



RESEARCH ARTICLE

Revenue Allocation and Governance in Transboundary River Basins: Lessons from the Orange River and Zambezi River for South African Water Policy

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Transboundary river basins are regulated not just by legal and administrative frameworks but also by intricate financial mechanisms that influence sustainability, equity, and service delivery results. This study analyses the ongoing deficiencies in the integration of revenue allocation and financial governance within transboundary water management systems in Southern Africa. This paper examines the Orange River and Zambezi River basins as comparative case studies to analyse how varying institutional frameworks, legal mandates, and finance methods affect basin-level collaboration and national water governance results. The Orange River Basin, where South Africa is the principal riparian state, has a reasonably structured governance framework with enhanced domestic financial oversight, whereas the Zambezi River Basin demonstrates a more international and donor-reliant approach. The paper employs a doctrinal legal analysis alongside institutional comparison to examine treaties, protocols, basin commission mandates, and national water laws, evaluating the treatment of revenue generation, cost recovery, and financial accountability in the two basins. The research contends that the inadequate attention to financial governance in transboundary agreements compromises both basin sustainability and domestic water service provision. The article offers policy-relevant insights for South Africa by emphasising the necessity of aligning transboundary obligations with national revenue frameworks, enhancing fiscal transparency within basin institutions, and more explicitly incorporating financial governance into water law and policy reforms.

INTRODUCTION

Transboundary river basins, including the Orange River and the Zambezi River, are being pressured by climate unpredictability, population increase, and expanding urban and commercial development. These demands require strong and cohesive water governance structures to guarantee sustainable and equitable management of shared water resources. Nonetheless, despite the strategic significance of these basins, income distribution and financial control continue to be sidelined in numerous transboundary water agreements. This exclusion represents a substantial obstacle to fair benefit-sharing among riparian states and impacted communities. Current scholarship consistently emphasises the necessity for effective governance systems that implement multi-level and inclusive strategies, acknowledging the intricate dynamics of stakeholder engagement and resource distribution in shared river basins (Assis et al., 2020; Chiluwe & Claassen, 2020; Tilmant et al., 2011). Revenue derived from shared water resources, especially through hydropower initiatives, frequently does not result in equitable advantages for local populations. Although hydropower development offers regional energy security and economic advancement, it may intensify conflicts among riparian nations if local consequences and benefit allocation are insufficiently managed (Hensengerth, 2024; Tilmant et al., 2011). The challenges are exacerbated by governance deficiencies, such as restricted stakeholder engagement, insufficient legal and institutional frameworks, and immature financial mechanisms, which impede effective

collaboration and equitable resource distribution (Garrick et al., 2013; Dombrowsky & Hensengerth, 2018).

This study is framed by three interconnected research questions. Initially, it analyses the mechanisms of revenue generation and governance within the Orange and Zambezi River Basins. Previous research underscores the pivotal influence of legal and institutional frameworks on revenue governance, exemplified by the Zambezi River Basin, which, despite lacking a comprehensive water-sharing agreement, has been examined through economic valuation methodologies that can enhance revenue distribution (Tilmant et al., 2011). Conversely, the Orange River Basin exemplifies the significance of normative and cooperative governance frameworks functioning at various scales (Jacobs, 2012). The study examines governance deficiencies that hinder equitable benefit-sharing, such as power imbalances between upstream and downstream states, inadequate stakeholder involvement, lack of transparency, and inconsistent political will among riparian nations (Nyundu, 2025; Garrick et al., 2013). These shortcomings frequently lead to conflict and poor management of communal resources (Tilmant et al., 2011; Barua et al., 2019). The study examines the insights derived from basin-level experiences for South African water policy, emphasising the potential for adaptive and resilient governance frameworks that incorporate community interests and harmonise legal and institutional structures to enhance transboundary cooperation (Dombrowsky & Hensengerth, 2018; Mohammed et al., 2022). The paper utilises a doctrinal legal analysis alongside a comparative institutional examination of the Orange and Zambezi River Basins. A case study methodology is employed to enable a thorough analysis of the unique governance issues and revenue management strategies in each basin. The Orange and Zambezi Rivers are chosen for their socio-economic importance in Southern Africa and the differing governance dynamics they exhibit about revenue distribution. The analysis utilises scholarly literature, policy documents, and institutional reports to elucidate critical elements of transboundary water governance. The article systematically examines the pertinent literature on governance frameworks in transboundary river basins, subsequently presents comprehensive case study analyses of the Orange and Zambezi Rivers, and concludes with policy recommendations for South Africa, highlighting equitable governance, stakeholder engagement, and financial accountability. The study asserts that effective management and revenue distribution in transboundary river basins rely on governance frameworks that explicitly tackle financial governance, consider intricate socio-political dynamics, and foster inclusive stakeholder participation (Nyundu, 2025; Garrick et al., 2013; Tilmant et al., 2011). The experiences of the Orange and Zambezi River Basins provide valuable insights for the development of sustainable and equitable water governance policies in South Africa and comparable transboundary contexts.

2. Conceptual and Theoretical Framework

2.1 Governance of Transboundary River Basins

Integrated Water Resources Management (IWRM) has become a crucial governance element for the management of shared freshwater resources in transboundary river basins. This holistic approach emphasizes the coordinated development and management of water, land, and related resources to maximize the economic and social welfare without compromising the sustainability of vital ecosystems. IWRM advocates for stakeholder participation at various levels, which is crucial for addressing the complex interactions and dependencies characteristic of transboundary water systems (Earle & Neal, 2016), (Mogomotsi et al., 2020). The IWRM framework acknowledges the intricate nexus between water, energy, and food security, particularly in contexts like the Zambezi and Orange River Basins, where stakeholder interests often conflict. The efficacious implementation of IWRM can lead to more equitable benefit-sharing arrangements among riparian states, fostering enhanced cooperation and reducing the potential for conflict over shared resources (Wouters, 2004; Baltutis & Moore, 2019). Furthermore, adapting governance to embrace a polycentric model allows for more fluid and responsive management structures, which can better accommodate the diverse needs and aspirations of multiple stakeholder groups in transboundary contexts (Baltutis & Moore, 2019).

Transboundary river governance can be approached through either basin-wide or state-centric models. Basin-wide governance emphasizes collective management among all riparian nations, promoting cooperative frameworks and joint decision-making processes. In contrast, state-centric

governance tends to prioritize the interests of individual states, often leading to unilateral actions that may disregard broader basin health and sustainability (Earle & Neal, 2016), (Mogomotsi et al., 2020). Centric models can exacerbate tensions, especially where upstream nations control water flows and downstream nations are left vulnerable to fluctuations in availability and quality. A definitive example of these dynamics can be observed in the Zambezi River Basin, where competing national interests complicate the establishment of cohesive governance strategies (Nyundu, 2025), (Fatch et al., 2022). Conversely, the Orange River Basin showcases the benefits of implementing a basin-wide governance structure through its participatory mechanisms that enhance agreements on water sharing and management practices (Earle & Neal, 2016), (Mogomotsi et al., 2020). Evaluating these models is vital for South Africa, as it seeks to reform its water policy to promote more equitable and cooperative transboundary governance.

2.2 Revenue Allocation and Financial Flows in Shared Watercourses

Revenue generation in shared watercourses often stems from hydropower projects, abstraction charges, water transfers, and infrastructure investments. Hydropower, as a primary revenue source, can generate substantial economic benefits through the sale of electricity, yet it often leads to complex negotiations about the equitable distribution of benefits among riparian states (Yasmin, 2025; Öjendal & Rudd, 2017). Abstraction charges and water transfers can also provide a steady income stream for governments managing shared resources, reinforcing the financial viability of infrastructure maintenance and development (Garrick et al., 2013). However, it is crucial to establish transparent frameworks for how these revenues are allocated and distributed, focusing on equitable sharing that considers environmental sustainability and socio-economic impacts. This ensures that marginalized communities that may be disproportionately affected by large-scale water projects also benefit from the revenues generated (Nyundu, 2025), (Fatch et al., 2022).

Equitable benefit-sharing is essential in transboundary water management, particularly when addressing distributive justice concerns among riparian states. The principles of equitable and reasonable utilization, as prescribed by international water law, dictate that all riparian states should derive reasonable and beneficial uses from shared resources, avoiding significant harm to other states. Moreover, this establishes a foundation for cooperative governance and shared prosperity (Mogomotsi et al., 2020; Earle & Neal, 2016). In the context of the Zambezi and Orange River Basins, effective financial governance requires not only clarity in revenue allocation but also mechanisms that foster participatory engagement of local communities. This aspect is critical as it recognizes the need to incorporate diverse perspectives and interests into governance frameworks, thereby enhancing social equity and environmental justice (Mirumachi, 2013), (Nyundu, 2025). The absence of such participatory structures can lead to conflicts over resource allocation, diminishing the credibility and effectiveness of water management institutions.

2.3 International and Regional Legal Norms

International legal norms governing transboundary watercourses underscore the principle of equitable and reasonable utilization. This principle mandates that all riparian states have the right to beneficially use the water resources within their jurisdiction while ensuring that their activities do not cause significant harm to other states. Such legal frameworks are foundational in managing disputes and fostering collaborative arrangements among countries sharing water resources (Earle & Neal, 2016), (Mogomotsi et al., 2020; Baltutis & Moore, 2019). The obligation to cooperate is another core element of international water law, epitomized in treaties such as the United Nations Watercourses Convention (Earle & Neal, 2016). This legal obligation compels riparian states to engage in discussions and negotiations, aiming to reach consensus on utilization and management strategies that respect mutual interests. Effective cooperation should lead to the establishment of regional governance institutions tasked with the sustainability and management of transboundary waterways, evidenced by the collaborative frameworks seen in both the Orange and Zambezi River Basins (Mogomotsi et al., 2020; Mirumachi, 2013).

Soft law instruments, treaties, and regional protocols play a pivotal role in shaping regimes for revenue governance within transboundary river basins. While binding treaties establish formal legal mechanisms and obligations, soft law comprises guidelines and principles that can inform state behaviour without legal enforcement. In the Southern African context, regional frameworks such as the SADC protocol on shared watercourse systems facilitate regional cooperation and

provide a basis for collaborative governance (Martunenکو et al., 2020; Prniyazova et al., 2025). These normative frameworks must be supported by local laws and institutional arrangements to ensure their practical applicability. The importance of regional cooperation is evident in the Zambezi River Basin, where the Zambezi Watercourse Commission (ZAMCOM) aims to promote equitable sharing and sustainable management of the basin's resources, despite the persistently complex negotiating landscape (Nyundu, 2025), Hybka, 2016). In this regard, furthering South Africa's water policy to enhance governance structures and align with these international norms is crucial for the sustainable management of its shared water resources. By systematically evaluating these elements, this study aims to clarify the complexities involved in revenue allocation and governance in transboundary river basins and propose viable lessons for enhancing South African water policy in light of stochastic environmental challenges and socio-economic intricacies.

3. Case Study I: The Orange River Basin

3.1 Overview of the Basin and Its Strategic Significance

The Orange River Basin is a vital hydrological and physical entity in Southern Africa, spanning many riparian nations, including South Africa, Lesotho, Namibia, and Botswana. It is crucial not just for its water supplies but also for its function in sustaining agricultural, industrial, and domestic water requirements for millions of inhabitants in these regions. The basin is an essential element of South Africa's water security strategy, contributing significantly to the nation's river water supply, with the Orange River, one of the longest rivers in the area, extending roughly 2,200 kilometres ("Water security crisis in South Africa will escalate," 2015; Yue & Gebremichael, 2021). The significance of the Orange River Basin to South Africa's water security is intensified by persistent drought conditions and escalating demands on water resources resulting from population increase and economic development. As interruptions in water delivery become more prevalent in urban systems, the dependability of the Orange River becomes increasingly vital, complicating the governance of this transboundary river ("Water security crisis in South Africa will escalate", 2015; Warner et al., 2008). The basin's strategic significance is highlighted by its capacity to enhance agricultural output and facilitate electricity generation via hydropower initiatives, thereby playing an essential role in the region's socio-economic framework ("Water security crisis in South Africa will escalate", 2015).

3.2 Institutional Framework

The governance system of the Orange River Basin is supported by a basin commission structure, namely the Orange-Senqu River Commission (ORASECOM). Founded in 2000, ORASECOM seeks to foster the equitable and sustainable management of resources within the Orange River Basin among the riparian states (Tadesse et al., 2024). The commission is responsible for promoting regional collaboration on water resource management and guaranteeing adherence to common legislative and institutional frameworks. Although ORASECOM serves as an essential forum for conversation and negotiation among the states, its advising capacity restricts its institutional authority. In contrast to binding treaties, ORASECOM's decisions frequently lack enforceability, resulting in difficulties in executing collective agreements across national borders (Tadesse et al., 2024; Ogunlaja et al., 2022). Thus, although the commission lays the foundation for collaboration, the efficacy of its mandate is dependent on each state's readiness to comply with collective agreements, and the lack of a legally binding structure further hampers governance initiative.

3.3 Mechanisms for Revenue Generation and Allocation

Revenue creation in the Orange River Basin predominantly derives from multiple sources, including hydropower production, inter-basin water transfers, and project-specific earnings linked to infrastructure investments (Livingstone, 2021; Adil et al., 2013). Hydropower plants situated along the river fulfil local energy requirements and generate revenue through electricity sales, which is essential for financing maintenance and additional investments in water management infrastructure. Nonetheless, the allocation of these monies frequently exposes considerable disparities across riparian states. Upstream nations such as Lesotho, which gains from the Lesotho Highlands Water Project (LHWP), obtain significant revenue from water transfers to South Africa; however, this financial influx does not consistently result in equitable development for local communities impacted by the hydropower activities (Adil et al., 2013). The financial mechanisms

must foster a balanced approach that sufficiently addresses the interests and rights of all riparian governments while rectifying disparities and injustices in revenue generation and allocation.

3.4 Challenges in Governance

The administration of the Orange River Basin is beset by obstacles that impede its ability to manage shared resources efficiently. A notable concern is the power disparities among riparian states, wherein downstream countries like South Africa can wield substantial influence over water management choices, adversely affecting upstream nations such as Lesotho and Namibia. This dynamic frequently results in disputes over water allocations and prompts enquiries about the equity of benefit-sharing agreements (Adil et al., 2013; Bofana et al., 2020). Moreover, inadequate financial transparency and accountability systems intensify prevailing governance issues. Stakeholders frequently contend with ambiguous financial flows about revenue collection and distribution, which erodes trust among the riparian states (Bofana et al., 2020). In the absence of competent oversight, corruption poses a significant risk, exacerbating governance challenges and potentially threatening long-term viability.

Ultimately, restricted basin-wide budgetary cooperation introduces an additional layer of complication in the governance of the Orange River. Countries frequently manage water resources independently, resulting in disjointed decision-making that lacks coherence and strategic alignment among states (Evans et al., 2018). Improved fiscal coordination and collaborative governance structures are crucial for tackling these difficulties and fostering a more resilient and equitable management framework for the Orange River Basin (Bofana et al., 2020; Livingstone, 2021). The Orange River Basin scenario exemplifies the complex interplay of topographical, institutional, and economical factors that influence transboundary water control. The governance issues encountered underscore the necessity for enhancements in institutional frameworks, fair revenue distribution systems, and improved cooperation among riparian nations. Utilising insights from the Orange River Basin can enhance the formulation of more efficient water management strategies, especially as South Africa addresses its water security challenges under escalating pressures from climate change and socio-economic factors.

4. Case Study II: The Zambezi River Basin

4.1 Overview of the Basin and Context of Development

The Zambezi River Basin is a highly intricate transboundary river system in Africa, encompassing eight nations: Zambia, Angola, Namibia, Botswana, Zimbabwe, Mozambique, Tanzania, and Malawi. This multi-state complexity creates a uniquely challenging environment for water management, as diverse national interests, varying developmental needs, and geopolitical dynamics converge within this shared hydrological space (Nyundu, 2025; Tilmant et al., 2011). The basin possesses substantial hydropower potential, with significant infrastructure projects like the Kariba Dam and the Cahora Bassa Dam greatly enhancing the energy security of various riparian nations, thereby emphasising the economic significance of this river system (Schuerholz & Baldus, n.d.; Tilmant et al., 2011). Moreover, the Zambezi River Basin is characterized by its high infrastructure potential, bolstered by initiatives focused on hydropower generation, irrigation, and climate adaptation. The basin's development context is shaped by its natural resources, which not only support national economies but also link to regional energy agreements aimed at addressing electricity shortages across Southern Africa (Nyundu, 2025; Tilmant et al., 2011). As countries aim to maximize the basin's resources, tensions can arise surrounding equitable access, benefit-sharing, and environmental sustainability.

4.2 Institutional Architecture

The Zambezi Watercourse Commission (ZAMCOM) serves as the main institutional framework guiding the governance of the Zambezi River Basin. Established to facilitate collaboration among riparian states, ZAMCOM has a mandate that emphasizes sustainable development and resource management while promoting cooperation and equitable sharing of benefits (Tilmant et al., 2011; , Schuerholz & Baldus, n.d.). The commission's legal personality allows it to engage in negotiations, develop agreements, and oversee the implementation of policies that align with the interests of the member states. ZAMCOM operates predominantly within a coordination-oriented governance

model, aiming to enhance synergy among different stakeholders, including governments, local communities, and civil society (Nyundu, 2025). This model is essential for navigating the complexities inherent to the multi-state environment of the Zambezi Basin. However, ZAMCOM's effectiveness can be hindered by limited capacity for enforcement and regulatory oversight, making it challenging to implement cooperative agreements consistently across all member states.

4.3 Revenue Allocation and Benefit-Sharing Practices

Revenue generation within the Zambezi River Basin primarily results from hydropower projects, which significantly influence national economies. Hydropower facilities not only provide energy but also create opportunities for revenue-sharing agreements among riparian countries. This aspect is critical, as demonstrated by ongoing debates regarding how to allocate revenues from shared hydropower resources (Nyundu, 2025). Donor and development-finance influence in the basin's projects also shapes revenue allocation mechanisms. International financing institutions often stipulate conditions relating to equity, social impact, and sustainability when funding infrastructure developments, which can reshape how benefits are distributed among riparian states (Schuerholz & Baldus, 2012). This influence underscores the need for equitable benefit-sharing frameworks that account for the diverse socio-economic contexts of each riparian country, highlighting the importance of collaborative negotiations to avoid exacerbating inequalities.

4.4 Governance Challenges

The Zambezi River Basin faces several governance challenges, primarily revolving around coordination and enforcement difficulties. The fragmented nature of governance, stemming from differing national interests and varying institutional capacities, complicates cooperative resource management efforts. Disparities in political will and the lack of a binding legal framework can lead to unilateral decision-making, undermining the effectiveness of coordinated governance approaches (Nyundu, 2025; Tilmant et al., 2011). Additionally, the political economy of large-scale infrastructure projects often poses substantial hurdles. Projects such as dams and irrigation systems can spark disputes between upstream and downstream countries, particularly when resource allocation is perceived as inequitable. Local communities, often reliant on the river for their livelihoods, may find their concerns overlooked in larger national and regional negotiations, risking social unrest and conflict (Schuerholz & Baldus, 2012).

The Zambezi River Basin illustrates the complex interplay of governance, revenue allocation, and institutional dynamics in transboundary water management. Addressing the challenges faced in the Zambezi Basin requires continuous efforts toward enhancing institutional frameworks, promoting equitable governance structures, and fostering genuine stakeholder engagement. The lessons drawn from the Zambezi experience may serve to inform and strengthen South Africa's policies regarding water governance and transboundary cooperation, especially as it contemplates its own water security strategies against the backdrop of increasing pressures from climate change and socio-economic developments.

5. Comparative Analysis of the Orange and Zambezi River Basins

5.1 Institutional Framework and Jurisdiction

The Orange River Basin is predominantly regulated under an advisory framework, exemplified by the Orange-Senqu River Commission (ORASECOM). This model facilitates dialogue and negotiation among riparian states but lacks binding authority, limiting its ability to enforce cooperation effectively (Tadesse et al., 2024; Ogunlaja et al., 2022). Conversely, the Zambezi River Basin functions under a coordination-centric framework facilitated by the Zambezi Watercourse Commission (ZAMCOM), which, despite its analogous limitations in enforcement capacity, aims to promote collaboration and collective decision-making among various states (Tilmant et al., 2011; Schuerholz & Baldus, n.d.). A key difference in these institutional frameworks affects their operational effectiveness. ZAMCOM's explicit mandate for coordination among multiple actors offers a more structured approach to management compared to ORASECOM's advisory framework, which may lead to inconsistencies in policy application and commitment levels among states (Ogunlaja et al., 2022), Schuerholz & Baldus, n.d.). Notably, the legal personality of ZAMCOM, which allows for negotiations and agreements between member states, provides a platform that may

facilitate more substantial cooperation compared to the advisory nature of ORASECOM (Tilmant et al., 2011). The legal frameworks governing these river basins play crucial roles in their operational effectiveness. ZAMCOM's establishment under treaties that emphasize equitable utilization and effective governance potentially empowers it to mediate conflicts and promote sustainable development (Tilmant et al., 2011). Conversely, ORASECOM's advisory model lacks legally binding provisions, which can result in challenges related to the implementation and monitoring of cooperative agreements (Tadesse et al., 2024; Ogunlaja et al., 2022). Operational effectiveness is further influenced by how institutional arrangements integrate stakeholder participation and address collective action dilemmas in both basins. Strong participation mechanisms in ZAMCOM, aimed at incorporating local communities and stakeholders, can enhance the legitimacy of its governance processes (Tilmant et al., 2011). In contrast, ORASECOM's focus on high-level negotiations may disconnect management decisions from local needs, hindering adaptive responses to emerging challenges (Ogunlaja et al., 2022).

5.2 Revenue Allocation Approaches

Revenue allocation approaches vary significantly between the Orange and Zambezi basins. The Orange Basin relies heavily on project-specific revenue mechanisms, where revenues generated from specific hydropower initiatives are often used for targeted infrastructure and project financing (Adil et al., 2013). This project-oriented focus tends to limit the broader benefits derived from sustainable basin-wide resource management, leading to potential inequities in how these resources are distributed among riparian states (Livingstone, 2021; Adil et al., 2013). In comparison, the Zambezi Basin has a more pronounced emphasis on basin-wide mechanisms for revenue allocation, aiming to integrate revenue generation processes across multiple hydropower projects and shared water resources (Schuerholz & Baldus, n.d.). This approach encourages more equitable sharing of benefits among countries, though it does come with challenges related to coordinating diverse interests and negotiating fair allocation practices (Tilmant et al., 2011). The basin-wide mechanism promotes holistic resource management that seeks to align incentives, interests, and investments, thereby potentially enhancing cooperative relations among member states. Transparency in revenue allocation is a critical consideration in both basins but is often inadequately addressed. In the Orange River Basin, project-specific revenue models may lead to opaque financial flows and unequal benefit distribution, where upstream states could gain disproportionately from agreements lacking robust oversight mechanisms (Adil et al., 2013), Evans et al., 2018). In the Zambezi Basin, although attempts have been made to create frameworks for equitable benefit-sharing, challenges remain regarding accountability and transparency in how revenues are managed and distributed (Tilmant et al., 2011). Donor influences and developmental financing can complicate transparency, as differing expectations and requirements from external partners may impact revenue allocation (Schuerholz & Baldus, n.d.). Ensuring clear, equitable, and transparent revenue allocation mechanisms is essential for building trust and long-term cooperation among riparian countries in both basins.

5.3 Comparative Lessons

A salient lesson from the comparative analysis of the Orange and Zambezi River Basins is the critical role of financial governance in determining the sustainability of cooperative arrangements. In the Zambezi Basin, where basin-wide mechanisms are supported by coordinated governance models, collaborative financial governance frameworks can foster more sustainable partnerships among riparian states (Tilmant et al., 2011, Schuerholz & Baldus 2012). Clear financial guidelines promote stakeholder buy-in and ensure that benefits are equitably distributed, ultimately bolstering cooperation sustainability. In contrast, the Orange Basin's reliance on project-specific revenues, coupled with its limited enforcement capabilities, risks undermining cooperative agreements and potentially leading to tensions among states (Livingstone, 2021; Adil et al., 2013). Addressing these financial governance issues in transboundary contexts is fundamental for advancing cooperative dynamics and enhancing the overall effectiveness of institutional frameworks.

Both river basins exhibit revenue asymmetry, which can give rise to tensions among riparian countries. In the Orange Basin, tensions are frequently exacerbated by inequities associated with water usage rights, particularly as downstream countries rely heavily on upstream water flows,

which can lead to accusations of unfair exploitation (Adil et al., 2013). Within the Zambezi Basin, revenue asymmetries can equally provoke disputes, especially when upstream nations derive significant financial benefits from hydropower projects while downstream neighbours perceive their interests as secondary (Tilmant et al., 2011, Schuerholz & Baldus, 2012). Addressing revenue asymmetries, ensuring equitable resource distribution, and fostering transparent dialogues among states are paramount to mitigating potential conflicts and fostering collaborative waterscapes in both basins. The comparative analysis of the Orange and Zambezi River Basins illustrates how differences in institutional design, revenue allocation approaches, and governance challenges inform the dynamics of transboundary water cooperation. Important lessons regarding transparency, equity, and financial governance can guide South Africa and its regional neighbours in developing robust frameworks for sustainable collaboration in shared water resources. By learning from these case studies, policymakers can enhance stakeholder engagement and develop governance structures that prioritize equitable resource management and foster long-term cooperative relationships.

6. Consequences for South African Water Policy

6.1 Deficiencies in Domestic Water Governance

The water governance structure in South Africa reveals significant deficiencies in the efficient integration of transboundary budgetary factors. The existing policy, predominantly influenced by national laws and regulations, frequently neglects the financial dynamics involved in transboundary situations, especially with shared water resources such as the Orange and Zambezi Rivers (Nyundu, 2025). The absence of comprehensive fiscal frameworks that accurately represent the realities of transboundary governance might hinder equitable revenue distribution and benefit-sharing among riparian governments. As transboundary river systems gain significance in climate resilience and resource competition, it is imperative to address these budgetary overlaps for the overall sustainability of water governance (Bukhari & Brown, 2021). A notable deficiency in South Africa's water governance is the disjunction between national water price frameworks and the commitments outlined in regional agreements (Modlin & Stewart, 2014). The national water pricing policy may inadequately represent the necessity for equitable pricing models that consider the interdependencies established by shared water resources. This disconnection hinders regional collaboration, as pricing frameworks that fail to conform to regional commitments might impose unequal responsibilities on upstream and downstream governments, hence intensifying tensions (Suyeno et al., 2024). To enhance a collaborative framework for transboundary management, it is imperative to realign water price plans in South Africa with established regional commitments.

6.2 Options for Policy and Institutional Reform

A key reform strategy for South African water policy involves integrating revenue governance into the structure of transboundary water management. This involves formulating detailed regulations that clearly outline revenue sharing, fiscal obligations, and financial transparency systems among riparian nations (Nyundu, 2025). Implementing explicit norms for financial governance can alleviate the revenue disparities evident in the Orange and Zambezi basins, thereby fostering equity and collaboration among states (Song et al., 2023). Enhancing financial oversight at the basin level is essential for improving governance structures. By implementing more stringent systems for overseeing financial transactions related to shared water resources, South Africa can enhance accountability and transparency, thus fostering trust among riparian governments. This methodology reflects the governance frameworks instituted in ZAMCOM, wherein participatory oversight processes enhance financial management and decision-making (Bukhari & Brown, 2021; Banda & Banda, 2022). A coordinated initiative to improve financial monitoring at the basin level will strengthen local communities and stakeholders, especially in areas impacted by transboundary water projects.

It is essential for South Africa to synchronise its water diplomacy, legal frameworks, and fiscal policies to effectively solve current governance deficiencies. This alignment would guarantee that transboundary water management decisions incorporate extensive stakeholder involvement, legal responsibilities, and fair financial considerations (Modlin & Stewart, 2014). By implementing a cohesive strategy that aligns these characteristics, South Africa may position itself as a proactive

leader in transboundary water governance, emphasising collaborative management rather than unilateral decision-making.

6.3 Strategic Significance of South Africa

South Africa possesses the capacity to take on a strategic leadership position in the reform of transboundary water governance throughout the Southern African area. Given its experience with the ORASECOM and its historical influence on regional water policies, South Africa can leverage its position to advocate for more robust institutional frameworks that facilitate cooperation and equitable resource sharing among riparian states (Nyundu, 2025). By adopting a leadership stance, South Africa not only enables constructive dialogues among countries but also sets a precedent for collaborative governance models that can be emulated by other nations (Kasahara et al., 2020). In addition, South Africa's position as a leading economic and diplomatic force in the region enables it to play a critical role in norm-setting for transboundary water governance. This potential extends to establishing best practices and innovative models for fiscal governance that emphasize collaboration, equity, and sustainability (Nyundu, 2025). Norm-setting initiatives may also involve creating platforms for dialogue among water resources stakeholders, promoting cooperative agreements that encapsulate holistic water governance strategies aligned with both local needs and regional obligations (Banda & Banda, 2022).

The implications for South African water policy derived from the comparative analysis of the Orange and Zambezi River Basins underscore the necessity for reform in various dimensions of governance. Addressing gaps in fiscal integration, aligning national water policies with regional commitments, and embracing a strategic leadership role in transboundary governance are critical pathways for fostering sustainable water management. The lessons learned from these river basins illustrate the importance of robust institutional frameworks, transparent financial practices, and cooperative dialogue as foundational elements for enhancing water equity and sustainability in Southern Africa. As South Africa embarks on a course of reform, it is well-positioned to influence regional water governance positively and ensure the longevity and resilience of its water resources.

CONCLUSION

This article illustrates that although transboundary river basin governance in Southern Africa has markedly progressed regarding water allocation principles and institutional collaboration, it is structurally deficient in the absence of a coherent and explicit framework for revenue distribution and financial governance. Through a comparative analysis of the Orange and Zambezi River Basins, the study reveals that the sustainability, equity, and political durability of transboundary water cooperation are shaped as much by how financial benefits and costs are distributed as by how water itself is allocated. The examination of the Orange River Basin reveals a governance framework defined by project-specific revenue structures, particularly through extensive inter-basin transfer and hydropower projects. Although these arrangements have produced significant economic advantages, they are predominantly disconnected from basin-wide institutional governance, leading to uneven benefit allocation and restricted collective responsibility. In contrast, the Zambezi River Basin exhibits a more coordination-focused institutional framework, with an increasing acknowledgement of benefit-sharing and comprehensive basin planning. Nonetheless, despite its relatively robust mission, revenue governance in the Zambezi setting remains hindered by enforcement deficiencies, political economy influences, and dependence on external financing mechanisms. The two case studies collectively illustrate that institutional structure alone is inadequate; in the absence of specific fiscal governance measures, even well-structured basin institutions find it challenging to convert cooperation into fair and sustainable results. This paper posits that revenue allocation is an overlooked component of transboundary water governance. International and regional water law has historically emphasised principles such as equitable and reasonable utilisation, the duty to cooperate, and the prevention of substantial harm. Although essential, these principles are progressively insufficient when considered alone. The allocation of economic rents from shared watercourses such as hydropower earnings, abstraction fees, and infrastructure benefits frequently dictates the actual power dynamics and incentives among riparian governments. Regarding revenue allocation as a secondary or technical issue jeopardises the entrenchment of inequity, erodes confidence, and

diminishes the efficacy of basin-level organisations. A reconceptualization of transboundary water governance is thus necessary one that acknowledges financial flows as a fundamental legal and governance issue rather than a downstream policy matter.

The findings hold significant policy and institutional ramifications for South Africa. As both a dominant riparian and a regional norm-setter, South Africa's water policy framework would benefit from more explicit integration of transboundary fiscal considerations into domestic water law, pricing strategies, and diplomatic engagement. Fortifying the financial governance authority of basin institutions like ORASECOM, augmenting transparency in revenue-generating initiatives, and synchronising water diplomacy with national treasury and development planning are essential measures for fostering equitable and resilient transboundary collaboration. More broadly, South Africa is well positioned to champion a regional shift toward benefit-sharing models that explicitly incorporate revenue governance, thereby reinforcing both water security and regional stability. Finally, this study opens several avenues for future research. An empirical examination of the correlation between revenue allocation mechanisms and conflict prevention, the influence of climate finance and green industrialisation on basin-level financial flows, and a comparative analysis extending beyond Southern Africa would enhance comprehension of this inadequately explored aspect of water governance. By foregrounding revenue allocation as a central concern, this article contributes to a more holistic and realistic approach to transboundary river basin governance one capable of addressing not only the allocation of water, but also the distribution of the value it generates.

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