Priorities and challenges for the implementation of Integrated Water Resources Management in Mozambique: a SWOT-AHP approach

Jordi Gallego-Ayala[*] and Dinis Juízo[2+]

[*]Water Research Institute of Mozambique, Av. Patrice Lumumba nº 770 Maputo, Mozambique
[+]Eduardo Mondlane University, Department of Civil Engineering, Av. de Moçambique km 1.5. P.O Box 258 Maputo, Mozambique

Abstract
The Mozambican government is updating its political and legal framework of the water sector to foster the application of Integrated Water Resources Management (IWRM) concept as a guide to achieve sustainable development. Nonetheless the steps towards the implementation of this national strategy are still in preparation. The objective of this research was to identify and establish a priority ranking of the fundamental factors likely to affect its implementation in Mozambique, with the aim of supporting its strategic implementation. On the other hand, the institutional challenges and linkages with the factors which tackle the IWRM implementation are analyzed. The methodology used in this study is a combination of Strengths, Weaknesses, Opportunities, and Threats technique and the Analytic Hierarchy Process. The results obtained enable us to quantify the different relative importance of the factors that act as IWRM implementation drivers. The conclusion an optimal approach that uses efficiently the available resources is possible through action in a small number of factors.

Keywords: AHP; IWRM; SWOT.

1. Introduction

Society relies on economic growth as a foundation for socio-economic development. Water is an essential element to attain economic growth; yet, as it is a finite resource, its mismanagement is likely to impose significant constraints on development (WWAP, 2009). The increasing interdependencies between regions and countries mean that water allocation problems transcend the traditional country or hydrological boundaries of water resources (Allan, 2003). The complexity of water resources management in the Southern Africa region derives from the large climatic variability, both in space and time, directly leading to recurrent droughts and floods. These events challenge the region to find innovative approaches to its water resources development and use to meet the common goal of economic and social development (World Bank, 2010). The existing Southern Africa Development Community (SADC) Protocol on Shared Watercourses is a clear demonstration of the desire of member countries to work through an agreed platform in the utilization of the limited water resources of the region (Juizo et al., 2006). SADC countries also strive to harmonize country policies and strategies for the development and use of the region's common resources.

The SADC region has more than 70% of its land territory falling within a designated international river basin area, therefore, there will always be increasing interdependencies between countries, which will affect the way water is used and developed in any one country (ECA, 2006). Over the past 20 years, SADC countries have been working on the development of regional policy and institutional water management framework. However, the implementation of the policies and principles involved, across the region, has faced difficulties; while in many cases this has not been duly documented.

The existing regional framework for water resources development, management and use advocates the adoption of Integrated Water Resources Management (IWRM) principles and tools by all SADC member states, as a common platform to achieve regional integration and levelling the playfield (SADC, 2005, 2006, 2007). Thus most countries in SADC are in advanced stages of implementing the IWRM framework by reforming their national policy, legal and institutional instruments to conform to this paradigm (UN-Water, 2008).

Likewise, Mozambique has over the past 20 years planned and implemented a number of reforms. In fact, in 2007 the Mozambican government approved the revised water policy and other legal documents of the water sector which implied that the IWRM concept was included as a fundamental component of its implementation, aiming to achieve sustainable development. However, the steps towards implementing this national strategy are still in preparation. On the other hand, the challenges faced while effecting these changes are not clearly documented.

The IWRM framework itself is still subject of debate; in fact, there is a growing literature in the world calling for a critical assessment of concepts surrounding IWRM. Merrey (2008) elaborates extensively on the reasons for the need to be critical when evaluating the merits and de-merits of the concept involved in IWRM. Literature shows that practitioners should critically review the conditions under which the adoption of the principles and tools advocated in IWRM are more likely to succeed and be open to adaptation to suit local conditions (Merrey, 2008). However, whether the IWRM approach to water resource development, management and use is in its own an infallible framework is not the subject of this paper. What remains important is to critically evaluate the key factors influencing the implementation of any selected approach to suit the local context. The rational of this approach is that each paradigm will have specific challenges and different constraints must be resolved for the transformation to succeed and attain the desired results.
Therefore the objective of this research is to identify and establish a priority ranking of the fundamental factors affecting the implementation of the IWRM framework in Mozambique, as well as the water institutions that should address those factors, with the aim of supporting the strategic planning for its implementation. Thus for this study, knowing the factors that can influence the outcome of adopting the IWRM are considered to be as critical as the design of a set of policies, institutional arrangements and tools for implementing the approach.
The paper starts with an introductory section, followed by a section that describes the IWRM concept and foundations. The third section presents the case study, explaining the Mozambican water resources management context. The fourth section offers a detailed description of the methodology employed. The fifth section reports the results. Finally section six discusses the findings and section seven presents the conclusions.

2. Integrated water resources management in perspective

Literature shows that the IWRM paradigm started to gain prominence with the 1992 Rio de Janeiro Summit and the Dublin Conference that preceded it, nonetheless the IWRM concept appeared more than 60 years ago, however, it could not be applied with success before the 1990s (Biswas, 2004 and 2008). The Global Water Partnership (GWP) (2000) defined IWRM as '*a process that promotes the co-ordinated development and management of water, land and related resources in order to maximise the resulting economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems*', this is the most quoted definition of the IWRM (Biswas, 2004) Thus IWRM may be interpreted as an approach to water development and management that seeks a balance between the three dimensions of sustainable development (economic efficiency, social equity and environmental sustainability). IWRM also requires integration and coordination across different public and private sector institution, and greater involvement of stakeholders and water users in water management to improve water governance (Dungumaro and Madulu, 2003). Notwithstanding, many authors criticise the deficiencies in the IWRM conceptualization and the difficulties in its implementation. Within this context of criticism, several authors have proposed alternative definitions of the concept e.g. Merrey et al. (2005), Rahaman and Varis, (2005), van der Zaag (2005), Jonker (2007) and Grigg (2008) among others.
The main problem with the IWRM conceptualization has been polarized mainly by "how to integrate" as stated by Saravanan et al. (2009). In fact, it is difficult to identify which aspect(s) should be integrated, how and by whom (Biswas, 2004 and 2008). This problem - lack of clarity for decision-makers - results in difficulties to implement and transpose the IWRM concept into an operational tool to guide the development of water resources management (Grigg, 2008). Other authors mention further reasons for the failure in the practical implementation of IWRM: a) low human resource capacity in the water resources institutions (Swatuk, 2005), b) weak financial structure (Swatuk, 2005), c) lack of political will (Allan, 2003; Swatuk, 2005; van der Zaag, 2005) and d) institutional barriers (Grigg, 2008). Despite these challenges, IWRM implementation is important for developing countries to achieve the Millennium Development Goals, which are the reduction of poverty and hunger, increase well-being and improve sustainable resources management (van der Zaag, 2005). Therefore it is imperative to continue studying the concept to understand and identify the constraints in its implementation, particularly in developing countries; and at the same time propose solutions to overcome them. Given the large spectrum and varying socioeconomic environmental conditions over which IWRM is supposed to be implemented, it is fair to argue that the concept should be less normative and more adaptive for it to benefit from the enabling pre-conditions while avoiding the obstacles to its success.
As stated early, this paper will not discuss the merits and demerits of the IWRM concept; therefore, for the purpose of the research we have adopted the GWP definition of IWRM to orient our research.

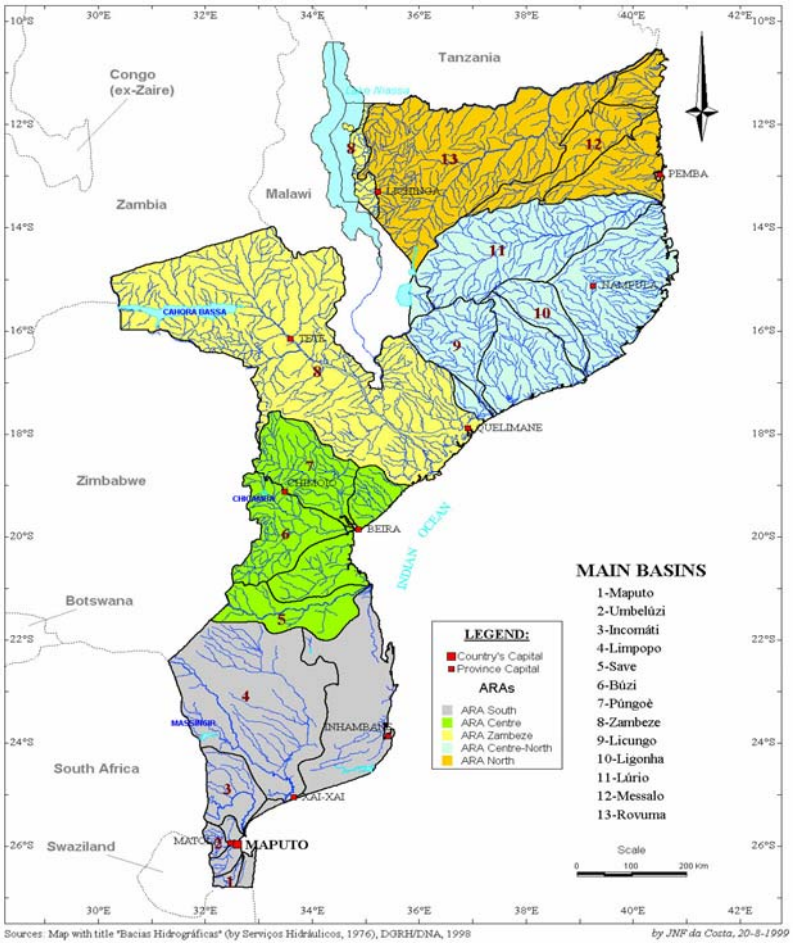
3. The Mozambican context

Mozambique lies on the East Coast of southern Africa with an area of 799,380 km^2 and 2,800 km coastline off the Indian Ocean. The total population of the country is 21 million with an average density of 26 inhabitants per square km (INE, 2009). Mozambique is part of the SADC region that comprises 14 states including the islands of Mauritius and Madagascar. The most prominent feature of this region is the number and the area extent of transboundary rivers: 15 rivers are shared between two or more countries.

Mozambique shares nine of these and is a downstream country in eight of them,, the Rovuma River forms the border with Tanzania (see Figure 1).

Figure 1

Mozambique location and Water Resources Administration Units



Source: DNA (1998).

The Mozambican institutional water sector is led by the National Directorate of Water (DNA) within the Ministry of Public Works and Housing (MOPH), covering two main areas:

1. Integrated water resource management: hydrology, international rivers agreements, watershed agencies, infrastructures such as main dams and canals and flood & drought mitigation.
2. Water supply and sanitation.

The institutional framework of the water resources management in Mozambique is set by the Water Act (1991). The core institutions and their key roles in water resources management in Mozambique are shown in Table 1.

Table 1

Key institutions in water resources management in Mozambique

Institution	Type of Institution / Geographic Scope	Main role
National Water Council – Council of Ministers	Governmental advisory board / National Scope	Provide advice on inter-sector strategies aspects of water-related policies implementations
National Directorate of Water - MOPH	Governmental institution / National Scope	Implementation and regulation of policies and strategies related to water resources management
Regional Water Administration	Public governmental institution subordinated to MOPH and DNA / regional confined scope	Operational water resources management at regional / basin level
River Basin Management Units	Basin confined scopes	Promote efficiency of water use and representation of user´s interests on water management

Source: Inguane (2010).

Irrigation development in Mozambique is the responsibility of the Ministry of Agriculture. The relationship between irrigation development and the other sub-sectors is weakly developed (MADER, 2004).

Within the context of IWRM implementation in Mozambique, DNA has started with decentralization, de-concentration and devolution of its core activities in crucial areas. This is demonstrated by the following actions:

- *River basin management:* starting in 1992, DNA is in the process of establishing Regional Water Administrations (ARAs) covering in most cases 3 or more river basin areas. ARAs South (Sul), Centre (Centro), and Zambezi (Zambezi River Basin) have been established and are fully operational, whereas ARA Centre-North (Centro Norte); and North (Norte) are theoretically in place but at very initial stage of operationalization. These ARAs are responsible for water management in their designated area of operation.
- In 1998 *urban water supply* started its delegated management with the creation of the Water Supply Investment and Assets Fund (FIPAG) and the Council for Regulation of Water Supply (CRA). Following the institutionalization of municipality administration in 1998, urban sanitation has been passed on to the municipalities. However, there are still certain responsibilities falling under the ministries of health, education and environment; and
- *Rural water supply and sanitation* is the main responsibility of Provincial DIrcetorare for Public Works and Housing through its Water and Sanitation Department. In this context DNA with support from donors started a National Rural Water and Sanitation Program. This program will be implemented through a basket fund reducing the proliferation of projects in the sector, hence improving the efficiency in delivering services and management of infrastructures.

The legislation framework to support IWRM implementation is at different stages of implementation as shown in Table 2.

Table 2

Policy Framework and status of the policies and strategies in Mozambique

Policy/Strategy	Status/Year of Approval
• Water Law	1991
• National Water Policy	1995 updated
• Institutional Framework for Delegation of Water Supply Management	2007
• Water Tariff Policy	1998
• National Irrigation Policy	2001
• Rural Water Transition Plan	1997
• Implementation Manual for Rural Water supply	2001
• National Water Resources Management Strategy	2007
• Strategic Plan (Road Map) Rural Water Supply and Sanitation	Final draft 2007
• Strategic Plan (Road Map) Urban Water Supply and Sanitation	First draft 2006
• Mid Term Expenditure Framework 2008 – 2010	First draft 2007
• Regulation on Water Licences and Concessions	2008
• National Irrigation Strategy	2010

The national policy framework is laid out in the following documents: the Water Law (1991), the National Water Policy (1995) adopted by the Mozambican Government in 1995, thereafter and following an extensive review a new version, now called Water Policy, was approved in 2007, Water Tariff Policy (1998) and other laws establishing several decentralized entities such as FIPAG and CRA (1998), the National Irrigation Policy (2001) and the international agreements that govern water use for certain rivers. Through its current water policy the country is committed to:

- Decentralized, autonomous, and financially self sustaining provision of water supply and sanitation services.
- An increased role for the private sector.
- Integrated water resources management taking environmental impacts into account.
- Recognition of water as an economic, as well as a social, good.
- Multi-objective investment planning.
- Increased beneficiary participation.
- Water education at early ages.

- Integrate promotional activities in water supply, sanitation and hygiene.
- A greater focus on capacity building.

As stated in the above summary, the water resources management framework in Mozambique is complex in its main key areas of interest, namely: a) the nature of the resources that are largely transboundary, and b) legal and institutional framework that appears to have some fragmentation and spanning across different bodies of government at ministerial level.

4. Methodology

4.1. The A'WOT method

The A'WOT method, first proposed by Kurttila et al. (2000) is a hybrid model that combines two previously independent techniques the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis and the Analytic Hierarchy Process (AHP) technique. In the A'WOT method, the latter is used for the prioritization of SWOT factors by assigning them the corresponding weights. Therefore, by transforming qualitative information into quantitative information; this analytical tool is used to overcome one of the main drawbacks of the SWOT analysis, as strategic planning process - lack of commensurability of the factors identified - hampering definition of priority actions.

The A'WOT method is applied in three steps:

- The *first step* is used to list the most important internal (strengths and weaknesses) and external (opportunities and threats) factors for the strategic planning, making-up the SWOT analysis.
- The *second step* applies the AHP technique to capture the weights of each SWOT group.
- Finally the *third step* uses the AHP technique to derive the comparative weights of each factor within the SWOT groups. Then, the overall factor priority rank is obtained by multiplying the factors local weights by the specific group weight.

In this research we carried out the *first step* using a formal discussion meeting with an expert group; the *second and third steps* used a structured interview, based on a questionnaire, with a panel of water resources management experts and practitioners (see next section); this was complemented with responses from other experts residing far away from Maputo city, to whom the questionnaire was sent.

The methodology followed in this paper has been used previously in strategic planning by Pesonen et al. (2001), Sherstha et al. (2004), Masozera et al. (2006), Shinno et al. (2006), Kahraman et al. (2007) and Dwivedi and Alavalapati (2009) among others.

The process to derive priority rankings for the different key factors likely to influence the outcome of IWRM strategy implementation is described in sections 4.2 and 4.3, which deal with the SWOT and the AHP respectively.

4.1.1.Data requirements and sources for the A'WOT analysis

As stated earlier, data needed for the A'WOT were derived from secondary and two primary sources, namely a) an expert group meeting and b) a questionnaire to water resource management experts and practitioners.

The panel of external experts was constituted by academic researchers and technical experts from the water sector. Six experts participated in the meeting, producing a consensual SWOT matrix containing the most important factors identified for IWRM implementation in Mozambique. Furthermore, the information obtained from this meeting was augmented by secondary information contained in literature about IWRM implementation. Subsequently, the resulting matrix was validated by the experts that participated in the meeting.

Using the SWOT factors identified, a questionnaire was designed and administered to Mozambican water resource management experts and practitioners in order to weigh SWOT groups and factors. The water resource management experts and practitioners who participated in this study were selected based in their in-depth knowledge of the water resources management and water sector reality in Mozambique, their professional experience, as well as their individual reputation in the water sector. The questionnaire was structured following the standard AHP pair-wise comparison methodology. The questionnaire included support tools to facilitate the decision making among the factors evaluated: a) AHP pair-wise comparison scale (is based on the degree of importance and definition of a factor), and b) brief explanation of the meaning of each SWOT factor. A total of 26 valid questionnaires were obtained. This information was used to feed the AHP model in order to derive the weights of the different SWOT groups and factors considered in our study.

4.2. The Strengths, Weaknesses, Opportunities and Threats analysis

The SWOT analysis was developed in the 1960s, is a widely used analytical tool to support the preparation of strategic planning. It is mainly used to establish a framework showing the key internal and external factors that should be confronted during the strategic planning process. This framework is the base used by policy decision-makers in the making of a strategy that ensures a good fit between internal and external factors (Kurtilla et al., 2000). The most common way to present all the listed factors identified in the SWOT analysis is through the so-called SWOT matrix, forming a milestone of this analytic framework. There are experiences with application of SWOT analysis in several areas, other than business, including water resources management (Diamantopoulou and Voudouris, 2008). Despite the fact that the SWOT analysis is a useful

tool for the strategic planning process, it does not report information about the importance of the factors identified.
Without information on the relative importance of SWOT factors, it becomes implicit that this analysis could have a degree of subjectivity in the construction of the strategic plan, to the extent that the final result would be biased by the decision-maker own perception . There are several attempts to overcome the problem; Kurttila et al. (2000) proposed the use of the AHP to obtain the relative importance of the factors identified in the SWOT.

4.3. The Analytic Hierarchy Process

The AHP method was developed by Saaty (1980) is a multi-criteria decision-making technique based on the organization of the decision-making problem in a hierarchical structure, resulting in a ranked relative importance of its elements by using a pair-wise comparison system. In this case study, the hierarchical structure results from the SWOT matrix and is divided in three levels: a) goal to be achieved by the decision (in this research the strategic implementation of IWRM), b) the SWOT groups (criteria) and c) the factors included within each SWOT group (sub-criteria).
After the hierarchical structure has been established, the next step is to identify the relative importance of each criterion and sub-criterion by using a pair-wise comparison system (the panel of water resources management experts and practitioners make the pair-wise comparison between those criteria and sub-criteria). To this end we used two different levels of pair-wise comparison: a) among the SWOT groups and b) among the different factors contained in each SWOT groups. We used the Saaty scale to carry out these pair-wise comparisons and determined the relative importance between each pair of options.
The information gathered from the pair-wise comparison allows obtaining the so-called Saaty matrices, which are used to derive the criteria and sub-criteria weights. Nonetheless, in order to check the consistency of the comparison matrix obtained, the Consistency Ratio (CR) is calculated; the results are consistent if the subjective judgements of the decision-makers result in CR smaller or equal to 10%.
Although the AHP was originally developed for individual decision-makers, overtime it also got to be used for group decision (Easley et al., 2000). Thus, within this context there are two alternatives to derive the weights for group decision – in our case an expert panel of water resources management professionals –: a) aggregation of individual priorities (AIP) and b) aggregation of individual judgements (AIJ) (Forman and Peniwati, 1998). We selected the AIJ procedure to aggregate the expert opinion, taking into consideration that the expert respondents participated as a unit rather than as separate individuals. Therefore, we followed the procedure by Aczel and Saaty (1983) to aggregate the pair-wise comparisons of the Saaty´s matrices by using the geometric average method, from the *m* experts who composed the expert group, in order to derive the aggregated Saaty´s matrix. Finally, with the obtained aggregated matrix it was possible to derive the vector weights or priorities for the criteria and sub-critera analysed.

5. Results

5.1. SWOT analysis for the Mozambican water sector

The SWOT analysis identified 21 factors relevant to IWRM strategic planning in Mozambique (see Table 3). These factors, forming the internal and external environment, are distributed into four groups: strengths (5 factors), weaknesses (6), opportunities (5) and threats (5).

Table 3
SWOT matrix of the IWRM in Mozambique

Strengths	**Weaknesses**
S1. Updated Water Policy and Water Resources Management Strategy	W1. Fragmented management of the water resources sector
S2. Existence of River Basin Committees	W2. Weak legislative structure
S3. Water pricing policy being implemented	W3. Low human resource capacity building in the water sector institutions
S4. Existence of adequate institutional arrangement to gather data	W4. Inexistence of water resources management plans at river basin level
S5. Existence of transboundary agreements of conflict resolution in the international river basins	W5. Lack of civil society participation into the water resources management
	W6. Weak financial structure
Opportunities	**Threats**
O1. Political will for the effective implementation of the IWRM	T1. Climate change
O2. Donor will to fund projects focused on IWRM	T2. Brain drain in the water sector
O3. Pro-active civil society that is aware of the importance of an efficient water resources management	T3. District empowerment (lack of coordination)
O4. Existence of regional educational networks that offers specific training opportunities in IWRM	T4. Global virtual water trade
O5. Decentralization of political power	T5. Slow institutional transformation

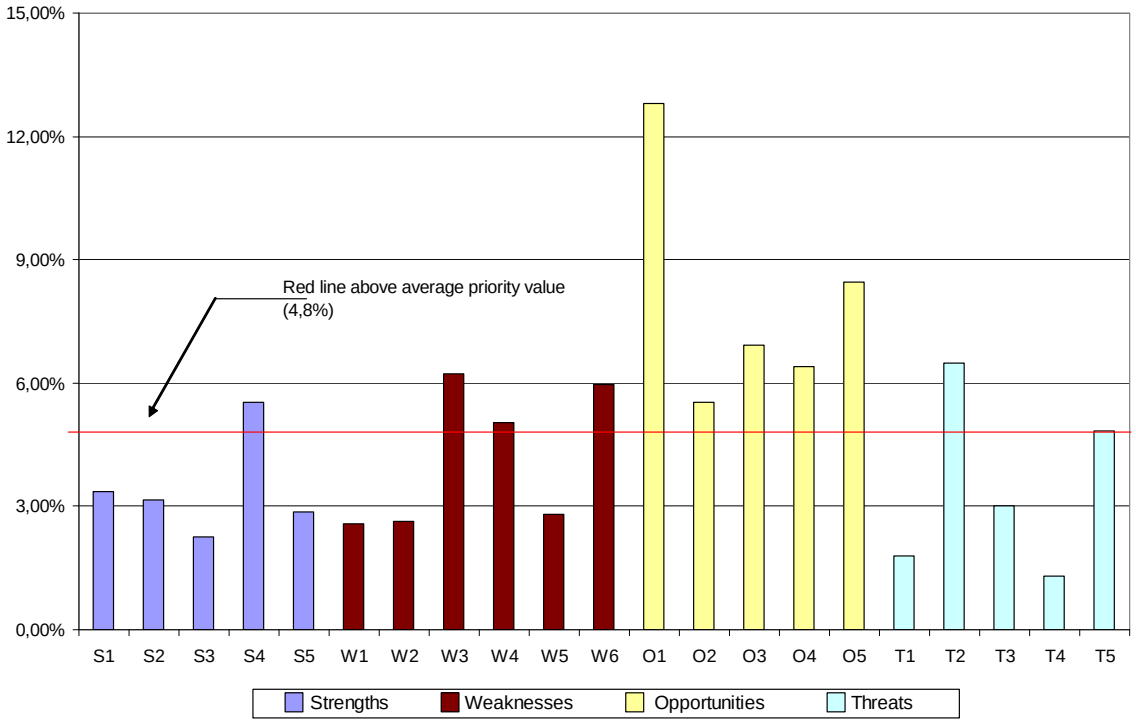
5.2. Weighting the SWOT

The 26 questionnaires have been used to produce the aggregated Saaty matrices. It is worth noting that the Saaty matrices obtained revealed a high degree of consistency, the CR for all matrices being less than 10%. This supports the validity and robustness of the results obtained.

The results reveal the following ranking of group priority: opportunities (group weight 40.1%), weaknesses (25.2%), threats (17.4%) and strengths (17.2%). Comparing the results in each SWOT group (see Figure 2), the results obtained for the opportunity group reveal that all factors identified within this group have weights above the expected average priority value for the entire set of variables (i.e. above 4.8% (1/21*100%)). The factors weights in this category are ranked as follows according to priority: *political will for the effective implementation of the IWRM* (factor O1, 12.8% of total priority), *decentralization of political power* (factor O5, 8.5%), *pro-active civil society that is aware of the importance of an efficient water resources management* (factor O3, 6.9%), *existence of regional educational networks that offers specific training opportunities in IWRM* (factor O4, 6.4%) and *donor will to fund projects focused on IWRM* (factor O2, 5.5%).

With regard to the weaknesses group, the three key factors are the *low human resource capacity building in the water sector institutions* (factor W3, 6.2%) having highest priority, the *weak financial structure* (factor W6, 6.0%) and the *inexistence of water resources management plans at river basin level* (factors W4, 5.0%). However factors W3 and W6 obtained almost equivalent weights.

Figure 2
Priority scores of SWOT factors



From the point of view of the threats group, the experts perceived that the *brain drain in the water sector* (factor T2, 6.5%) should be tackled as one of the key factor for the strategic and successful implementation of IWRM. Additionally, it is important to point out that the only factor within the group of strengths which received a weight above average priority is the *existence of adequate institutional arrangement to gather data* (factor S4, 5.5%). The other factors identified in the threats and strengths groups obtained a low priority. Finally it should be pointed out that the 10 key factors mentioned above with an above average priority correspond to around 70% of the global priority, if individual weights are summed up.

5.3. Integrated analysis of priority factors and institutional responsibility in IWRM

We decided to evaluate and compare the degree of responsibilities of public institutions for the obtained factors which constrain the IWRM implementation. This analytical exercise has been carried to support the results achieved in the previous section. We focus our analysis in the responsibilities of the National Water Council, National Directorate of Water, Regional Water Administration and River Basin Management Units. Table 4 shows the distribution of the factors affecting the IWRM implementation between the different public institutions confronted.

The heterogeneous distribution of the factors between the four institutions under analysis should be noted: National Water Council (5 factors), DNA (14 factors), Regional Water Administrations (11 factors) and River Basin Management Units (12 factors). The differences caused by the factors' distribution are closely linked to the decentralization and overlapping of responsibilities, as well as dual institutional subordination as in the case of the Regional Water Administrations. Among the different institutions analysed, DNA requires a major effort to align its activities for a strategic implementation of the IWRM. On the other hand, DNA is in a privileged situation to take advantage of the political will to implement the IWRM. The Regional Water Administrations and the River Basin Management Units, which are key actors in the IWRM implementation due to their scale of action (river basin), have an important role in enabling the environment for IWRM implementation at the local level, taking into consideration the factors which fall within their responsibility.

Table 4
Institutional factors responsibilities

Institution	Priority factors under its responsibility	Overall factor priority
National Water Council – Council of Ministers	• S1. Updated Water Policy and Water Resources Management Strategy	3.36%
	• W2. Weak legislative structure	2.63%
	• O1. Political will for the effective implementation of the IWRM	12.79%
	• O5. Decentralization of political power	8.47%
	• T4. Global virtual water trade	1.31%
Total priority		***28.55%***
MOPH - National Directorate of Water	• S1. Updated Water Policy and Water Resources Management Strategy	3.36%
	• S4. Existence of adequate institutional arrangement to gather data	5.54%
	• S5. Existence of transboundary agreements of conflict resolution in the international river basins	2.87%
	• W1. Fragmented management of the water resources sector	2.57%
	• W2. Weak legislative structure	2.63%
	• W3. Low human resource capacity building in the water sector institutions	6.23%
	• W6. Weak financial structure	5.96%
	• O1. Political will for the effective implementation of the IWRM	12.79%
	• O2. Donor will to fund projects focused on IWRM	5.52%
	• O4. Existence of regional educational networks that offers specific training opportunities in IWRM	6.39%
	• O5. Decentralization of political power	8.47%
	• T1. Climate change	1.81%
	• T2. Brain drain in the water sector	6.48%
	• T5. Slow institutional transformation	4.83%
Total priority		***75.46%***
Regional Water Administration	• S2. Existence of River Basin Committees	3.16%
	• S3. Water pricing policy being implemented	2.27%
	• S4. Existence of adequate institutional arrangement to gather data	5.54%
	• S5. Existence of transboundary agreements of conflict resolution in the international river basins	2.87%
	• W3. Low human resource capacity building in the water sector institutions	6.23%
	• W4. Inexistence of water resources management plans at river basin level	5.05%
	• W6. Weak financial structure	5.96%
	• O2. Donor will to fund projects focused on IWRM	5.52%
	• O4. Existence of regional educational networks that offers specific training opportunities in IWRM	6.39%
	• T1. Climate change	1.81%
	• T2. Brain drain in the water sector	6.48%
Total priority		***51.28%***
River Basin Management Units	• S2. Existence of River Basin Committees	3.16%
	• S3. Water pricing policy being implemented	2.27%
	• S4. Existence of adequate institutional arrangement to gather data	5.54%
	• S5. Existence of transboundary agreements of conflict resolution in the international river basins	2.87%
	• W3. Low human resource capacity building in the water sector institutions	
	• W4. Inexistence of water resources management plans at river basin level	6.23%
	• W5. Lack of civil society participation into the water resources management	5.05%
	• W6. Weak financial structure	2.81%
	• O3. Pro-active civil society that is aware of the importance of an efficient water resources management	5.96%
	• O5. Decentralization of political power	
	• T1. Climate change	6.93%
	• T3. District empowerment (lack of coordination)	8.47%
Total priority		***54.12%***

6. Discussion

This paper results show the potential usefulness of the A'WOT technique in studying strategic implementation of the IWRM. It demonstrates how each specific factor affecting the implementation of IWRM could be prioritized to optimize the use of resources needed for the implementation of a strategic plan. In this methodology the factors with greater weight are interpreted as preferential targets for the development or planning strategy for the implementation of the IWRM, because these are more likely to have substantive impact in effecting change.

However, looking at the weights of the SWOT groups by the AHP method, it is worth pointing out the important heterogeneity of each group as perceived by the sample of Mozambican experts. The A'WOT results though suggest that a successful strategic plan for the implementation of IWRM in Mozambique should be developed to exploit the opportunities that have been identified, to eliminate the weaknesses, mitigate the threats and reinforce the strengths in that order.

While deciding which aspects to prioritize for the intervention, one should not forget that at all are important, however with different impact. The factors scoring low in priority do contribute to consolidate the needed change, but their impact is limited when the major factors are not dealt with first. This has been cause of concern in many reforms, when stakeholders expect to see results from the moment the process is started. In summary, changes are more likely to be seen sooner, if the implementation process prioritises the highest ranking factors and SWOT groups.

Our results confirm Merrey (2008), who argues that a non-normative approach is needed for IWRM implementation and that for effective implementation of IWRM one should focus on the fundamental factors affecting its implementation rather than act simultenously on a wide array of factors. For a country like Mozambique, with limited resources and human capacity, the findings of this study give a good prospect for optimizing the use of its limited resources.

For example, the findings show that the institutional challenge of integration and coordination across the water sectors, which is one of the main concepts embodied in the IWRM, is not identified as a key factor (factor W1, *fragmented management of the water resources sector*) for the success of IWRM. This might be interpreted as a sign of institutional weakness perceived by the respondents, who do not, as yet, clearly see the impact of actions by recently established institutions on the ground. In Mozambique, decentralization and deconcentration has just begun, yet IWRM requires the participation of several actors to be effective. At this point in time the need to integrate might not be clear to people, it still requires institutions to mature and prove their capacity to contribute. On the other hand, in the current Mozambican water sector situation, there are still important problems and challenges (i.e. *development of water resources management plans at river basin level* –based on the factors' prioritization) that should be addressed, before confronting the challenge of how to achieve a "total" integration.

7. Conclusions

The framework established in this research could be interpreted as a road-map to support the development of the strategic implementation of IWRM in Mozambique, while adding more reliable information for the decision-makers in the planning process. In fact, as shown in our study, the participation and consideration of expert opinion in the planning process allows achieving a more consensual strategy rather than one based on subjectivity and ad-hoc perceptions.

An in-depth analysis of the results lead us to conclude that the strategic implementation of IWRM in Mozambique should be guided mainly by the opportunity factors that might help to overcome the major weaknesses (*low human resource capacity building in the water sector institutions*, *inexistence of water resources management plans at river basin level* and *weak financial structure*) and threats (*brain drain in the water sector*) identified, as well as maximize the strengths (*existence of adequate institutional arrangement to gather data*). According to these arrangements, decision-makers should put in action different actions in order to allow a good external environment to benefit from the opportunities and overcome the main weakness and threats detected in the analysis through the implementation of the most adequate mechanism. These circumstances would require a well-balanced planning in order to achieve a compromise solution that satisfies the factors priorities. For example, this might be achieved by taking advantage of existing regional educational networks that offer specialized training in IWRM in order to improve the limited human resource capacity in the water sector institutions.

Finally, it is worth mentioning that this work must also be considered as a starting point for future research. Regarding the methodology, alternative weighting procedures which allow taking into account the interdependence relationships between the different factors affecting the IWRM implementation (e.g., the Analytic Network Process) should be applied. On the other hand, further qualitative analysis could also be developed to complement the results obtained in this research, with an emphasis in the institutional factors constraining the performance of the decentralization of water management in Mozambique.

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