use during the dry season may be arrived at by all parties, which may mean that a perennial flow through the Ruaha National Park becomes unlikely". [My note: The issue here is that there is visible waste in Usangu during the dry season (see table further down where I am not talking about Mkoji or Chimala rivers where is a need to utilise dry season water, but about Ndembera, Ruaha, Mbarali and Kimani rivers) – it's a question of whether this waste is put to downstream environmental uses or upstream for livelihood uses or kept upstream as a status quo indicator of an institutional inability to distinguish waste from efficiency and to respond accordingly.]

2.0 Background to the drying up of Great Ruaha River - can you refer here to publications, particularly the SMUWC reports, and research findings of the other RA 's?

The Great Ruaha River is one of Tanzania's major rivers and an important tributary of Rufiji River draining an area of about 68,000 km^2. It is one of the three major river systems of the Rufiji River Basin, which is the largest basin in Tanzania, draining an area of about 177,000 km^2. The Great Ruaha River rises in the hills of the Usangu catchment, originating from a number of large and small streams at the northern slopes of the Poroto and Kipengere mountains in the Southern Highlands between Mbeya and Iringa. From here it flows to the Usangu plain where several other rivers flowing from the highlands join it. The major rivers contributing to the GRR are Mbarali, Kimani and Chimala whereas the small ones include Umrobo, Mkoji, Lunwa, Mlomboji, Ipatagwa, Mambi and Mswiswi rivers.

During the rainy season, the Great Ruaha River spills onto the Usangu plains, forming the Usangu wetlands (Western-*Utengule* and Eastern) and feeding a perennial swamp (*Ihefu*) within the Eastern wetland. It then flows through Ng'iriama (an exit to the Eastern Wetland) on to the Ruaha National Park, providing the main water source to the park and then to Mtera dam - the main electrical generating source in Tanzania (accounting for 56% of the runoff to Mtera dam). In the course, it is joined by Little Ruaha River before being joined by the Kisigo River. It then passes through the Mtera reservoir, before flowing westward to the Kidatu reservoir, being joined on the way by the Lukosi and Yovi rivers. From the Kidatu reservoir the GRR flows into Kilombero Plains before joining the Rufiji River (just above Steigler's gorge), collecting *en route* the Kitete and Sanje rivers. On its journey it serves many uses, including irrigation, livestock, domestic uses to neighboring villages, fisheries and aquatic flora and fauna.

The Great Ruaha River Basin is a complex basin with diverse multi-sectoral water uses and users. A great population of the basin is sustained by irrigation and the water-related livelihood such as fishing and livestock keeping. Irrigation in the basin is the major activity and largest water user and mainly during the dry season. The dry season irrigation is concentrated in upper courses of the rivers, irrigating high-valued crops such as green vegetables, onions, tomatoes, beans and maize. This paragraph is not correct though? Surely wet season irrigation is the main irrigation, and dry season crop irrigation is found in highly localised patterns – I would be very worried if we started to promote the idea that dry season irrigation was widespread, or a major livelihood provider. It may become so in the future, but many rice farmers choose not to irrigate during the dry season. However, we should further distinguish between dry season crop irrigation and dry

season tailend rice irrigation. Farmers cascade water through fallow fields to get water to tailend rice that yields at about 1 ton/ha, but uses considerable amounts of water in non-livelihood evaporation.

The dry season is a water scarcity period and most associated with conflicts and disputes over access to water unlike the wet season. During the dry season, villagers along the rivers in the mid catchments divert water to both irrigated and fallow fields and to the villages for consumptive domestic uses as well as for brick making, both commercial and domestic. Downstream, most rivers dry up, except for the Mbarali, Kimani, Chimala and Great Ruaha rivers. Though perennial, these rivers retain very minimal flows in the dry season and towards the end of the dry season the Great Ruaha River flow, which is the main river that drains into the Ihefu wetland, is very small and the total inflows into the Ihefu swamp fail to maintain an outflow from the swamp through the RNP. This has brought a lot of suffering among downstream water users and also environmental concerns, expressed, but generally not further specified, as "the massive mortality (who died???) and "stresses to aquatic ecosystem".

Downstream of the RNP there are two hydro power stations (Mtera and Kidatu) depending much on the basin for their water for power generation, contributing about 50% of the Tanzania national grid. Their water is received during the wet season, and thus shortages of electricity are not a dry-season phenomenon. Studies have shown that without irrigation in the GRR inflows to the two dams would increase only by 6%-8% (page 27 SMUWC, 2001) In totality, the Great Ruaha River Basin has therefore a big impact on the national policy and economy.

In 1980, a commission was carried out to evaluate the possibility of installation of HEP plant at the Mtera dam. The HEP plant was installed in 1988. Since then, the regulations for operation of the dam have never been followed (Mwaluvanda, Pers. Comm.; I strongly feel we should cite research findings here e.g. by Daniel Yawson, and avoid any naming of persons, whose opinion will always be discarded as 'personal' if they are not heavily blamed. Further it is usually very difficult to phrase people's opinions on sensitive matters accurately enough) In 1990, the Mtera dam overflowed to full supply level. The same year, the water was used up to the level of 6.92, close to economic level. The following year, 1991 was a dry year and the level was not recovered. So was 1992, and 1993. Within this period, GRR was flowing throughout the year.

The GRR did not actually dry up in 1993, but in January 1994, within the season that has started in November 1993. The major thrust for examining the cause of the dry up of the Great Ruaha River was somewhat political, i.e. the Load Rationing of Electricity. Table 1 hereunder shows the following years and the length of the dry up of the GRR

Not sure about your analysis of 1993: I quote from the SMUWC baseline report
This drying up first occurred at Msembe in 1993 and has occurred every year since, with an earlier onset and increased length of drought in most successive years. The river dried up even in the 1997/98 season – the 'el Nino' year – when total flow was exceptionally high, suggesting that total flow is not the key issue. Indeed, analysis of flow records shows no significant change in either total or wet season flows downstream of Usangu; the problem is essentially a dry season problem. However, the data show a clear declining trend in dry season flows from the early 1970s; this is demonstrated in figure 4.3.

Table 1: Summary of the dates for the cease and start of flow for the Great Ruaha River
has the river never, never dried up before, not even in the driest year?? Yes it has dried up before in 1954; hence incorrect to say that it never has dried in living memory as claimed by some.

Year	Dates for the cease/start	Comments on rainfall and river situation
1993	Not known but flow at Msembe was ceased in December 1993	
1994	River dried up on Nov.17, started flowing Dec.15	Average rainfall rivers full and flowing well. (Rainfall not recorded)
1995	River dried up on Oct.19, started flowing Dec.23	Average rainfall rivers full and flowing well. Rainfall Total for 95/96 - **388mm** *(incomplete records)*
1996	River dried up on Oct.17, started flowing Dec.16	Generally very poor rainfall this year. Sand rivers hardly flowed. Rainfall Total for 96/97 - **401mm**.
1997	River dried up on Sept.20, started flowing Nov.22	Major rainfall due to El Nino; river burst its banks for 3 months. Rainfall Total for 97/98 - **815mm**.
1998	River dried up on Nov.18, started flowing Jan 19 1999. Stopped again Feb.12 1999; Started flowing March 9 1999. Full River Flowing Mid April 1999	Despite floods river still dried up; rain very sporadic and late, it looked like drought conditions. No rain in February, river dried up again. Good rain in March and half of April. Full river flowing mid April 1999. Rainfall Total for 98/99 - **392mm**.
1999	River dried up on Sept. 21, started flowing Dec. 20. Flow was due to local flooding so did not flow continuously until Jan. 28 2000	Poor rainfall, late and sporadic in catchment areas Rainfall total for 99/00 - **527mm.**

2000 River Stopped Flowing Sept.17, started Flowing, Nov. 22 Rainfall Total for 00/01 - **960mm**

2001
2002
2003

Adopted and Modified from FORS

Popular (or scientifically found? e.g. SMUWC) reasons for the dry up of the Great Ruaha River include (mention source!)

Barbara's question here is very important – do you mean popular or scientifically reasoned?

1. Dry season irrigation In the Usangu plains, especially for high value crops
2. Extension of the period of growing rice where rice is planted earlier, starting from September for large farms and planting continues later up to April for smallholder farms
3. Increased migration of livestock herds to the Ihefu wetlands, destructing the same and destroying the spongy effect of the wetlands (this is popular but not scientifically reasoned – am concerned about us suggesting that this is real)
4. climate change; change in hydrology? (again, SMUWC found no evidence of a trend in climate change, yes there is climate variability, but nothing to suggest a long-term decrease in rainfall and hydrological runoff)
5. Changes within the wetland increasing evaporative losses and decreasing throughflow of water from inlet to outlet of the Ihefu swamp

From the baseline report I have added this table which shows estimated demand and abstraction in the Mbarali, Kimani and Ruaha rivers during the dry season. Please notice the balance; its important in my mind that we see this as some kind of 'waste'. Should Mbarali system take 4000 l/sec for a gross demand of 350 l/sec?? The **net** domestic demands are far lower than the gross demand given in the first column; and are around 20 l/sec for each system, but we are not suggesting delivery of net demands since this cannot be distributed.

Table 5.1 Summary of current use and abstractions in the dry season.

Irrigation system	Estimated gross demand (l/sec)	Current abstraction (l/sec)	Excess use over requirements (l/sec)
Mbarali (farm offtake)	350	2 000 – 4 000	1 650 – 3 650
Kimani river (various offtakes)	40 – 50	200 – 500	150 – 350
Hassan Mulla (Mbarali river)	110	150 – 200	40 – 90
Kapunga (Ruaha river(	200 - 300	600 – 1 200	300 – 900

		Total excess use	2 140 – 5 000

Note: this is from SMUWC baseline report, 2001.

What is not popular, but is a possible cause of the dry up of the Great Ruaha River is the poor management of the Mtera reservoir. The Mtera reservoir failed to fill up some three years before the dry up of the Great Ruaha River. The assumption here is that when the dam went into low flows, it failed to provide the effect of backwater, which may as well go up to some 30 Km. The stretch between Ihefu swamp and the Mtera dam is approximately 75 Km. The effect of back water is therefore significant here. The low level of water at the Mtera dam has affected the hydrological behaviour of the river to some extent. For example, before 1991, the Great Ruaha River entered the dam as one main channel. Now, it enters the dam as a series of four different smaller channels. Is this not the effect of siltation and creation of an inland delta?
I have never heard of this theory and am not sure I understand it. Who is saying this? We need to know a lot more about this. Having visited Ruaha National Park and seen all the rapids which denote a steep gradient, I'm not sure the dam can create a backwater, I have to say am sceptical. 30 km may be a good proportion of 75 km, but if the remaining 45 km is a steep gradient then backwater effects are impossible.

3.0 Institutional and legal responses to the Dry up of the Great Ruaha River

It is worth noting that the institutional and legal responses focused on the dry up of the Great Ruaha River, and not at the failure of the Mtera dam to regain maximum flows. Although the dry season is a critical test period for managing water; the upper capping of the maximum abstraction rate, now 40 cumecs and rising does provide a challenge to water management. There is a need for all stakeholders to agree how to manage three things low flows; medium range flows; peak flows (the latter being important for annual volumetric management).

The early responses for the low water levels at Mtera dam was the formation of series of commissions and taskforces to examine the cause of the failure of the dam and the possible remedy to the growing demand for electricity between 1992 and1994. Although some reports identified the poor management of the Mtera dam as the major cause of the failure of the dam to refill, more blame were thrown to irrigation upstream. try to avoid

accusational language like "throwing blame", even if you are right. It upsets those who 'threw blame'.

Several institutional developments have taken place since the dry up of the Great Ruaha River, some as deliberate response of the dry up, others as a coincidence. Table 2 summarises main institutional development that has occurred so far.

Table 2. Main Institutional Development since the dry up of Ruaha

Year	Institutional response
1991	Establishment of Rufiji Basin Water Board
1992	Electricity rationing
1993	Official launch and start up of RBWO
1994	Review of water user fees to deter water uses, solve water conflicts and support the operations of RBWO
1995	The Prime Minister calls for revival of annual flow of the Great Ruaha River in ten years time – was this not said in 2001? Or was it later repeated then?
1995	World Bank Appraisal of water resources
1996	Start of RBM/SIIP
1997	Improvement and construction of concrete intakes in the Usangu plains
1999	Launch of RBWO sub office in Rujewa
1999	Enactment of water user fees
1998	Start of SMWUC comprehensive research project
1999	Draft New National Water Policy
2001	Formation of WUAs
2002/3	Formation of WUA Apex body
2001	Merge Ministry of Water with Livestock
2002	National Awater Apolicy O issued
2003	WU Act amendments starts

4.0 Institutional Responses - how is this different from section 3 – merge?

As noted earlier, several institutional responses have been noted since the dry up of the Great Ruaha River. For the sake of clarity, the responses are divided here into those of specific organizations, whether direct, i.e. deliberately to respond to the water shortage or indirectly as a coincidence towards organizational expansion, performance and intervention. Table 3 hereunder briefly explains the activities of RBWO, RBM, WWF and DANIDA in the former category and that of DAI PESA, AMSDP and Enterprise Works on the latter category. The table also denotes some research responses.

Recall that the Irrigation Section via the SIIP programme is also responding by assuming efficiency gains via infrastructural and water user group interventions.

Table 3. Organizational Responses of the Dry up of GRR

Organizational responses **A: Direct responses**	
Organization	**Response**
RBWO/ RBM	- Establishment of sub office at Rujewa - Registration of water users through water rights - Collection of water fees - Improvement/ construction of concrete intakes - Mitigation of conflicts - Formation of WUAs at MSC - Formation of apex organization at MSC
WWF	- Launch of Ruaha water program - Formation of WUAs at Chimala SC - Support provision of boreholes downstream for domestic water supply
DANIDA	- Initiation of DANIDA wetlands program
TANESCO	- Commission of some studies (?) - Subsidizing power shortage with IPTL
B: Research initiatives	- SMWUC - RIPARWIN - Several Individual studies (e.g. Mwakalila et al –on going; Mwakaje et al (2002), Maganga & DANIDA/World Bank (1995), Faraji & Masenza, I.A (1992) Lankford, & Frank, (2000), Charney, S. (1996) et cetera) - FAO- FNPP
C: Indirect responses NGDOs and Donor Supported Programme	
NGDO	**Activity**

DAI PESA (Private Enterprise Support Activities)	Usangu Paddy and Rice Alliance that promote production and marketing of paddy.
Enterprise Works Tanzania	Project for Rural Initiatives in Micro-Enterprise Development (PRIME), which aims at tree crop production, and marketing focusing on small scale irrigated horticulture and oilseed production and processing and train farmers and provides materials on loan on short repayment periods
Agricultural Marketing Systems Development Program (AMSDP)	Intervene in marketing of agricultural produce through establishment of focal markets one of which has been identified to be at Inyala village.

5.0 Legislative responses

Since the beginning of the dry up of Ruaha several legislations, laws and acts have been introduced and/or amended to address the challenge. Table 4 shows the major legislations that have been amended or enacted after the dry up.

Table 4. Major Legislative Development Since the Dry up of GRR

Year	Legislations
1997	The WU Act (1974) further amended by Act no. 8, which empowered the Minister of Water to establish water boards for individual basins. The act also declared the boards as financially autonomous, and as legal entities
1997	The National Environmental Policy launched. The policy adds environmental attention and EIA to the water resource
1997	The Regional Administrative Act number 19 of 1997 passed. The act requires the Regional Secretariats to undertake various responsibilities that include monitoring of water sector, providing technical and administrative assistance, interpreting national policies, and enhancing institutional capacity among other things.
1999	The Land Act (1999) enacted The Village Act (1999) enacted. Both Acts give the Village Council the right to manage its own forests and other natural resources, water inclusive
	Local agreements and bye laws
1999	Gate closure program in perennial rivers
2000	Water Managers' meeting
2000	Bye laws for Control of area under irrigation in the dry season by WUAs at Inyala, Imezu and Mahongole
2000	Bye laws for penalties for obstructing irrigation rotation by WUAs at Inyala, and Imezu

Between 1996 and now, several National Policies and acts which impact water resource management have been enacted or reviewed. !!! While this cannot be ascribed to the response of the dry up of Great Ruaha River, the phenomena has remained a lesson of significant reference!!! this is a very relevant remark, and implies that there were rather

parallel developments than simple direct or even indirect cause-effect responses. This needs to be systematic throughout the paper. We can perhaps better distinguish local direct and indirect responses to the electricity crisis, to the drying up of the Ruaha, relevant national developments and perhaps pilot implementation in the Rufiji catchment or so, and relevant parallel local developments? The development of the wider National policies however, has been spearheaded by the adoption of the National Vision 2025 in 1996[1] and also RBM SIPP I suppose??

In 1997, the Water Utilization (Control and Allocation) Act was amended so as to empower empowered the Minister of Water to establish water boards for individual basins (wasn't this already in 1981? user participation in the composition of the board is in this year I thought. Let me check this weekend). The act also declared the boards as financially autonomous and as legal entities. In the same year, the National Environmental Policy was launched. The policy added, among other things, environmental attention and EIA to the water resource. The Regional Administrative Act number 19 was also passed in 1997. The act requires the Regional Secretariats to undertake various responsibilities that include monitoring of water sector, providing technical and administrative assistance, interpreting national policies, and enhancing institutional capacity among other things.

[1] [1] The Vision 2025 is a long-term (25 years) development strategy that was adopted by the Government of Tanzania in 1996. The strategy aims at achieving sustainable development and reducing proportion of the population below the basic needs poverty line by half by 2010 and eradicate it all together by 2025 as stipulated in the Poverty Reduction Strategy (PRS). Sustainable development is an economic concept, which considers integration of, and coordination among different sectors, including the environment and hence water as the key aspects of bringing sustainable of the present generation and yet providing an opportunity for the development of the future generation using the same natural resources. The concept of sustainable development builds from the United Nations Conference on Environment in Rio de Janeiro in 1992. Vision 2025 specifically emanates from the transition period from the state controlled to the market oriented economy in mid 1980s. After the implementation of SAPs in 1986, a need for a national for a long-term development vision and philosophy was felt and the government ventured in the formulation of the vision process in 1995 and finalized in 1998 by the issuance of the Tanzania Development Vision 2025.

In 1999, the Land Act (1999) and the Village Act (1999) were enacted. Both Acts gave the Village Council the right to manage its own forests and other natural resources, water inclusive. This would later act as a basis of the formation of WUAs in the villages, as piloted by the 24 villages of the Mkoji Sub catchment. Oops, I thought WUAs were with the Ministry of Water?? Anyhow, it is very important to see the linkages between WUAs and local government. I agree that this needs clarifying.

It is also worth noting some local institutional responses that have taken place so far. The most visible ones are the gate closure program, water managers meeting, and the enactment of local bye-laws by water users.

6.0 The Gate Closure Program

In 1999, the Rufiji Basin Water Office through Sustainable Management of the Usangu Wetlands and its Catchment (SMUWC) project initiated the gate closure programme in the perennial rivers. This program aimed at rescuing the flows that would have otherwise been lost in the irrigated systems during the dry period where no irrigation activities are carried out. Each year, the gates are partially-closed (throttled) every 1st July, directing water to its river course with only limited flows for maintaining the canals and for domestic uses (are these flows sufficient?). Although this has been done for the past three years, the programme is yet to register significant contribution since the river has continued to dry up in the dry season.

7.0 Water managers' meeting

Water managers' meeting started out in 2001/2 as an informal forum of the three state-based large schemes; Kapunga, Mbarali and Madibira irrigation schemes. Later on its membership widened and incorporated representatives of smallholder schemes, particularly those who lie on the same rivers as the state schemes. The initiatives became formal, with an established chairman, secretary and procedures. The initial plans were that the managers would meet frequently with RBWO funding the meetings.

The managers met last in November 2002. The next meeting was scheduled for February 2003 but is not yet done due to financial constraints. While the forum has been instrumental in providing valuable continuity in ensuring that key issues are kept under

review, it has since then ceased due to the dependency on the donor funding. It is a pity that even water managers would wish to require external funding for meeting for their own benefits.

While it is early to publish a conclusion, it is evident that the water managers meeting have a great potential of influencing water use in the dry period and hence availability of water downstream. The efforts of the water managers meetings are commendable and given resources, should be fully supported.

8.0 Gazetting of the Usangu Game Reserve

The Usangu game reserve was gazetted in late 1990s deliberately to protect the Ihefu swamp from overgrazing. The boundaries of the reserve were extended to well beyond the swamp area and declared a no-entry zone. The major assumption was that this would bar livestock keepers from grazing in the wetland in the dry season. Livestock are conceived to be destroying the spongy effect of the wetland thus in a way contributing to the dry up of the Great Ruaha River downstream. Since the gazetting of the Usangu Game Reserve, there have been severe confrontations between the pastoralists and the district officials and game rangers over the cattle grazing in the wetland. The game ranges would confiscate some cattle and the pastoralists would react back. Similarly, there have been some bickering between the game rangers and the fisher people whose properties; especially bicycles have been repeatedly confiscated for trespassing in the reserve area.

10. Research efforts

After the dry up of the Great Ruaha River, it was felt that the RBM in collaboration with RBWO would finance a comprehensive study, a survey to causes of the dry up and the alternative solutions for reviving the flow. The study however, has not been done.

In 1998 SMWUC project was launched. This was a (depending on the currency) comprehensive study of water resources in the Usangu plains. The project acted as an eye opener and raised some key findings that would later call for further research and actions.

In 2001, RIPARWIN, a research project funded by the UK's Department for International Development as a follow-up to the SMUWC project was launched. RIPARWIN is

investigating impacts of various actions and interventions and advising key players on institutional and allocation issues. Through a role-playing game called the River Basin Game, RIPARWIN has been inspiring both grassroots water users and decision makers on equitable water allocation and conflict mitigation (Lankford and Sokile, 2003). RIPARWIN is also conducting several seminars to feed back the findings to the decision makers.

External donors continue to play an important role. The WWF programme, for example, focuses on dry season water management and impacts, particularly assisting in developing Water User Associations, and in supporting boreholes downstream of the state schemes to reduce dry season abstractions. This programme shows a balanced mix of both physical and institution-strengthening objectives in its framework.

11.0 Water rights and water user fees; the controversial response

Of all institutional responses, the RBWO's water fees and water rights have been so contagious (contentious??). Water rights were introduced in Tanzania, like elsewhere in Africa by colonial powers with the aim of safeguarding priorities of the white settlers' water use. The post independence acts and legislations, though severally amended, have retained these formal, paper-based water rights and have continued to issue other rights through relevant machinery that are vested by the powers thereof. In 1994, water user fees were reviewed and introduced *de jure* as an important aspect of water management. The fees were thus linked with the volumetric provisions of water rights, with the latter acting as a vehicle for estimation of the amount of payable fees.

The initial assumption for the introduction of water fees were that when implemented

1. Fees would act as a deterrent to excessive wasteful water uses
2. Fees, coupled with water rights, would strengthen ownership and respect for the ownership, that minimizing water use conflicts
3. Fees would also support the operations of the RBWO, the body that was also vested with powers to collect the same.

Our experiences in the grassroots, especially in Inyala, Imezu, Itewe, Idunda and Iyawaya villages in the Mkoji Sub catchment have shown a converse to the above assumption;

1. Water fees have further aggravated water use. Farmers now feel that they have to put water into more use by expanding their fields and increasing irrigation time so as to accrue extra income for the fees. As a matter of result water resource have been subjected under severe demand since the enactment of fees. Price is an important and effective incentive for allocating resources in the market economy. Water supply prices, however, are low, even lower than the water supply costs so the water prices cannot correctly reflect the supply and demand of water resources, indirectly resulting in the inappropriate use of water. This has been cautioned by several scholars; that attaching fees to water without having in place sophisticated control devices would prove counterproductive, promoting not discouraging extra water uses (See for example; GWP TAC 2000, Rogers et al (1998), Rosegrant and Binswanger (1994), Perry, et al (1997), http://www.cgiar.org/iwmi etc.
2. Water fees have aggravated water use conflicts. Those who have applied for water rights and have paid the fees feel that they have 'bought' the resource and are free to subject it to extensive use, thus denying the downstream users who have not got the water rights nor have paid the use of water. Such a case is exemplified by the Imezu Mjini vs Imezu Darajani intakes in Imezu village in the Mkoji sub catchment. Should we elaborate this example e.g. in a footnote, and also for our spears and cake paper?
3. Contrary to the initial expectation, collection of fees is an expensive venture and the fees that are collected are too low to meet the collection costs. Furthermore most smallholder farmers are reluctant to pay the fees, even further complication unfinished sentence. Collection of these fees from the smallholder farmers is costing the government, RBWO and RBM a lot of money, time and resource that cannot be justified by the amounts collected. In the process, the smallholder farmers also loose the small amount whatsoever that they are bound to pay. The exercise is thus counterproductive and a loss to all actors.

12. A New Institutional Response; Bargaining Water Prices

Seemingly, RBWO slowly discovers that it is collecting fees from smallholder farmers is a costly and counterproductive venture. The RBWO has, for example, advised the reduction of smallholder water fees and increase of the water fees to commercial large-scale farmers. The newly proposed tariffs are with the Minister of Water and may become

operational in a near future. What the RBWO does not seem to understand is the fact that collecting the newly reduced water fees from smallholder farmers would be even further counterproductive, and that increasing the same would also result into diverse political and social implications as poor farmers may not afford to pay altogether. RBWO and the responsible organs would of necessity, advocate waiving the water fees for smallholder farmers thus generating a win-win scenario to the farmers, the government and RBWO itself.

Price can't represent all economic relationships and pricing systems can't solve all economic problems in society. Similarly, without support from some kind of non-price system, water property right regime can't be put into practice effectively and water right allocation will be defeated. The prices of water required to cover O&M costs are too low to have a substantial impact on demand, much less to actually bring supply and demand into balance (Perry 2001). It may be worth thinking of new ways and methods of charging for water – why do we have to charge for water – surely instead we have to manage water. Since we don't have volumetric structures for measuring volumes, better charge Marginal value of water (crops however, differ in value, time to maturity etc). This however is complex. Use average value of water (value of crop divided by total water used) but the challenges are evident;

- Effect of crop valuation and inputs factor; market factors and taxes may distort the value
- Difficulties in valuing non cash inputs such as land, family labour, draft animals etc
- Which water? Water diverted?, water applied to the field or actual water used? What about losses?

This last section is not very clear… what is it trying to say?

In the video Talking about Usangu, farmers did talk about a levy for water users to reduce over-usage. I remember mentioning early on that this would be interesting to research; in other words farmers own experiences at charging for water.

13.0 Against Water Price; Exploring Institutional Options

The whole idea of charging for irrigation water among smallholder farmers needs a second thought. Unlike for domestic and industrial water where water **supplied** is a

proper measure and easily determinable, the appropriate unit for irrigation is **consumption**, which is difficult to measure. Several options may be available if we are to continue charging for water;

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- Review the water charging mechanism; Move away from blanket charging and charge higher tariffs per volume to raise awareness through water costing; this would require sophisticated control and allocation devices,; or abandon water charges altogether and thing of a new way of effecting and if necessary financing water management
- Request irrigators to build sophisticated (what is that?) control devices to abstract water and return the flows back to the river,
- save the need for high abstractions from the river to irrigate schemes e.g. by lining canals (lining canals would not save water for many reasons that I have covered before, for example in the recent email to Isjbrand – Usangu systems are on heavy clays; losses are minimal and would not be reduced by lining as cracks in the cement would give rise to the same degree of small losses; high abstractions are much more about matching high flows – thus a supply demand linkage exists here related to the expansion and shrinkage of irrigated area; high flows at the end of the rice cropping season far beyond net needs are about field to field irrigation to get water to tailend plots, this cascading system increases evaporation over evapotranspiration because water passes through previously cropped plots; other mosaic planting patterns (fallow plots alongside cropped plots) at the beginning of the season are caused by livelihood diversification - water user groups around Kapunga following drought decided to create bye-laws that forbade plots to receive water that were not then cropped as they saw this was wasteful – very interesting! Thus water productivity in Usangu is really about managing the window-length of cropping (see the paper Conjoining paper Mdemu et al 2003.
- Generally discourage dry season irrigation and invest in rain fed agriculture – dry season agriculture is already very localised and rare in Usangu – about 2000 hectares in total in year 2001. Where it is present it is an important part of the marketing and livelihood system e.g. Chimala and Mkoji rivers. The issue is to

discourage wasteful dry season irrigation – this is found in the high catchment where recently Agric Extension officers have been promoting irrigation at an altitude where it is not necessary and secondly inefficient dry season agriculture is found at the end of the rice cropping season when tailend plots continue to receive water yet produce very low tonnages because the temperature is too low for rice. Or because water is reticulated through the canal system to provide for domestic users. Other rice farmers are not happy about seeing their fields not getting a rest from water!! Think of the benefits of a proper fallow-rice system which is a bit like a rice-wheat system.

- Construct a reservoir to supply water during the peak of the scarcity period. Perhaps re-phrase this, recommend the exploration of this option maybe but not recommend the construction of a dam as we do not know enough about the costs and benefits. Dams are not a widespread or cost-effective solution and we have to ask where in the Upper Ruaha might a dam or dams go?
- Review all water rights and reallocate according to available water resource (this is good, and is a theme I pick up below, yes, a review is much needed but should we be handing out rights at all? – and what is meant by available water resource in an environment where it changes logarithmically from flows of 100 l/sec to 10,000 l/sec)
- A mix of the above options

Charles, this is a good start, could you consider others; perhaps those that relate to options explored by farmers and higher level institutions mentioned at both river game sessions; plus there are the analyses and options that were conducted by RIPARWIN and SMUWC researchers. Also, for example why reservoirs rather than village boreholes? Why not proportional water rights? Why not time-defined water rights? Can tradeable water rights work? Can user to user agreements work combined with water payments? Can we mention improvements in irrigation management?

14.0 Conclusion and Recommendation

Much as there have been several institutional responses since the dry up of the Great Ruaha River, little success have been registered since the river has continued to dry up. Most of the institutions available in the Great Ruaha River are loosely coordinated and

operate in isolation, with every one carrying his agenda on the front. The lack of coordinating body and a comprehensive strategic plan has also neutralised some individual institutional efforts (what are these?). Some of these individual efforts have also proved counterproductive.

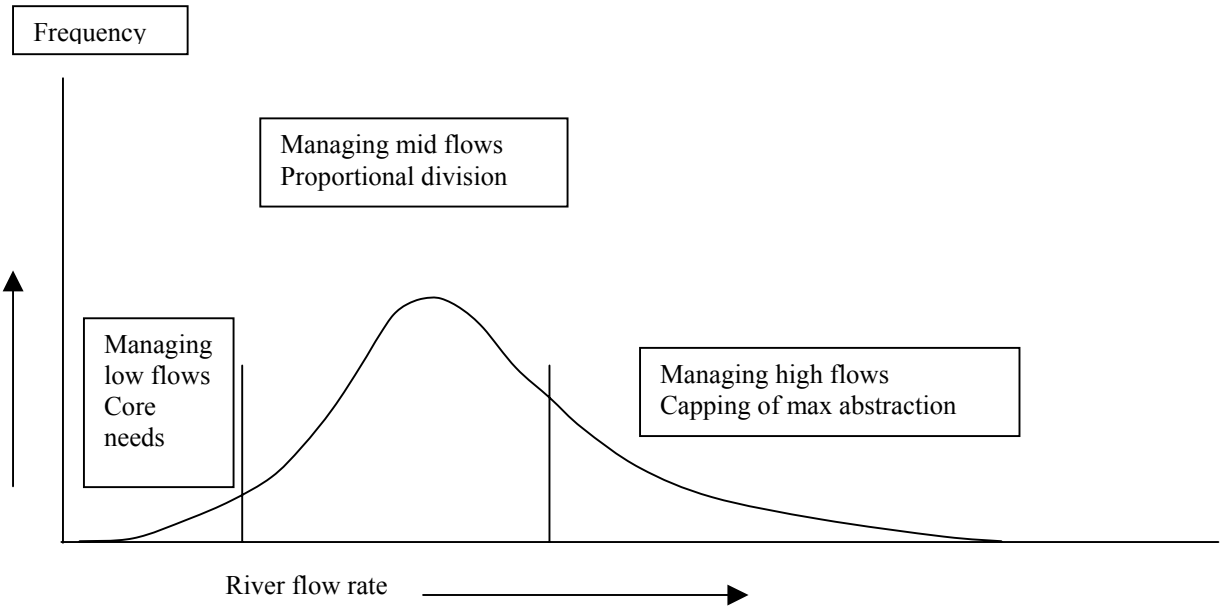
It is recommended here that there is a need to coordinate a number of parallel initiatives (!! good formulation – but then the paper should already highlight what is parallel and what is a direct response etc) that are taking place to improve the institutional framework for resource management at the local level, from the level of single sub-catchments to the overall basin. Efforts should be made to establish institutions (organisational structures, and the processes that link them) at the sub-catchment level, and then to support them as they provide a framework in which local people can negotiate with one another on the management of natural resources, including water. Counterproductive measures such as water fees should be reviewed or abandoned altogether. The efforts for the WUAs formation and the Apex body formation in the Mkoji sub catchment should be strengthened, with the downstream villages that were left out in the process included. Other Institutional Support (which support, for what?), especially from the government and other external agencies should be increased and coordinated by the RBWO.

Plus the benefits of good facilitation of local knowledge - why did the river basin game result in a day of 'solutions' being suggested by local users? Can you not list some of these? Was there not something special about the river basin game in the way it generated ideas….

HOWEVER – MORE THOUGHTS!!! Perhaps for your conclusion??

What (and how) is river basin management trying to do in Tanzania? Or rather what future vision of water management is the current legislation trying to effect? This question never seems to be explicitly expressed in various interventions and analyses. Even in this analysis, the authors have not fully posed a fundamental question of what various players are attempting to achieve. What is the water governance vision? I think we could usefully pose this question. Perhaps the following might help

Visions – a move towards sharing of benefits and functions of water arising out of hydrological variability (see graph taken from my sustainability paper) – seeing three parts to the hydrological regime or distribution – low flows, mid flows and high flows.



- **During low flow periods, a move towards an equitable sharing of critical needs, or so called lifeline needs for all sectors?**
- **A move towards sharing mid-range normal flows on the basis of affordability bearing in mind a dispersed and agrarian population using agriculture as a means to climb out of poverty**
- **A move towards managing high flows and flow summations that sees the benefits from large bulk volumes in recharging reservoirs, in charging irrigation systems and in environmental purging. However managing high flows is important, for example storage capacity, and imposing caps on total abstraction, perhaps by combined institutional agreements and retrofitting technology**
- **An agreement that where affordable and achievable alternatives to water-derived energy might be found.**

Means

- **A move towards local agreements on sharing water with emphasis on locally-derived and situated bye-laws – with attached institutions**
- **A review of externally imposed rights and responsibilities realising both benefits and risks. Formal legislation designed to meet downstream or water quality needs to be carefully agreed with local users with emphasis on bye-laws and local monitoring where possible.**
- **A review of alternative water sharing arrangements. Externally imposed obligations met via a range of options that include any number of possibilities: proportional transparency of water division; centrally controlled monetised division of water via a formal rights and**

weirs; or by time scheduling; or devolved monetised transactions via transferable water rights. (With regards to the first option, which is found in S.Asia, I've mentioned proportional water rights before often finding agreement with local users, but consistently falling on deaf ears either with senior stakeholders or RIPARWIN team members – not sure why).

Apportioning Costs

- **As with the irrigation management transfer debates of the last ten years, we can explore transferring costs and responsibilities to users in river basins. As I mentioned farmers already impose their costs on irrigated land – e.g via renting costs or adding other local taxes to those who take up irrigated plots, or by limiting the area given to each grower.**
- **'Public good' management to be funded via public good or high-profit venture taxes rather than imposing taxes on rural water users**

Engagement

- **I think the way in which catchment and local user groups are engaged with is important and is a missing element from various interventions. I think that partnership arrangements based on cross-compliance or transactional/transformational negotiations could have a part to play. I used this kind of approach in Kyrgyzstan to strengthen the WUA. Am happy to expand here.**

Just for starters.. I could write more if you are interested…

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