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# Water Management of River Basins

– A Case Study in Kiru Valley, Tanzania

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## **Abstract**

This case study was made in Kiru Valley in the northeast Tanzania in order to study the water management to get a picture of which institutions that are involved, how conflicts are resolved, and also to see if all farmers in the area have an influence in the management. The area consists of big-scale farmers, small-scale farmers with IFAD irrigation scheme and small-scale farmers without irrigation scheme. The irrigation scheme was built in 2004 in the villages Mawemairo and Matufa. Mapea village is located downstream and has got less water after the scheme was built. The case study was conducted by semi-structured interviews with some officials at different institutions in the District, Mawemairo and Mapea and also with some farmers in Mawemairo. The results were mainly analysed with Integrated Water Resources Management approach which have been adapted by Tanzania government. Mawemairo and Matufa have established a Water Users Association (WUA) and the water management seems to work quite good for those who are members of this. But those farmers who are not members of a WUA seem to be outside of the management of the rivers in Kiru Valley. What is missing is a platform where all relevant stakeholders in Kiru Valley, like farmers, can participate in the decision-making and where conflicts can be resolved.

Keywords: Upstream-downstream problems, water conflicts, institutions, IWRM, IRBM

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## **Acronyms**

BWO	Basin Water Office
GWP	Global Water Partnership
IRBM	Integrated River Basin Management
IWRM	Integrated Water Resources Management
ZIU	Zonal Irrigation Unit
WUA	Water Users Association

# 1. Introduction

## 1.1 Background

River basins play a vital role in sustaining people's lives and other forms of life. If one looks back in time one sees close connection between the availability of water and the stability of a group of people, and its economic and social development.<sup>1</sup> Settlement of people and establishment of communities and towns have been closely linked to search for naturally irrigated areas and valleys sufficiently supplied with water.<sup>2</sup> Within basins everything is linked; surface water and groundwater, quality and quantity. Water has many important functions, not just ecological but also economical, aesthetics and spiritual functions.<sup>3</sup> The human pressure on many river basins is increasing and some basins are reaching their maximum sustainable level or have already surpassed it.<sup>4</sup> The increased pressure is caused by population growth, increased economic activity and improved standards of living.<sup>5</sup> This causes severe competition between water users, sectors and countries and increases the conflicts between upstream and downstream users.<sup>6</sup> Conflicts between upstream and downstream water users have existed since human settled down to cultivate food in 8000 and 6000 BC, according to Wolf et al.<sup>7</sup> Since there are a lot of competing interests of the water, like farmers, domestic users, hydropower generators, recreational users and ecosystems for example, the water management has to navigate between these different interests. If the basin covers several nations and there is no mutual solution the risk of conflicts increases between these stakeholders or state authorities. Wolf et al.<sup>8</sup> raise three issues that most water related conflicts can be attributed to; quantity, quality and timing. Of course there is a risk of increased tension when the water is scarce. The second issue is quality. Contaminated water makes the water inappropriate for drinking, industry and sometimes agriculture. Polluted water can be a serious threat for human and the ecosystem. This can cause conflicts between those who are responsible and those who get affected. The timing of water flow is the third issue. Dams can cause conflicts within this issue. Water from reservoir for hydropower production may be released by upstream users in the winter, while downstream users may

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<sup>1</sup> Jaspers, 2003, p. 78

<sup>2</sup> Ibid.

<sup>3</sup> Wolf et al., 2005, pp. 80- 81

<sup>4</sup> Jaspers, 2003, p. 78

<sup>5</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, pp. 9, 10

<sup>6</sup> Jaspers, 2003, p. 78

<sup>7</sup> Wolf et al., 2005, pp. 80-81

<sup>8</sup> Ibid.

need it in the summer for irrigation.<sup>9</sup> Carius et al. bring up an additional reason to conflicts namely that the water is inadequate managed and governed.<sup>10</sup> Wolf et al. also mean that the key to understand and prevent water conflicts can be found in the institutions.<sup>11</sup> Some of the reasons why management fails are: “lack of adequate water institutions, inadequate administrative capacity, lack of transparency, ambiguous jurisdictions, overlapping functions, fragmented institutional structures, and lack of necessary infrastructure.”<sup>12</sup> Overlapping functions and competing responsibilities by governmental institutions are common by many countries. Disputes may also arise when local communities and water users are not sufficiently participating in the decision-making.<sup>13</sup> Too many institutions involved in the management could be another reason.

Kiru Valley, in Babati District in Tanzania, is a part of a river basin. The area is characterized by social differences. The area has big-scale farmers, small-scale farmers with an irrigation scheme and small-scale farmers without irrigation. Mawemairo and Matufa are two villages in the area that have an irrigation system, funded by IFAD.<sup>14</sup> Mapea village is located downstream from this scheme and has got less water since the scheme was built in 2004. When the water is scarce conflicts can arise in the area, mainly between big-scale farmers and small-scale farmers. This can be caused by an inadequate management of the water. Several of the reasons that were mentioned above seems to exist in Kiru Valley. There is no clear picture of which institutions are involved in the water management in this area and if all villages and farmers are sufficiently participating in the decision-making.

## ***1.2 The aim of the study and study questions***

The aim of this study is to get a picture of the water management in Kiru Valley in Tanzania and institutions that are involved to get a view if all villages and farmers have the opportunity to be involved in the water management and decision-making. The aim of the study is also to see how conflict resolution works in Kiru Valley.

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<sup>9</sup> Wolf et al., 2005, pp. 80-81

<sup>10</sup> Carius., et al., 2004, p. 2

<sup>11</sup> Wolf et al., 2005, p. 82

<sup>12</sup> Carius, et al., 2004, p. 2

<sup>13</sup> Ibid.

<sup>14</sup> Environmental Cell Unit, 2001, p.1

**Study questions:**

Which institutions at different hierarchical levels are involved in the water management in Kiru Valley?

What role do they have?

Do several institutions have overlapping function or are some functions missing?

How is the cooperation working between these institutions?

Does the governance involve participation for all villages and farmers in Kiru Valley?

What differs in the water management between villages with irrigation scheme and WUA, like Mawemairo and villages without, like Mapea?

How are conflicts solved in Kiru Valley concerning the water?

Does it exist institutions that deal with problems for whole Kiru Valley?

## **2. Methodology**

This study is based both on a case study performed in Babati and Kiru Valley in Tanzania during nine field days in February and March 2010, and on secondary materials. Secondary materials were needed to supplement the field work and to get more information about management of river basins. The secondary materials are mostly reports found through Google scholar and in scientific journals through Södertörn's library web page. Information about Tanzania was found through Tanzania's National web site and Bonniers Lexicon. One book by Ostrom (1990) was also used in this study.

A qualitative method was used in the case study with semi-structured interviews. Semi-structured interviews were best suited for this study since they have the advantage of giving deeper conversations and are not as confined with boundaries as structured interviews, but still have some predetermined questions, compared to non-structured interviews.

Triangulation was an important tool that was used in several interviews, which mean that same questions were asked to several informants which give more validity to the survey. The informants were organized by my field assistant, Joshua Mtauu. The criterion of the informants was that they should work at different institutions at different hierarchal levels with water management in Kiru Valley. Some farmers in Mawemairo were also chosen to see if they have the same opinions as the officials and to hear their thoughts on involvement in the decision-making. The interviews were mostly made in Mawemairo and Mapea to see the

difference between a village with irrigation scheme and a village without, and also get an upstream-downstream perspective. Since the informants were chosen by the field assistance and also by Mr Mohammed, the WUA facilitator, the survey is probably not a random sample of all farmers since for instance Mr Mohammed may chose the farmers which have a positive view of the water management.

This study is based on ten interviews, the informants were; Mrs Sainabo and Mr Emmanuel Konkon from the District, three members from the village council in Mawemairo, Mr Mohammed-WUA facilitator, a member of WUA, the executive secretary of the village council and one member in the village council in Mapea, two farmers (one male and one female) and a group interview of female farmers in Mawemairo. Since most of the informants did not speak English, an interpreter was used. This can be a disadvantage since translating to another language can cause misunderstandings. The use of interpreter can also make the situation uncomfortable since none of the parties can talk to each other directly which can result in not getting enough information. Since the translation is made in two steps, Swedish-English and English-Swahili and vice versa, it also increases the risk of misunderstanding. Two interviews were made without an interpreter which made it easier to talk to each other and to create a discussion. One disadvantage was that their accent differed from the accent we are used to and was harder to understand compared to the interpreter which also can result in misunderstandings. But it was quite easy to know if the questions were misunderstood or not correctly translated by the answers that was given and therefore ask the same question again but in a different way. Another risk is that the informants may not be honest and instead answer what they think I wanted to hear.

This essay may give an indication of water management of the rivers in Kiru Valley. Since this study however is based on only ten interviews, a generalized view of the situation in Kiru Valley can not be given. This is important to consider when reading this essay.

## 3. Theory

### 3.1 *Common-pool resource approaches*

A lot of studies of management of common-pool resources have been done and resilience and adaptive co-management are common themes in these studies.<sup>15</sup> Concerning management of irrigation systems studies have been made by for example Shui Yan Tang where he brings up common problems like provision and appropriation problems faced by irrigators.<sup>16</sup> But Elinor Ostrom's studies are among the most recognised concerning management of different common-pool resources. A lot of focus in these studies is on the local level and on community-based management. She has come up with eight principles for this that characterize good common-pool resource institutions. This essay will just focus on her eighth principle – Nested enterprises.

The eighth principle, nested enterprises, concerns larger resources and means that management, like appropriation, provision, monitoring, enforcement, conflict resolution and governance should be organised at different levels, local, regional and national level.<sup>17</sup> River stream involves a lot of stakeholders at different levels and establishing rules for one level but not on others could lead to an incomplete system.<sup>18</sup> Conflict resolution at several levels is especially important for dealing with upstream-downstream problems. It may be hard to solve conflicts at regional level if it just exist conflict resolution mechanism at local level.

### 3.2 *Integrated management*

For management that concerns water and river basins Integrated Water Resources Management (IWRM) and Integrated River Basin Management (IRBM) have become more common, and have been adopted by Tanzania.<sup>19</sup> Global Water Partnership (GWP) defines IWRM as a process that “promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”<sup>20</sup>. This approach coordinates water management between different sectors and interest groups, at

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<sup>15</sup> For example; Berkes and Folke, 1998, Olsson and Folke 2004, Folke et al., 2005

<sup>16</sup> Shui Yan Tang, 1993

<sup>17</sup> Ostrom, 1990, p. 101-102

<sup>18</sup> Ibid.

<sup>19</sup> Ministry of Water and Irrigation, 2008, p. 6

<sup>20</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, p. 22

different levels, from local to international.<sup>21</sup> IWRM in basins can be defined as a process that “enables the co-ordinated management of water, land and related resources within the limits of a basin so as to optimise and equitably share the resulting socioeconomic well-being without compromising the long-term health of vital ecosystems”.<sup>22</sup>

Since river basins are an important source for the world’s freshwater and have important roles when it comes to biodiversity, drinking water supply, agriculture, recreation, hydropower generation etc. IRBM has therefore become a common way to manage this important resource.<sup>23</sup> Water resource management at basin level should correspond to the national vision but should also in its management plans and implementation reflects the specific issues for the basin.<sup>24</sup> When implementing IRBM and IWRM more focus must be on bottom-up instead of top-down approaches. But this does not mean that all decision-making should be on the local or community level, instead it should be a balance between community-level organisations and governmental bodies.<sup>25</sup> Jaspers has in *Institutional arrangements for integrated river basin management*<sup>26</sup> analyzed IRBM and what institutional arrangements need to have:

- Water management on hydrological boundaries,
- A platform where stakeholders can involve in decision-making,
- Authorities for river basin and sub-basin to incorporate decision-making at the lowest appropriate level with their respective by-laws,
- A planning system for integrated river basin plans,
- A system for water pricing and cost recovery.

It is vital to have hydrological boundaries of the management to better handle upstream-downstream problems and the growing competition for water. But since river basins could be very large, several levels of subdivisions may be needed. If hydrological subdivisions match administrative divisions it could be wise to consider them as well.<sup>27</sup>

It is very important with stakeholder participation in IRBM. GWP defines real participation when stakeholders are involved in the decision-making and when the representatives of the stakeholders are democratically elected or accountable spokespersons. Real participation is

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<sup>21</sup> Global Water Partnership, International Network of Basins Organisations, 2009, p. 10

<sup>22</sup> Ibid. p. 18

<sup>23</sup> Jaspers, 2003, p. 78

<sup>24</sup> UNESCO, 2009, p. 6

<sup>25</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, p. 46

<sup>26</sup> Jaspers, 2003, p. 83

<sup>27</sup> Ibid. pp. 81, 85

also when stakeholders at all levels have an impact on the decisions at different levels.<sup>28</sup> Therefore it is vital to have a platform where all relevant stakeholders are represented. The function of this platform, according to Jaspers<sup>29</sup>, is for instance to deal with conflicting interest concerning the water management, to involve stakeholders in decision-making and to deal with conflict prevention and resolution. The platform should be under governance of the government so that the interest of the society is protected according to Jaspers.<sup>30</sup> Meanwhile other scientists, for example Ostrom, advocate community-based management and not so much involvement by the State.<sup>31</sup>

Molle et al. in the study *The comprehensive assessment of water management in agriculture (CA)*<sup>32</sup> address the need to coordinate across scales. Things that are best managed at sub-basin and local scale, like soil and water conservation, also affect water flow and nutrients downstream, therefore there have to be links between local level decision-making and basin level decision-making. Molle et al. therefore bring up “coordination-based”, collaborative approaches where users, community organisations, government organisations and stakeholders develop a coordination and negotiation mechanism at the basin or sub-basin level. This sort of institution can play a role as a coordinating organisation or a mix of legislation, stakeholder platforms and institutional linkages.<sup>33</sup> GWP also brings up this sort of platform. They have one example from Mexico where different water users and governmental officials are gathered. Here water users and authorities have direct channels of communication from top to bottom and vice versa.<sup>34</sup>

What is more vital is clear definition of the responsibilities, roles and relationships for different levels of administration and relevant stakeholders within the management of the basins.<sup>35</sup> GWP<sup>36</sup> takes up concrete suggestions of roles and functions for different institutions at different levels for IRBM. At regional or basin level, issues like allocation of water, charging for water, enforcement of standard or permit conditions and adjudication of conflicts should be handled. This level should also have regulatory functions to make sure that

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<sup>28</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, pp. 15-16

<sup>29</sup> Jaspers, 2003, p. 83

<sup>30</sup> Ibid.

<sup>31</sup> Ostrom, 1990

<sup>32</sup> Molle et al., 2007 (a), p. 3

<sup>33</sup> Ibid.

<sup>34</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, p. 17

<sup>35</sup> UNESCO, 2009, p. 6

<sup>36</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, pp. 46, 48, 49-50

institutions at local level are fulfilling their duties effectively. It is important to have a forum for all stakeholders at this level for decision-making concerning water resource issues, where also the central government should participate. At community level people should be encouraged to participate in operational water resource management, like an irrigation scheme, where community-based organisations may be responsible for this scheme. Sense of ownership, which this can create, is often a precondition for an improved and a sustainable management of resources.<sup>37</sup>

According to Molle et al.<sup>38</sup> some problems have arisen when implementing IWRM and IRBM. At first basin boundaries do not match political and administrative jurisdictions which make it harder to reach agreement between different states or provinces. A common way to handle this problem is to establish river basin institutions, but there is a risk for other boundary problems with existing line agencies and other policy fields, like land-use planning, energy, transportation, and forestry that also have an impact on the water use.<sup>39</sup> These are just some problems that may arise when implementing IWRM and IRBM. According to Molle et al.<sup>40</sup> the focus should not be to try to implement an ideal organizational model for management of river basins through a centralized river basin organisation for basins with high human pressure and complex problems of conflicting values. The focus for institutional arrangements for these basins should instead be on coordination and consultation. The institutional arrangements may stay within existing administrative structures but the governance should change to be more polycentric and collaborative.<sup>41</sup>

Co-management is another way to manage natural resources. This is not an approach that Tanzania follows but it might be important to consider in this study. There are lot of definitions of co-management, but the main definition is that responsibility and power is divided between the government and local resource users, the public and the private actors.<sup>42</sup> Another definition is “a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources”.<sup>43</sup> The main idea is that

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<sup>37</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, pp. 46, 48, 49-50

<sup>38</sup> Molle et al., 2007 (b), p. 608

<sup>39</sup> Ibid.

<sup>40</sup> Ibid. p. 586

<sup>41</sup> Ibid.

<sup>42</sup> Carlsson and Berkes, 2003, p. 2

<sup>43</sup> Borrini-Feyerabend et al., 2000, p. 1

an agency (usually the state) with authority over an area cooperates with relevant stakeholders like local resource users and develops a partnership. The degree of the partnership could be from just exchanging information with each other to formal partnership. Furthermore, co-management can be defined as a decentralized approach where local users get equally involved in the decision-making as the State.<sup>44</sup>

The analysis will mainly focus on the different platforms that are mentioned. Stakeholder participation and coordination between different institutions and levels will also be analysed. The analysis of stakeholder participation will also discuss water users' role and whether there is a need of co-management. The analysis will also discuss the cooperation between different institutions and their roles and responsibilities.

## **4. Case study**

### **4.1 Area description**

#### **4.1.1 Tanzania**

Tanzania has an area of 945 090 km<sup>2</sup> and has a population of 37.7 million, estimated at 2004. 63 % of these are rural.<sup>45</sup> The country's political capital is Dodoma which is situated 309 km west of Dar es Salaam (figure 1). The country's commercial capital is Dar es Salaam.<sup>46</sup> Agriculture accounts for 50 % of the country's GDP.<sup>47</sup> The estimated area to cultivate is 40 million ha, 42 % of the total land area. Only 13 % of the cultivable area is cultivated, estimated in 2002. 90 % of the farmers are small-scale farmers, the rest are medium- and large-scale farmers. Concerning water use the total withdrawal is 5 142 million m<sup>3</sup> of which agriculture stands for 90 %. Most of this is for irrigation and the rest for livestock.<sup>48</sup>

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<sup>44</sup> Carlsson and Berkes, 2003, pp. 2-4

<sup>45</sup> ICID (2006), International Commission on Irrigation and Drainage

<sup>46</sup> National website of the United Republic of Tanzania, 2010 a

<sup>47</sup> National website of the United Republic of Tanzania, 2010 c,

<sup>48</sup> ICID, 2006, International Commission on Irrigation and Drainage



Figure 1: Map over Tanzania

Source: Magellan Geographic, 1997

In large part of Tanzania we have savannah<sup>49</sup> and through central Tanzania runs the Great Rift Valley,<sup>50</sup> that is passing through East Africa from the Red Sea to Zambezi River.<sup>51</sup> The climate is quite variable. Along the coast we have tropical climate and in the highlands we have temperate climate.<sup>52</sup> Tanzania has two rainy seasons.<sup>53</sup> The short rains are from October to December and the long rains are from March to May.<sup>54</sup> One third of the country receives less than 800 mm of rainfall and thus is arid or semi-arid. In the rest of the country, only one third receive rainfall more than 1 000 mm.<sup>55</sup>

#### 4.1.2 Babati and Kiru Valley

Babati district belongs to Manyara region together with four other districts and is located in the north-east of Tanzania (figure 1). The district is divided into Babati District Council and Babati Town Council. Babati District Council has 5 divisions (figure 2), 18 wards, 82 villages and 333 sub villages. At 2002 the district had a population of 302 253.<sup>56</sup> The altitude in Babati

<sup>49</sup> Reimers and Ahlgren, 1998, p. 19:151

<sup>50</sup> National website of the United Republic of Tanzania, 2010 a

<sup>51</sup> Reimers and Ahlgren, 1998, p. 19:151

<sup>52</sup> ICID, 2006, International Commission on Irrigation and Drainage

<sup>53</sup> Reimers and Ahlgren, 1998, p. 19:151

<sup>54</sup> National website of the United Republic of Tanzania, 2010 a

<sup>55</sup> National website of the United Republic of Tanzania, 2010 b

<sup>56</sup> Kavishe, 2006

is between 950 meters to 2450 meters above the sea level. Rainfall is between 500 – 1,200 mm per year. Most of the soils in the area are of volcanic origin, which mean that the soil is very fertile. Agriculture is the largest economic sector in Babati district.<sup>57</sup>

Kiru Valley is located in the rift valley, and extends from north of Babati to the southern shores of Lake Manyara.<sup>58</sup> The area has two wards; Magugu and Kiru ward, Magugu ward is located downstream. At 2004 an irrigation scheme was built in Mawemairo/Matufa<sup>59</sup> under the PIDP (Participatory Irrigation Development programme) and was funded by IFAD.<sup>60</sup> The scheme is situated 20 km north of Babati, along Babati - Magugu Road (figure 2). PIDP also built an irrigation scheme in Gichamedia village which is also located in Kiru Valley and has Kou River as the source for the scheme. Dudumera River is the source of water for the scheme in Mawemairo/Matufa, which is situated 170 m downstream from the confluence of Kiongozi and Dudumera rivers.<sup>61</sup> Dudumera River originates from Kiru escarpment<sup>62</sup> and forms the main river course that flows in the north direction towards Lake Manyara.<sup>63</sup> Small-scale farmers in Mawemairo and Matufa mainly cultivate rice and maize.<sup>64</sup> Mapea village is located downstream from the irrigation scheme in Mawemairo/Matufa. All these three villages belong to Magugu ward.<sup>65</sup> In Kiru Valley there are also about 34 commercial big-scale farmers, most with Asian origin. Most of these cultivate sugar cane, beans and maize.<sup>66</sup> There are a lot of social differences in Kiru Valley. The area consists of rich big-scale farmers, small-scale farmers with irrigation scheme and small-scale farmers without irrigation scheme.

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<sup>57</sup> Kavishe, 2006

<sup>58</sup> Ubwani, 2002

<sup>59</sup> Interview; Mr Mohammed, WUA facilitator, 2010-02-26

<sup>60</sup> Environmental Cell Unit, 2001, p.1

<sup>61</sup> Ministry of Agriculture and Food Security, 2002, p. 15, 21

<sup>62</sup> Environmental Cell Unit, 2001, p. 29

<sup>63</sup> Ministry of Agriculture and Food Security (2002), p. 21

<sup>64</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>65</sup> Ibid.

<sup>66</sup> Ubwani, 2002

Map 2. Babati District - Administrative Divisions

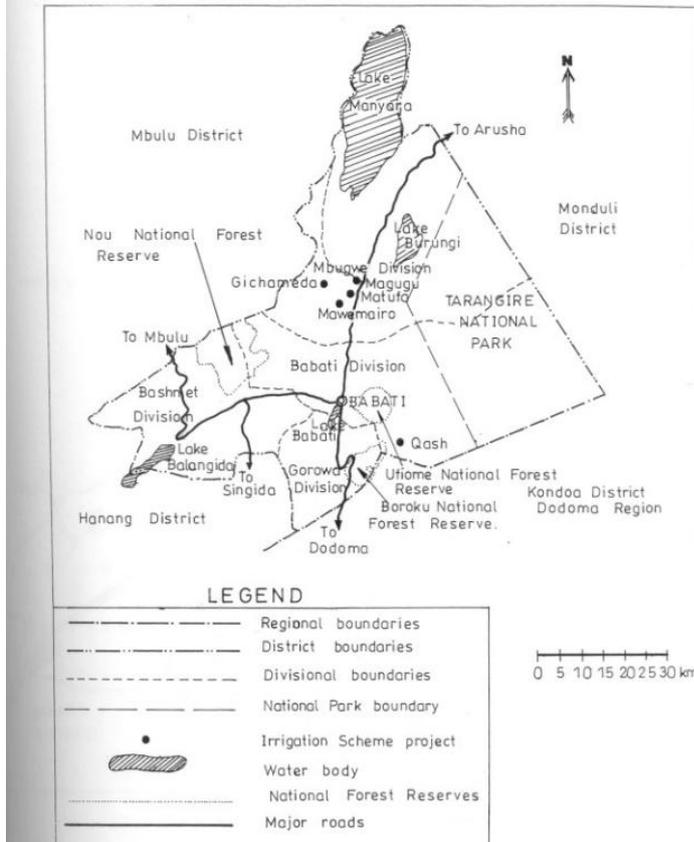


Figure 2: Map over Babati District

Source: Environmental Cell Unit, 2001

## 4.2 Case Study Results

This part of the essay will describe some of the most important institutions that are involved in the water management in Kiru Valley.

### 4.2.1 National level

Tanzania has an Integrated Water Resources Management approach which is based on water basins and has participatory, multi-sectoral and multi-disciplinary perspective. Integrated Water Resource Management (IWRM) in Tanzania, which also includes smallholder irrigation, was implemented through the River Basin Management and Smallholder Irrigation Improvement Project<sup>67</sup> in Rufiji and Pangani basins where one aim was to improve the Government's capacity to manage the water resources.<sup>68</sup> This also led to the National Water

<sup>67</sup> Ministry of Water and Irrigation, 2008, p. 6, 29

<sup>68</sup> The World Bank, 2001

Policy, 2002.<sup>69</sup> The main aim of this policy is: “to provide a comprehensive framework for sustainable development and management of the Nation’s water resources, in which an effective legal and institutional framework for its implementation will be but in place.”<sup>70</sup> Some of the goals are “to address cross-sectoral interests in water, watershed management and participatory integrated approaches in water resource planning, development and management” and “to ensure full participation of beneficiaries in planning, construction, operation, maintenance and management of community based water supply schemes in rural areas”.<sup>71</sup>

In *National Water Sector Development Strategy* (2008) new institutions are proposed for water management (figure 3) which arise from two threads of Government policy; decentralisation and local government reform. The government role changes from service provider to that of co-ordination, policy and guidelines formulation and regulation.<sup>72</sup> The main responsibilities are decentralised to the Basin Water Boards, Catchment Water Committees and local Water Users Associations.<sup>73</sup> The planning of water use goes from administrative (District level) to basin level. Irrigation has to adapt to Integrated River and Lake Basin Management and Development plans.<sup>74</sup>

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<sup>69</sup> Ministry of Water and Irrigation, 2008, p. 6

<sup>70</sup> Ibid. p. 1

<sup>71</sup> Ibid.

<sup>72</sup> Ibid. p. 1, 71

<sup>73</sup> Ibid. p. 71

<sup>74</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 1

FIGURE 3.1: NEW INSTITUTIONAL FRAMEWORK FOR WATER RESOURCES MANAGEMENT

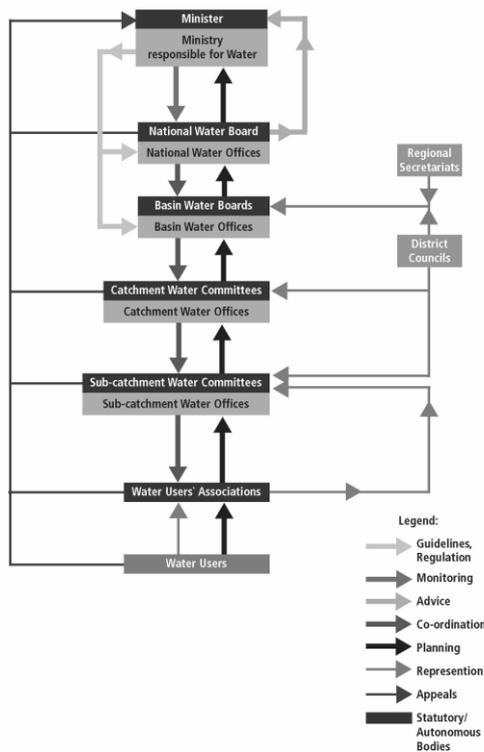


Figure 3: Institutional framework for water resource management

Source: Ministry of Water and Irrigation, 2008, p. 27

Concerning irrigation, several ministries are involved, the most important of which are under the Agriculture Sector Lead Ministries (ASLMs). These consist of Ministry responsible for Water and Irrigation, Ministry responsible for Agriculture Food Security and Cooperatives, Ministry responsible for Livestock Development and Fisheries, Ministry responsible for Trade Industry and Marketing and also Prime Minister's Office, Regional Administration and Local Government. Roles for these ministries are for instance to create a favourable environment for implementation, coordination and supervision of irrigation development. But there are more Ministries and stakeholders that have responsibilities and interests in irrigation development interventions.<sup>75</sup>

#### 4.2.2 Basin Water Office

In 1981 Tanzania adopted the River Basin Management concept and established nine basins<sup>76</sup> that do not follow administrative boundaries like Regions and Districts.<sup>77</sup> This is for a more

<sup>75</sup> Ministry of Water and Irrigation, 2009, p. 43

<sup>76</sup> Ministry of Water and Irrigation, 2008-09

integrated and comprehensive management of the water.<sup>78</sup> Manyara region, where Babati district is situated, belongs to Internal Drainage Basin<sup>79</sup> which also includes Dodoma and Singida regions<sup>80</sup> and has the Basin Water Office in Singida.<sup>81</sup> The Basin Water Offices (BWO) are the ones who are administering the Basins<sup>82</sup> and are governmental institutions under the Ministry of Water and Irrigation<sup>83</sup> and are the executive offices of the Basin Water Boards.<sup>84</sup> In the fieldwork, the focus was on BWO and not on Basin Water Boards. But according to the *National Water Sector Development Strategy* the water users, as well as Regional Secretariats and District Councils, will participate through representation on the Boards.<sup>85</sup>

BWO are the main contact with water users in the basin<sup>86</sup> and is also for instance responsible for regulating, monitoring, and policing of water use in the Basin and for the water rights and fees.<sup>87</sup> To divert or abstract water for productive use one needs to have water rights and pay a fee.<sup>88</sup> According to the District Water Engineer<sup>89</sup>, water rights are given to entities, organisations, authorities or to single farmers but not to village councils. If a group of farmers wants to use water from the river they can establish an entity and apply for permit to the Basin Water Office. The application goes through the District since one can not get registered as an entity without recommendations from the District, according to the District Water Engineer. There exist entities for both irrigation and domestic use. The District then facilitates and prepares for regulations and constitutions that need to be implemented. When one applies for water rights one also applies for the amount of water one wants to use. A river has a specific amount of water that can be used, which is measured in the dry seasons. According to the District Water Engineer it is the BWO's responsibility to coordinate that this amount of water is not exceeded. This means that it also coordinates water rights between different Districts that use water from same river. There are different names for entities; one name is Water Users Association. In Kiru Valley there are only two registered entities, which are the Water

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<sup>77</sup> Ministry of Water and Livestock Development, 2002, p. 27

<sup>78</sup> Ministry of Water and Irrigation, 2008-09

<sup>79</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>80</sup> Röstth, 2009, p. 17

<sup>81</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>82</sup> Ministry of Water and Irrigation, 2008-09

<sup>83</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>84</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p.34

<sup>85</sup> Ministry of Water and Irrigation, 2008, pp. 25, 27

<sup>86</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 34

<sup>87</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>88</sup> Koppen van et al., 2004, p. 1

<sup>89</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

Users Associations in Gichamedia and Mawemairo/Matufa, according to the District Water Engineer. The big-scale farmers also have water rights. There are some villages that have water committees which are Masware, Eri, Shawrimjo, Kisangaji, Magara and Maweni. The District helps these with assistance but the District does not have the capacity to make them entities because of lack of resources thus they do not have to pay for the water but there are some advantages to be registered as an entity, which will be discussed in the analysis. A problem in dry seasons is that the villages with only water committees take too much water from the rivers since they have no regulations on the amount of water they can use. Other villages that are not mentioned, like Mapea, do not have reliable water sources and depend mostly on rainwater and have therefore nothing to do with Singida Water Basin Office.<sup>90</sup>

Other responsibilities by BWO, according to the *Formulation of the National Irrigation Policy and Strategy* (2006), are to control the pollution in the basin and follow Act 42 of 1974 and its subsequent amendments concerning water resources use and regulations. Furthermore BWO also assists and facilitates in the formation of Water Users Associations in the Basin<sup>91</sup>, which is also one of the District's responsibilities according to the District Water Engineer in Babati.<sup>92</sup> BWO also wants to create awareness about water resource management to the water users and it also participates in water projects in the Basin.<sup>93</sup>

#### **4.2.3 Zonal Irrigation Units**

Additional institutions are Zonal Irrigation Units (ZIU) that according to *Formulation of the National Irrigation Policy and Strategy* will become Basin Irrigation Agencies (BIAs) together with the Basin Water Offices<sup>94</sup> and promote Integrated Water Resource Management in the Basins.<sup>95</sup> But when this policy was written there was no cooperation between BWO and ZIU.<sup>96</sup> According to Mrs Sainabo and Mr Emmanuel Konkon ZIU cooperates with the District with technical help for instance.<sup>97</sup> It also contributes with planning, designing and

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<sup>90</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>91</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 34

<sup>92</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>93</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p.34

<sup>94</sup> Ibid. p. iv

<sup>95</sup> Ministry of Water and Irrigation, 2009, p. 41

<sup>96</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 70

<sup>97</sup> Interviews; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24 and Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

developing irrigation infrastructure.<sup>98</sup> Zonal Irrigation Office that includes Kiru Valley is seated in Dodoma and involves Manyara, Singida and Dodoma regions.<sup>99</sup>

#### **4.2.4 Catchment and Sub-catchment Committees**

The *National Water Sector Development Strategy*<sup>100</sup> brings up new institutional framework where new institutions are created. Two of them are Catchment and Sub-catchment committees. These institutions will coordinate catchment and sub-catchment integrated water resource management plans, solve conflicts concerning water resources in the catchment and sub-catchment and also have other responsibilities that are delegated by Basin Water Boards.<sup>101</sup> It is unclear how large area that these institutions should be involved with. These institutions seem to not have been implemented yet since they were never mentioned during the interviews.

#### **4.2.5 District Council**

In Babati District, District Water Engineer Office cooperates with Agriculture Department and Livestock Department concerning water management.<sup>102</sup> The District's role concerning water management in Kiru Valley is to overrule and give conditions.<sup>103</sup> The District also has an advisory role and gives technical advice, collects funds, distributes different projects and solves conflicts.<sup>104</sup> Concerning management of irrigation it is responsible for development and implementation of irrigation with help from ZIU, the private sector and NGOs and assists farmers with identification, implementation and management of irrigations schemes.<sup>105</sup> The District's role seems to work well according to the informants, the question is if the results would be different if other informants were interviewed.

#### **4.2.6 Ward Council**

Magugu and Kiru Ward are responsible for problems that involve several villages in Kiru Valley. According to Mr Mohammed and Mrs Hawa Juma there are Ward Water

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<sup>98</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 27

<sup>99</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>100</sup> Ministry of Water and Irrigation, 2008, p 26

<sup>101</sup> Ibid.

<sup>102</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>103</sup> Interview; Village Executive Secretary in Mapea, 2010-03-04

<sup>104</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>105</sup> Ministry of Water and Irrigation, 2009, p. 42

Management Committees that involve one member from every village<sup>106</sup> but their role and responsibilities do not become clear during the interviews. According to *the National Irrigation Policy* (2009), Ward Development Committee has to verify farmers' requests for irrigation intervention before it goes to the District.<sup>107</sup>

#### **4.2.7 Village Council**

The Village Councils are responsible for by-laws and regulations of the water in the village<sup>108</sup> and have the main responsibilities for the water management in the village.<sup>109</sup> But many villages have water committees or, like Mawemairo and Matufa, Water Users Associations consisting of the ones who work with the water management in the village, like distribution of the water. The Village Councils in Mawemairo and Matufa consist of 25 members each, in Mawemairo seven of these are women. According to some of the members in the Village Council in Mawemairo there is a good cooperation between different institutions, from village to district level.<sup>110</sup>

#### **4.2.8 WUA**

Mawemairo and Matufa have established a Water Users Association (WUA) which consists of over 400 members and have a WUA committee which is made up by 17 members, four of them are women.<sup>111</sup> The village chairmen from both the villages and the facilitator are three of the members in the committee. The facilitator is a link between WUA and the District Council.<sup>112</sup> The rest are seven members elected from each village. The members from Mawemairo are responsible for the water management and the irrigation in their own village.<sup>113</sup> WUA committee meets every month.<sup>114</sup> All the members in the committee have their farms near the scheme, the leaders have the best farms.<sup>115</sup> The committee has elected a group of 20 farmers that are responsible for the distribution of the water and are directly

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<sup>106</sup> Interviews; Mr Mohammed, WUA facilitator, 2010-02-26, and Mrs Hawa Juma, member of village council in Mapea, 2010-03-04

<sup>107</sup> Ministry of Water and Irrigation, 2009, p. 42

<sup>108</sup> Group Interview; Members in the village council in Mawemairo, 2010-02-26

<sup>109</sup> Interview; Female farmer, Mawemairo, 2010-03-02

<sup>110</sup> Group Interview; Members in the village council in Mawemairo, 2010-02-26

<sup>111</sup> Group Interview; Members in the village council in Mawemairo and Mr Mohammed, WUA facilitator, 2010-02-26

<sup>112</sup> Interview; Male Farmer, Mawemairo, 2010-02-27

<sup>113</sup> Interview; Mr Mohammed, WUA facilitator, 2010-03-02 and 2010-02-26

<sup>114</sup> Group Interview; Members in the village council in Mawemairo and Mr Mohammed, WUA facilitator, 2010-02-26

<sup>115</sup> Interview; Male farmer and a member in the WUA committee, Mawemairo, 2010-02-27

involved with the farmers.<sup>116</sup> Mawemairo gets water four days a week and Matufa gets water three days a week. This is because Mawemairo is a bigger village with more farms.<sup>117</sup>

WUA committee is in charge of the irrigation scheme like planning, construction, equal distribution of the water and solving conflicts. They also collect money from the farmers since they have to pay for the water rights. But some of this money goes to maintenance of the irrigation scheme. The ones who have farms and cows have to pay for the water. If a farmer does not pay or breaks a rule he/she has to pay a fine which is between 15 000 – 50 000 tsh<sup>118</sup>, depending on the mistake. New rules and regulations that the committee wants to be implemented have to be approved by the Village Councils in Mawemairo and Matufa,<sup>119</sup> and the Village Councils may call for meeting for all villagers.<sup>120</sup> But the committee can make some own decisions or rules if they report them to the Village Councils.<sup>121</sup>

The general opinions of WUA committee and the water management among the farmers that were interviewed were positive, which also earlier studies in the area have found.<sup>122</sup> All the farmers in the survey thought it was easy to influence the decision-making. If there is a problem farmers meet together and then discuss it with the committee. The committee's work was accepted by the farmers. They also thought that the cooperation and relations to other institutions like the District were good but they did not seem to know which institutions above the District are involved in the water management.<sup>123</sup> But there were several things that should be improved like harder leadership and punishment. One female farmer thought that the farmers were not afraid of breaking the rules.<sup>124</sup> According to another farmer, who also was a member in the committee, the members in the committee are staying too long. This has got the effect that they dominate and it takes long time to adopt new ideas.<sup>125</sup> Also the distribution of the water should be improved.<sup>126</sup> According to several informants, for example

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<sup>116</sup> Interview; Male farmer, Mawemairo, 2010-02-27

<sup>117</sup> Group Interview; Members in the village council in Mawemairo and Mr Mohammed, WUA facilitator, 2010-02-26

<sup>118</sup> ~85-280 SEK/10-35 USD, Valuta.se, 2010-06-08

<sup>119</sup> Group Interview; Members in the village council in Mawemairo and Mr Mohammed, WUA facilitator, 2010-02-26

<sup>120</sup> Group interview; Female farmers, Mawemairo, 2010-03-02

<sup>121</sup> Interview; Mr Mohammed, WUA facilitator, 2010-03-02

<sup>122</sup> For example; Ericsson, 2007, Rösth, 2009

<sup>123</sup> Interviews; Male farmers, 2010-02-27, female farmer, 2010-03-02, Group interview; female farmers, Mawemairo

<sup>124</sup> Interview; Female farmer, Mawemairo, 2010-03-02

<sup>125</sup> Interview; Male farmer and member in the WUA committee, Mawemairo, 2010-02-27

<sup>126</sup> Interview; Male farmer, Mawemairo, 2010-02-27

Mr Mohammed, people at all levels should also be more educated about water management and the conservation of the environment should be improved.<sup>127</sup>

#### **4.2.9 Mapea village**

Mapea village is situated downstream the IFAD irrigation scheme. The farmers have got both positive and negative effects after the scheme was built. Now several farmers go to Mawemairo and Matufa to work and rent land. But they do not have any water in the river in the summer and they only cultivate once a year, before they could cultivate twice a year. The farmers in Mapea get most water from rain and wells. They have a sort of water committee, called the stream committee that involves six farmers and is responsible for the distribution of the water. They have also tried to establish a water committee with Matufa in order to get more water. Matufa was going to discuss this with Mawemairo but nothing has happened. The District is not directly involved in the water management in the village.<sup>128</sup> If the village needs help from the District it turns to the agriculture department in the District.<sup>129</sup>

#### **4.2.10 Big-scale farmers**

In Kiru Valley there are several big-scale farmers, several of them with Indian origin<sup>130</sup> which for instance cultivate sugar cane which demands a lot of water. These farmers own their farms under a 99 years lease.<sup>131</sup> After the interviews it seems that the conflicts are mainly between the big-scale farmers and small-scale farmers. According to several informants, for instance Mr Mohammed, the big-scale farmers sometimes close the water in the river so that farmers downstream do not get any water. One reason for this is lack of workers at the big-scale farms since less people work at them after the scheme was built.<sup>132</sup> There has even been fighting and killing between small-scale farmers and big-scale farmers.<sup>133</sup>

Earlier studies by Rösth (2009) and Said (2006) have done interviews with big-scale farmers. According to Rösth there can be some conflicts between big-scale and small-scale farmers with irrigation during the dry seasons. But otherwise there are no big conflicts between them

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<sup>127</sup> Interview; Mr Mohammed, WUA facilitator, 2010-02-26

<sup>128</sup> Interview; Mrs Hawa Juma, member of the village council, Mapea, 2010-03-04

<sup>129</sup> Interview; Village executive secretary, Mapea, 2010-03-04

<sup>130</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>131</sup> Ubwani, 2002

<sup>132</sup> Interview; Mr Mohammed, WUA facilitator, 2010-02-26

<sup>133</sup> Interview; Mrs Hawa Juma, member of the village council, Mapea, 2010-03-04

according to both one big-scale farmer and small-scale farmers in Mawemairo and Matufa. There is even a good cooperation between WUA and the big-scale farmers. When the water is scarce and conflicts arise they meet and discuss the distribution of the water.<sup>134</sup> But Said's survey has different results. According to him the main conflicts are between big-scale farmers and small-scale farmers with irrigation but also between the farmers within the irrigation scheme. Farmers in Matufa are blaming farmers in Mawemairo for taking more water than what is allowed, while farmers in Mawemairo are blaming upstream big-scale farmers to divert too much water.<sup>135</sup> Some reasons why the results differ could be explained by which informants were interviewed and that it was a drier year when Said made his survey compared to when Röstth made her survey.

#### **4.2.11 Conflict resolution**

In dry seasons when water is scarce, conflicts can arise between farmers. For Mawemairo and Matufa conflict resolution seems to work quite well. First the problem goes to WUA, if it can not be solved there it goes further to the Village Councils. If it is still not solved it goes to the District Council through Ward Council.<sup>136</sup> According to Mr Mohammed these institutions solve conflicts together and he thought that the cooperation worked well,<sup>137</sup> which the farmers in Mawemairo also thought.<sup>138</sup> If there is a conflict between several villages it goes to the Ward Council. When there is a shortage of water in Magugu Ward, they discuss it with Kiru Ward and get a conclusion. According to the Executive secretary in Mapea this works well.<sup>139</sup> But the main problem seems to be between small-scale farmers and big-scale farmers. The Ward Councils help the cooperation between small-scale farmers and big-scale farmers, but according to one informant a problem is that big-scale farmers bribe the people in Ward Council so that they can take more water. Mrs Hawa Juma said that the leader in Ward Council should be more committed.<sup>140</sup> Since Basin Water Office in Singida has the main responsibility for the water in Kiru Valley it also gets involved if conflicts arise, according to the District Water Engineer.<sup>141</sup> This was never mentioned by other informants.

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<sup>134</sup> Röstth, 2009, p. 19

<sup>135</sup> Said, 2006, p. 19

<sup>136</sup> Interview; Mr Mohammed, WUA facilitator, 2010-02-26

<sup>137</sup> Ibid.

<sup>138</sup> Interviews; Male farmers, 2010-02-27, female farmer, 2010-03-02, Group interview; female farmers, Mawemairo

<sup>139</sup> Interview; Village executive secretary, Mapea, 2010-03-04

<sup>140</sup> Interview; Mrs Hawa Juma, member of the village council, Mapea, 2010-03-04

<sup>141</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

It is less clear how conflicts are solved in Mapea. If the conflicts just exist in the village it is probably a matter for the Village Council. But since they have got less water after the IFAD irrigation scheme was built and got more marginalised there is a risk for conflicts. According to the surveys made by Rösth and Ericsson the conflicts are rather between farmers with the irrigation scheme and the farmers in Mapea.<sup>142</sup> Why their results differed from this survey could be explain by different informants or less conflicts on the time when this survey was made. Therefore there should be a forum for all farmers around Dudumera River to facilitate the cooperation. The Ward Council is one forum but it does not seem to work so well if the leaders are taking bribes, as it was claimed in an interview. According to Mrs Sainabo there is a Joint Water Committee at division level but it is not permanent. This committee includes important persons like village chairmen, secretaries, big-scale farmer etc.<sup>143</sup> But according to other informants, for instance the executive secretary in Mapea, there is no water committee for all farmers around Dudumera River.<sup>144</sup> Said's survey also confirmed that there is a Joint Water Committee that solves conflicts, according to a big-scale farmer. But according to a small-scale farmer nothing is done to solve conflicts and the committee has a majority of big-scale farmers.<sup>145</sup>

## **5. Analysis**

It is not easy to get a clear picture of the water management in Kiru Valley. There are a lot of institutions involved and the governance seems to be quite different for villages with WUA and villages without. The analysis will first analyze participation for farmers in Mawemairo and Mapea and then the cooperation between different institutions.

### **5.1 Participation in decision-making**

The general opinion among the farmers in Mawemairo about involvement in decision-making was positive, according to both members of WUA and some members outside WUA. But the results may have been different if the interviews had been made with other informants, since the informants that were selected for this survey may have been the ones who have got positive effects of the scheme. Global Water Partnership (GWP) defines real participation when stakeholders are involved in the decision-making and when the representatives of the

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<sup>142</sup> Rösth, 2009, Ericsson, 2007

<sup>143</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>144</sup> Interview; Village executive secretary, Mapea, 2010-03-04

<sup>145</sup> Said, 2006, p. 24

stakeholders are democratically elected.<sup>146</sup> Mawemairo seems to have good participation for the villagers. When some new decisions have to be made, the village council may call the villagers to a meeting and discuss them together. Further, fourteen of the seventeen members of WUA committee are elected by the villagers. According to one member of WUA committee, however, the members stay for a long time, which got the effect that it takes a long time to adopt new ideas. Real participation is also when stakeholders at all levels have an impact on the decisions at different levels.<sup>147</sup> This is harder to answer. Since this survey mainly focus on water management concerning agriculture it is not possible to answer if stakeholders from other sectors participate in the decision-making. But to answer if all farmers and also villages have an impact on the decisions at different levels, different platforms for participation and conflict resolution in Kiru Valley will be discussed further down.

Since farmers are so dependent on the river for their livelihood it is important that they participate in the decision-making, which may also decrease the risk of conflicts. Therefore it may be good to consider co-management as well. On the other hand it is important with participation by relevant stakeholders in decision-making like farmers in IWRM so hopefully they are included in the management. This however does not seem to be the case in Kiru Valley, which will be discussed now.

## **5.2 Platforms for stakeholder participation and conflict resolution**

This part of the analysis will discuss whether it exist platforms and institutions in Kiru Valley or Dudumera River that deal with joint issues, conflict resolution, participation for relevant stakeholders and coordination between different levels.

In IRBM there should be a platform at basin level for all stakeholders for decision-making concerning the water use, according to GWP.<sup>148</sup> This platform is very vital to handle upstream-downstream problems and also to let all relevant stakeholders participate.

According to *National Water Sector Development Strategy* water users will participate in the Basin Water Boards,<sup>149</sup> but since only BWO was mentioned during the fieldwork there was no

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<sup>146</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, p. 15-16

<sup>147</sup> Ibid.

<sup>148</sup> Ibid. 48

<sup>149</sup> Ministry of Water and Irrigation, 2008, pp. 25

focus on the Boards, so it is therefore impossible to answer how well the participation works for water users in the whole basin. But a platform at basin level involves a large area and a lot of stakeholders and it is hard to get everyone involved. Therefore it would be wise to consider a platform at a smaller level as well, that would just deal with stakeholders in Kiru Valley. Tanzania has in *National Water Sector Development Strategy* proposed new institutions that are adapted to IWRM and have hydrological boundaries. The main responsibilities are decentralised to Basin Water Boards, Catchment Water Committees (these will be discussed later) and local Water Users Associations.<sup>150</sup> This may result in that those water users not members of a WUA will have hard to participate and be involved in the decision-making. If one looks at figure 3 of the new institutional framework for water resource management one sees that the way water users get involved in planning and representation is through WUA. For villages like Mapea, that do not have a WUA, there is a need for an institution that involves all relevant stakeholders for whole Kiru Valley or for those around Dudumera River for participation. Johanna Rösth<sup>151</sup> came up with same results. According to Mrs Sainabo there actually exists a Joint Water Committee at division level, which is not permanent<sup>152</sup>, but since no other informants said anything about this and several said that there is no water committee that involves all around Dudumera River it seems like this committee does not have a big role in the area. Said's survey also confirm that there are different opinions of this committee.<sup>153</sup> Rösth suggests that this platform for those around Dudumera River should be at the District or the District's responsibility.<sup>154</sup> But the District does not seem to be equally involved in the water resource management in all villages. Mawemairo village seems to have better cooperation with the District Council, compared to Mapea. The District Council is not directly involved in the water management in Mapea since the village does not have reliable water sources. But Mapea is still dependent on the river for the production since the farmers cultivate less after the scheme was built. Therefore it is important to have a platform where all water users that are dependent on the rivers in Kiru Valley are involved, both for decision-making and also for conflict resolution. The District Council may also be at too high hierarchical level since it is in charge for more areas than just Kiru Valley. Ward Councils are other institutions that may be at more appropriate hierarchical level to deal with these problems. Jaspers writes that if hydrological subdivisions match administrative divisions it

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<sup>150</sup> Ministry of Water and Irrigation, 2008

<sup>151</sup> Rösth, 2009

<sup>152</sup> Interview; Mrs Sainabo Mnumbi, coordinator in District Agriculture Development Plan, 2010-02-24

<sup>153</sup> Said, 2006, p. 24

<sup>154</sup> Rösth, 2009

can be wise to consider them as well.<sup>155</sup> According to two informants there is a Ward Water Management Committee that involves one member from each village. This sort of platform sounds quite good since every village gets involved, but only one member from each village is too little. No other informants mentioned this committee and its role did not become clear during the survey. One problem according to another informant is that the big-scale farmers may bribe the people in the Ward Council so that they can get more water. Therefore it may be better to have this sort of platform for participation and conflict resolution at a more neutral institution and on hydrological boundaries. The new institutional framework brings up two other institutions; catchment and sub-catchment water committees where Local Government Authorities and WUAs will be represented.<sup>156</sup> These are based on hydrological boundaries and may therefore better handle upstream-downstream problems. If the sub-catchment committee is in an appropriate hierarchical level and may just involve water users in Kiru Valley, even those outside WUA, this may be a good platform for all relevant stakeholders in Kiru Valley. But it seems that these have not yet been implemented since they were never mentioned during the interviews.

There is also a need for coordination across scales when having IWRM, which Molle et al. address. There has to be links between local level decision-making and basin level decision-making<sup>157</sup>, since decisions that are made by WUA may also affect water users downstream, like Mapea. The Ward Councils have some responsibilities concerning coordination between different villages, but it is unclear how well this works. But it may be good to have an institution for whole Kiru Valley. Molle et al.<sup>158</sup> bring up a platform where users, community organisations, government organisations and stakeholders develop a coordination and negotiation mechanism. Here users and authorities may have a direct channel of communication from top to bottom and vice versa.<sup>159</sup> This platform may help with upstream-downstream problems as well as issues that concern both local level and basin level. But to establish too many new platforms and institutions may be difficult and not so effective. Therefore the best solution would be to have one institution for coordination, conflict resolution, stakeholder participation, legislation etc. which Molle et al. also address.<sup>160</sup> Another solution is to improve the platforms and institutions that already exist since it

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<sup>155</sup> Jaspers, 2003, p. 77-90

<sup>156</sup> Ministry of Water and Irrigation, 2008

<sup>157</sup> Molle et al., 2007 (a), p.3

<sup>158</sup> Ibid.

<sup>159</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000

<sup>160</sup> Molle et al., 2007 (a), p.3

requires a lot of financial and human resources to implement new institutions, and according to Molle et al. new basin institutions may create problems with existing line agencies and policy fields.<sup>161</sup> Since it exists a Joint Water Committee according to Mrs Sainabo, it may be better to improve this. This committee is not permanent now and involves people with more power like village chairmen, secretaries and big-scale farmers. But if more stakeholders, like farmers, have an opportunity to participate and the focus is on coordination and consultation then this platform may be a better idea. Maybe Tanzania puts too much focus on implementation of new institutions on hydrological boundaries and forgets to focus on coordination between different levels and participation for different stakeholders. But on the other hand to implement a sub-catchment committee may be better. This committee may better handle coordination between different levels, like BWO and WUA and perhaps other institutions since it is an institution under the Ministry and may therefore have more power and is based on IWRM, while the Joint Water Committee seems to be an independent institution and may therefore not handle coordination between different levels as good.

Regardless of whether new institutions are implemented or whether old ones are improved there is a risk that there is an unfair distribution of power between all relevant stakeholders and all do not have right to influence in the decision-making since there is great social and economic differences between the stakeholders. Therefore it is important to consider this when implementing new institutions, creating new rules, roles and rights so these not privilege those that already have more power. One way is to consider having this platform under governance of the government since it may have the ability to give all stakeholders influence in the decision-making, which Jaspers also suggests.<sup>162</sup>

### ***5.3 Cooperation between different institutions and responsibilities***

In the short time that this survey was done it was hard to get a clear picture of the cooperation between different institutions and their roles. In figure 4 I have tried to write down the most important institutions and the links between them. For the farmers within the irrigation scheme and WUA the management seems to work quite well. It is at higher hierarchal level where it seems to be a little confusing. According to the informants in Mawemairo the cooperation between different institutions, from Village Council up to the District Council

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<sup>161</sup> Molle et al., 2007 (b), p. 608

<sup>162</sup> Jaspers, 2003

was good. But it is important to keep in mind that if the interviews had been done with other informants the results concerning the cooperation may have been different. By the WUA facilitator WUA has a direct link to the District Council. But since both BWO and WUA are institutions at hydrological boundaries there should be a good cooperation between these two to better handle upstream-downstream problems. But no farmers seem to know which additional institutions above the District are involved in the water management in Kiru Valley and no farmers mentioned BWO in Singida. According to GWP the responsibilities at basin level, like BWO, should for instance be allocation of water, charging for water, enforcement of standard or permit conditions and adjudication of conflicts.<sup>163</sup> It seems that the first three things are in line with Singida BWO since these three have to do with water rights. But their role concerning adjudication of conflicts was just mentioned by the District Water Engineer<sup>164</sup> and no other informants. According to him, BWO has the main responsibilities of the water and also needs to get involved when conflicts arise and therefore should cooperate with WUA but also with other stakeholders and institutions. But the cooperation between the District and BWO seems to work quite well, according to the District Water Engineer. But it seems that BWO and the District have overlapping function concerning the formation of WUA. According to *Formulation of the National Irrigation Policy and Strategy* BWO should assist and facilitate in the formation of WUA:s in the basins.<sup>165</sup> But according to the District Water Engineer the District facilitates and prepares for regulations and constitutions that need to be implemented when an entity, like WUA, is established.<sup>166</sup> Maybe this is not overlapping functions or maybe BWO has delegated this to the District.

The cooperation between Zonal Irrigation Unit (ZIU) and the District also seems to work quite well, where ZIU mainly helps the District with technical advice concerning irrigation. But the cooperation between ZIU and BWO is unclear. According to *Formulation of the National Irrigation Policy and Strategy*, ZIU and BWO will form Basin Irrigation Agencies but this does not seem to have been implemented yet.<sup>167</sup> Now these two are seated at different cities, BWO in Singida and ZIU in Dodoma. The cooperation between these would be facilitated if they were located in the same city.

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<sup>163</sup> Global Water Partnership, Technical Advisory Committee (TAC), 2000, p. 46

<sup>164</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>165</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. 34

<sup>166</sup> Interview; Mr Emmanuel Konkon, District Water Engineer, 2010-03-05

<sup>167</sup> Ministry of Agriculture, Food Security and Cooperatives, 2006, p. iv

The cooperation between wards seems to work quite well according to the executive secretary in Mapea. When it is shortage of water in Magugu Ward the wards meet and discuss the problem. But the cooperation may be inadequate with the farmers since there may be a risk that the Ward Councils are taking bribes from the big-scale farmers so they can take more water. Since there was no time for interviews with big-scale farmers it is hard to discuss their cooperation with different institutions and their opinions but they would probably deny that they are bribing the Ward Councils. Earlier studies have different results of the cooperation between big-scale farmers and small-scale farmers where the cooperation between WUA and big-scale farmers was good according to Rösth, while according to Said one of the main conflicts was with small-scale farmers with irrigation and big-scale farmers. So no clear conclusions can be made concerning the big-scale farmers. As already mentioned, villages with no WUA seem to have inadequate cooperation with other institutions since they for instance have nothing to do with BWO in Singida. Therefore the platforms that are already discussed are important to implement.

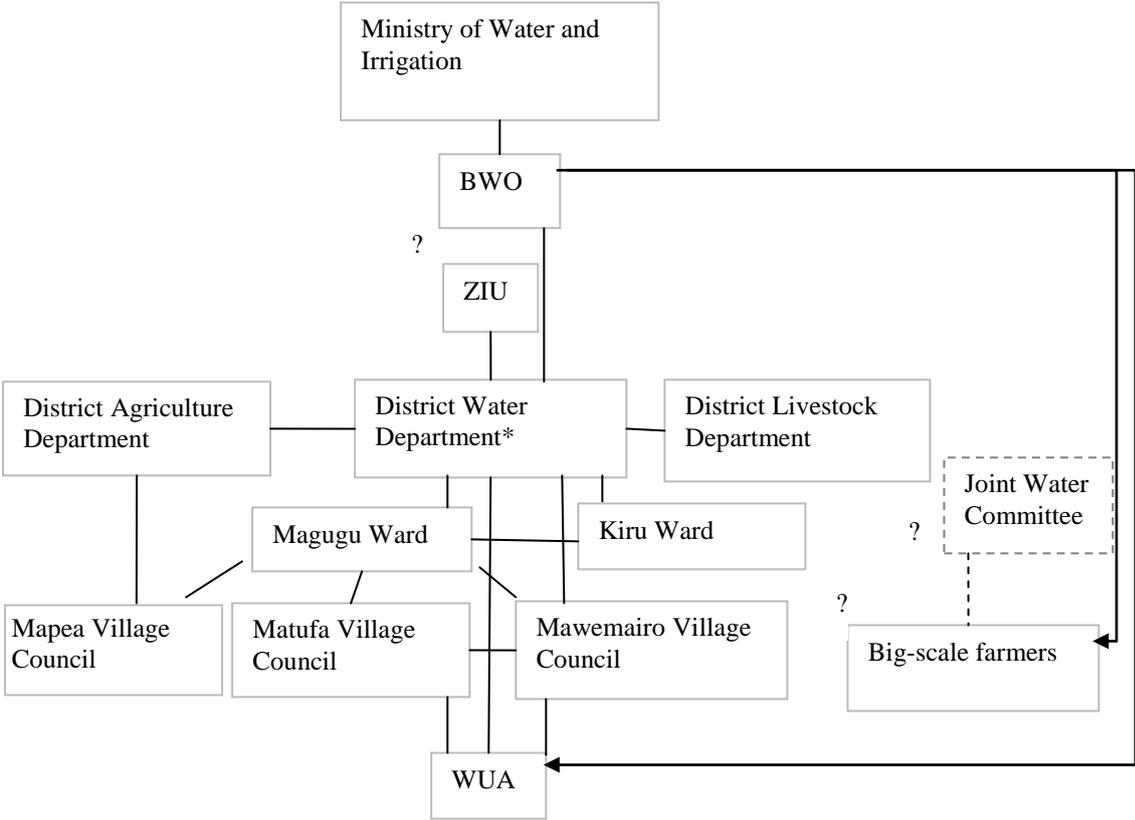


Figure 4: My own view of some of the institutions involved in the water management in Kiru Valley

With IWRM it is important with cooperation between different sectors. Since this study mainly focuses on water management for agriculture it is hard to answer how the cooperation is between other sectors. One of Tanzania’s goals in their *National Water Policy 2002* is “to

address cross-sectoral interests ... in water resource planning, development, and management.”<sup>168</sup> According to the District Water Engineer the District Water Engineer Office cooperates with Agriculture Department and Livestock Department concerning water management. Whether this cooperation works well is impossible to answer since this was never questioned during the survey. Concerning irrigation, a lot of sectors and different stakeholders are involved. The most relevant ministries are under Agriculture Sector Lead Ministries and involve four ministries. How this cooperation works in Babati District and Kiru Valley is hard to say, but to have so many different ministries involved in irrigation may harm the water resource and irrigation management, since there are several ministries with different interests concerning irrigation. But the implementation of IWRM maybe will facilitate the cooperation and coordination between these.

#### **5.4 Nested enterprises**

Ostrom’s principle about nested enterprises tells that management should be organized at different levels. Those within the irrigation scheme seem to work like this. There is a WUA committee that is responsible for the whole irrigation scheme, then the members from each village form a sort of sub-committee that is responsible for the irrigation and water management in their own village. These two are closely interconnected and new rules that need to be implemented are decided by the two village councils together. WUA committee then has a link with the District Council through the WUA facilitator, who probably makes sure that WUA by-laws and management are in line with the District policy. The District then cooperates with BWO and for instance makes sure that right regulations are implemented by WUA. Mapea has a stream committee that is responsible for distribution of the water. How well this work is hard to say as well as the conflict resolution in the village. But water management concerning the whole of Kiru Valley seems to be inadequate since it for instance does not seem to exist an institution for conflict resolution for all water users in Kiru Valley. Another example is water rights. It seems that there are just WUA in Gichamedia and Mawemairo/Matufa, and also the big-scale farmers that have water rights in Kiru Valley. According to van Koppen et al., water rights concern everyone who diverts surface and groundwater for productive use.<sup>169</sup> This means that it is only those farmers within WUA and

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\* The District Water Engineer Office cooperates with District Agriculture Department and District Livestock Department, but if this office belongs to a District Water Department I do not know.

<sup>168</sup> Ministry of Water and Irrigation, 2008, p. 1

<sup>169</sup> Koppen van et al., 2004, p. 1

big-scale farmers that are allowed to divert water for production and they who have to pay for the water. But this is not really the case in Kiru Valley. Several villages divert water from the rivers, for example Mapea and those villages with water committees. Why they are doing that and if it is okay did not become clear during the survey. But to get water rights one need to establish an entity. This means that rules and constitutions need to be implemented and the amount of water needs to be specified. So it is only WUAs in Kiru Valley that have these rules and regulations. Other farmers do not seem to have them. So the farmers in Kiru Valley do not have the same conditions. Ostrom's eighth principle says that rules at one level but not on the other levels could lead to an incomplete system.<sup>170</sup>

## 6. Discussion

To manage river basins can be very difficult since it can cover a large area and involve a lot of stakeholders. Another problem is that use of a river at one place also affects people at another place. This can cause conflicts. In dry seasons when the water is scarce there is a risk that people are taking more water than allowed which increases the risk of conflicts. But often the main reason for these conflicts is not scarcity of water, instead it is according to Carius the way the water is managed and governed.<sup>171</sup> If the management is unclear, like the rules and institutions that are involved, the water users may just divert as much water as possible to their plots and not think about the water users downstream. One problem, especially in Tanzania, is that there are a lot of institutions that have responsibilities in water management. Some of the management may be overlapping and some important roles like planning, monitoring, legislation etc. may be divided to different institutions and the coordination between these may be weak. But if there are clear rules and regulations and if the institutions and their responsibilities are clearly defined the risk of conflict may decrease. But it is also important that water users and other stakeholders have a forum where they can meet and discuss the use of the water with each other. Since they are the ones who are affected by the rules and regulations it is also important that they can participate in the decision-making. According to Shui Yan Tang participants have easier to accept rules if they are developed by themselves and not given from the government above.<sup>172</sup> This could be a reason why WUA in Mawemairo and Matufa seems to work so well since the members of WUA feel involved in the decision-making of the irrigation scheme. This creates a sense of ownership which makes

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<sup>170</sup> Ostrom, 1990, p. 102

<sup>171</sup> Carius et al., 2004, p. 2

<sup>172</sup> Shui Yan Tang, 1993, pp. 238-239

it easier for a sustainable management. A forum for all relevant stakeholders at different hierarchal levels may therefore decrease the risk for conflicts if all are involved in decision-making and if all have equal power. This is another problem. In Kiru Valley the big-scale farmers have more power compared to small-scale farmers, especially those without a WUA. WUA also seems to have much power since it is well organised and has a good cooperation with other institutions. In Tanzania, where corruption is not unusual it may be hard to have a platform where there is no corruption and where all stakeholders have equal power.

To implement IWRM and institutions based on hydrological boundaries may be a way to solve some of these problems, since the focus is on the basins and not limited by administrative boundaries. But a successful IWRM in reality is not that easy. With a management based on hydrological boundaries it is probably easier to handle upstream-downstream issues. But to implement new institutions and perhaps match these with administrative institutions so they do not have overlapping functions may be hard as well as having a working coordination between these. In Tanzania it seems that they are still working to implement these new institutions. The catchment and sub-catchment committees are still not implemented for example. Implementing successful river basin management in developing countries is also harder than in rich countries since it needs a more developmental dimension. Poor countries do also have worse conditions like: “dominance of smallholder agriculture, weak institutions, insufficient financial and human resources, marked social inequity, and extreme poverty.”<sup>173</sup> According to Jaspers it is important with initial funds to start the implementing of the institutions. Therefore there is a need of investments which all countries can not afford.<sup>174</sup>

Since river basins involve a lot of stakeholders from many sectors it makes water in basins hard to manage in a sustainable way. There are sectors like agriculture, fisheries, industry etc. where all have different interests in the basins. It is not hard to understand why conflicts easily arise in river basins. To coordinate these sectors may be difficult but it is necessary since there is a risk that the water will decrease over time. Therefore a sustainable management with participation for all relevant stakeholders and coordination between different sectors and levels is needed before the amount of water is in a critical level and it is too late.

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<sup>173</sup> Molle et al., 2007 (b), p. 620

<sup>174</sup> Jaspers, 2003

## 7. Conclusions

For the members in WUA, the water management seems to work well. But the management seems to be inadequate for those water users that are not members of a WUA, like the farmers in Mapea. Since a lot of stakeholders, like farmers, are depending on the rivers in Kiru Valley than just those in the WUAs, there is a need of an institution that involves them as well for conflict resolution, participation in decision-making, and coordination between different levels, for example. This sort of institution seems to be missing in this area. There seems to be some institutions that deals with some of these issues like the Ward Councils and the Joint Water Committee, but in the Ward Councils there may be a risk for corruption and the Joint Water Committee does not seem to be well-known by different stakeholders in Kiru Valley and also involves people with more power. Two solutions are to either improve the institutions that already exist or to implement new institutions like a sub-catchment committee. Both of these alternatives have their pros and cons. But most important is to have an institution or platform where even farmers in Mapea can participate and where all water users can have their voice heard so the risk of conflicts may decrease as well as the coordination between different levels will be improved.

Concerning the institutions that are involved there seem to be a lot of them. The new institutions that are proposed in figure 3 have the main responsibilities over the basins but a lot of other institutions and sectors have interests in water management and the higher up one looks the more confusing it seems. But it seems to be quite good cooperation between the different institutions that this survey addresses, but not perfect. For example, BWO's cooperation with WUA seems to be inadequate since only officials seem to know about BWO and no farmers and its role concerning resolving conflict between water users was only confirmed by one informant. But the new institutions that are on hydrological boundaries are probably a good idea to better manage water resources, however with risk of problems with existing administrative institutions and overlapping functions.

More research would be interesting to bring clearness concerning water rights in the area and the difference between farmers with water rights and those who divert water from the rivers without water rights. More research about the Joint Water Committee would also be interesting as well as more study concerning participation of water users in other villages in Kiru Valley is also needed.

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