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Transboundary water rights and conflicts in sub-Saharan Africa: conflict prevention through functional transboundary river basin institution-building in the Southern African Development Community region

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Many scholars of conflict and hydropolitics argue that not all cooperation is good, and neither is all conflict bad. Hydro-diplomacy scholarship also presents these two phenomena as co-existent and oftentimes manifest in the same river basin. The 'water for peace' discourse of the Southern African Development Community (SADC) is therefore premised on the notion of water as an agent for peace; water presenting opportunities for growth and cooperation. However, can we say that the SADC region is able to truly contain or prevent regional water conflict and that the approaches are systematic and fully understood, especially in relation to the issue of water rights and equity of sharing and utilisation of the resource? Furthermore, while various scholars of hydropolitics have somewhat analysed practices of transboundary water cooperation in the region's river basins, little has been discussed about the form and centre of everything—the SADC process—why and how SADC drives regional water cooperation. This study presents an analysis of regional experience in SADC, to spotlight how the regional body has used water institution-building to advance peace and cooperation between states. Using a qualitative case study approach, the study explores the application of the concepts of transboundary water governance, institution-building, and strengthening in the SADC. The study finds that the SADC approach generates regionally endorsed legal and policy frameworks to drive institution-building and empowerment. The study also finds that the practices promoted by SADC for transboundary water cooperation to achieving this goal include: (a) fostering closer cooperation, including strengthening of good neighbourliness among riparian states; (b) strengthening source-to-sea and source-to-sink cooperation; (c) increasing information sharing and exchanges between River Basin Organisations (RBOs), the new learning from the old; (d) increased establishment and capacitation of new RBO institutions; and others. Except for a very few known cases, the region has largely been able to curb conflicts way upstream before they became a regional concern. For sustained peace through good water cooperation, the study recommends increased development of water diplomacy instruments and the design of inclusive engagement models for all levels of the SADC-cube (namely regional, river basin, and national levels).

KEYWORDS

conflict, cooperation, institution-building, peace, water rights

1 Introduction

Many scholars of conflict and hydropolitics argue that not all cooperation is good, and neither is all conflict bad (Benedetti and Langerman, 2020; Swatuk, 2015; Yildiz, 2024). Transboundary water cooperation presents these two phenomena as co-existent and oftentimes manifest in the same river basins. Climate change scholars (e.g., Busby, 2022; Mamshai and Hassan, 2023; Prange, 2022; Su and Karthikeyan, 2023) also present water as a medium of most negative climate impacts in its one face and as a resilience multiplier on the other hand. Prange (2022), using the case of Iraq, highlights how climate change-induced water stress, as one of the many climate impacts, has caused rising levels of climate migration in the country. Busby (2022), in his analysis of climate change impact using data for nations in the Sahel region in Africa with acute water scarcity, found that climate change, when combined with conflict situations, tended to exacerbate the water crisis, which in turn worsened the humanitarian crises in these countries (Bald, 2022; Manungufala, 2021). On the other hand, water resources development as a climate adaptation strategy is a significant resilience multiplier (Karim et al., 2024), with water positively impacting food and security, health, and hygiene against the odds of climate change (Bagayas, 2023; Su and Karthikeyan, 2023; Zeitoun et al., 2020).

The water-for-peace discourse apparently is also premised on water as an agent for peace-building; water presenting opportunities for growth and cooperation. The water-for-peace discourse mainly finds its significance in the issue of water utilisation, which is prominent largely in transboundary water sharing. Key voices in the discourse are centred on whether water and its governance contribute positively to regional or transboundary peace-building and whether water security is assured for livelihood enhancement and development. Perhaps the loudest voices in the water-for-peace discourse may include that (1) water is a tool for peace, (2) water connects people, (3) water governance should be decolonised so that all people have a say pertaining to its management, and (4) water remains a fundamental human right—must be accessible to all, and at all times (Castro, 2020; Dresse et al., 2018; European Union, 2018; Weinthal, 2020). Several arguments are also advanced in the water-for-peace discourse, such as (a) water provides an entry point to dialogue; (b) water carries distributive power with it—power understood as a medium of expression of decision-making; (c) climate change, combined with the Malthusian discourse on the impact of population growth to resources, tend to increase the potential for conflict over water; (d) water conflict potential should not only be assumed at the international level (between states) but also exists at the national level and is interdependent with international conflict (Gehrig et al., 2009; Pacific Institute, 2024); and (e) regional and river basin institutions are utility in providing platforms for information sharing, dialogue, and capacitation for conflict management (Tawfik, 2019; Tayia, 2019).

In SADC, the water-for-peace agenda is advanced through the water vision of increasing the water sector's contribution to regional cooperation (SADC, 2020). Furthermore, to counter earlier postulations by various scholars of hydropolitics regarding future water wars as caused by water, the SADC policy framing has focussed on developing governance mechanisms to resist conflict occurrence in the region.

However, can we say that the SADC region can truly contain or prevent regional conflict over water, especially in relation to the issue of water rights and equity of sharing and utilisation of the resource? This study presents an analysis of the regional experience in SADC and how the regional body approaches the issue of transboundary water cooperation towards water security and conflict reduction. This study, therefore, sets to explore how institution-building at SADC has been used as a means to advance peace and cooperation, reduce conflicts, and promote water rights distribution among riparian states. The rationale for institution-building is contextually linked to the issue of natural resource utilisation, especially the question of whether the resource is adequate, has a sufficient assurance of supply in both quantitative and qualitative terms, and is sustainable. Functional institutions also make an effort to ensure the right of access to all (Dobbin and Fencl, 2021).

1.1 Background

The SADC region is an economic bloc in the southernmost Africa. It is comprised of 16-member states, namely Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe. The region covers a land area of approximately 554,919 km^2, with a population of over 380 million people (SADC, 2024). The objectives of SADC include, among others, achieving peace and security, poverty alleviation, economic growth and integration, and improvement of the standard of living of its people. Water is considered key in the regional economic growth and development agenda, and it is inseparably linked to the realisation of these objectives (Muller et al., 2015; Yildiz, 2024). While the region is not such a good performer against its own goals of regional growth and integration (Walters et al., 2016), the issue of water scarcity, combined with the destructive effects of flooding, poses even more limitations to regional development.

The SADC population of over 380 million people depends on the region's water resource for their livelihoods (SADC, 2024), and yet the resource is unevenly distributed both spatially and temporally. There are 15 major river basins of the SADC region, shared by at least two countries, and 13 of the basins are located fully within the SADC region. There are approximately 30 transboundary aquifers (SADC Groundwater Management Institute, 2021), and groundwater supports approximately 70% of the region's population, where it is mainly utilised for livelihood upliftment. Dependence on groundwater resources is expected to increase with the ever-rising water demand in the region due to population growth, which is also exacerbated by the challenges of climate change.

Transboundary water cooperation is, therefore, a big issue, and the Regional Water Protocol of 2000 serves as the main framework for regional water cooperation. The Protocol draws significantly from the UN Convention on the Law of the Non-navigational Uses of International Watercourses, and its principles are largely founded on contemporary international water law and practice. As a framework cooperation tool, the expectation is that member states and RBOs would harmonise their own cooperation instruments and align with this regional guidance framework (SADC, 1992; Global Water Partnership, 2022). The Protocol is also strong on transboundary water institution-building.

1.2 Theories and practice of water allocation

In water resource management, nearly all issues that pertain to water governance and utilisation are institutional—require some kind of an institution to make effective water resource management and allocation decisions (van Koppen et al., 2024; Murombo, 2022; Peters and Woodhouse, 2019). This is even more true for utilisation of transboundary waters, where the expectation is that dictates of international water law should come into play (Kliemann, 2021; Mwebesa, 2021). Moreover, central to the resource utilisation issue is water allocation or resource distribution, which, in the claims of international water law practice, has to be equitable, reasonable, and sustainable (Aktar, 2021; Bezerra et al., 2021; Prange, 2022).

According to Pourmand and Mahjouri (2018), an allocation system requires that all water users (or at least the major users) be known and registered, with their water rights or allocation for abstraction or storage. This entails the establishment of a permitting system with the aim of effective implementation and monitoring of water allocations (Schreiner and van Koppen, 2018). Several characteristics have to be checked for an efficient permitting system (UN (United Nations), 2000). The characteristics are namely: (a) time boundedness and legal certainty; (b) contains extreme conditions that are described (such as droughts or floods) where special rules may apply; and (c) volume of abstraction or abstraction rate and times, as well as the point (geographical) of abstraction, water source, and the water use type.

Pourmand and Mahjouri (2018) further proposed an allocation model, the fuzzy decision-making methodology used to obtain a socially optimal scenario for allocating effluent from wastewater treatment plants and urban runoff to agricultural regions and recharging aquifers. When the model named modified fuzzy social choice (MFSC) was applied, the results revealed that using fuzzy multi-stakeholder multi-criteria decision-making methods that consider both equal and different negotiation powers can lead to different outcomes. Arguably, the MFSC method considers a number of decision-makers with different negotiation powers and degrees of importance in the decision-making criteria and may yield promising results in real water resources management problems.

Shen et al. (2021) later developed a water allocation theory, the synergetic theory. The theory promotes the harmonious development of human and water resources. It posits that the scarcity and ecological value of water resources have to be fully considered in water resource allocation. Taking further the application of the harmonious development of human and water resources concept, Zhang et al. (2023), in their work in the Yellow River Basin in China, have considered the issues of water scarcity, water environment deterioration, and unreasonable allocation of water resources in the urban area of the river basin. They introduced the human–water harmony theory to allocating regional water resources. Based on an analysis of the structural characteristics of the regional water resource system, the harmonious water resource allocation (HWRA) model—which includes three sub-systems (i.e., the water service system, ecological environmental system, and economic and social system)—was established.

Yet, another novel methodology was later developed by He et al. (2023)—the newsvendor model-based framework for regional industrial water resources allocation. The model considers uncertainties in water supply and demand. This framework generates optimal water allocation schemes while minimising total costs. The total cost of water allocation consists of the allocated water cost, the opportunity loss for not meeting water demand, and the loss penalty for exceeding water demand.

Most of the above-discussed allocation models assume national scale allocation, even if at varying scales. The scales range from federal states to regional or provincial, management districts, user associations, local authorities, and water utilities. However, many of the world's river basins may also be transboundary in nature, managed through transboundary water cooperation institutions. In Africa, the transboundary institutions can be in the form of Lake Basin Organisations, River Basin Organisations (RBOs), and River Basin Authorities (Sogno et al., 2024; Medinilla, 2018).

Global water allocation practice shows that the RBO is best placed to build consensus among riparian states on the resource assessment (Bhonde et al., 2024; European Commission, 2023), undertaking the quantification and the generation of models to estimate the basin resource. Similarly, the RBO is useful in building consensus on the models and results of ecological flows that the riparian states can agree on in the allocation of the shared waters (Kliemann, 2021). Hence, there is a need for a deeper understanding of the regional river basin institution's establishment and functioning, as well as their influence and potential role in the practice of transboundary water allocation. Perhaps RBOs, because they are not conflicted like resource users, can help deal with the issue advanced by the scholar above. For instance, transboundary water allocation considers bulk water and rarely considers the quality—water can be available but unusable because it is polluted. A polluted source can cause conflict if it has to be used by the downstream country. Furthermore, conventional allocation models do not consider effluent or wastewater reuse and also its allocation (Yanhu He et al., 2023). The human water harmony model by Zhang et al. (2023) provides an often-ignored perspective on water allocation that takes cognisance of the resource value to livelihoods, ecosystem sustainability, and economic and social systems.

1.3 Conflict management and transboundary water governance

The likelihood of conflict over shared water resources often arises whenever user actors have conflicting requirements, perspectives, or even interests (Zarei et al., 2023; Nagheeby, 2021). International competition over resources results from some countries drawing more water from the shared water source (Gebrehiwot, 2020). Equity and compromise in the utilisation of such resources are a product of a negotiation process, which, if not successful, leads to a conflict-linked relationship between the actors, and gradually the actors will start to notice that conflict exists. From an international relations perspective, shared waters are transboundary; transboundary in the sense that the resource is shared or borders two or more different states (Nagheeby, 2021; Muller et al., 2015). Reduction of conflict risk is, therefore, through negotiation, whose success is crowned with cooperation agreements (or treaties) that cement consensus on expectations and compromises in the use and management of the resource by all concerned parties (Gebrehiwot, 2020). According to the UN Convention on the Law of the Non-navigational Uses of International Watercourses, such agreed cooperation arrangements should ensure

that resource utilisation is equitable, reasonable, and sustainable, with the desire for beneficial utilisation of the resources while also preserving and protecting it (McCaffrey, 2019; UN (United Nations), 1997, 2000; Tayia et al., 2021).

International water law may be lauded for the principles and norms that it advocates to advance equity and reasonableness in the utilisation of finite shared water resources. However, international water law sometimes fosters conflict through its recognition of certain rights that sometimes appear controversial (Kliemann, 2021; Schwarz, 2021). For example, the legal principles of 'riparianism', 'prior appropriation', and 'sovereignty' in the issue of right to access to water by riparian states are considered limiting for meaningful resource redistribution (Dobbin and Fencl, 2021; Kliemann, 2021). Riparianism and prior appropriation, for their part, inherently exalt historical and geographic access over other rights. This complicates the redistribution of the resources when the need arises to revise resource allocation, such as when the water regime changes, when climate change and variability hit, or when general reprioritisation of use is desired.

Functional river basin institutions are therefore a necessity both as offering a platform for negotiation and engagement by riparian states and as agents that could promote equitable water distribution and redistribution and for peaceful settlement of disputes over transboundary water resources (Dresse et al., 2018; Nagheeby, 2021; Sogno et al., 2024). The 'neutral broker' status of transboundary water institutions such as RBOs allows them to navigate even the complex concepts and unlock challenging water governance principles (using scientific knowledge and technical and negotiation skills) to re-dress unjust water utilisation practices (Bezerra et al., 2021; Meshel, 2018; Zarei et al., 2023).

1.3.1 Hydropolitics and hydro-diplomacy

Hydropolitics is a big aspect of transboundary water utilisation. It considers the conflict-proneness of sharing water resources by river basin states. This is also because water can be used to drive a political agenda and is sometimes used for influence and hegemony (Gebrehiwot, 2020; Gleick and Shimabuku, 2023; Nagheeby and Warner, 2022). Deeper understanding of a region's hydropolitics, the reasons and consequences of water conflict, is therefore vitally important in the management and governance of shared waters resources (Michel, 2020). The issue of upstream versus downstream country, dams, transfer infrastructure, and abstractions receives major consideration in the hydropolitics theory (Han and Webber, 2020; Nagheeby, 2021; Zarei et al., 2023).

For Southern Africa, early efforts to explore the region's hydropolitics commenced two decades ago, with the work of scholars such as Turton (2003). In the conception, Turton (2003) observed the lack of adequate hydropolitical theory. They then offered hypotheses premised on the Southern African hydropolitical complex and a broadened definition of hydropolitics. The hydro-hegemony and hydropolitics complex theory were also analysed from the premise of an evaluation of international cases. Various scholars have explored further the concept's application in Southern Africa, especially its application in regional integration and hydro-diplomacy (e.g., Mndzebele, 2020; Muller et al., 2015; Swatuk, 2015). Theoretically, also, conflict ideology has been historically used in research in the exploration of the struggle, discord, and disagreements between actors, analysed using organisational conflict models (Angelakis et al., 2021).

Noteworthy also is that conflict may not always be a bad thing, as Mirumachi (2015) presents that just conflict is actually cooperation. Furthermore, scholars of the conflict who examined it through the political ecology lens tend to view conflict as simultaneously existing with cooperation (Swyngedouw, 2015; Swatuk, 2015). Swatuk further argues that in the system of transboundary water cooperation, there is the undeniable simultaneous presence of conflict and cooperation. There is a need for scholars and practitioners of hydropolitics and hydro-diplomacy to recognise that not all conflict is bad and that not all cooperation is good (Swatuk, 2015)—it is all relative.

By conceptual framing, the hydropolitics theory also sets some primary conditions for any two actors (e.g., upstream against downstream) driven by political ambition (Muller et al., 2015; Nagheeby, 2021). Hydro-diplomacy, on the other hand, pursues harmony in the use of the resource, its management, and governance. It assumes the co-existence of parties, water resource sharing, and non-zero-sum resource use and governance practices (Tanzi, 2020). Hydro-diplomacy, by its nature, therefore, seeks to tone down or reverse tensions arising from tricky or difficult hydropolitics in a transboundary or regional system. Of significance, hydro-diplomacy may have its angle of attack along five groups of hydropolitical variables as representing watershed and transboundary watercourses, namely primary, third-party, national, regional, and state-building, as identified by Shahbazbegian et al. (2016). Hydro-sensitivities may arise from asymmetrical power through cooperation against conflict strategies to neutralise either the effect or perceptions around the asymmetries or inequalities. Al-Muqdadi (2022) presents these variables by sectors as determined by earlier scholars (e.g., Pourmand and Mahjouri, 2018) as (a) theories of hydropolitics, (b) water conflict and resolution, (c) water and international relation theories, and (d) water governance and policies.

Hydro-hegemony is another hydropolitics problem that water diplomacy or hydro-diplomacy may seek to address. Keohane (2005) defines hegemony as a kind of political domination with reference to resource capacity and the international political system. Earlier scholars of hydropolitics also identified four stages that reflect key factors in hydro-hegemony, used to determine transboundary flows, which include geography, resource levels, bargaining power, and ideational power (Wheeler and Hussein, 2021; Zeitoun et al., 2020). The behaviour of the state in hydro-hegemony exhibits some hegemonic attitudes that are generally reflective of the affinity to use power or threaten the use of power in the sharing of resources. In water hegemonic practices, there is also the tendency to bind water with nationalism, which is an emerging discourse that justifies mega water infrastructure and the construction of dams within the notion of water nationalism. Salameh (2021) explored nation-building and water and power-related interventions. They presented, for instance, how decision-makers may apply dam symbolism to attain legitimacy, patriotism, and national identity in a shared watercourse system.

Transboundary water cooperation institutions such as RBOs, working with regional bodies, are then well placed to bring cooperating states together, counter noted hydro-hegemonic attitudes, and execute hydro-diplomatic arrangements that foster knowledge-based cooperation while also mitigating upstream-downstream conflicts (Hussein et al., 2018; Kliemann, 2021; Krasznai, 2021). Functional RBOs can thus utilise water diplomatic channels to ensure that upstream developments are cleared by all riparian actors

(including downstream countries) to ensure equity and sustainability of planned developmental undertakings.

1.4 Institutionalism and water governance solutions

Institutionalism may be viewed as a movement that, in many disciplines, focuses on how organisations and institutions shape society, politics, and economics. In this analytical lens, institutions are seen as collective entities made of norms, rules, and a form of a social structure. The institutionalist model postulates society as being incapable of prospering without broadly agreed rules guiding social interactions between organisations and the people (Maarse, 2023).

The need for functional institutions for river basins management is because anarchy, the alternative, is never capable of yielding the desired outcomes in transboundary river basin governance (Bosch and Gupta, 2022; Nagheeby, 2021; Tawfik, 2019). The riparian interaction, provided by the agency of RBOs, in this context, is a process that involves castes and classes of many actors in relation to regulation, governing, and negotiation of shared water resources. The importance of negotiation underscores the significance of leadership development for water conflict prevention and resolution.

Yildiz (2024) argues that water governance performance at the local level helps contain looming water wars—water governance prevents the possibility of conflict escalation to the regional and global levels. In general, knowledgeable leadership capacity helps enable a better understanding of watercourse conflicts, thus resulting in less litigation and increased cooperation between riparian countries. Transboundary water cooperation interaction then gets cemented through agreed policy, which, in strictly formalised arrangements, manifests in the form of water cooperation agreements or protocols. The policy formulation process is itself cyclic by the individual governments of riparian states, which in transboundary policy formulation is also a hydro-diplomatic activity.

Considering that water could trigger conflict and that most inter-state conflicts or regional actions have a ripple effect internationally, international relations and hydro-diplomacy should therefore be viewed as a key in transboundary water cooperation (Islam and Repella, 2015; Schillinger et al., 2020; Zandvoort et al., 2018). The international relations theory framework then serves as one of many tools to employ to understand and critique the essentials that shape state behaviour in a transboundary, regional, and international system (Susskind, 2017). Water diplomacy engagements are determined by water institutions, and so are the interactions guided by the convergence of ideas regarding the issue of institutions and water governance. The agencies of institutionalism, RBOs in this context, are vital for deepening the understanding of public policy for this purpose. This complicated task can be clarified through the different strands of institutionalism–normative, rational choice, historical, empirical, and discursive, as detailed by Peters (2017). The institutionalism strands help explain the policy choice and policy-making process.

2 Materials and methods

This study examined regional practice in the SADC and how the regional body approaches the issue of transboundary water cooperation towards water security and conflict reduction. This explored how institution-building at SADC has been used as a means to advance peace and cooperation to reduce conflicts and promote water rights distribution among riparian states. A qualitative approach was used, utilising secondary data and information in the form of regional, river basin, and national protocols, treaties, policies, and strategies. Secondary data were collected from academic institutions, modern literature, reports sourced through the Google Scholar engine, SADC Secretariat reports, public portals, and private sector webpages. A comparative analysis approach was also employed in the investigation, analysis, and integration of the information. Water sharing agreements (or strategies) were examined for two river basins known to be advanced in the area of transboundary water allocation, namely the joint Incomati and Maputo River Basins and the Okavango River Basin.

The text search particularly examined the issue of water allocation to interrogate the question of water utilisation—international water law tends to reference more water utilisation than water allocation (e.g., UN Convention on the Law of the Non-navigational Uses of International Watercourses). The demand for transboundary water cooperation institutions and the rationale for country participation in transboundary water cooperation were also explored. The questions of how SADC water governance interfaces with regional governance and how water cooperation connects with the regional peace-building agenda were also interrogated. Precisely, the examined questions (in both text search and interviews) sought to attain insight into the (a) nature of institutions and/or agreements that might assist in the realisation of improved transboundary water cooperation; (b) benefits of riparian countries for participation in transboundary water cooperation arrangements in the SADC region—rational thought argues of country's interest first before anything in country cooperation; (c) motivations for country participation in joint water infrastructure projects in the SADC region; and (d) insights whether indeed there is a case for RBOs' active involvement in transboundary water allocations (surface and ground waters), and how.

The literature-based analysis was supplemented with interviews of chief executives (current and retired) of three major river basin organisations. For the choice of research participant RBOs, the purposeful sampling technique (a non-probability sampling strategy) was applied as determined by defined selection criteria in the choice of the RBOs. The criteria included three major aspects: (1) RBOs with a long history of transboundary water cooperation; (2) RBOs with functional secretariats; and (3) at least one new RBO with potential for novelty and impact in its governance arrangements and functioning. The participant RBOs in the research represented a total of 7 of the 16 SADC member states (43%) and four of the region's 15 transboundary river basins (27%). The information for RBO executives was also supplemented with member states perspectives of at least one for each river basin. The three RBOs were the Okavango River Basin Water Commission (OKACOM), the Orange-Senqu River Water Commission (ORASECOM), and the Incomati and Maputo Watercourse Commission (INMACOM).

The main task initially was to ascertain the rationale in the whole issue of water institution-building: for what and how. The starting point was to understand the water allocation theories and practices as the determinants of water sharing. Literature analysis was also employed to appreciate the main theories of water conflict management and how they manifest in regional settings such as the

SADC. This would reveal the hydropolitics and hydro-diplomacy at play, as well as the associated governance practices. The demand for and supply of functional institutions was located within these analytical framings.

The SADC cooperation continuum was then hypothetically conceived from literature, drawing mainly from the work of Sadoff and Grey (2005). The manifest theory of action along the cooperation continuum was then developed. The aim was to interpret the SADC process into a kind of systematic conceptual framing that is nearly representative of the practice of SADC in relation to regional cooperation and all the major stages of the cycle. Success and challenges in the SADC model of regional water cooperation were also evaluated and recommendations for improvement were offered.

3 Results and discussion

3.1 Demand for the supply of water institutions for conflict prevention

The study finds that the Regional Protocol on Shared Watercourses is extensively used to inform and guide the practice of water cooperation between states in the SADC region. Despite it being primarily for transboundary or shared watercourses, it is utilised across the region with its principle-based prescripts. The Protocol promotes several norms and principles of transboundary water cooperation to realise the sustainability and no harm goals in the utilisation and governance of shared waters. The text search of the regional policy framework and literature on SADC transboundary water cooperation reveals that the dominant norms and principles promoted in SADC include the following: (a) unity and coherence of each shared watercourse (or harmonisation of use); (b) utilisation of a shared watercourse as being open to all watercourse states; (c) respect of existing customary and general international water law; (d) maintenance of proper balance between development for a higher standard of living versus conservation and environment enhancement for sustainable development; (e) cooperation in joint studies and joint project execution; (f) exchange of available information; (g) equitable and reasonable utilisation of shared watercourses; and (h) prevention of causing significant harm.

Notably, for effective application, these principles require systems and institutions. As Al-Muqdadi (2022) argues, an anarchical system cannot enable harmony in the delivery of desired governance outcomes; therefore, the case for functional institutions to enable successful implementation of the Protocol principles in transboundary water cooperation seems compelling. It does appear that SADC predominantly follows this approach, building transboundary water institutions to oversee, manage, and strengthen regional cooperation. Central in this institution-building ambition towards effective cooperation in SADC, the study finds, is to deliver on the principles and norms on (a) equitable and reasonable utilisation, (b) sustainable utilisation and management, and (c) the avoidance of significant harm.

3.1.1 Importance of the equitable and reasonable utilisation principle in the SADC

Most conflict arises from discontentment among users regarding equity in the utilisation of shared waters (Kliemann, 2021; Mwebesa, 2021; Tawfik, 2019). Oftentimes, it is the downstream country or the latest entrant state in the utilisation of shared resources that suffers. The equitable and reasonable utilisation principle, therefore, ensures that agreement is reached in sharing the waters in a river basin system. This is a principle of international water law, which for SADC is articulated in the Protocol in Article 4(1). Inherently, the principle is also premised on the 'right of access' principle, which argues for a right of access to all states traversed by a watercourse system for SADC. In enforcement, the principle is not straightforward as its application has to be in balance with so many parameters, whose weighting can only be a subject of negotiation, which the Protocol presents as a vital requirement.

The test of the equitable and reasonable utilisation principle application can be seen in formulated transboundary water cooperation frameworks (Tanzi, 2019, 2020; McCaffrey, 2019). In SADC, what tends to be the ultimate aim in transboundary water cooperation agreements is shared water security, as revealed by the interview of RBO executives. The often-advanced argument is that basin water allocation strategies are needed to help in transboundary water allocation or distribution. These have been offered through varying frameworks—indirect allocation through reliance on principles of transboundary water allocation (e.g., OKACOM water allocation strategy) or direct allocation through a water sharing agreement (e.g., INMACOM's IncoMaputo Water Agreements I & II).

3.1.2 Sustainable utilisation principle and the no harm doctrine application in the SADC

Sustainable utilisation (and management) is another principle in the Protocol, also derived from international water law and practice. For SADC, the principle provides a framework for aligning water governance, development, management, and utilisation with global ambitions, as in the global development goals of sustainability (e.g., Global Sustainable Development Goals, SDGs). In application, the sustainability principle also seeks to address recognition of the natural environment as the legitimate water user, which, for SADC, is a principle also articulated in the Regional Water Policy. River basin institutions, if established, are viewed as crucial therefore in the delivery of sustainable utilisation and management of river basin resources, both surface and underground waters.

In SADC, the study finds that sustainable transboundary management has been ensured through negotiated or formally adopted ecological flows (e-flows) policy arrangements (e.g., in the Orange-Senqu River Basin) and interpretation through environmental flows or minimum cross-border flow allocations (e.g., in the Incomati and Maputo River basins). A review of the IncoMaputo Agreement I (version 1 of the water sharing agreement covering the Incomati and Maputo transboundary River Basins) has revealed that minimum cross-border flows had to be determined for all major transboundary tributaries of these two watercourses. This was in the spirit of not causing significant harm to downstream countries by the upstream states.

The sustainable utilisation principle also serves to prevent or mitigate harm to one another among riparian states (Mohammed et al., 2021; Schmidt, 2021; Tanzi, 2020). In the SADC, the upstream-downstream impact potential is very high. Consequently, a state may be harmed by over-extraction of the shared resources by an upstream state. In groundwater resources, a state may be harmed by practices of another transboundary Aquifer State that either pollutes or over-abstracts the shared groundwater resources. To prevent or mitigate

significant harm to one another, the SADC Water Protocol requires that information exchange should actively take place. Joint resource monitoring, the text analysis of basin strategies, and interviews of RBOs have revealed aided confidence-building through increased information exchange and notification. Many SADC basin states have also included in their transboundary water cooperation agreements the need for notification of significant harm to one another and measures to be undertaken (e.g., in the event of accidental pollution) to mitigate the impact of any harmful incidence or act. The IncoMaputo Agreement (versions I & II) is again an example of such agreements that specify what would cause significant harm in the use of these basin resources.

3.2 Practice of water institution-building in SADC

Literature exploration in the study reveals that the statutory bodies of SADC in the context of the regional water sector are informed by the SADC Treaty and the Regional Protocol on Shared Watercourses. At the apex, there is the Summit of Heads of State and Government, which is the ultimate decision-making body of SADC. The Summit is advised by the SADC Council of Ministers (often from the foreign affairs sector), but it is also mandated to make policy operational decisions in its own right. These two bodies, established by the SADC Treaty, serve as the highest political and diplomacy bodies of SADC, and for peace and security, they are advised by the Organ Summit. The Organ is responsible for overall regional peace and security in the region—regional peace and security is considered foundational to all cooperation and functioning of the SADC region.

For the water sector, there is the SADC Committee of Water Ministers, which reports to the SADC Council and serves as the highest hydro-diplomacy institution on the regional water sector scale. Its function is supported by the SADC Secretariat (through the Water Sector Coordinating Unit, technically referred to as the SADC Water Division), which coordinates the work of the SADC water sector and established river basin institutions. The Committee of Water Ministers is advised by the Committee of Senior Officials, which is comprised of permanent secretaries of the ministries responsible for water in SADC member states. Below the Committee of Ministers is the SADC Water Resources Technical Committee (WRTC), which has an advisory function to the SADC Committee of Water Ministers (through the Committee of Senior Officials). The WRTC comprises the regional water directors, one for each of the SADC member states. The WRTC, therefore, provides techno-hydro-diplomacy services to the region, providing close oversight of programme implementation, conflict diagnostics, and early resolution for prevention. It also negotiates regional cooperation agreements and review policy, strategies, and joint initiatives for approval by the Water Ministers.

The Protocol also mandates the WRTC to appoint sub-committees and task teams to provide technical advisory services and project implementation. The following sub-committees were established as a result: Sub-Committee for Hydrogeology; Sub-Committee for Surface Water Hydrology; Sub-Committee for WRTC technical support; and the Sub-Committee for Water Quality and Aquatic Weeds. These subcommittees, when functional, are the means for implementation of joint data and information collection, information exchange, and enforcement of compliance with the regional water Protocol.

The Protocol also mandates Water Ministers to establish shared watercourse institutions (SWIs), and the practice dictates that the SWIs can be in two forms mainly, the RBOs and River Basin Authorities (RBAs). The RBOs are top-down influence results of SADC, with member states then committing to establish such institutions, which also have regional accountability. The RBAs are sub-basin institutions responsible for joint water infrastructure cooperation (development, operation, and maintenance) and are demand-supplied. So, RBOs are responsible for basin-wide cooperation while RBAs are responsible for local joint project cooperation, mostly bilateral, although tripartite RBAs are also emerging (e.g., in the Orange). Examples of bilateral RBAs include the Komati Basin Water Authority (KOBWA) between Eswatini and South Africa in the Incomati Basin, Lesotho Highlands Development Authority (LHDA) between Lesotho and South Africa in the Orange-Senqu Basin, Permanent Joint Technical Committee (PJTC) between Angola and Namibia in the Kunene Basin (also doubling as the basin RBO in function while the establishment of a fully fledged basin RBO is under consideration), and the Zambezi River Basin Authority (ZRA) between Zambia and Zimbabwe in the Zambezi Basin. The following RBOs have been established in SADC: Cuvelai Watercourse Commission (CUVECOM), Buzi-Pungwe-Save tri-basin watercourse commission (BUPUSACOM), Limpopo Watercourse Commission (LIMCOM), ORASECOM, OKACOM, Songwe Watercourse Commission (SONGWECOM), INMACOM, and Zambezi Watercourse Commission (ZAMCOM).

The study also finds that the SADC RBOs tend to comprise a committee (council) of ministers, technical committees, sub-committees, task teams, and working groups. The authority in the allocation of transboundary waters in the RBO tends to be the committee or council of water ministers. The technical committees generally serve an advisory function. The RBO ministerial council, therefore, serves as the overall political and hydro-diplomacy body at the transboundary cooperation level. River basin states are both the masters and executors of the decisions of the Basin Commission at the country level. The RBO Secretariat, led by an Executive Secretary, provides secretariat support to all the governance levels of the RBO.

For monitoring and reporting purposes, the study finds that RBOs are required by the Protocol to provide periodic reports on progress to the SADC Committee of Water Ministers, which is provided through the Water Division of the SADC Secretariat. Member states are also expected in their own right to align interests, harmonise frameworks, and account to SADC (through the SADC Secretariat), as well as the SADC Committee of Water Ministers (through the RBO Secretariat). Figure 1 shows the cooperation frameworks and institutions that define basin and regional water governance in SADC.

3.3 Mapping progress in transboundary water institution-building in SADC

3.3.1 Successes of SADC water institution-building

The impact of the regional water institution-building project of SADC was observed in several areas, which may be considered as a success, such as (a) ease of regional accountability SADC member

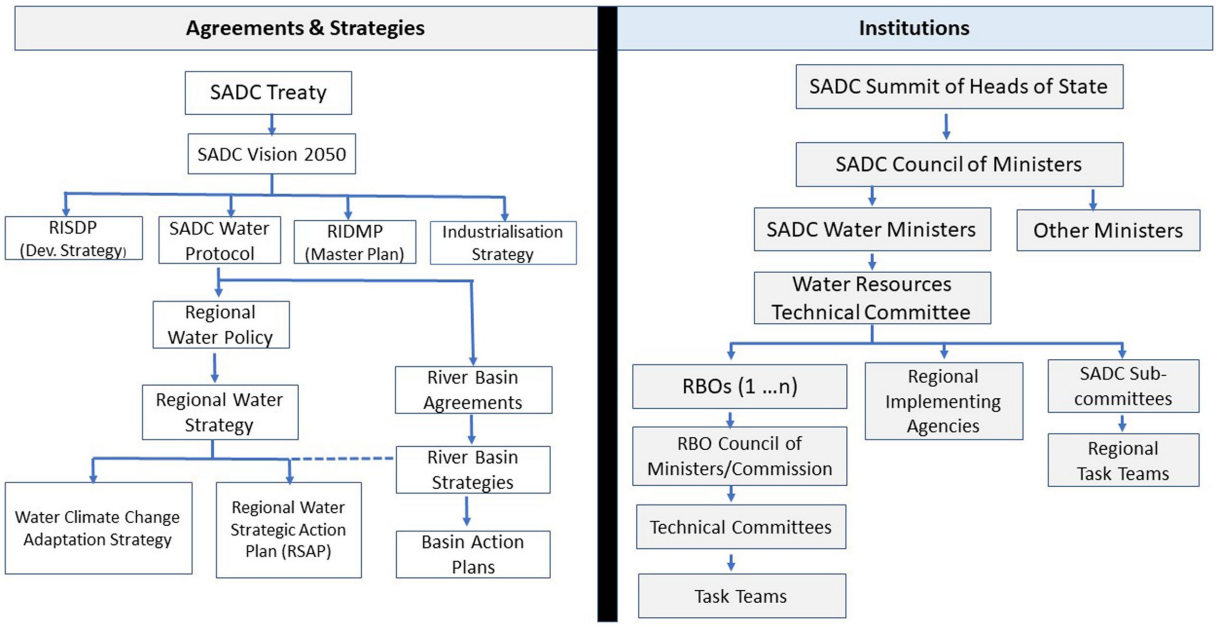

FIGURE 1
SADC water cooperation frameworks and institutions.

states, (b) rise in the use of regional water cooperation frameworks (e.g., protocol and policy) to formulate cooperation agreements by riparian states, (c) rise in the establishment of RBOs, including sophisticated ones such as the ZAMCOM (comprising 50% of SADC member states in number) and multi-basin RBOs that are emerging (e.g., INMACOM and BUPUSA); (d) RBOs increasingly supporting joint infrastructure projects in shared watercourse systems, (e) increase in member states are bilateral, a multi-lateral investment project; (f) sophisticated water cooperation agreements (e.g., water sharing agreement in Incomati and Maputo and ecological flow-based agreements).

Regional accountability, the study finds, tends to follow the expectation of Article 5 of the SADC Protocol on Shared Watercourses, which requires that RBOs and member states report work and progress taking place in their cooperation programmes. This enables the reporting of all basins projects to the SADC Ministers Responsible for Water, which also report to the SADC Council of Ministers and, ultimately, the SADC Summit of the Heads of State.

3.3.2 Challenges

3.3.2.1 Failure of conflict prevention using regional instruments over Sedudu Island

The Sedudu Island case is perhaps the only major recorded water conflict that really went emotive in the SADC region and could not be resolved using the regional conflict resolution toolbox. While mostly a border boundary conflict case than water use conflict, considering that it was centred on the water as a trigger to boundary conflict (Ramoeli, n.d.), it provided a real test of the region's transboundary water cooperation theory application.

The Sedudu fluvial Island (known as Kasikili Island in Namibia) is found in the Chobe River Basin, which is a tributary of the mighty Zambezi River Basin, and it is formed adjacent between two channels of the Chobe that define the border between the Republic of Botswana and the Republic of Namibia. The Island, approximately 3.5 sq. km in area, divides the Chobe to the north and south, and gets flooded every year for several months, starting around March.

A territorial dispute arose between Botswana and Namibia over ownership of the Sedudu/Kasikili Island. The situation was so tense that armed conflict was on the verge of being launched by the year 1998. There was regional intervention whereby the president of Zimbabwe was nominated as the mediator by SADC and attempted to sit the two countries together, but a compromise could not be reached (Ashton and Manley, 1999). After failure to resolve the conflict using local and regional broker means, the two countries then agreed to take the matter to the International Court of Justice (ICJ). To resolve the case, the ICJ used the Thalweg Doctrine, which in International Law practice is often used to resolve water boundary disputes (Fox, 2010). Following the Thalweg doctrine (Garner, 1935), the depth of the two Chobe River channels that split the Island (the main channel) had to be determined (Gathii, 2005; Perry, 2000). Surveys and scientific assessment revealed that the main channel was on the northern or Namibian side, which meant the Island was on the Botswana side. The ICJ passed the judgement in 1999, and Botswana was declared the owner of the Island (i.e., that the Kasikili/Sedudu Island formed part of the territory of Botswana), which thus resolved the case (Gathii, 2005; ICJ (International Court of Justice), 1999; Shaw and Evans, 2000; Fox, 2010).

As earlier alluded, Sedudu Island is perhaps the only known case since the 1980s that had to be resolved through an international court. The region, it would appear, has generally been able to contain conflicts before they reached critical stages. An example of the success of the SADC model in similar settings, this study argues, can be seen in the Songwe River Basin case. The Songwe River forms a boundary between Malawi and Tanzania, and water often overtops river banks

during flooding conditions, thereby resulting in shifting borders. The two countries have resorted to strengthening institutional mechanisms and joint planning to resolve the issue. They have established joint river basin institutions in the format promoted by the SADC Protocol (e.g., the Songwe RBO, SONGWECOM) and are pursuing a huge joint basin development programme that also includes a big dam development project to aid with flood water regulation during the rainy season. The study finds that collaboration at different governance levels, even partnering in joint investments, tends to broaden the levers of conflict prevention and resolution in the basin, and these practices are anchored on institution-building and capacitation.

3.3.2.2 Sustainability of RBOs and their impact

Despite the registered success of the SADC RBO-driven transboundary water cooperation highlighted above, the region's RBOs still face a huge sustainability challenge. They have a high dependency on international cooperating partners for funding. The issue of water financing, therefore, requires urgent consideration. Related to that, the value of water is not fully determined, which has resulted in a low drive for paying for water and ecosystem services, among other things. Virtual water and water footprint consideration and adoption of the value chain approach may be required to improve appreciation of the contributions of the sector to regional development and thereby garner the requisite political support to attract investment. This, together with increased involvement of private sector and non-state actors, is desired in all levels of the water value chain (e.g., resource governance and development, regulation, supply and distribution, disposal and waste management, reclamation and re-use).

Another challenge that threatens the sustainability of the RBO concept in application is the fact that some of the SADC member states are transboundary to several river basins. This necessarily means they have to participate in several transboundary river basin commissions. The affordability of this extent of involvement is challenging as more RBOs that involve the country are established. Botswana, Mozambique, Namibia, and South Africa, for instance, already participate in at least three river basin commissions each (i.e., Botswana is involved in OKACOM, LIMCOM, ORASECOM, and ZAMCOM; Mozambique is involved in INMACOM, BUPUSACOM, LIMCOM, ZAMCOM, and BUPUSA; Namibia is involved in CUVECOM, OKACOM, ORASECOM, and ZAMCOM; and South Africa is involved in INMACOM, ORASECOM, and LIMCOM).

Another performance challenge of SADC RBOs is related to the level of impact they make on community livelihood enhancement—interventions tend to take place at sub-regional levels and rarely directly impact the community level. There is a need, therefore, for demonstration of the transboundary water governance benefit through assisting livelihood enhancement. Efforts have been made in some river basins (e.g., by OKACOM) to use livelihood enhancement projects to moderate the human–wildlife conflict. Upscaling and replication of such initiatives would be very useful for SADC.

Yet, another challenge, the study finds, is that there is still scepticism regarding the full embrace of the river basin approach in some parts of SADC, especially in terms of transboundary water cooperation. For instance, not all riparian countries of the Zambezi River Basin have ratified the basin cooperation agreement, even though they all participate in most of the basin programmes. There is still a need to transform the remaining 13% of riparian states into full basin cooperating members.

3.4 Theory of action in the cooperation continuum of the SADC

Sadoff and Grey (2005) present the cooperation continuum as consisting of four main stages, moving from dispute to integration, namely (1) unilateral action, (2) coordination, (3) collaboration, and (4) joint action. In SADC, the theory of action for associated stages of the cooperative continuum, the study posits based on the findings of the nature of activities that dominate, can be said to consist of (a) awareness and dialogue, (b) engagement and establishment of river basin institutions, (c) information exchange and notification on planned measures, (d) joint resource monitoring and infrastructure development, and (e) building unity for proper joint action or integration.

Tracking the progression of transboundary water cooperation in the SADC by the study has shown how the region moves from stage to stage of cooperation, revealing that SADC could be placed at both stage 3 of the cooperation continuum (collaboration) and transitioning to stage 4 (joint action). The progression is accounted for by the theory of action phases, as sketched in the study, discussed below, and summarised in Figure 2.

3.4.1 Awareness and dialogue, and RBO establishment and engagement

In the SADC region, the transboundary water cooperation journey tends to start with awareness and dialogue. The regional communication strategy defines engagement stages and outlines their levels. The levels of engagement are defined in a framing model branded the 'SADC-Cube.' This is a tri-dimensional representation of the aspects to be checked for SADC water engagements: Dimension 1 (on Levels of Inventions)—being Regional, River Basin, and Local; Dimension 2 (on Areas of Inventions)—being Governance, Development, and Management; and Dimension 3 (on Stages of Adaptation action)—being Preparation, Response, and Recovery.

Considering that transboundary cooperation is an international relations and diplomatic issue (Eriksson, 2015; Msangi, 2014), the State institutions tend to be the ones leading the project of transboundary cooperation. Multi-stakeholder regional dialogues are convened to engage on new concepts and principles to define the cooperation practice. At the river basin level, national water departments start engagement at the joint basin technical level, a process that is approved at government levels and cemented through treaties and agreements. To a large extent, the concept of integrated water resources management has shaped the stakeholder engagement thought throughout this journey in the SADC.

In promoting the RBO concept, SADC introduces the idea of basin-wide cooperation and assists the riparian states in the early stages of trust-building. The SADC Secretariat can even convene and fund participation in such engagements and negotiations of basin agreements until a co-owned cooperation framework is in place, signed by all parties and coming into force. This was the case, for instance, in the establishment of the ZAMCOM in the Zambezi River Basin. The cycle continues for SADC, establishing an RBO for each river basin, one after another. Weak RBOs are strengthened through resource mobilisation by

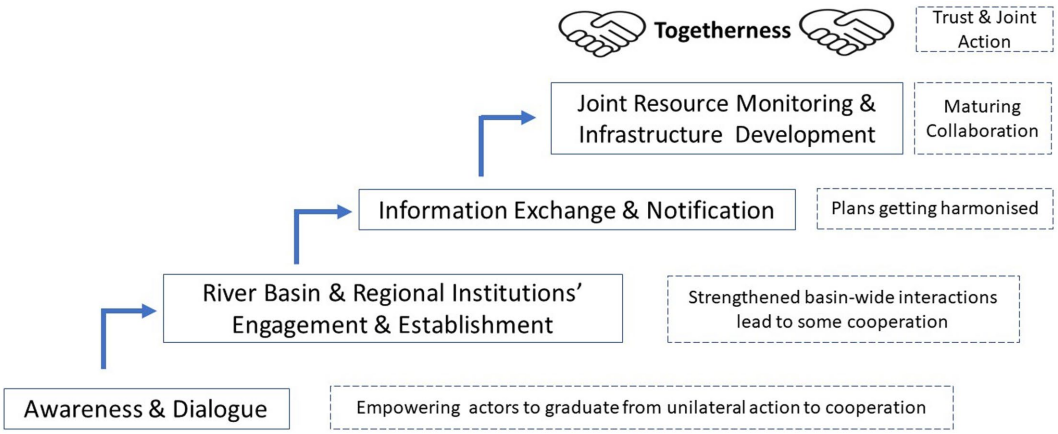

FIGURE 2
SADC theory of action aligning with the regional water cooperation continuum.

the SADC Secretariat working with the Secretariat of the already established RBO. Further support can also be provided as guided by full employment of the SADC-Cube approach, which also allows testing effectiveness of participation and progress in all areas and levels.

Because the Protocol requires reporting by shared watercourse institutions to SADC once established, the study finds that the SADC Secretariat creates an accountability system for the RBO. This is through the requirement for annual reporting by the RBO to the SADC-wide Committee of Water Ministers through the SADC Water Division (Water Sector Coordinating Unit). This also ensures that challenges and unresolved conflicts can be reported to SADC, so that the SADC Secretariat can assist the riparian states (and RBOs) in resolving persisting challenges and emerging conflicts.

3.4.2 Information exchange, notification on planned measures, and joint investment

The Protocol, built on international water law practice, requires active information exchange and data sharing among riparian states. Part of the information sharing is for system operations and to plan better knowing system performance and upstream river conditions. Another aspect of information exchange is for long-term planning or plan adjustments in light of planned developments by a riparian state. Countries sharing watercourses are by requirement expected to notify other riparian states of an intended or upcoming development (often infrastructural) long before it takes place. This is in accordance with Article 4(1) of the SADC water Protocol, which compels the project owner state to seek endorsement of such development by the other basin states. This also aids the object of avoidance of causing significant harm to one another by the riparian states.

Joint planning is also ensured through basin-wide strategic action plans that get implemented with the central coordination of the RBO secretariat. Equity issues in the project selection and delivery are often decided by consensus through the river basin commission and technical teams as required. The same happens with joint water infrastructure development. However, due to the cost of investment, the tendency is that not all basin states may participate in joint infrastructure investment (e.g., dam or water transfer scheme development) due to the financial capacity, scope, or geography of the intended project. However, the RBO has to facilitate so that 'no objections' to the development action are timely solicited from all concerned riparian states.

3.5 How SADC institutions help curb conflict

The study finds that several strategies are employed to curb water conflict in SADC, which have tended to work to contain disputes before they become real conflicts. The strategies or practices include (a) a combination of regional diplomacy and regional hydro-diplomacy; (b) enforcement of obligations towards information-sharing and exchange; (c) 'name and shame' strategy to discourage disobedience or non-compliance by member states; (d) strengthening of river basin institutions; and (e) requirement for RBOs to report progress to SADC. The result of these strategies in relation to conflict management is that disputes are often diffused way upstream while at the stage of latent conflict, before many even realise that there is a potential conflict situation.

Combining regional diplomacy and hydro-diplomacy to support transboundary water cooperation appears to be another main achievement of SADC in containing conflicts in the water sector. SADC water cooperation mechanisms are formulated to align with the SADC-wide cooperation principles and practices. As such, the Regional Protocol on Shared Watercourses is required by the SADC Treaty, which calls for a water sectoral protocol to elaborate and enable the implementation of the Treaty aspirations. The governance action of the sector is also subjected to regional accountability—by requirement, the Committee of Water Ministers has to report progress regarding sectoral challenges to the SADC Council of Ministers, which gets escalated to the Heads of State for very pressing strategic issues.

At the basin level, as discussed elsewhere, the information-sharing obligations are dictated by the SADC Protocol, which, for instance, in Article 4(3), requires watercourse states to establish joint water resources management mechanisms. The Protocol also compels for notification of planned measures (resource development projects) and active information exchange that allows for pooling of resources to avail new data and information that another riparian state (e.g., downstream states) may require for purposes of sustainable river basin management. Joint programme development, programme co-design, and co-creation also aid confidence-building among the basin states.

The '*name and shame*' approach is also invoked when a riparian state persists in bad practices that work against general smooth cooperation progress. The said member state may be reported to joint

meetings of the SADC WRTC or SADC Committee of Water Ministers or even the Council, depending on the needed escalation. By requirement, RBOs also have to submit periodic reports to the Secretariat that highlight progress in basin progress implementation and challenges that the basin may wish to register with SADC for political support and resource mobilisations support.

The case of the Zambezi water cooperation agreement negotiation reveals the limits of the 'name and shame' principle application, though, in that a country may not budge if the national political will has not been garnered. In the Zambezi cooperation agreement negotiations, Zambia could only agree to sign the agreement once national water instruments (such as policy and/or water act) were harmonised with the SADC-wide water protocol and policy (Ramoeli, n.d.). Once done, Zambia's ultimate signing of the agreement greatly unlocked the negotiations due to the geo-strategic position of the country in the Zambezi River Basin.

4 Conclusion

The study set out to answer the question of whether, indeed, the SADC can be said, using its models and approaches of transboundary water cooperation, to truly contain or prevent regional water conflict. Second, it aimed at deepening the understanding of the SADC process of driving regional and transboundary water cooperation. Using case study and comparative analyses approaches, the study explored the application of the concepts of water governance and institution-building and strengthening in the SADC to attain insights into the SADC approach.

So, how does the SADC drive regional water cooperation? The study finds that SADC utilises the river basin governance and management approach, centred on basin cooperation institutions, which are mainly in the forms of RBOs and RBAs—RBOs being mainly for entire river basin coordination, and RBAs responsible for a specific transboundary project in the river basin. In the Zambezi River Basin, for example, ZAMCOM is the RBO providing oversight to governance and management of the entire system (of eight riparian states), while Zambezi River Authority (ZRA) is a river basin institution in charge of the joint water scheme (Kariba Dam and hydropower plant) and involves only two of the eight riparian states (Zambia and Zimbabwe). The SADC approach, the study finds, is to first generate a regionally endorsed legal and policy framework consisting of the Regional Protocol on Shared Watercourses, Regional Water Policy, Regional Water Strategy, and rolling 5-yearly (or 10-yearly) RSAPs. SADC then promotes these frameworks for the domestication of transboundary water cooperation by riparian states. Technical support is provided by SADC to riparian states to establish shared watercourse institutions, thus creating standing platforms for engagement and water diplomacy through shared watercourse commissions. The SADC water Protocol provides the overall guidance principles and norms of cooperation, and these principles and norms are adopted and adapted by the different watercourse commissions. Over the years, these structures have been further adapted to nest groundwater governance through hydro-geological task teams that report to the water commissions.

There has been generally good progress in the transboundary water institution-building in the SADC, as argued in this study. The study findings also reveal that, once established, the region's RBOs join the SADC Secretariat and become the centre of regional water governance transformation, becoming catalytic to transboundary cooperation—with significant regionalising influence using the water-for-peace approach. The region's RBOs have huge trust and confidence-building agency among riparian states and are viewed as a possible future of transboundary water infrastructure development in basin states. The established RBO institutions have also increasingly embraced conjunctive governance of surface and ground waters.

Of the 15 major transboundary river basins in SADC, at least eight already have established RBOs with functional Secretariats. To realise this agenda of increased transboundary water cooperation through strengthened SADC river basin institutions, the study also finds the following promoted practices: (a) fostering closer cooperation of riparian states; (b) source-to-sea and source-to-sink cooperation strengthening; (c) fostering the spirit of good neighbourliness; (d) increasing information exchange among basin states; (e) exchanges between RBOs, the new learning from the old; (f) basin-wide resource allocation; (g) capacitation and mandate expansion of RBOs to effectively support member states with infrastructure development and other impactful projects; (h) regional and river basin water dialogues, (i) increased establishment of new RBO institutions; and the (j) convening of regional water dialogues for cross-regional engagement of RBOs and to widely share experiences.

So, can it be said that the SADC model has helped prevent or reduce conflict? Besides the Sedudu Island case of conflict between Botswana and Namibia over transboundary waters, which was ultimately resolved by the ICJ, the region has generally been able to curb conflicts way upstream before they became a regional concern. SADC member states have also adopted the Protocol principles and have formulated some kind of water-sharing agreements in at least four of the seven SADC river basins with functional RBOs. Regular engagement at various tiers of governance institutions has apparently contributed a lot to increasing trust among the cooperating member states. Cases of doubt are still manifested, though in a smaller part, evident in delayed ratification of basin cooperation agreements by some basin states (e.g., in the Zambezi River Basin).

To advance further programme of regional transboundary water institutions' development, especially considering the threats to the sustainability of the RBO model, the study recommends that consistent engagement models in basin cooperation at all levels of the SADC-cube (namely regional, river basin, and national levels) be developed. A theory of action has been proposed in this study to inform the developmental stages of such a model along the phases of the cooperation continuum of SADC. Capacity strengthening of RBOs is also a requirement for early warning and early action to improve support for riparian states in increasing their disaster and climate resilience. Since RBOs have attained the trust of the region's riparian states, they can now consider participating actively in the SADC goal of developing a regional water pool, supporting the development of water transfer infrastructure, and generating other innovative water solutions.

Models for true conjunctive surface and groundwater governance, as implemented at the transboundary levels, also need to be developed and agreed upon. An institutional model for civil society or non-state actor agencies participation in transboundary water cooperation programmes is also required for meaningful-cross border engagement of basin stakeholders that impact the shared watercourse systems. The RBOs can support such cross-border stakeholder forums with dedicated liaison capacity for effective and regular engagement. Moreover, a cross-border research collaboration support system can be established, with the RBOs providing additional resources and facilitating joint sessions where joint

research findings can be presented to basin stakeholders, and knowledge sharing and exchanges can be increased.

Data availability statement

Publicly available datasets were analysed in this study. This data can be found at: https://www.sadc.int/secretariat.

Author contributions

DM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

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The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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