DAFNE

A **D**ecision-**A**nalytic **F**ramework to explore the water-energy-food **NE**xus in complex and transboundary water resources systems of fast growing developing countries

MODELS AND PRINCIPLES OF WATER GOVERNANCE IN THE OMO-TURKANA AND ZAMBEZI BASINS

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Abbreviations

ACCNNR	African Conventions on the Conservation of Nature and Natural Resources
AEC	African Economic Community
AEC Treaty	Treaty Establishing the African Economic Community
AU	African Union
CBD	Convention on Biodiversity
DAF:	Decision-analytic-framework
DoA:	Description of Action (Annex I of the Grant Agreement)
DAF	Decision-Analytic-Framework
DAFNE	DAFNE: A Decision-Analytic-Framework to explore the water-energy-food NExus in complex and trans-boundary water resources systems of fast growing developing countries
DSS	Decision Support System
EAC	East African Community
EIA	Environmental Impact Assessment
EEP	Ethiopian Electric Power
ESIA	Environmental Social Impact Assessment
EU	European union
GIS	Geographic Information System
IGAD	Intergovernmental Authority on Development
IGADD	Intergovernmental Authority on Drought and Development
IWRM	Integrated Water Resources Management
OTB:	Omo-Turkana River and Lake Basin
LAM:	Legal Assessment Model
LAT:	Legal Assessment Tool
MoU	Memorandum of Understanding
NEPAD	New Partnership for Africa's Development
NDP	National Development Plan
OTB	Omo-Turkana Basin
REC	Regional Economic Communities
RSAP	Regional Strategic Action Plan
SADC:	Southern African Development Community
SADC-PC:	2000 Revised Protocol on Shared Watercourses in the Southern African Development Community
SDGs	Sustainable Development Goals
SUPSED	Kenya-Ethiopia Cross-Border Programme for Sustainable Peace & Socio-Economic Development
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification

UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNWC:	1997 UN Convention on the Non-navigational Uses of International Watercourses
WP:	Work Package
WEF:	Water-Energy-Food
ZACPLAN	Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System
ZAMCOM:	Zambezi Watercourse Commission
ZAMSEC	Secretariat of the Zambezi Watercourse Commission
ZAMSTRAT	The Integrated Water Resources Management (IWRM) Strategy and Implementation Plan for the Zambezi River Basin
ZAMWIS	Zambezi Water Information System
ZRB:	Zambezi River Basin

1. INTRODUCTION

Transboundary watercourses (water resource systems that extend across state borders) have a multifaceted role in social and economic development, such as energy and agricultural production (Jägerskog et al, 2007; World Bank, 2017). They are therefore important resources to fast developing countries in particular (Jägerskog et al, 2007). Equally, transboundary waters also present risks such as floods, droughts, and environmental challenges such as invasive weed species, which may be best mitigated through collective approaches. However, it is a challenge to manage the complex trade-offs between various uses and needs both between and within states (Pahl-Wostl, 2018). The way in which transboundary water resources are used and managed – both cooperatively and unilaterally – encompasses a complex network of actions with multidimensional implications upon various sectors and actors, including the environment (Jalilov et al, 2016; Basheer et al, 2018). ***Governance***[1] structures created through legal, political, and organisational ***institutions*** seek to influence the nature of these actions and their resulting implications (De Stefano et al, 2017; World Bank, 2017). However, these institutions are often created in national or sectoral silos, raising the question as to how fragmented and overlapping institutions that exist simultaneously across multiple levels and ***jurisdictions*** apply in relation to a single contiguous resource. Some attempts have been made to understand the complexity of multi-level water governance (see Pahl-Wostl, 2009; Pahl-Wostl et al., 2010; Pahl-Wostl et al., 2012; Dore et al, 2012), yet a gap remains in understanding the implications of ***de jure*** legal principles, using legal methodologies. In response, this report examines the governance structures in two case studies through a legal modelling approach, which seeks to identify the governance implications of certain actions in transboundary watercourses. It maintains the overarching goal to understand **the developments and challenges of applying substantive and procedural legal rules in the context of transboundary watercourses and their competing uses and users** (*see* Description of Action (Annex I of the Grant Agreement) (DoA), p27)**.**

1.1 REPORT OBJECTIVES WITHIN THE DAFNE PROJECT

To understand the application of legal principles in the context of transboundary watercourses, this report provides an approach to modelling legal frameworks. The modelling exercise aims to indicate levels of legal expectations (or good and widely held views and standards) in response to actions upon a watercourse. Application of the modelling approach provides insights into the governance context of two transboundary basins in Africa: the Zambezi River Basin (ZRB) and the Omo-Turkana River and Lake Basin (OTB). The two case studies lie within very different contexts, represented most obviously by the vastly different number of States involved, but also by differences in the political economy and in the history of cooperation strategies. As such, while the governance model seeks to apply to both basins, the context within which this model would operate is of direct relevance to the results it may be able to achieve.

The objectives are to both develop and apply a "governance model" in relation to these two basins form part of the research that contributes toward the European Commission project: "DAFNE: A Decision-Analytic-Framework to explore the water-energy-food NExus in complex and transboundary water resources systems of fast-growing developing countries" (DAFNE Project). The DAFNE Project aims to develop a decision-analytic-framework (DAF)

> "to quantitatively assess the social, economic, and environmental impact of expanding energy and food production in complex physical and political contexts, where natural and social processes are strongly interconnected and the institutional setting involves multiple stakeholders and decision-makers" [2].

[1] Due to the interdisciplinary nature of the DAFNE Project, a glossary is provided at the end of this report to define and explain certain terms that are ***emphasised*** within the text the first time they appear.

[2] DoA, p.3

This report presents the research conducted in relation to a component of the project under work package 4 (WP4), which concerns the modelling of economic, and social processes and environmental policy under the water-energy-food (WEF) nexus (DoA, p25). Specifically, this report is the output of task 4.2, which **aims to develop a matrix to optimise good governance and the sustainable use of the two basins** (DoA, p25).

Consistent with the description in the DoA, this report has built upon the first year of work completed in Subtasks 2.1.6 and 2.3.4 which identified the institutional framework of water governance through the collection of laws, frameworks and policies regarding water use in the ZRB and OTB. The description of Task 4.2 in the DoA is ambitious, particularly with regards to its relationship with the data collection within Work Packages 2 and 3. The DoA states that Task 4.2 will use relevant inputs from Work Packages 2 and 3 in order to optimise good governance and the sustainable use of the two rivers. Specifically, the DoA lists a number of factors to be considered. While a number of these factors have been covered qualitatively within the remit of this report, the explicit incorporation of data itself is largely absent. This is largely a result of the timeframe of the data collection process in the DAFNE project, in addition to unavailable and incomplete datasets. The extent to which these factors have been covered within the report is detailed below.

- **Factor 1:** Basic data including population, geography and human needs: information regarding the geography of the basin is presented both with relation to the background of each basin, as well as with regards to the application of key legal principles in Table 20 (OTB) and Table 21 (ZRB) respectively. Information with relation to the population needs are also presented within these tables. However, explicit data with regards to water use for human needs within each basin is not given.
- **Factor 2:** Water allocation to different sectors: throughout the report the use of water for different purposes is referred to. Data relating to volume of water allocation has not been included.
- **Factor 3:** Benefits of basin for water, energy, food resources and access to these at local, national and inter-state levels: the benefits of the basin for WEF resources are described with relation to the law and governance of both basins. In addition, potential models for benefit sharing of such resources are described in Table 22.
- **Factor 4:** Operational rules on dam filling, water release and flood controls: dam filling, water release and flood controls are described as mechanisms with relation to the achievement of key legal principles. Explicit reference to existing dam operational rules is not considered due to a lack of available information.
- **Factor 5:** Impact on human populations of resource exploitation and use at local, national and inter-state levels: some reference to the impact of human populations on resource exploitation are given, however this is not of direct relevance to the legal frameworks considered within the remit of this report.
- **Factor 6:** Participation of stakeholders in decision making: participation is discussed with regard to legal frameworks. It is not however possible at this stage to have a comprehensive understanding of the participation of stakeholders in decision making with relation to the formation of legal or policy frameworks. Findings which relate to the Negotiation Simulation Lab (WP6) have been incorporated where appropriate.

Through the analysis of laws and policies, the DoA stated that these factors should be used to:

- Assess the socio-economic benefits of water use and their short and long term environmental downstream/upstream implications.
- Assess the extent to which the WEF interplay in the two basin systems fulfils sustainable development criteria with reference to principles of good governance of international water bodies.

This report includes application of the governance framework to hydropower developments specifically, including socio-economic benefits and possible implications. It was not possible within the remit of this report to provide a comprehensive analysis of multiple actions/interventions within each basin. At this stage it has also only been possible to generate tentative discussions regarding possible implications with relation to the model of water governance. It is expected that as the DAFNE project continues to progress and more data become available, it will be possible to apply the analysis conducted within the remit of this report to provide a more comprehensive picture of

environmental downstream/upstream implications. In line with the DoA, the report also assessed the WEF interplay within the basins and discusses potential integration with the Sustainable Development Goals (Table 23), before making recommendations for possible pathways (to be integrated into the DAF) and contribute towards good governance (Section 4).

To this end, this report applies the following tasks:

1) Develop a governance modelling method within the aims of the DAFNE Project
2) Apply the governance modelling method through theoretical simulations to provide:
   a) Findings in regard to the model's ability to reveal legal expectation
   b) Findings in regard to the potential need for reform in relation to the WEF nexus and promoting good practices
   c) Findings in regard to the challenges of applying legal rules in the context of transboundary watercourses and their competing uses and users

1.2 RATIONALE FOR METHODOLOGICAL APPROACH

The methodology underpinning the DAFNE Project is the integration of disciplines in the development of a model that can quantitively assess the impacts of a variety and combination of actions upon transboundary watercourses. The focus of this research therefore seeks to develop a modelling approach that can quantitively assess governance implications in a way that can be integrated into the wider DAFNE project and DAF development alongside other disciplines such as hydrology, environmental sciences, economics, and social research. This will be supported by qualitative analysis of relevant laws policies and scenarios, taking into account the hydrological research, social, environmental and economic models produced within the wider DAFNE project.

The study of law has traditionally taken a singular methodological approach of legal interpretation, through the analysis of technical and co-ordinated legal rules found in primary sources (*see* Van Hoecke, 2013). It is therefore a highly interpretative and subjective discipline that often lacks the methodological infrastructure that enables quantitative modelling. Modelling would in fact create a reductionist approach to the complex process of legal reasoning and argument which must deliberate many multifaceted and nuanced factors – from the legal source, to the facts that raise the legal question – which often cannot be relegated to foreseen variables (*see* generally on objectivity in law and legal reasoning: Husa and Van Hoecke, 2013). As McCrudden (2006, p.648) explains:

> "If legal academic work shows anything, it shows that an applicable legal norm on anything but the most banal question is likely to be complex, nuanced and contested. Law is not a datum; it is in constant evolution, developing in ways that are sometimes startling and endlessly inventive."

Nevertheless, creating a "legal" or "governance model" could add transparency to the legal reasoning process which is otherwise hidden within the "endlessly inventive" veil of legal scholarship. In fact, some attempts have been made to fill this disciplinary deficiency by creating operational tools that allow the application of law to become accessible across disciplines. For example, the Food and Agricultural Organisation (FAO) have developed a systematic methodology to identify areas in need of *de jure* law reform in the subject of gender-equitable land tenure through a "Legal Assessment Tool" (LAT) (FAO, 2014; Kenney and De la O Campos, 2016). In the context of transboundary watercourses, Wouters et al. (2005) developed a "Legal Assessment Model" to assess the parameters of a watercourse state's legal entitlements and obligations regarding their use of a watercourse. Lankford (2013) has gone further to develop a negotiation model to objectively determine equitable entitlements within the parameters of international water law.

The research presented in this report draws upon and develops these existing approaches to achieve the objective of understanding the application of legal principles in the context of transboundary watercourses, in line with the aims of the DAFNE Project. Underpinning the research is a doctrinal legal methodology,

> "which provides a systematic exposition of the rules governing a particular legal category, analyses the relationship between rules, explains areas of difficulty and, perhaps, predicts future developments" (Pearce, 1987).

Thus, this research focuses upon the identification and application of legal principles (such as rules, procedures, obligations, and rights) relevant to actions over transboundary watercourses that set the standards and expectations from riparian states by identifying and analysing the applicable legal instruments. This objective is guided by the following criteria, which are necessary to establish as part of the legal reasoning process:

- The ***legal force*** of a legal instrument
- The identification of key ***legal principles***

1.3 REPORT STRUCTURE

This report will be split into four main sections, as follows:

- **Section 2**: overview of some key concepts used within water governance, such as Integrated Water Resources Management (IWRM), Adaptive Management (AM) and Benefit Sharing. A summary of the relationship between the SDGs and the WEF Nexus is also provided. Subsequently, the context of the ZRB and OTB case studies is given, providing an overview of the legal frameworks which are relevant to each basin. This summary provides key considerations which are important for the development of a "governance model" in the context of the two case studies.
- **Section 3**: sets out the key legal principles which form the basis of the legal principles matrix which underpins the governance model and expands upon the methodology which is central to modelling the governance implications of various actions and scenarios.
- **Section 4**: operationalises these approaches by simulating scenarios in the context of each case study. This section will also provide specific results in relation to each case study regarding the governance implications of certain actions over others, as well as the strength of the law and governance frameworks in each basin, which may give rise to the need for reform.
- **Section 5**: lessons learnt from the model simulations and key findings regarding the developments and challenges of applying legal rules are discussed. Some suggestions for the integration of the governance model into the wider DAF are also given, along with some concluding remarks regarding this research in the context of the broader DAFNE project.

2. IDENTIFYING KEY LEGAL DOCUMENTS AND PRINCIPLES

2.1 GOVERNANCE, BENEFITS AND SUSTAINABILITY

2.1.1 Concepts of Water Governance

In the development of the governance model a literature review was conducted covering a diverse range of issues relating to governance of shared watercourses. Within the literature, a number of key concepts became evident as having been utilised for the management of watercourses across riparian states; namely, IWRM, AM and Benefit Sharing. While it is out-with the remit of this report to discuss the full findings of such research, some main points regarding each of the concepts and their utilisation for the purpose of the governance model are provided in the following sections.

In addition to the creation of a WEF Nexus, a number of other approaches to water governance have become prevalent. IWRM has become a global discourse of sustainable water management and has been codified as an international norm in global development agendas, including the Dublin Principles of the International Conference on Water and the Environment, and Agenda 21 of the Rio United Nations Conference on Environment and Development. According to Savenije and Van der Zaag (2008) by 2000, 113 countries had adopted IWRM principles.[3] IWRM principles were also endorsed within the Millennium Development Goals (MDGs) and the implementation of IWRM is

[3] H.H.G Savenije and P Van der Zaag, Integrated water resources management: concepts and issues (2008) Phys Chem Earth Parts A/B/C, 33(5) 290-297

now one of the indicators under Sustainable Development Goal (SDG) 6, the water goal.[4] Yet, despite its wide-scale endorsement and recognition as a framework for the sustainable management of water resources, IWRM has not fulfilled expectations when it comes to implementation.[5] Hering and Ingold (2002)[6] argue that one of the main reasons for this is the normative value which it places on integration with little guidance as to how this integration may take place. IWRM has also been criticised for becoming an end goal in itself, in some instances even undermining functional water management systems and limiting the scope for any alternative means of water governance.[7] In the context of this report, IWRM can also be seen to be limited on the basis that it places water at the centre of the development paradigm, when in reality water forms only one part of a complex holistic framework. In addition, placing focus on the implementation of formal IWRM systems often neglects existing and often functioning informal rights in relation water use.[8] IWRM approaches can be seen across the ZRB and OTB basins, it therefore must be ensured that frameworks built around such an approach do not become the goal themselves, but rather form part of a holistic framework to strive towards the resolution of cooperative management of shared watercourses.

AM refers to the process of continuous improvement by learning new processes and taking a "learning by doing" approach.[9] AM has been widely promoted as a solution to complex natural resource management problems, originally conceptualised as a methodology for managing ecosystems. The most crucial aspect of AM is the iterative process of feeding back information during the design and implementation of water resource management projects. However, both AM and IWRM have proven difficult to translate into practice due to a lack of definition, complexity and institutional barriers. In addition, in some ways adaptive and flexible processes can be seen to be at odds with legal obligations found in treaties which often do not allow for uncertain processes and changing and evolving circumstances. The WEF Nexus approach seeks to remedy the traditional approach of sectoral silos through the development of a new holistic paradigm in water governance.

The WEF Nexus has progressively become a promising approach to governing water resources which need to manage a number of complex and inter-connected uses. Unlike IWRM and AM, the WEF Nexus approach goes beyond the water centred management approach and attempts to ensure that food and energy security are already achieved. Nonetheless, water still appears to be considered ***primus inter pares***, but the additional emphasis on energy and food allows those responsible for water governance to look outside of the water focused discourse.[10] However, the coordination of different sectors is difficult, in many cases, as has been illustrated with regards to institutional structures within the basins, in most cases regulatory frameworks and planning instruments are siloed within one particular ministry, reducing opportunities for taking a holistic viewpoint. The WEF Nexus was explored at the Bonn 2011 Conference on "The Water-Energy-Food Security Nexus: Solutions for the Green Economy" which looked at the framing of the concept and its potential for environmental, social and economic sustainability. During the conference, the importance of institutional structures was also highlighted, it was stated that:

[4] Sustainable Development Goal 6.5.1 measures the degree of integrated water resources management implementation. See Transforming Our World: The 2030 Agenda for Sustainable Development, UNGA Res. A/RES/70/1, 21 October 2015 (The Sustainable Development Goals)

[5] Carlo Giupponi and Animesh Kumar Gain, "Integrated spatial assessment of the water, energy and food dimensions of the Sustainable Development Goals", Reg Environ Change (2017) 17, 1883

[6] JG Hering and KM Ingold, Water resources management: What should be integrated? (2012) Science 336:1234–1235.

[7] Mark Giordano and Tushaar Shah, "From IWRM back to integrated water resources management", International Journal of Water Resources Development (2014) 30 (3) 364-376

[8] Mark Giordano and Tushaar Shah, "From IWRM back to integrated water resources management", International Journal of Water Resources Development (2014) 30 (3) 364-376

[9] Carlo Giupponi and Animesh Kumar Gain, "Integrated spatial assessment of the water, energy and food dimensions of the Sustainable Development Goals", Reg Environ Change (2017) 17, 1883

[10] Carlo Giupponi and Animesh Kumar Gain, "Integrated spatial assessment of the water, energy and food dimensions of the Sustainable Development Goals, Reg Environmental Change (2017) 17, 1883

> "While the opportunities of the nexus perspective and their social, environmental and economic benefits are real, implementation requires the right policies, incentives and encouragement, institutions up to the task, leadership as well as empowerment, research, information and education."[11]

Difficulties also arise with regard to the power dynamics between WEF Nexus resources, it is often the case that agricultural policy will triumph over environmental considerations such as water quality. Equally, it is often the case that economic considerations with regard to projects such as hydropower development, will prevail over water use and allocation. Taking a nexus approach is based on the premise of attributing equal importance to all three of its domains.[12] In this sense, what is important is that the entrenched sectoral divisions are shifted in order to make room for a more cooperative framework. The WEF Nexus does also not explicitly determine the shape of governance arrangements, unlike IWRM which is based upon principles of "good governance" such as transparency and accountability.

The UNWC does not make explicit references to taking a WEF approach to transboundary water governance. The most relatable provision of the Convention is that of Article 6 which provides a breakdown of the factors to be taken into consideration in the determination of equitable and reasonable use. However, unlike the UNWC, the United Nations Economic Commission for Europe (UNECE) has adopted a methodology for assessing a Water-Food-Energy-Ecosystems Nexus in Transboundary basins.[13]The UNECE characterises the WEF nexus using a number of core features: knowledge mobilisation, sound scientific analysis, capacity building, participatory processes, collective efforts and the pursuance of mutual benefits and opportunities. The methodology discussed within the ECE Water Convention Framework covers a number of key steps: 1) identification of the basin conditions and socioeconomic context; 2) identification of key sectors and stakeholders to be included within the assessment; 3) analysis of key sectors; 4) identification of intersectoral issues; 5) nexus dialogue and future developments and; identification of opportunities for improvement.[14] These steps can be useful for applying they key principles of international water law through a WEF nexus approach. The idea of cooperation through the WEF nexus also links to utilisation of the concept of benefit sharing as well as to the utilisation of the SDG framework to create a more equitable and coordinated approach to the WEF nexus. The relationship of benefit sharing and the SDGs to the WEF nexus approach will now be considered.

2.1.2 Benefit Sharing

At a national level, states may face difficulty in understanding the quantity and quality of shared waters which they are entitled to, or the obligations for sharing the resource. It is also difficult for States to reconcile national need with international obligations, reconciling competing and co-existing interests with riparian states. Benefit sharing could therefore be utilised as a helpful framework whereby States can establish cooperative mechanisms to facilitate the utilisation of shared resources and increase the sustainability of the resource.

While the concept of benefit sharing has progressively become part of the international discourse on transboundary water management, there continues to be no clear definition of benefit sharing from either a law or policy perspective.[15] While the concept itself sounds simple, the quantification of benefits and the sharing of resources between riparian states is complex. For the purposes of this document, benefit sharing is defined as "any action designed to change the allocation of *costs*

[11] Bonn Conference. Messages from the Bonn2011 Conference: The Water, Energy and Food Security Nexus – Solutions for a Green Economy. In The Water, Energy and Food Security Nexus – Solutions for a Green Economy, Bonn, 2011, p.3

[12] For a detailed analysis of the WEF nexus, please see Claudia Pahl-Wostl, "Governance of the water-energy-food nexus: A multi-level coordination challenge", Environmental Science and Policy (2017)

[13] United Nations Economic Commission for Europe (UNECE). Methodology for Assessing Water-Food-Energy-Ecosystems Nexus in Transboundary Basins, ECE/MP.WAT/WG.1/2015/8, 15 June 2015. < http://www.unece.org/fileadmin/DAM/env/water/publications/WAT_Nexus/ece_mp.wat_46_eng.pdf>

[14] United Nations Economic Commission for Europe (UNECE). Methodology for Assessing Water-Food-Energy-Ecosystems Nexus in Transboundary Basins, ECE/MP.WAT/WG.1/2015/8, 15 June 2015. < http://www.unece.org/fileadmin/DAM/env/water/publications/WAT_Nexus/ece_mp.wat_46_eng.pdf>

[15] Elisa Morgera, "The needs for an international legal concept of fair and equitable benefit-sharing" European Journal of International Law (2016) 27 (2) pp. 353-383

and *benefits* associated with cooperation" which will generally "require some form of redistribution or compensation", as defined by Sadoff and Grey (2005).[16] Sadoff and Grey (2005) further define benefits to include "economic, social, environmental and political gains".[17] Therefore, the concept of benefit sharing aims to provide a framework for agreement and cooperation between parties, jointly motivated by the benefits which they can derive from that agreement.[18]

Benefit sharing becomes useful at times when the simple allocation of water would not be efficient. By taking a wider analysis beyond water-related issues, benefit sharing has the possibility of opening up a broader spectrum of arrangements which could serve to foster inter-state cooperation. In terms of cooperation within the WEF nexus, benefit sharing can therefore open up space to link water resources to irrigated food production or hydropower generation, encompassing socio-economic, political, and environmental benefits.[19] Paisley (2002) lists eight examples of "international agreements which provide for the return, either in kind or in monetary form, of a share of benefits received in a state or states as a result of acts done in another state or states" (Paisley, 2002, p.288) On this basis, he concludes that:

> "these examples confirm that state practice can be invoked in support of an emerging principle of customary international law regarding the equitable sharing of downstream benefits where the act that confers the benefit on one state appears to have been done, or not done, at the request of another state" (p.289).

Agreements can therefore be made in the form of compensation for costs or payments for benefits. For instance, upstream states may put in place watershed management arrangements which reduce flooding, control pollution or reduce sediment loads and as a result can be provided with payment of benefits derived from downstream states which their management techniques assist to facilitate. Sadoff and Grey (2005)[20] divide benefits into four types, as demonstrated in Table 1.

Table 1 – Example of Benefit Sharing Mechanisms with regards to Shared Watercourses

Type	**The Challenge**	**The Opportunities**
Type 1 Increasing Benefits to the River	Degraded water quality, watersheds, wetlands and biodiversity	Improved water quality, river flow characteristics, soil conservation, biodiversity and overall sustainability
Type 2 Increasing Benefits from the river	Increasing demands for water, sub-optimal water resources management and development	Improved water resources management for hydropower & agricultural production, flood-drought management, navigation, environmental conservation, water quality and recreation
Type 3 Reducing costs because of the river	Tense regional relations and political economy impacts	Policy shift to cooperation & development, away from dispute/conflict; from food (& energy), self-sufficiency to food (& energy) security; reduced disputes/conflict risk & military expenditure
Type 4 Increasing Benefits Beyond the River	Regional Fragmentation	Integration of regional infrastructure, markets & trade

[Source: Sadoff & Grey, "Cooperation on International Rivers" Water International (2005) 30 (4) 420-427]

Globally, there have been a number of examples of benefit sharing in international watercourses, the origin of which is understood to be the 1961 Treaty Relating to Cooperative Development of the

[16] Sadoff & Grey, "Cooperation on International Rivers" Water International (2005) 30 (4) 422

[17] Sadoff & Grey, "Cooperation on International Rivers" Water International (2005) 30 (4) 421

[18] Elisa Morgera, "The needs for an international legal concept of fair and equitable benefit-sharing" European Journal of International Law (2016) 27 (2) pp. 353-383

[19] O McIntyre, "Benefit-sharing and upstream/downstream cooperation for ecological protection of transboundary waters: opportunities for China as an upstream state" Water International (2015) 41 (1) 51

[20] Sadoff & Grey, "Cooperation on International Rivers" Water International (2005) 30 (4) 420-427

Water Resources of the Columbia River Basin (Columbia River Treaty), concluded between Canada and the United States.[21] The treaty covered the construction of three infrastructure projects in Canada and aimed to maximise benefits associated with such projects, such as hydropower generation capacity, irrigation and flood control, within the United States.[22] Development of joint opportunities can therefore easily outweigh the benefits of acting independently. For example, negotiations concerning significant hydropower developments in an international watercourse in the territory of one riparian state should include alternative scenarios that attempt to maximise the benefits of the project for other riparian states – such as energy supply or flow regulation. These types of negotiations must be based on the identification and development of opportunities which can have reciprocal sharing of benefits.

However, a number of concerns have also been raised with regard to the effectiveness of benefit sharing arrangements. Tarlock and Wouters (2007) identify the lack of binding legal and competent institutional arrangements as key reasons for unsuccessful benefit sharing arrangements.[23] Conducting a comparison between the relative success of the Columbia River benefit sharing arrangements with the problems experienced in introducing benefit sharing within the Amu Darya and Syr Darya basins in Central Asia, the authors identify "a dysfunctional, ad hoc allocation regime, augmented by endless soft law declarations and agreements".[24] In some cases, evidence has demonstrated that benefit-sharing may actually work against its identified objectives.[25] Martin et al (2014) have described benefit sharing as "disingenuous win-win rhetoric" which actually results in loss of control over natural resources. Criticism is often inherently linked to power asymmetries between riparian states. In the case of international watercourses, hydro-hegemony has been widely discussed as a key element in the formation of agreements over transboundary resources.[26] In addition Subramanian et al. (2014) states that "benefits are necessary, but they are not sufficient to induce widespread cooperation" citing that perceived risks of cooperating may impede cooperation over shared waters.[27] Therefore, within the creation of a governance framework which promotes benefit sharing, the incorporation of interventions which reduce risk has the potential to be as effective as those which promote economic benefits to countries. Therefore, while, benefit sharing approaches can provide a useful mechanism on which to base cooperative governance arrangements, such models must take into consideration the character of the country, including perceived risks as well as benefits. Potential models of benefit sharing within the DAFNE project are considered in Section 4.1.3.

2.1.3 Sustainable Development Goals

In 2015, the UN General Assembly adopted a resolution entitled "Transforming our world: the 2030 Agenda for Sustainable Development", more commonly known as the Sustainable Development Goals (SDGs). This global policy put in place 15 overarching goals and 169 integrated targets for global development. The SDGs provide commitment to universal action on a global scale, however implementation occurs at local and national levels. Nations are responsible for defining their own pathways to the SDGs. The broad scope of the SDGs, as is the case with the WEF Nexus, requires an approach which goes beyond single sectors. Taking a broad overview, a relationship be-

[21] O McIntyre, "Benefit-sharing and upstream/downstream cooperation for ecological protection of transboundary waters: opportunities for China as an upstream state" Water International (2015) 41 (1) 51

[22] O McIntyre, "Benefit-sharing and upstream/downstream cooperation for ecological protection of transboundary waters: opportunities for China as an upstream state" Water International (2015) 41 (1) 51

[23] Dan Tarlock and Patricia Wouters, "Are shared benefits of international waters an equitable apportionment?" Focus Issue: International Water, Colorado Journal of International Environmental Law and Policy (2007) 18 (3), 527

[24] Dan Tarlock and Patricia Wouters, "Are shared benefits of international waters an equitable apportionment?" Focus Issue: International Water, Colorado Journal of International Environmental Law and Policy (2007) 18 (3), 527

[25] E Morgera, "The needs for an international legal concept of fair and equitable benefit-sharing" European Journal of International Law (2016) 27 (2) pp. 353-383

[26] Marwa Daoudy, "Hydro-hegemony and international water law: laying claims to water rights" Water Policy (2008)10(2); Mark Zeitoun and Jeroen Warner, "Hydro-hegemony – a framework for analysis of transboundary water conflicts" Water Policy (2006) 8 435-460

[27] Ashok Subramanian, Bridget Brown and Aaron T. Wolf, "Understanding and overcoming risks to cooperation along transboundary rivers" Water Policy (2014) 16 826

tween the WEF nexus and all of the SDGs can be identified. This means that working positively towards a WEF nexus approach is likely to have positive ramifications across other goals. However, in order to provide a more useful analysis, only the most relevant goals, targets and associated indicators will be considered within this report. Of the 17 SDGs three specific goals are dedicated to the nexus problem: 1) food security (SDG 2 aims to end hunger, achieve food security and improve nutrition and promote sustainable agriculture); 2) availability and sustainable management of water (SDG 6 aims to ensure the availability and sustainable management of water and sanitation for all); affordable and clean energy (SDG 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all).

Assessment of the environmental impacts of development projects are generally conducted from a perspective of protection for the environment and as such it examines those impacts which are likely to be detrimental to both the environment and wider issues such as social and economic interests. Although positive impacts are considered by funders themselves as a rationale for the project to take place, they are not often examined from a governance perspective. This is largely because the law is framed from the perspective of what is and is not permitted by particular actors within particular circumstances. However, soft law instruments, such as the SDGs which can be seen as more “aspirational” in their aims can provide a framework against which the positive impacts of a potential project could be measured.

The water goal (Goal 6) discusses water quality, water efficiency, integrated water management and protecting and restoring water-related ecosystems. Target 2.4 of the Food Security Goal (Goal 2) refers to sustainable food production systems as well as resilient agricultural practices. The energy goal (Goal 7) is less ambitious and places focus on the efficiency of energy resources, rather than sustainability. The interconnectedness of the three goals is not made explicit within the framework. Target 6.5 of Goal 6 is extremely important for the purposes of both this paper and the wider DAF framework in general. The target calls for the implementation of IWRM at all levels, including through transboundary cooperation. The two related indicators cover the degree of IWRM implementation and the proportion of a transboundary basin area with an operational arrangement for water cooperation. Therefore, for cooperation to be deemed operational, cooperation must be underpinned by a joint body. Such a joint body or institution may take a different form in different basins and should be based upon the needs of the relevant riparian states. It is likely that the greatest difficulty with implementing the SDGs will be the availability of comparable global datasets. These gaps stress the importance of the need for such cooperation through procedural aspects of governance on aspects such as data and information sharing. Further detail regarding the relationship between the SDGs, the governance model and the ZRB and OTB is provided in Section 3.3.4.

2.2 LAW AND GOVERNANCE IN THE ZAMBEZI RIVER BASIN

The modelling approach presented in this report is underpinned by doctrinal legal methodology. It is therefore necessary to provide a doctrinal account of the legal frameworks of the two basin case studies which form the foundations of the governance model matrices. Within the DAFNE Project, these legal frameworks have been comprehensively established and explained in Milestones 4 and 57 (Yihdego and Hawkins, 2017; 2018). Within the development of these Deliverables, 362 law and policy documents relevant to the governance of both basins on multiple scales were collected and analysed to determine the key legal principles that shape the duties owed by and to the basin states. A summary of each legal framework is outlined here, with emphasis upon the key considerations and findings relevant for development of the governance model.

2.2.1 Geographical background and basin characteristics

The ZRB is a vast resource with multiple challenges between many stakeholders, requiring cooperative decision-making. Many laws and policies govern the resource on multiple levels, some broadly governing water resources in the region, and some directly in relation to the ZRB itself. It is the largest river basin in the Southern African Development Community (SADC), with a total area

of 1.37 km^2, spanning the riparian countries of Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe (see Figure 1) (World Bank, 2010). The countries share different proportions of the basin and rely on it to different extents. For example, the basin comprises almost all of Malawi's territory, 76.4% of Zambia, 54.5% of Zimbabwe, 20.2% of Mozambique and 18.9% of Angola (FAO, 1997). By comparison, the basin comprises very minor parts of Tanzania, Botswana and Namibia. The vast range of the basin gives rise to significant physical and climate variations such as rainfall, temperature, and geological characteristics. Moreover, the different economic and cultural contexts of the riparian states result in varied land use and economic development across the basin (ZRA, 2008). For better management of such a large and varied resource, the ZRB has been divided into 13 sub-basins representing major tributaries and segments, most of which are transboundary (see Figure 2).[28]

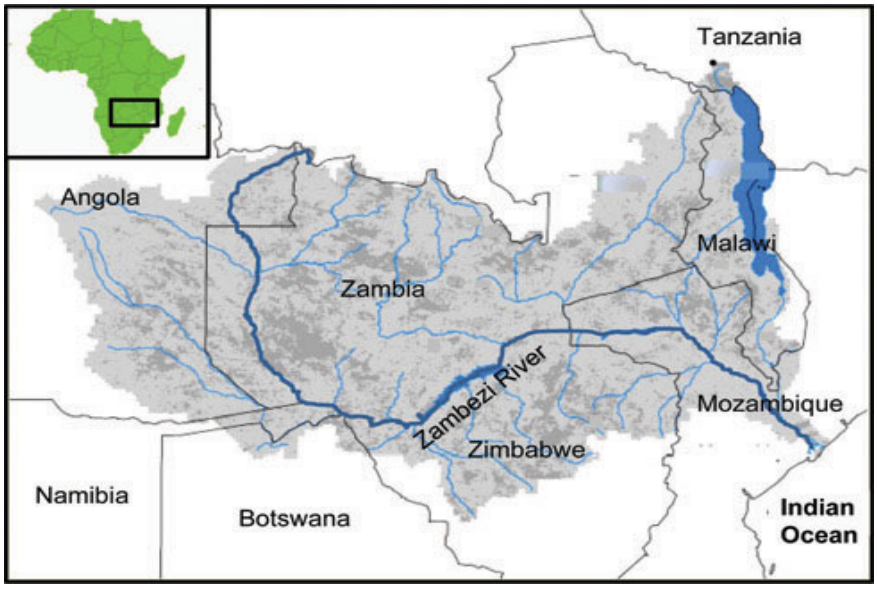

Figure 1 – Location of the Zambezi River Basin (Phiri, 2007)

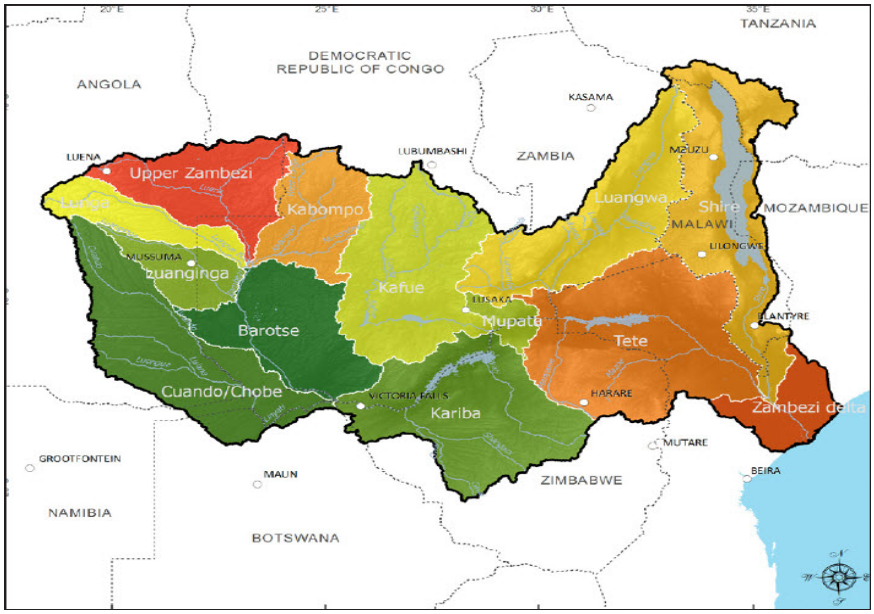

Figure 2 – The 13 Sub-Basins of the Zambezi River Basin (Beilfuss, 2012)

[28] The sub-basins are named as follows: (1) Zambezi Delta; (2) Tete; (3) Shire River-Lake Malawi/Niassa/Nyasa; (4) Mupata; (5) Luangwa; (6) Kariba; (7) Kafue; (8) Cuando/Chobe; (9) Barotse; (10) Luanginga; (11) Lungúe Bungo; (12) Upper Zambezi; (13) Kabompo.

The Zambezi River travels around 150 km before entering the Indian Ocean (ZRA, 2008), creating many opportunities for economic development projects such as hydropower plants and agricultural developments along the way (see Figure 3). While there are several sources to the ZRB as a whole, the source of the Zambezi River itself is located in Zambia, flowing into Angola, back into Zambia, the Eastern Caprivi Strip in Namibia, northern Botswana and then through Mosi-oa-Tunya (Victoria Falls), shared by Zambia and Zimbabwe. The river then flows into Lake Kariba behind the Kariba Dam, built in 1959 (WCD, 2000). The Zambezi River is then joined by the Kafue River, a major tributary, which flows through the Copperbelt of Zambia into the reservoir behind the Itezhi Tezhi Dam, built in 1977 (McIntyre, 1996). The Kafue River next enters the Kafue Flats and then flows through the Kafue Gorge Upper hydroelectric scheme, commissioned in 1979 (ibid). Below the Kafue River confluence, the Zambezi River pools behind Cahora Bassa Dam in Mozambique, built in 1974 (Wiafe-Amoako, 2016). Further downstream, the Zambezi River is joined by the Shire River, which flows out of Lake Malawi/Niassa/Nyasa to the north, the third-largest freshwater lake in Africa (ZRA, 2008). The combination of these natural physical characteristics and development project dams create many challenges, as well as opportunities, for the management of the ZBR and the human and ecological needs it sustains. These challenges and opportunities were discussed in Milestone 4 using the framework of the WEF nexus to highlight the multi-sectoral issues facing the management of the ZRB, as identified through a literature search (Yihdego and Hawkins, 2017). The tensions and mutual benefits between water, energy and food in the Zambezi River Basin outlined in Milestone 4 are summarised in Table 2.

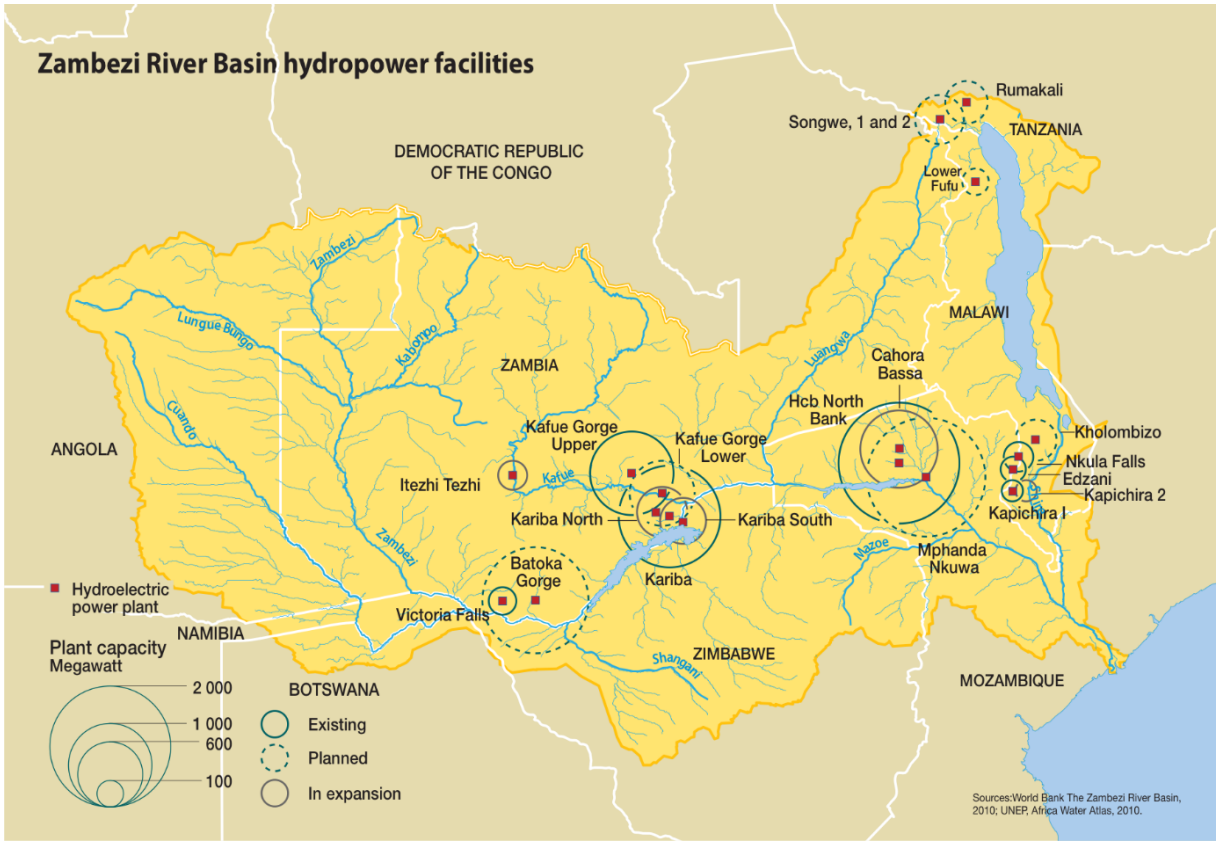

Figure 3 – Zambezi River Basin hydropower dams (GRID-Arendal, 2013)

Table 2 – Tensions and mutual benefits between water, energy and food in the Zambezi River Basin

Impact → ***Cause ↓***	***Water***	***Energy***	***Food***
Water	– Domestic consumption smallest use of basin; access to clean water and sanitation in the basin is poor + Water transfer schemes can help address poor access to potable water and sanitation – Water transfer schemes are a source of tension between riparian states – Dams disrupt natural flooding and associated livelihoods	+ Increased navigation would improve industries through transportation networks, including mining within the energy sector	+ Irrigated agriculture and livestock watering accounts for a small percentage of basin use, but is critical to local and export markets – Increased navigation would affect ecosystems and flow level regulation due to dredging and infrastructure, impacting seasonal fluctuations important for agriculture and fisheries
Energy	– Hydropower is largest share of water consumption in the basin through evaporation, and increased hydropower development is foreseen, impacting river basin flows necessary for ecosystem health – Hydropower dams impact the potential for increased navigation + Energy production could enable regulated water flow to help mitigate flooding and a more predictable flow of water	+ Hydropower is very important to the energy sector and improving the well-being of population in the region – Hydropower infrastructure requires high economic investment and continued maintenance	– Hydropower affects ecosystems and flow level regulation due to storage reservoirs, impacting sediment levels, seasonal fluctuations important for agriculture and fisheries + Hydropower dams can be used for agricultural activities through regulated supply and predicable river flows
Food	– Agricultural run-off effects water chemistry, potentially impacting ecosystem health	– Increased irrigation would dramatically increase water consumption and could affect flows required for hydropower generation	– Changes in water chemistry from agriculture, potentially impacts the health of fisheries

These trade-offs can be cooperatively managed and addressed through the multi-level legal frameworks governing transboundary watercourses. These legal frameworks are now outlined, giving rise to key considerations for the modelling approach, which is designed with reference to the trade-offs and mutual benefits identified through the WEF nexus analysis.

2.2.2 International and regional law

The rules of international water law have been codified in several international and regional instruments. As identified in Milestone 4 (Yihdego and Hawkins, 2017), the two most relevant framework Conventions applicable to the cooperative governance of the ZRB are the 1997 UN Convention on the Non-navigational Uses of International Watercourses (UNWC) and the 2000 Revised Protocol on Shared Watercourses in the Southern African Development Community (SADC-PC). A full analysis of the legal frameworks is provided in Milestone 4 and as such only a brief summary of the key principles will be provided here.

Table 3 – Ratification status of the international instruments relevant to the Zambezi River Basin

	Angola	Botswana	Malawi	Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
UNWC	**Voted in favour**: 21 May 1997 UNGA vote	**Voted in favour**: 21 May 1997 UNGA vote	**Voted in favour**: 21 May 1997 UNGA vote	**Voted in favour**: 21 May 1997 UNGA vote	**Ratified**: 29 Aug 2001	**Ab-stained**: 21 May 1997 UNGA vote	**Voted in favour**: 21 May 1997 UNGA vote	**Absent**: 21 May 1997 UNGA vote
SADC -PC	**Signed**: 7 Aug 2000	**Ratified**: 21 Feb 2001	**Ratified**: 31 May 2001	**Ratified**: 12 Jan 2001	**Ratified**: 11 Sep 2001	**Ratified**: 20 Aug 2003	**Ratified**: 31 May 2004	**Signed**: 7 Aug 2000

Key Substantive Principles

The UNWC establishes the key substantive guiding principles for governing international watercourses as:

(a) equitable and reasonable utilisation of the resource (Article 5),
(b) the obligation to prevent significant harm to other watercourse states (Article 7),
(c) the protection and preservation of ecosystems (Article 20),
(d) the prevention, reduction and control of pollution (Article 21), and
(e) the general duty to cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith (Article 8)

Among the key provisions that link governance of water to other issues found in the WEF nexus are the realisation of equitable use and participation through considering the factors relevant to determining equitable and reasonable utilisation (Article 6). Specifically, Article 6 requires taking into account all relevant factors and circumstances, including:

(a) geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character
(b) the social and economic needs of the watercourse States concerned;
(c) the population dependent on the watercourse in each watercourse State;
(d) the effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
(e) existing and potential uses of the watercourse;
(f) conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect; and
(g) the availability of alternatives, of comparable value, to a particular planned or existing use.

This is not an exhaustive list of factors; their realisation may vary from case to case as each basin has varied natural and man-made characteristics. However, all of these factors can be relevant to understanding the WEF nexus in river basins in their own way, including to the ZRB. For example, the need to consider social and economic needs of States, as well as existing and potential uses, requires decision-makers to understand the nature of different uses in the ZRB – such as hydropower, irrigation, and fisheries – and the importance of distributing resource utilisation and trade-offs so that all basin States can meet their socio-economic demands in regard to those uses. The requirement to consider the transboundary effects of uses requires States to understand their water utilisation in terms of the consequences for other States and their uses. Article 6(2) states that:

> "the weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors" and that "all relevant factors are to be considered together and a conclusion reached on the basis of the whole."

Thus, cooperation is necessary for the implementation of Article 6, whereby States must clearly set out their resource needs in terms of their social and economic demands.

Next to equitable and reasonable use, the second most notable principle of international water law is the duty to prevent significant transboundary harm, which is subordinate to equitable and reasonable use. The provision is contained in Article 7 of the UNWC and requires consideration of Articles 5 and 6 (equitable and reasonable use). Importantly, this cross-reference is not replicated in the SADC-PC and as such it has been suggested that the SADC-PC places more weight upon the obligation of no significant harm.[29] The principle states that "watercourse states shall, in utilising an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse states". Article 7(2) provides further detail to the provision stating that "where significant harm nevertheless is caused to another watercourse State, the State whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected State, to eliminate and mitigate such harm and, where appropriate, to discuss the question of compensation." The definition of harm under the rule has been understood to include both water and non-water related interests.[30] As noted by McCaffrey (2001, p.349) the obligation is not defined to one state use of a watercourse which causes harm to another state use thereof, as "activities in one state not directly related to a watercourse (such as deforestation) may have harmful effects in another state". Therefore, benefit sharing can be used as a mechanism by which to share water-related benefits, as well as a means by which to eliminate, mitigate or compensate for the actual or potential harm to a state, as a practical implementation of the "no harm" rule.

Reflecting the UNWC, the SADC-PC sets out the key substantive principles for shared water governance as:

(a) equitable and reasonable utilization of the resource (Article 2; 3(7)),
(b) the obligation to prevent significant harm to other watercourse states (Article 3(10)),
(c) the protection and preservation of ecosystems, including the prevention, reduction and control of pollution (Article 4(2)), and
(d) the duty to cooperate (Article 3(7)).

The SADC-PC goes further than the provisions set out in the UNWC in regard to the environment. The factors relevant to equitable and reasonable utilisation are identical to the UNWC, except Article 3(8)(a)(ii), which adds the environmental needs of the Watercourse States concerned when considering the utilisation of shared watercourses. Furthermore, while the UNWC establishes the obligation not to cause significant harm to other watercourse states, Article 4(2) of the SADC-PC mandates:

> "the prevention, reduction and control of] pollution and environmental degradation of a shared watercourse that may cause significant harm to other Watercourse States *or to their environment*, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse." (emphasis added)

Thus, this provision extends beyond the direct interests of watercourse States, making the environment a legal actor, and extending the consideration of harm to individuals as well as States.

[29] Alistair Rieu--Clarke, Ruby Moynihan and Bjørn--Oliver Magsig, "UN Watercourses Convention -- User's Guide" (CWLPS 2012). pp. 234-258

[30] O McIntyre, "Benefit-sharing and upstream/downstream cooperation for ecological protection of transboundary waters: opportunities for China as an upstream state" Water International (2015) 41 (1) 54

Key Procedural Principles

In addition to the substantive norms and their factors, the UNWC provides relatively detailed procedural rules. Procedures for planned measures include the general obligation to exchange information, as well as detailed notification and consultation requirements with time period parameters (Articles 11-19). Planned measures are generally understood as intended projects or programmes that, according to Article 12, "may have a significant adverse effect on other watercourse States" (*see also* Rieu-Clarke et al. 2012). There is also significant emphasis placed on institutional mechanisms for cooperation. Article 8 (2) of the UNWC clearly states that:

> "In determining the manner of such cooperation, watercourse States may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate cooperation on relevant measures and procedures in the light of experience gained through cooperation in existing joint mechanisms and commissions in various regions."

Alongside this is the duty to peacefully (and not forcibly) settle disputes arising from water uses (or abuses) between riparian and other States (Article 33). Peaceful settlement methods such as negotiations, adjudication, and most importantly, employing fact-finding, have been emphasised in the Convention (Article 33), although these are recommendations that are not binding but should be considered by parties in good faith (Tanzi and Arcari, 2001: p284; McCaffrey, 2007). These are key for managing tensions and disagreements between and among basin riparians, the reasons for which are often characterised by different uses and demands, notably domestic, energy and agricultural uses.

The SADC-PC reinforces the UNWC's procedural rules of notification for planned measures in Article 4(1). Further, while the UNWC lacks a proper institutional framework for implementation, the SADC-PC establishes a framework of SADC Water Sector Organs comprising a Committee of Water Ministers, a Committee of Water Senior Officials, a Water Sector Coordinating Unit, and a Water Resources Technical Committee and sub-Committees in Article 5. In regard to dispute resolution, the SADC-PC refers to the SADC Tribunal in Article 7, however this provision is much less detailed than the UNWC.

In addition to the SADC-PC the SADC has adopted several policies for the management and development of regional water resources. The 2005 Regional Water Policy for the SADC (SADC, 2005) was developed to further the implementation of the Protocol and to provide the framework for sustainable, integrated and coordinated development, utilisation, protection and control of national and transboundary water resources regionally, whilst also representing the aspirations and interests of member States. This was followed by the 2006 Regional Water Strategy for the SADC (SADC, 2006), which provides the framework for the implementation of the Protocol and the Policy. The SADC has also produced specific guidelines for transboundary cooperation, including the 2010 SADC Guidelines for Strengthening River Basin Organisations (SADC, 2010), and the 2012 Regional Infrastructure Development Master Water Sector Plan (SADC, 2012), which guides the implementation of cross-border infrastructure projects. The most recent Regional Strategic Action Plan for Integrated Water Resources Development was approved in 2015 (SADC, 2015), and presents targets for the SADC to particularly address challenges relating to the water and energy crisis in the region, rainfall distribution, and regional transmission in the region.

2.2.3 Basin agreements

The size of the ZRB, spanning eight riparian states, creates a notable challenge in regard to basin-wide cooperation. Yet, developments towards joint management of shared watercourses has been significant within the basin. A long history of cooperation exists within the ZRB, with agreements dating back over a century. This report will focus on the most recent period of transboundary water cooperation, beginning with the formation of the Zambezi River Authority (ZRA).[31] Therefore, the main legal frameworks for the ZRB which will be considered within this report are:

[31] Early agreements were formed in the imperial era and largely focused on the demarcation of national boundaries, put in place by colonial governments, while agreements which came slightly later were largely bilateral. These agreements are nonetheless important to

- ***ZRA Agreement:*** 1987 Agreement between Zambia and Zimbabwe Concerning the Utilization of the Zambezi River (ZRA, 1987),
- ***ZACPLAN:*** 1987 Agreement on the action plan for the environmentally sound management of the Common Zambezi River system (ZACPLAN, 1987),
- ***ZAMCOM:*** 2004 Agreement on the Establishment of the Zambezi Watercourse Commission (ZAMCOM, 2004).

The ZRA Agreement is an institutional agreement which specifically establishes the ZRA, previously the Central African Power Cooperation, and charges it with the duty to "operate, monitor and maintain the Kariba Complex" (Article 9). The ZRA Agreement entered into force on the 1st of October 1987 and takes the form of a bilateral treaty, binding upon States" ratification through national legislation. The ZRA applies to both the "Zambezi River" and the "Zambezi Scheme", as detailed within Article 1. The Zambezi River is defined within the agreement as "that part of the Zambezi River common to the borders of the two states", the "Zambezi Scheme" is "the Kariba Complex and any additional dams, reservoirs and installations that may be constructed or installed on the Zambezi River" (Article 1). The Agreement also defines the "Kariba Complex" as the Kariba Dam and Reservoir, all telemetering stations relating to the Kariba Dam and any other installations owned by the Authority at Kariba.

The ZRA calls for efficient and equitable use of the waters of the Zambezi River (Article 18(1)). It also states that all energy produced from the Kariba Dam should be shared equally (Article 23) and provides further details regarding equal water allocation in Annexure 1 (Article 23). The agreement also provides a number of cooperation and consultation obligations within Article 18(1). The procedural mechanisms contained within the agreement are also well developed for the time of its formation, Annexure 1 (Article 22) calls for the exchange of information which is "of common interest related to the interconnected systems". It also lists a number of obligations regarding consultations over planned measures and abstractions on the watercourse (Article 9(e) and 18), as well as cooperation over regulation of the water level and maintenance of hydraulic works and installations (Articles 9 and 22). Obligations regarding financing are included in Articles 25 and 26 and compensation for expropriation are given in Article 20. Importantly a joint technical committee is established through Annexure 1 (Article 22) and obligations regarding dispute settlement are also put in place (Article 32).

ZACPLAN involved five of the ZRB riparian's – Botswana, Tanzania, Mozambique, Zambia and Zimbabwe and aimed to work on 19 projects to conserve the Zambezi system. It provided a framework to collect data and coordinate planning, however at its conclusion in 2008 only 10 of the projects had been implemented.

The ZAMCOM Agreement is an institutional agreement which specifically establishes the Zambezi Watercourse Commission (ZAMCOM) to "be an international organisation" with "legal personality with capacity and power to enter into contract, acquire, own or dispose of moveable or immoveable property and to sue or be sued" (Article 4). The treaty is binding on all of the States which have ratified it. As it currently stands, ZAMCOM has been ratified by all ZRB States with the exception of Malawi who has only signed the agreement.

ZAMCOM contains a number of the substantive and procedural rules which are found within the UNWC. Article 12(1)(h) and 13 cover equitable and reasonable utilization of the watercourse, with factors relevant to equitable and reasonable use covered in Article 13(2). The obligation to prevent significant harm to other watercourse states is provided in Articles 12(1)(v) and 14(2) which seek to prevent, eliminate, mitigate or control adverse transboundary impacts (Article 14(3)). The Agreement also includes provisions on the prevention, reduction and control of pollution, including the protection of associated ecosystems (Article 14(3)(a)). It also provides full cooperation and support

acknowledge the history of cooperation within the basin. For a full analysis of all of the agreements formed within the ZRB, *see* Jonathan, L., P. Zebediah, S. Vladimir & S. Davison. 2017. *The Zambezi River Basin: Water and sustainable development*. Taylor and Francis.

to the Council and Technical Committee of ZAMCOM (Article 14(5)). In terms of the procedural framework, the Agreement establishes a joint institutional framework in Articles 3 to 9. It also promotes the regular exchange of available or obtainable data and information "with regard to all aspects of the Zambezi Watercourse" (Article 15). Procedures regarding the exchange of information on planned measures and notification concerning planned measures with possible adverse effects are included in Article 16. Dispute settlement measures are also included within the Agreement in Article 16(5), 21 and 22. Importantly, a provision is also included regarding the harmonisation of development plans with the Zambezi Strategic Plan in Article 14(9).

Table 4 – Ratification status of the basin agreements governing the Zambezi River Basin

	Angola	Botswana	Malawi	Mozambique	Namibia	Tanzania	Zambia	Zimbabwe
ZRA Agreement	-	-	-	-	-	-	**Ratified**:	**Ratified:**
ZACPLAN	-	**Signed**: 28 May 1987	-	**Signed**: 28 May 1987	-	**Signed**: 28 May 1987	**Signed**: 28 May 1987	**Signed**: 28 May 1987
ZAMCOM	**Ratified**	**Ratified**	**Signed**	**Ratified**	**Ratified**	**Ratified**	**Ratified**	**Ratified**

2.2.4 National Development Plans and Strategies

Analysis of the level of implementation of international key principles within national legal and policy frameworks will be conducted in Section 3. Therefore, focus here is placed on National Development Plans (NDPs) and wider frameworks applicable to the WEF nexus. It should be noted that due to a lack of translation regarding Angola and Mozambique's laws and policies, the authors necessarily have relied on the few secondary materials that exist in the English language, as well as partial, unofficial translation. With regards to NDPs and wider WEF related frameworks, no such documents were found for Angola. It is important to note that a number of the Zambezi states are also part of other shared river basins, for instance Namibia and Botswana are included within the Orange-Senqu basin and Angola, Namibia and Botswana are also within the Okavango river basin. As a result, the national frameworks which relate to transboundary waters are likely to be formed with a number of water systems in mind, not only the ZRB.

Mozambique

Mozambique has been working towards the implementation of IWRM-inspired policies and a process of decentralisation, as is the case within the other Zambezi states. However, both the legal and policy framework of water governance within Mozambique appears outdated.[32] Throughout Agenda 2025, the impact of colonialism on existing development in Mozambique is made clear, with multiple references to colonial era structures throughout the document. As a means of overcoming underdevelopment, it states that

[32] For an analysis of the different stages of water governance which have taken place in Mozambique, see Rossella Alba and Alex Bolding, "IWRM *Avant la Lettre?* Four key episodes in the policy articulation of IWRM in downstream Mozambique, Water Alternatives (2016) 9(3)

> "…the Country can depend on substantial resources such as the availability of arable land, water, forest and marine resources, potential for tourism, hydropower potential, coal and gas, an enabling environment and untapped potential in the mining sector…"[33]

This list of developmental opportunities is challenging from an environmental stance, with development of coal and gas resources listed amid a number of environmental spheres such as land and water. No reference is made to the potential conflicts and trade-offs which would have to be made between such sectors. There is no specific section relating to the environment within the document, however each of the aspects of the WEF nexus are included, particularly relating to the use of land for food production, water resources for hydropower and gas and biomass potential with regards to the energy sector. It is noted that there is a lack of national programmes which focus on dams and dikes and thereby increase water storage for irrigation, flood control and other purposes.[34] The document also cites the enforcement of international and regional protocols and conventions, and specifically agreements and protocols for sharing waters of international rivers as providing opportunity for development.[35] It is also significant that under threats, the document states that "water and energy shortages may give rise to difficult relations between SADC States".[36] This point reiterated later within the document, where it is stated that "It is foreseen that in forthcoming years water becomes one of the main sources of conflict between the countries in the region", the document emphasises the downstream position of Mozambique and the need for cooperation.[37]

Botswana

The WEF Nexus notion of operating across sectors is iterated in Botswana's Eleventh National Development Plan which makes links with its broader goals in Vision 2036, as well as the SDGs. The NDP states that "for the SDGs to be realised, the projects to deliver Botswana's new Vision and the national priorities set out in NDP 11 will be designed in a way which delivers the targets under each goal to the greatest extent possible.[38] This strong framework of linkages helps to create a coherent NDP which coordinates the multiple frameworks which the country is working towards the realisation of. The NDP recognises the scarcity of water resources and identify water and energy as challenges for the agricultural sector, thus recognising the relationship between each aspect of the WEF nexus. Further, within the wider framework of infrastructure, linkages are again made between the energy and water sectors, stating that the Government will implement an Integrated Water and Energy Resource Management Programme which "promotes the optimal utilisation of energy and water resources".[39] The plan also mentions the importance of integrated water resource management more generally and places emphasis on the role which transboundary water resources play in Botswana's water security "as the country will depend heavily on international waters".[40]

Malawi

The Malawi Growth and Development Strategy (MGDS) III (2017) is the fourth medium-term national development strategy to be implemented between 2017 and 2022, and contributes to the countries wider development aspirations contained in Vision 2020.[41] At the outset of the strategy,

[33] Mozambique, Agenda 2025, pg. 59 < https://www.foresightfordevelopment.org/sobipro/55/130-agenda-2025-the-nations-vision-and-strategies>

[34] Mozambique, Agenda 2025, pg. 59 < https://www.foresightfordevelopment.org/sobipro/55/130-agenda-2025-the-nations-vision-and-strategies>

[35] Mozambique, Agenda 2025, pg. 60 < https://www.foresightfordevelopment.org/sobipro/55/130-agenda-2025-the-nations-vision-and-strategies>

[36] Mozambique, Agenda 2025, pg. 61 < https://www.foresightfordevelopment.org/sobipro/55/130-agenda-2025-the-nations-vision-and-strategies>

[37] Mozambique, Agenda 2025, pg. 81 < https://www.foresightfordevelopment.org/sobipro/55/130-agenda-2025-the-nations-vision-and-strategies>

[38] Botswana, Eleventh National Development Plan pg. 24

[39] Botswana, Eleventh National Development Plan pg. 110

[40] Botswana, Eleventh National Development Plan pg. 134

[41] Malawi Growth and Development Strategy (MGDS) III (2017)

the importance of the relationship between agriculture and water development is stated, recognising that "efforts to improve agricultural productivity will not yield meaningful results unless water resources management and other related aspects are improved".[42] The plan goes on to state that "increased investment in irrigation cannot succeed without addressing water conservation and catchment area, as well as ecosystems management".[43] The MGDS also makes note of importance of the SDGs, as well as making linkages to a number of other international law and policy documents. Similarly to Botswana, the MGDS creates explicit linkages between the national level strategy and international frameworks including the SDGs, Agenda 2030 and the African Union Agenda 2063.[44] The strategy also specifically recognises that it is "imperative that national plans domesticate all the international, regional and continental frameworks for easy implementation, monitoring and reporting".[45] The overall goal for agriculture, water development and climate change management is "to achieve sustainable agricultural transformation and water development that is adaptive to climate change and enhances ecosystem services".[46] The subsequent strategy for the realisation of this goal clearly recognises the WEF nexus, bringing together food security with integrated water resources management.[47] The importance of energy is also recognised within the strategy, although cross-cutting linkages with water and food are not provided. Within Vision 2020, increasing access to water is listed as one of the ambitions of the vision, noting that current water supplies are from unreliable sources and run by inadequate institutional arrangements. The need to prevent the degradation and depletion of water resources is also stressed, particularly with regards to the need to reduce pollution through the formation of proper waste disposal systems. Reference to food security is also made within the document, including the need for better irrigation in order to stabilising production during periods of drought.

Tanzania

Tanzania's National Water Policy 2002 links to Tanzania's Vision 2025 and covers water resources management, rural and urban water supply and sewerage. The policy recognises the WEF nexus, linking to the National Agricultural policy regarding rain-fed agriculture and irrigation projects and to the energy sector highlighting the importance of hydropower development. As with the other Zambezi countries, the policy also states that an IWRM approach is adopted to ensure that "multi-sectoral linkages" are included in the planning of water resource development.[48] In relation to transboundary waters in particular, the policy highlights that cooperation is necessary in accordance with the principle of equitable and reasonable use, as well as technical cooperation in research, data collection and information dissemination.[49]

Tanzania's National Five-Year Development Plan runs from 2016/17 to 2020/21 and is built on three pillars of transformation: industrialisation, human development and implementation effectiveness. One of the key objectives of the plan is to ensure that global and regional agreements, including the SDGs and Africa Agenda 2063 are adequately mainstreamed into national development planning and implementation frameworks.[50] Section 4.2.6 of the plan focuses specifically on natural resources management, environment and climate change. It cites as key targets a 10% share of GDP from sustainable utilisation of forest, water and marine resources and 50% of energy being from renewable sources. In relation to the water sector more specifically, the document cites that 158 important natural ecosystem/water basins have been identified and protected. In addition to the Section of the plan which focuses on environmental strategies overall, Section 4.3.4 provides targets and interventions for water supply and sanitation services specifically. Key interventions within the water sector are conservation and protection of water resources; the construction

[42] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 16
[43] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 16
[44] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 32
[45] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 33
[46] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 57
[47] Malawi Growth and Development Strategy (MGDS) III (2017) pg. 59
[48] National Water Policy, United Republic of Tanzania, July 2002, pg. 14
[49] National Water Policy, United Republic of Tanzania, July 2002, pg. 16
[50] Government of Tanzania, Five Year Development Plan (2016/17-2020/21), pg. 2

of water harvesting infrastructure; wastewater treatment plants; and capacity building, as well as the rehabilitation of existing infrastructure. However, no reference is given to transboundary resources or the need for cooperation.

Namibia

Namibia's Water Supply and Sanitation Policy of 2008 links with Namibia's Vision 2030 and its National Development Plans, stating that the financial performance of the water and sanitation sector will likely influence the pace of national development.[51] The policy recognises the link between the agricultural sector[52]and energy in relation to economic development.[53] However, more explicit references to key principles such as ecosystem protection and intergenerational equity or any mention of equitable and reasonable use or no significant harm are absent from the policy.

Namibia's 5th National Development Plan (NDP5) is the third five-year implementation plan to contribute to the achievement of Vision 2030 and is to be implemented from 2017/18 to 2021/22. NDP5 is based on four pillars, based on sustainable development, namely: economic progression; social transformation; environmental sustainability; and good governance. The fourth pillar of "good governance" is listed as being an "enabler" for the achievement of the other three pillars. The goal of the goof governance pillar is to "promote good governance through effective institutions".[54] Section 5.1 of NDP5 focuses on the need for increased investment in infrastructure development and looks at all aspects of the WEF nexus. In relation to water it states that agriculture (irrigation) is the largest water consumer and will remain to be so until 2030. Focus within the section is on the use of resources for economic growth and industrialisation, rather than for protection and preservation. Fisheries are also mentioned within the document, specifically with relation to the Zambezi, where it cites problems relating to over harvesting and commercial fishing. Overall water scarcity is referenced as a problem throughout the document. It is stated that domestic purposes (including livestock) are given priority with relation to water resources, with the second priority being economic activities such as mining, industry and irrigation.[55] Similarly to a number of the other Zambezi member states, the need for water infrastructure is highlighted within the plan. Reference is also given to the difficulty of shared watercourses and enhanced transboundary water cooperation is one of the cited goals of the plan. Within this goal it is stated that the strategy aims to "ensure equitable and reasonable access and allocation to transboundary shared water sources by securing Namibia share allocation and developing a water allocation strategy by 2018 with other riparian states".[56]

Zambia

Zambia's Seventh National Development Plan (7NDP) for the period of 2017-2021 contributes to its Vision 2030 and aims to work towards Zambia becoming a middle-income country by 2030. The importance of both agriculture and fisheries is expressed within the 7NDP. Interestingly, in the context of agricultural development, the plan notes "increasing agricultural outputs leads to the development of both upstream and downstream activities, the consolidation of value chains and the expansion of agro-industries, which are significant sources of employment and present real opportunities for economic diversification".[57] Therefore, while the plan recognises the relationship between agricultural activities on both upstream and downstream areas, it does not go further to state the relationship with water. The plan also states that "irrigation development remains a key intervention for increasing crop diversification, production and productivity".[58] Regarding energy the 7NDP

[51] National Water Supply and Sanitation Policy 2008, Government of Namibia. Section 2.2
[52] National Water Supply and Sanitation Policy 2008, Government of Namibia. Section 2.6.5
[53] National Water Supply and Sanitation Policy 2008, Government of Namibia. Section 2.5.1
[54] Government of Namibia, 5th National Development Plan (2017/18-2021/22) < http://www.gov.na/documents/10181/14226/NDP+5/>
[55] Government of Namibia, 5th National Development Plan (2017/18-2021/22) < http://www.gov.na/documents/10181/14226/NDP+5/> pg. 36
[56] Government of Namibia, 5th National Development Plan (2017/18-2021/22) < http://www.gov.na/documents/10181/14226/NDP+5/> pg. 37
[57] Zambia, Seventh National Development Plan, pg. 65
[58] Zambia, Seventh National Development Plan, pg. 66

states that there is need to increase supply in order to meet demand and as a result to "promote investment in hydro, nuclear, geothermal, wind and solar energy generation".[59] The plan goes on to emphasise that focus will be placed on promoting the development and use of "renewable and alternative energy sources such as solar, wind, biomass, geothermal and nuclear".[60]

One of the development outcomes highlighted within the plan is "improved water resources development and management". It states that "water resources infrastructure is a critical component in the provision of sustainable water resources management and services for engineered irrigation, drainage, water supply and sanitation, hydropower generation, flood control and food security".[61] Therefore, the plan explicitly recognises the link between water resources and food security. The plan cites a number of strategies which will be used to address water development and management issues with a view to "increasing availability of water resources for utilisation by productive sectors, for enhanced heath and sustainable economic growth".[62] These include the construction of small, medium and large dams, to meet various water needs, "particularly for domestic, agriculture and hydropower generation".[63] The importance of both transboundary aquifer and river basin management within the Zambezi are highlighted, stating that the government will promote the implementation of programmes and projects on transfer of water resources from water rich part of Zambia to water stressed parts.[64]

Zimbabwe

Zimbabwe has adopted a number of ad hoc plans which do not quite form the same level of comprehensive development strategy as found in the NDPs of the other Zambezi riparian states. The most recent of which is the Medium-Term Plan (MTP, 2011-2015), ZimAsset (2013-2018) and the Ten-Point Plan. All of the documents are either approaching or have past their point of expiration, as such, it can be expected that new development strategies will be put in place imminently. The MTP discusses the importance of natural resources and cites sustainable development as a key principle of the plan. It further states that people have the right to benefit from environmental goods, but also have a duty to look after them.[65] The importance of developing national strategies and actions plans in line with the multilateral environmental agreements which have been signed is also stressed within the MTP. Within the ZimAsset, references to the environment are less obvious although reference is made to a number of environmental challenges, including water pollution. Emphasis is placed on water infrastructure and water supply related development within the document. No reference is made to transboundary resources or the need for cooperation.

2.3 LAW AND GOVERNANCE IN THE OMO-TURKANA BASIN

2.3.1 Geographical background and basin characteristics

The Omo-Turkana Basin (OTB)– for the purposes of the DAFNE project - comprises two main water bodies: the Omo River in Ethiopia, which drains into Lake Turkana (formerly Lake Rudolf), which is located in both Ethiopia and Kenya (see Figure 4). In addition to Kenya and Ethiopia, who are the key stakeholders of the basin, small parts of the basin also enter the territories of South Sudan and Uganda. The basin holds high cultural, social, geological and environmental importance, with the Lower Omo Valley and Lake Turkana both listed as UNESCO World Heritage Sites. It is also an important economic resource due to its high potential for hydropower, which has led to transboundary cooperation in regard to hydro-power projects in recent years.

The Omo River and Lake Turkana are physically connected, with the international border between Ethiopia and Kenya crossing the northern tip of Lake Turkana. Broadly, most of Lake Turkana

[59] Zambia, Seventh National Development Plan, pg. 72
[60] Zambia, Seventh National Development Plan, pg. 73
[61] Zambia, Seventh National Development Plan, pg. 78
[62] Zambia, Seventh National Development Plan, pg. 79
[63] Zambia, Seventh National Development Plan, pg. 79
[64] Zambia, Seventh National Development Plan, pg. 79
[65] Government of Zimbabwe, Medium Term Plan (2011-2015) < http://extwprlegs1.fao.org/docs/pdf/zim151067.pdf>

therefore lies within Kenyan territory with some of its parts lying within the Ethiopian territory, whilst the Omo River is located entirely within Ethiopian territory (see Figure 4). Yet, fluctuating lake levels lead to changes in the physical character of the basin with implications vis-a-vis the international boundary between the two states. That is, the "official" start of the lake becomes more ambiguous as the wetland/ delta in the northern part of the lake increases.

The Omo River is about 760 km long, with a total fall of about 2,000m, producing a rapid flow with various waterfalls and limited navigability. The river has important geological and archaeological significance with the discovery of many early hominid fossils, leading to the Lower Valley of the Omo being designated a UNESCO World Heritage Site in 1980. Lake Turkana is the world's largest permanent desert lake, the fourth largest Salt Lake, and the Lake Turkana National Parks are also listed as UNESCO World Heritage Sites as of 1997. Three rivers flow into the lake (the Omo, Turkwel and Kerio), yet sources report that the lake receives 80% of its waters from the Omo River's inflow. The lake does not have an outflow, meaning that it is sensitive to climatic and seasonal fluctuations, and its main water loss is through evaporation, which is calculated at around 2.6 meters per year. It has been estimated in one study that development projects would result in the Lake's level dropping due to an initial period of dam reservoir filling, but that further study is needed to assess the impact of regulated Omo River flows on the lake.[66]

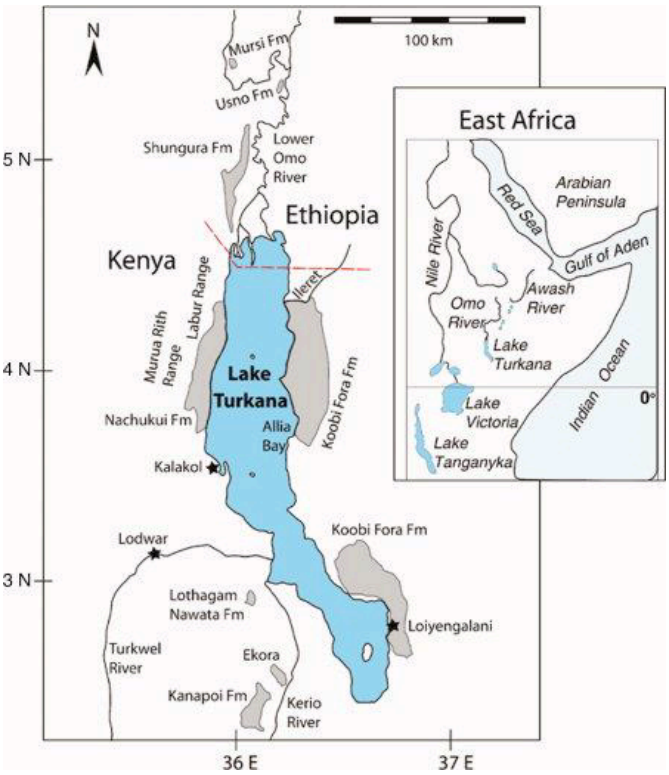

Figure 4 – Schematic map of the Omo River Basin showing the international border between Kenya and Ethiopia

As previously mentioned in Section 2.1.1 on the Zambezi, the trade-offs between water-energy-food can be cooperatively managed through appropriate governance mechanisms, including legal frameworks. The legal frameworks which are applicable to the OTB will now be outlined, demonstrating the key considerations for the modelling approach, which is designed with reference to the

[66] NM Velpuri and GB Senay, "Assessing the Potential Hydrological Impact of the Gibe III Dam on Lake Tur-kana Water Level Using Multi-Source Satellite Data" (2012) 16 Hydrology and Earth System Sciences 3561.; UNEP, "Ethiopia's Gibe III Dam: Its Potential Impact on Lake Turkana Water Levels (A Case Study Using Hydrologic Modelling and Multi-Source Satellite Data)" (United Nations Environment Programme 2013).

trade-offs and mutual benefits identified through the WEF nexus, as previously stated with regards to the Zambezi.

Table 5 – Tensions and mutual benefits between water, energy and food in the OTB River Basin

Impact → ***Cause ↓***	***Water***	***Energy***	***Food***
Water	– Water supply a key feature of the basin – Wastewater treatment is significantly underdeveloped – Flooding is prominent issue	+ Increased navigation would improve industries through transportation networks, including mining within the energy sector	+ Irrigated agriculture and livestock watering accounts for a small percentage of basin use, but is critical to local and export markets – Increased navigation would affect ecosystems and flow level regulation due to dredging and infrastructure, impacting seasonal fluctuations important for agriculture and fisheries – Flood managed agriculture and fisheries are key food resources in the basin. Increased irrigation will impact the flood-recession agriculture relied upon by many indigenous groups
Energy	– Hydropower is largest share of water consumption in the basin through evaporation, and increased hydropower development is foreseen, impacting river basin flows necessary for ecosystem health – Hydropower dams impact the potential for increased navigation + Energy production could enable regulated water flow to help mitigate flooding and a more predictable flow of water	+ Hydropower is very important to the energy sector and improving the well-being of population in the region + Wind farm construction on Lake Turkana has potential to provide energy to the basin – Hydropower infrastructure requires high economic investment and continued maintenance – Recent oil discovery around lake may have impacts on energy within the basin	– Hydropower affects ecosystems and flow level regulation due to storage reservoirs, impacting sediment levels, seasonal fluctuations important for agriculture and fisheries + Hydropower dams can be used for agricultural activities through regulated supply and predicable river flows – Wind farm has potential to result in decreased air and water quality, loss of ecology and increased noise and vibrations
Food	– Agricultural run-off effects water chemistry, impacting ecosystem health – Clearing of land for agriculture resulting in deforestation and degradation of land from overgrazing causes a build-up of silt, decreasing the rivers capacity	– Increased irrigation would dramatically increase water consumption and could affect flows required for hydropower generation	– Changes in water chemistry from agriculture, impacts upon the health of fisheries

2.3.2 International and regional law

As identified in Milestone 57 (Yihdego and Hawkins, 2018), neither Kenya or Ethiopia have ratified the UNWC, meaning the Convention does not legally bind these states. Yet, while neither State was among the more than 40 countries that sponsored the Convention, Kenya voted in favour of its adoption when voting in the UN General Assembly during its inception.[67] Ethiopia was recorded as abstaining, which may be partly explained by its geographical placement as an upstream state in its transboundary rivers and by the sense of being subjected to historical injustice regarding making reasonable use of its water resources.[68] Ethiopia also made a number of reservations on provisions during the drafting stages of the UNWC, including the perception that the scope of the principle of no significant harm could inhibit its ability to utilise its water resources and on the definition of a watercourse.[69] In addition, there is some controversy over the application of the definition of a watercourse to the OTB. The definition provided within the Convention is a 'system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally following into a common terminus" (UNWC, Article 2). The OTB therefore fits within the scope of this definition since the Omo River and Lake Turkana comprise a unitary whole of separate surface water bodies, that is, it is a system of surface water flowing into a common terminus, with parts situated in different states. However, an argument has been made by Ethiopia that the Omo River and Lake Turkana are actually two separate sub-basins (and therefore not a continuous international watercourse), although this is tenuous, as they are undoubtedly hydrologically connected with both upstream and downstream implications in the use of waters from either sub-basin. It is for this reason that the UNWC deliberately uses the language of "watercourse" comprising a 'system" of water bodies, and not "river basin" in order to clarify this potential ambiguity. Therefore, although Ethiopia is not party to the Convention, its reservation on the definition of a watercourse should be acknowledged, especially as it is not clear whether the definition of an "international watercourse" has attained the status of customary international law.

Despite not yet being party to the Convention, Ethiopia was actively involved in the drafting and development of the UNWC and voted in favour of the text when it was adopted by the Working Group of the Convention.[70] It has also endorsed key principles of international water law in the governance framework of the Nile, as demonstrated by the Nile River Basin Cooperative Framework Agreement (CFA)[71] which includes the principles of equitable and reasonable utilisation and no significant harm.[72] Therefore, it can be stated that Ethiopia is not against the use of these norms in principle, despite some reservations and objections.

Further, the UNWC is frequently regarded as codifying customary international law by the fact that many key principles of international water law (as contained in the UNWC) are widely endorsed in the international community and are also derived from, and endorsed by, other global instruments which are relevant to transboundary freshwater. For instance, the 1992, United Nations Economic

[67] "UN General Assembly Official Records, 99th Plenary Meeting, 21 May 1997, UN Doc A/51/PV.99" <http://www.un.org/ga/search/view_doc.asp?symbol=A/51/PV.99>

[68] Tadesse Kassa Woldetsadik, International Watercourses Law in the Nile River Basin: Three States at a Crossroads (Routledge 2013). pp250-253.

[69] This comment was however made in the context of the Nile but is nonetheless relevant in this case. *See* Convention on the law of the non-navigational uses of international watercourses. Draft articles on the law of the non-navigational uses of international watercourses and resolution on confined transboundary groundwater, Report of the Secretary-General, UN Doc A/51/275, General Assembly, Fifty-first session, 6 August 1996. 275.

[70] UN Doc. A/C.6/51/NUW /L.3Add.l/CRP.94; Sixth Committee Meeting No. 62, 11 April 1997.UN Doc. A/C.6/51/NUW /L.3Add.l/CRP.94; Sixth Committee Meeting No. 62, 4 April1997. See also Stephen McCaffrey, "The Contribution of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses" (2001) 1 Int. J. Global Environmental Issues. Stephen McCaffrey "The contribution of the UN Convention on the law of the non-navigational uses of international watercourses" Int. J. Global Environmental Issues, Vol. 1, Nos. 3/4, 2001 pp250-263.

[71] Agreement on the Nile River Basin Cooperative Framework [CFA] (signed 14 May 2010; not yet in force). Note that the CFA has added additional factors such as water contribution of riparian countries as a factor to applying equitable utilisation. However, the agreement is yet to enter into force.

[72] Article 4 and 5

Commission for Europe (UNECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention)[73] outlines in Article 2 the principles of equitable and reasonable use (taking into particular account their transboundary character, in the case of activities which cause or are likely to cause transboundary impact), prevention, control and reduction of transboundary impact and the conservation and restoration of ecosystems. The UNECE also includes the general duty of cooperation in Article 9, as well as adding key principles derived from international environmental law not present within the UNWC for the achievement of these provisions, such as the precautionary principle, the polluter-pays principle and the requirement to conduct environmental impact assessments. As discussion of the key provisions of the UNWC have already been conducted with regard to the ZRB, they will not be repeated here.

While the agreements in place at a regional level are not as elaborate in the OTB as those which can be found in the ZRB, a number of agreements which are applicable to the East African region are still relevant. While a full analysis of these agreements can be found in Milestone 57 (Yihdego and Hawkins, 2018), a summary of the instrument and its key principles and aims can be found below.

Table 6 – Applicable Regional Instruments in the OTB

Instrument	**Status**	**Key Principles/Aims**
1968 African Convention on the Conservation of Nature and Natural Resources, which was revised in 2003.[74]	Kenya and Ethiopia have signed both the ACCNNR and the Revised ACCNNR. Kenya is the only State to ratify the original ACCNNR, while neither State has ratified the Revised Version. Although the 2003 Convention takes precedence over the original Convention, where there is a relationship between Parties bound by the 2003 Convention and Parties bound by the original 1968 Convention, the original Convention shall apply.[75]	• "to adopt the measures to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people".[76] • With regards to water, the 1968 Convention sets out that policies should be established "for conservation, utilisation and development of underground and surface water, and shall endeavour to guarantee for their populations a sufficient and continuous supply of water"[77] • Where water resources are shared by two or more contracting states "the latter shall act in consultation, and if the need arises, set up inter-State commissions"[78] • The 2003 Convention therefore incorporates the principle of equitable utilization. [79] It also reinforces the need for cooperation in the management of water resources across a variety of sectors relevant to the WEF nexus, including irrigated agriculture and sustainable agro-based industrialisation. [80]
African Union (AU)	Both Kenya and Ethiopia are included in the agreement	• Promotes the mutual economic development among the majority of African States[81]

[73] UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1936 UNTC 269; signed 17 March 1992; in force 06 October 1996) (UNECE Water Convention).

[74] African Convention on the Conservation of Nature and Natural Resources (Signed 15 September 1968; in force 16 June 1969).; African Convention on the Conservation of Nature and Natural Resources (Revised Version) (Signed 11 July 2003; in force 10 July 2016).

[75] 1968 ACCNNR (n 92). Article 35.

[76] ibid., Article 2.

[77] Article 5

[78] Article 5(2), 2003 ACCNNR (Revised Version), Article 7(3)

[79] 2003 ACCNNR (Revised Version) (n 92)., Article 7(3).

[80] ibid., Article 7(4).

[81] Constitutive Act of the African Union (signed 11 July 2000; entered into force 26 May 2001).

(Table 6 continued)

African Economic Community (AEC)	Both Kenya and Ethiopia are included in the agreement	• Aims to strengthen existing regional economic communities such as the East African Community. • Significantly, the AEC specifies in Article 55 that member states shall cooperate on energy through the files of mineral and water resources, and new and renewable energy.[82]
COMESA 1993 Treaty Establishing a Common Market for Eastern and Southern Africa.[83]	Both Kenya and Ethiopia are party to the agreement	• "environmental protection requirements shall be a component of the Common Market's policy in all the fields of Common Market activity".[84] • Also calls on States to foster co-operation in the joint and efficient management and sustainable utilisation of natural resources within the Common Market for the mutual benefit of the member states", with specific reference to fresh water and forests.[85]
Intergovernmental Authority on Development (IGAD)	Both Kenya and Ethiopia are party to the agreement	• Regional integration organization, including various aspects of regional cooperation. • Article 6A is particularly relevant to transboundary governance, it establishes States" commitment to "[m]utual and equitable sharing of benefits accruing from cooperation under this Agreement", and Article 7 sets out an aim of IGAD to "[i]nitiate and promote programmes and projects for sustainable development of natural resources and environment protection". • Specific areas of cooperation are detailed in Article 13A which includes cooperation and coordination on policies relating to sustainable agricultural development, food security and energy policies and development plans. • The 2012 IGAD Inland Water Resources Management Programme (INWRMP) was also developed after water scarcity was linked with conflicts in the region. This subsequently led to the development of a Regional [86] • Water Resources Policy formed in 2015 which provides general guiding principles drawn from international water law.[87] • IGAD is also currently finalising a Regional Water Resources Protocol
New Partnership For Africa's Development (NEPAD)[88]	Both Kenya and Ethiopia are included in the agreement	• Aims to provide a vision and policy framework for accelerating economic cooperation and integration among African countries. • The Programme for Infrastructure Development (PIDA) under NEPAD aims to develop a vision and strategies framework for development of regional and continental infrastructure in energy, transport, information and communication technologies, as well as transboundary water resources.[89]

The recent emphasis on the management of shared watercourses through the IGAD illustrates the need for a cooperative framework in the region. The 2012 Water Programme (INWRMP) aimed to

[82] Treaty Establishing the African Economic Community (Signed 3 June 1991; in force 12 May 1994).
[83] COMESA Agreement
[84] ibid., Article 122(6).
[85] ibid., Article 123.
[86] Inland Water Resources Management Programme (INWRMP) in the IGAD Region" (*European External Action Service*) <https://eeas.europa.eu/delegations/venezuela/8404/inland-water-resources-manage-ment-programme-inwrmp-igad-region_en> accessed 5 September 2018.
[87] Inter-Governmental Authority on Development Regional Water Policy (endorsed 21 Match 2015).
[88] NEPAD, "The New Partnership for Africa's Development" (NEPAD 2001) <http://www.dirco.gov.za/au.nepad/nepad.pdf> accessed 3 September 2018.
[89] "Programme for Infrastructure Development in Africa (PIDA)" (*Programme for Infrastructure Development in Africa (PIDA)*) <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/programme-for-infra-structure-development-in-africa-pida/> accessed 5 September 2018.

work towards a common approach for the governance of shared water resources in the region, with the main output of a regional policy and subsequent protocol. The Regional Water Resources Policy was endorsed by the water ministers of Member States, including Ethiopia and Kenya on the 21st of January 2015. Its content has been based on a synthesis of national and legal frameworks and draws lessons from international water law and other basin agreements within the region. The policy also puts in place provision for a number of regional and national workshops to ensure stakeholder participation. IGAD Member States are now working towards the finalisation of a Draft Regional Water Resources Protocol which is to be informed by the policy and based on existing international water law principles. As per the current draft of the Protocol, it will aim to:

> "(a) to promote and facilitate the establishment of agreements on, and institutional arrangements for, the management of international river basins and transboundary aquifers and aquifer systems; (b) to promote the harmonization of policies and legislation on the use, development, protection, conservation and management of international river basins and transboundary aquifers and aquifer systems, and of the resources related thereto, and; (c) to promote research, technology development and capacity building so as to facilitate the use, development, protection, conservation and management of inter- national river basins and transboundary aquifers and aquifer systems, and of the resources related thereto."[90]

Many of the provisions of the protocol are expected to be taken from the UNWC and also from the Nile Basin Cooperative Framework.[91] In its draft form it includes all of the central tenets of international water law including *inter alia*: equitable and reasonable use; no significant harm; general obligation to cooperate; information sharing; notification and consultation; and transboundary impact assessments.[92]

In November 2018, a Ministerial Meeting took place to discuss progress made so far on the negotiation process of the IGAD Regional Protocol.[93] The meeting closed with the signing of a Comminiqué which reaffirmed commitment to the formation of the Protocol.[94]The Communique reiterates the endorsement of the IGAD Regional Water Resources Policy, signed on the 21st of January 2015 in Addis Ababa, Ethiopia. It recognises the need use of water for both survival and development and the need for common actions and synergy in the efforts towards preventing or mitigating the potential risks to which transboundary/shared water resources are exposed. The Communique also recalls the principles of the UNWC and the Draft Articles for Transboundary Aquifers.[95] The document also specifically refers to the principles of equitable and reasonable use and sustainable management of water resources without causing significant harm. The final sections of the document further reaffirm commitment to finalise the Regional Water Resources Protocol and to "promote closer cooperation in the equitable, sustainable and coordinated utilisation, protection, conservation and management of the Transboundary/Shared water resources in the IGAD region". The Communique was signed by both Ethiopia and Kenya.

Therefore, the formation of regional level agreements which relate to water governance in the OTB are progressing quickly. The finalisation of the Regional Water Resources Protocol will place the OTB within a similar arrangement as the ZRB with relation to the SADC-PC. Indeed, as stated by Nanni (2016), Articles 31-33 of the draft Protocol have taken inspiration from the SADC-PC in the formation of an institutional framework. The inclusion of Ethiopia and Kenya within this on-going

[90] Marcella Nanni, "Water Challenges in the IGAD region: towards new legal frameworks for cooperation", Water International (2016) 41(4) 635-651

[91] Marcella Nanni, "Water Challenges in the IGAD region: towards new legal frameworks for cooperation", Water International (2016) 41(4) 635-651

[92] It should be noted that it was not possible to obtain a copy of the Regional Water Policy or the draft Regional Water Resources Protocol within the course of this research. For this reason, analysis has relied upon secondary resources, namely Marcella Nanni, "Water Challenges in the IGAD region: towards new legal frameworks for cooperation", Water International (2016) 41(4) 635-651. It is also for this reason that neither document are included within the governance model matrix as the analysis is for primary sources.

[93] IGAD Ministers of Water Convene in Nairobi, 15th November 2018 https://igad.int/divisions/agriculture-and-environment/1993-igad-ministers-of-water-convene-in-nairobi

[94] Communique of the Meeting of Ministers Responsible for Water Resources of the IGAD Region, 14th November 2018 https://igad.int/attachments/article/1993/Communique'%20of%20the%20Meeting%20of%20Ministers%20Responsible%20for%20Water%20Resources%20in%20the%20IGAD%20Region.pdf

[95] Draft Law of Transboundary Aquifers appended Resolution No. 62/124 of the General Assembly of the United Nations, 11th December 2008

process should therefore be taken as positive demonstration of their commitment to key legal principles and to their desire to facilitate joint and cooperative management of shared water resources.

2.3.3 Basin agreements

The Kenya-Ethiopia border was defined in 1907 in a treaty between Ethiopia and Britain[96], which established the boundary which runs through the Omo River Delta and the Northern end of Lake Turkana. This boundary was reaffirmed in 1970 in an agreement between Ethiopia and newly independent Kenya.[97] In this agreement, it is stated that:

> "Kenya Government personnel in the Namoruputh area shall have access through Ethiopia territory to the Omo River for the purpose of obtaining fresh water" and that "other Kenya inhabitants and duly authorised government agents in the Namoruputh area may, from time to time, have access to the Omo River for fresh water under and subject to administrative arrangements made by the two governments and according to security conditions in the area."

This provision highlights both the positive spirit of cooperation between the two countries and peoples and the issues related to the division of water resources at the border, alongside poor infrastructure poor service provision and high poverty, which is somewhat confirmed by reports of conflict among pastoralist communities at the border over water and grazing land.[98]

In addition, the Kenya-Ethiopia Joint Technical Boundary Committee was established in 1950 for boundary demarcation and now serves the purpose of joint border inspections.[99]

Aside from the 1970 Border Agreement, Kenyan and Ethiopian relations have largely revolved around trade agreements[100] and to-date there has been no treaty between Kenya and Ethiopia directly addressing the governance of the OTB at the basin level. However, there have been two recent agreements between the countries relevant to the OTB: an agreement signed in December 2016 regarding hydropower sharing in relation to the Kenya-Ethiopia Electric Highway project[101] and the Cross-Border Programme for Sustainable Peace and Socio-Economic Development (SUPSED Agreement) signed in June 2017.

The 2016 power sharing agreement provides a mandate for the Kenya-Ethiopia Electricity Highway Project (or the Eastern Electricity Highway Project), which will see the construction of a 1,000km power line to run from Ethiopia to Kenya.[102] The agreement is built upon an MoU signed in 2006 between the Ethiopian Electric Power Corporation and the Kenya Electricity Transmission Company for the joint development of the project. The environmental and social impact assessment report was approved in 2012, although it has been criticised as it was conducted after any objection could be made.[103] Following a World Bank loan of US$684 million[104] construction began in June 2016. The agreement is not publicly available; however, it is reported that the agreement will allow

[96] Agreement between the United Kingdom and Ethiopia relative to the Frontiers between British East Africa, Uganda, and Ethiopia (signed at Addis Ababa, 6 December 1907).

[97] Kenya and Ethiopia Treaty respecting the boundary between the two countries (with maps, schedules and protocol) (Signed at Mombasa on 9 June 1970).

[98] "Ethiopia and Kenya Join Hands on Cross-Border Initiative to Boost Sub-Regional Peace and Development" (*UNDP*, 12 July 2015) <http://www.undp.org/content/undp/en/home/presscenter/pressre-leases/2015/12/07/ethiopia-and-kenya-join-hands-on-cross-border-initiative-to-boost-sub-regional-peace-and-development.html> accessed 5 September 2017.

[99] Government Notice No. 7, Kenya-Ethiopia Boundary Commission, S/A XAF 3/2 IV, 22 December 1950; *See also* Ian Brownlie and Ian Burns, *African Boundaries: A Legal and Diplomatic Encyclopaedia* (Royal Institute of International Affairs 1979).p.821.

[100] "Kenya and Ethiopia Sign Cross-Border Agreement" (*BBC news*) <http://www.bbc.com/news/world-africa-35025943> accessed 5 September 2017.; "Ethiopia, Kenya Ink Cross-Border Trade Agreement" (*Tralac.org*) <https://www.tralac.org/news/article/6811-ethiopia-kenya-ink-cross-border-trade-agree-ment.html> accessed 5 September 2017.; "Ethiopia, Kenya Sign Agreement to Build Major Road Linking the Two Countries" (*Ezega.com*)

[101] "Ethiopia, Kenya to Enhance Cooperation on Energy Sector." <http://bi.galegroup.com/global/article/GALE%7CA456075249/7f08136ab678381b204f382d03d2fa50?u=ustrath> accessed 5 September 2017.

[102] "Kenya-Ethiopia Electricity Highway, Kenya" (*Power-technology.com*) <http://www.power-technol-ogy.com/projects/kenya-ethiopia-electricity-highway/>

[103] Jon Abbink, "Dam Controversies: Contested Governance and Developmental Discourse on the Ethiopian Omo River Dam" (2012) 20 Social Anthropology 125.

[104] "AFCC2/RI-The Eastern Electricity Highway Project under the First Phase of the Eastern Africa Power Integration Program" (*projects.worldbank.org*) <http://projects.worldbank.org/P126579/regional-eastern-af-rica-power-pool-project-apl1?lang=en> accessed 2 September 2017.

Ethiopia to supply Kenya with 400 megawatts of hydro-power at less than 1 US-cent/kwh. The hydro-power source or sources that will supply this transmission line is not officially stated, although the World Bank modified an official project report specifying that power would be sourced "from Ethiopia's Gilgel Gibe hydropower scheme" changing the reference to the dam in its next report to "Ethiopia's power grid" instead.[105]

The 2017 SUPSED Agreement is built upon a programme initiated by the World Bank, UNDP and the IGAD Council of Ministers, which launched in December 2015 through an MoU between Kenya and Ethiopia.[106] Its scope covers the northern Marsabit county of Kenya and the southern Borana Zone in Ethiopia where the OTB is situated and aims to foster "environmental protection, trade, development and peaceful coexistence in their border regions". The agreement is not yet made available to the public.

As previously stated, it is important to note that both Ethiopia and Kenya have endorsed the CFA which adopts key principles of international water law including equitable and reasonable use of shared watercourses. However, while Ethiopia has ratified the agreement, Kenya has only signed it.[107] The existence of the CFA, as well as cooperation over power sharing demonstrates that there is scope for cooperation and benefit sharing arrangements to be put in place within the OTB basin.

2.3.4 National Development Plans and Strategies

An analysis of the national legislation in both Kenya and Ethiopia was conducted and detailed analysis provided in Milestone 57. The level of harmonisation between national and international legislation agreements and the incorporation of international legal principles is discussed in Section 3, therefore focus here is placed on NDPs and wider frameworks related to the WEF Nexus.

Ethiopia

Ethiopia's Constitution also sets out specific environmental objectives, including the right to a clean and healthy environment for all persons, and the duty of government and citizens to protect the environment.[108] In recognition of the WEF nexus, Ethiopia's water legislation recognises "water use" as "the use of water for drinking, irrigation, industry, power generation, transport, animal husbandry, fishing, mining and uses of water for other purposes".[109] The fundamental principle to complete integrated basin Master Plan Studies is to "ensure that any water resource is put to the highest social and economic benefit of the people of Ethiopia".[110] A proclamation was also put in place to provide for the establishment of a water resources development fund,[111] the funds objectives demonstrate the importance of the WEF nexus within Ethiopia. It is stated that the fund shall "make significant contribution in the course of development efforts directed towards attaining food self-sufficiency by expanding and ensuring the sustainability of irrigation development".[112]

Ethiopia also has in place a proclamation which details the function of River Basin Councils. The use of integrated water resources management is stressed throughout the document and the overall objectives of the river basin councils are stated as to "promote and monitor the integrated water resources management process in the river basins…with a view to using of the basins" water resources for the socio-economic welfare of the people in an equitable and participatory manner, and

[105] "Resettlement Action Plan (RAP) Final Report 2012" <https://www.afdb.org/fileadmin/uploads/afdb/Docu-ments/Environmental-and-Social-Assessments/Ethiopia%20RAP%20Final%20Report.pdf> accessed 5 September 2017.

[106] "The European Union Emergency Trust Fund for the Stability and Addressing the Root Causes of Irregular Migration and Displaced Persons in Africa" <https://ec.europa.eu/europeaid/sites/devco/files/regional-collaboration-in-cross-border-areas_en.pdf> accessed 5 September 2017.

[107] Agreement on the Nile River Basin Cooperative Framework [CFA] (signed 14 May 2010; not yet in force).

[108] 1995 Constitution of the Federal Democratic Republic of Ethiopia (adopted 8 December 1994; in force 21 August 1995), Articles 44 and 92

[109] 2005 Ethiopian Water Resources Management Regulations (No. 115 of 2005), Article 2(6)

[110] 2000 Ethiopian Water Resources Management Proclamation (No. 197 of 2000), Article 6(1)

[111] Water Resources Development Fund Establishment and its Administration Proclamation, Proclamation No. 268/2002, 31st January 2002

[112] Water Resources Development Fund Establishment and its Administration Proclamation, Proclamation No. 268/2002, 31st January 2002, Article 4(2)

without compromising the sustainability of the aquatic ecosystems."[113] A list of basins is given within the document, the Omo is listed as part of the "Omo-Ghibe" basin, however no reference to Lake Turkana is made. The proclamation also states that the basins high council will "provide information and advisory support to the body in charge of negotiating with neighbouring countries with respect to the basin where the basin is part of a transboundary basin".[114]

The Ethiopian Water Resources Management Policy appears outdated, formed in 1999, however it does give reference to a number of points of relevance to this report. For example, the policy clearly identifies the need for a WEF nexus approach, it states that "in order to alleviate the problems of agricultural outputs and other water users, sustainable and reliable development and proper use of the water resources of Ethiopia becomes imperative".[115] The policy also refers to the major hydropower potential of the country. A section of the policy is dedicated specifically to transboundary waters (Section 2.2.8), which promotes the "establishment of an integrated framework for joint utilisation and equitable cooperation and agreements on transboundary waters". It also recognises the relationship between regional and international frameworks, stating that Ethiopia's entitlement and use of transboundary waters should be "based on those accepted international norms and conventions endorsed by Ethiopia" and the need to "foster meaningful and mutually fair regional cooperation and agreements on the joint and efficient use of transboundary waters with riparian countries based on "equitable and reasonable" use principles.[116] Contained within the policy is a specific section (Section 2.3.3) relating to hydropower policy which demonstrates the importance of the progression of the sector to Ethiopia's development plans. The objectives of the hydropower policy stress the importance of taking into account environmental considerations, as well as ensuring there is mutual understanding and co-operation among Federal and Regional concerned parties. It states that it must be ensured that the "negative environmental impacts of hydropower are mitigated to the extent possible and that positive environmental impacts are exploited as far as possible".[117]

Ethiopia also gives consideration to WEF nexus issues through its Growth and Transformation Plan (GTP II), which provides a comprehensive five-year cross-sectoral plan to improve the country's economy.[118] With respect to energy, the GTP states:

> "Efforts will be made to provide the required energy for the development of industrial, agricultural and service sectors so as to position Ethiopia among the lower middle-income countries by 2025. The strategy focuses on increasing the share of domestic component of constructing energy projects to over 50% and enhancing the research capacity required for development and bringing about technological improvements. Energy potentials of the country are prioritised in order of importance, as follows: i) Hydroelectric power generation, ii) Geothermal energy, iii) Wind power and iv) Solar energy…"[119]

The ambition to provide potable water to citizens and expand irrigation was also articulated in the plan, which states that harnessing the water resource potential of the country is critical for the achievement of rapid and sustainable socioeconomic development. It emphasises that focus will be on efficient water resources utilization and development. Flood and drought control and mitigation efforts are also priorities in the water sector. An integrated water resource development and

[113] River Basin Councils and Authorities Proclamation, Proclamation No. 534/2007, 23rd July 2007, Article 4

[114] River Basin Councils and Authorities Proclamation, Proclamation No. 534/2007, 23rd July 2007, Article 6(7)

[115] Ethiopia Water Resources Management Policy 1999, Introduction

[116] Ethiopia Water Resources Management Policy 1999, Section 2.2.8

[117] Ethiopia Water Resources Management Policy 1999, Section 2.3.3.2

[118] Growth and Transformation Plan II (GTP II) (2015/16-2019/20) (Federal Democratic Republic of Ethiopia, National Planning Commission, 2016)

[119] Ibid, p.177. *See also* page 38 for the background of this strategic plan: "In order to support the efforts to accelerate rapid and sustainable growth, it was planned to increase the power generating capacity of the country from 2000MW in 2009/10 to 8000MW by the end of the plan period. In terms of delivery, total electricity generating capacity reached 4,180MW by 2014/15 and the average performance of all power projects stood at 52%. The Grand Ethiopian Renaissance Dam (GERD) (6450 MW), Gilgel Gibe III HEPP (1870 MW) and wind power projects were the distinctive features of GTPI. Fincha Amertinesh hydroelectric power project, Ashegoda and Adama I wind power projects are some of the projects which have become operational during the GTPI period. Besides, among the on-going power projects, the GERD Project and Genale III (254 MW) have been completed 40% and 65%, respectively. On the other hand, problems of service delivery, delay in rehabilitation of old lines, lengthy institutional reforms are some of the problems observed in the power sector that deserve proper attention in GTPII"

utilization will give due emphasis to the parallel usage of water supply, irrigation development, watershed management and water infra-structure development activities. In addition, water resources management will be integrated into complementary sectors such as agriculture, health, mining, energy, etc. In the coming five years, water resource development interventions will include, water supply, irrigation and drainage development, hydropower study and design, surface and ground water study and integrated master plan study and watershed management.[120]

Ethiopia's commitment to the SDGs is also reinforced throughout the plan, demonstrating that the SDG's are viewed as integral to address WEF nexus issues. It is also significant to note that Ethiopia was one of few countries which was praised for meeting the Millennium Development Goals, as a result of its first Growth and Transformation Plan.[121]

Kenya

The Constitution of Kenya states that national legislation is necessary to the protection of the environment[122] and Kenya's constitutional obligation to protect the environment has been upheld in the Environment and Land Court in the case of Friends of Lake Turkana Trust v Attorney General and Others, regarding Kenya's cooperation with Ethiopia on the Omo River's Gibe hydropower development (See case summary in Box 1).[123] The constitution also states that the national government should protect the environment and natural resources "with a view to establishing a durable and sustainable system of development", including fishing, hunting and gathering, water protection, securing sufficient residual water, hydraulic engineering and the safety of dams and energy policy.[124] This demonstrates how Kenya considers the environment as a necessary link in the WEF nexus and as such an essential part of national governance it is embedded in national institutional structure underpinned by the constitution.

This approach is also supported by Kenya's 2013 National Environmental Policy, which contains commitments in regard to freshwater and wetland ecosystems, soils and biodiversity for agriculture, as well as energy use, efficiency and conservation.[125] The policy also enforces the principle of subsidiarity, meaning that the management of natural resources should be conducted through decentralisation and devolution of authority to the lowest level possible. Kenya's legal framework also enforces the importance of benefit sharing is further reinforced through the Environmental Management and Co-Ordination (Conservation of biological diversity and resources, access to genetic resources and benefit sharing) Regulations (2006) which specifically regulates for the sharing of benefits accruing from the utilisation of genetic resources. Two cornerstone principles of environmental law are also listed, the precautionary principle (which is also one of the key legal principles used as an indicator within our model) and the polluter pays principle. The policy also lists international cooperation and good governance as guiding principles. Also of relevance within the context of this report is benefit sharing, which is also listed as a guiding principle, it states that where benefits are accrued from the utilisation of biodiversity these will be shared in order to promote conservation and sustainable use of biodiversity.

Kenya also has a number of policy documents in place which relate to water governance. The National Water Services Strategy (20-7-2015), which is now out of date, was established to provide a framework for the implementation of the MDGs and Vision 2030 through the creation of responsive institutions and well-defined standards and regulations. Under the remit of Vision 2030, there is

[120] Ibid, pg. 181. *See* page 39 for the background of this strategy: "During the GTP I period, development and expansion of reliable water supplies to rural and urban areas were undertaken. According to GTP I standard, national potable water supply coverage recorded was 84%, with rural coverage being 82% and urban 91% in 2014/15 (GTP I standard: rural 15 l/c/d within 1.5km radius, urban 20 l/c/d, within 0.5 km radius). However, according GTP II standard (rural; 25 l/c/d within 1km radius, Urban: based on demand categories of 100, 80, 60, 50 and 40 l/c/d from the highest to the lowest level, respectively) the rural, urban and national level water supply coverage were estimated as 59%, 51% and 58% respectively. Over the last five years (2010/11-2014/15), it was planned to undertake feasibility studies and design works on 746,335

[121] Growth and Transformation Plan I (GTP I) (2010/11-2014/15) (Federal Democratic Republic of Ethiopia, National Planning Commission, 2010)

[122] 2010 Constitution of Kenya, Article 191(3)(c)(vi)

[123] Friends of Lake Turkana Trust v Attorney General and Others, ELC Suit No.825 of 2012 (May 19, 2014)

[124] 2010 Constitution of Kenya, Forth Schedule re. Articles 185-187

[125] 2013 National Environmental Policy (Republic of Kenya, 2013), Sections 4.2, 4.7, 4.9 and 5.9

also a Strategic Plan for Water Conservation and Pipeline Corporation which focuses on the development and management of public waterworks infrastructure. News reports indicate that the government intends to release a new water management policy by the end of 2018 which will guide the implementation of the 2016 Water Act.[126]

Kenya aims to be a newly industrialised middle-income country under the theme of "clean and secure environment" by 2030 and the Ministry of Development planning is entrusted with the implementation of the SDGs to that effect.[127] Vision 2030 is the country's development blueprint covering the period 2008 to 2030, aiming to transform Kenya into a "newly industrialising middle-income country by providing high quality life to all its citizens by the year 2030"".[128] With regards to energy, Vision 2030 states that "the Government is committed to continued institutional reforms in the energy sector, including a strong regulatory framework, encouraging more private generators of power, and separating generation from distribution".[129] Regarding specific types of energy, it states that "new sources of energy will be found through exploitation of geothermal power, coal, renewable energy sources, and connecting Kenya to energy-surplus countries in the region".[130]

Regarding agriculture, Kenya aims to expand the sector "through an innovative, commercially oriented and modern agriculture, livestock and fisheries sector".[131] In the water sector, Vision 2030 aims to "conserve water sources and start new ways of harvesting and using rain and underground water".[132] Linking both the agricultural and water sector, demonstrating the significance of a WEF nexus approach, the vision also states that "to promote agricultural productivity, the area under irrigation and drainage will increase from 140,000 to 300,000 hectares". This is part of the aim to "raise the standards of the country's overall water resource management, storage and harvesting capability".[133] The vision also states that it will rehabilitate Kenya's "hydro-meteorological data gathering network" "construct multipurpose dams" and "construct water and sanitation facilities to support industries and a growing urban population".[134]

Summary of National Law and NDPs

The NDP or developmental strategies of most of the states[135] of the OTB and the ZRB mention the importance of reasonable and sustainable use of water resources for socio-economic development and the protection of the environment. Many of the plans also demonstrate the importance of a WEF nexus approach, placing emphasis on agriculture for food security and energy production, along with the importance of water resources. Approaches to the management of watercourses are predominantly based upon IWRM, with many states also positively making reference to benefit sharing approaches. However, none of the documents go as far as to explicitly highlight trade-offs which will likely result from focusing in one sector over another. As such, this is an area where the DAF will serve an incredibly useful purpose.

[126] "New water policy to be in place by December, says CS Chelugui" George Murage, The Star, July 30th 2018 https://www.the-star.co.ke/news/2018/07/30/new-water-policy-to-be-in-place-by-december-says-cs-chelugui_c1794493
[127] Benson Kimani, "Overview of the SDGs in Kenya" (Republic of Kenya, Ministry of Devolution and Planning, 2016)
[128] Kenya, Vision 2030, pg. 1
[129] Kenya, Vision 2030, pg. 8
[130] Kenya, Vision 2030, pg. 8
[131] Kenya, Vision 2030, pg. 13
[132] Kenya, Vision 2030, pg. 18
[133] Kenya, Vision 2030, pg. 18
[134] Kenya, Vision 2030, pg. 18
[135] With the exception of Angola due to translation issues

Box 1 – S Summary of Friends of Lake Turkana Trust v Attorney General and Others

Case Brief: Friends of Lake Turkana Trust v Attorney General and others

Facts: Friends of Lake Turkana Trust (FLTT) alleged that the government of Kenya deprived community members of their constitutional rights to life and dignity by agreeing to purchase 500MW of electricity from the government of Ethiopia, sourced through dams on the Omo River including the Gibe III dam, which flows into Lake Turkana. The claim is based on the anticipation that construction and operation of the dams would cause a sharp reduction in water flows to Lake Turkana and adversely impact community members who rely on the lake for their economic and cultural livelihoods.

Holdings:

1. Lack of factual evidence

The Court held that although there was evidence indicating that dam construction and opera-tion on the Omo River was likely to cause adverse impacts to Lake Turkana communities, FLTT had not introduced evidence of the actual effects of the Gibe III hydroelectric project and the infringement of community members" rights. The Court stated that "[t]his court cannot therefore at this stage make a finding that the Petitioner's rights to dignity, life, livelihood and cultural and environmental heritage have been infringed, in the absence of concrete evidence in this regard."

2. Right to information

The Court also held that the respondents violated the constitutional rights of community members when they withheld the power purchase agreement and other key documents about the impacts of the Gibe III dam from public disclosure. The government of Kenya has an affirmative duty to disclose all relevant information in relation to importation or purchase and transmission of electric power from Ethiopia, with regard to the public's constitutional right to information.

3. Obligation the protect and conserve the environment

The Court finally held that respondents "have a duty to establish that no environmental harm arises from the [electricity] agreements and projects" under Article 69 of the Constitution, also citing the principles of sustainable development and the precautionary principle. The Court directed the respondents to take all steps necessary to ensure that the resources of Lake Tur-kana are used sustainably and conserved in any engagement with or agreements made with the government of Ethiopia with regard to the purchase of electricity.

2.4 INSTITUTIONAL AND PROCEDURAL STRUCTURES

Irrespective of how well developed the legal and policy frameworks are within all of the basin states within the ZRB and OTB, the implementation of their provisions will only be conducted if they are met with enough institutional capacity. Lack of institutional capacity continues to plague developing countries with regard to the governance of watercourses. In many cases this is often a result of the policy and legal frameworks being based upon international level agreements which are not easily implemented at national level due to lack of capacity or financial restraints. As stated by Heyes, with regard to the institutional reforms within the Namibian Water Sector:

> "One of the pitfalls of institutional reform in a developing country is that the rationale behind the reforms may have been based upon sound best practices in water resources management, but when it comes to practical implementation, there is a lack of human capacity or adequate funding available to meet the needs identified."[136]

In addition, it is often the case that institutional structures are adopted from other countries, when in reality the unique physical characteristics, as well as socioeconomic context within each river basin requires equally unique institutional mechanisms.[137] The level of resilience and sustainability

[136] P. Heyns, "Water institutional reforms in Namibia" 7 Water Policy 89

[137] Olivia O. Green, "Resilience in Transboundary Water Governance: the Okavango River Basin" 18 Ecology & Society 339

within an institutional structure can be measured by the levels of conflict and cooperation which take place within both a national context and at a basin level.[138] However, taking this view of cooperation is not necessarily reflective of the "good governance" of the watercourse, as the existence of institutional frameworks does not necessarily mean that they function effectively towards the implementation of their goals.

2.4.1 Zambezi River Basin

A number of institutional mechanisms exist within the ZRB, which have largely been established by regional organisations. The frameworks within which institutional structures exist have already been discussed in Section 2.1.3 in the context of basin agreements. In this section closer attention will be given to the institutional mechanisms which are responsible for the implementation of those structures.

SADC Revised Protocol on Shared Watercourses

The SADC-PC reinforces the UNWC's procedural rules of notification for planned measures in Article 4(1). The UNWC does not put in place a detailed institutional framework for implementation, due to its aim at remaining flexible enough to be adapted to individual basin contexts. However, the SADC-PC establishes a framework of SADC Water Sector Organs in Article 5, as below.

- Committee of Water Ministers
- Committee of Water Senior Officials
- Water Sector Coordinating Unit
- Water Resources Technical Committee and Sub-Committees

Article 5(3) of the SADC-PC states:

- Member countries undertake to establish appropriate institutions, such as watercourse commissions, water authorities or boards as may be determined;
- The responsibilities of such institutions shall be […] in conformity with the principles set out in this protocol
- Shared Watercourse Institutions shall provide, on a regular basis, or as required by the Water Sector Coordinating Unit, all the information necessary to assess progress on the implementation of the provisions of the protocol.

In terms of dispute resolution, Article 33 of the UNWC refers to the International Court of Justice in situations where a dispute cannot be resolved through peaceful negotiations "in the absence of an applicable agreement". The SADC-PC creates such an agreement by referring to the SADC Tribunal in Article 7, although the provision has considerably less detail than the UNWC. It is therefore likely that the two can be read together for issues of dispute resolution, with the UNWC providing other mechanisms which are lacking in the SADC-PC.

Zambezi River Watercourse Commission (ZAMCOM)

The formation of ZAMCOM began with an Action Plan for the Environmentally Sound Management of the Zambezi River (ZACPLAN), from which a series of projects known as ZACPROs were launched. The projects aimed to address both technical and political issues, including providing support to the formation of the ZAMCOM.[139] All of the ZRB States have signed the ZAMCOM agreement, which entered into force in 2011, with only Malawi yet to ratify the agreement. It is worth noting that the scope of the ZAMCOM agreement applied to the "Zambezi Watercourse" which describes the hydrology of the river basin as a "unitary whole" with its common terminus at the Indian Ocean (Article 1), as opposed to the "Zambezi River Basin". Therefore, while the

[138] Olivia O. Green, "Resilience in Transboundary Water Governance: the Okavango River Basin" 18 Ecology & Society 339

[139] "The Zambezi River Basin: Multi-Sector Investment Opportunities Analysis", Volume 3, State of the Basin, The World Bank, June 2010, pg. 159 http://siteresources.worldbank.org/INTAFRICA/Resources/Zambezi_MSIOA_-_Vol_3_-_State_of_the_Basin.pdf

ZAMCOM Agreement governs the hydrological aspects of the river basin, it does not cover the environmental and ecosystem management aspects which would be incorporated into the entire river basin or catchment area.[140]

ZAMCOM governance is based (Figure 5) on institutional arrangements which are comprised of three main organs:

- **The Council of Ministers,**[141] which acts as the highest decision-making body and is comprised by the ministers in charge of water resources for each of the Member States. The council is responsible for overall guidance, strategic planning, supervision, strategic overview and decisions which are connected with institutions outside of the Zambezi River Basin.
- **The Technical Committee (ZAMTEC),**[142] a technical and advisory body with responsibility to develop and propose rules for consideration to the council.[143]
- **The Secretariat (ZAMSEC),**[144] which is responsible for the day-to-day operations of the commission

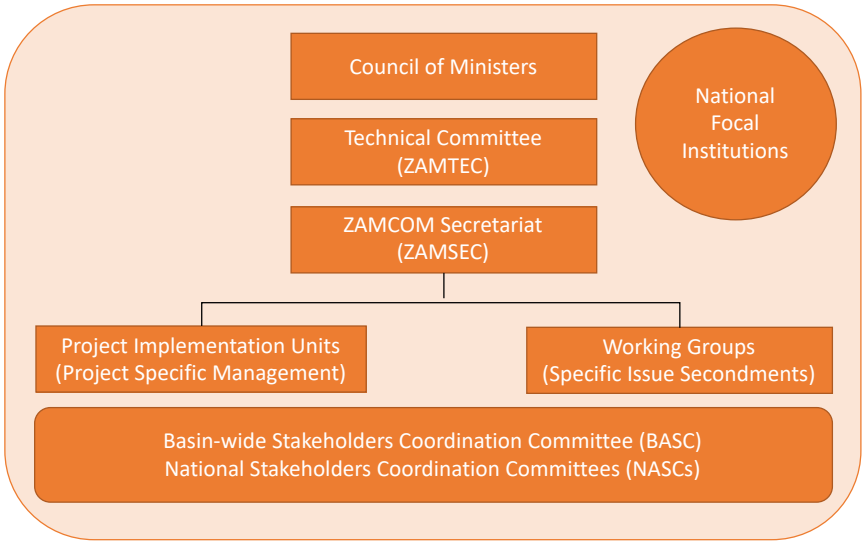

Figure 5 – ZAMCOM Governance Structure[145]

By signing the ZAMCOM Agreement, Member States committed to a number of technical, legislative and administrative duties. The duties, contained within the agreement, are largely derived from principles of international water law. However, in order to make the obligations clearer for member states, some of the procedural rules have been expanded on by the Commission, as detailed in the following sections.

Rules and Procedures for Sharing Data and Information

In February 2016, the ZAMCOM Council approved a new set of "Rules and Procedures for Sharing Information and Data".[146] The rules apply to the sharing of data and information which is relevant to

[140] Dan Tarlock A, "The Potential Role of International Environmental and Water Law to Prevent and Mitigate Water-Related Disasters", International Environmental Law (2016) 12 187-211
[141] ZAMCOM, Article 7
[142] ZAMCOM, Article 9
[143] ZAMCOM, Article 10
[144] ZAMCOM, Article 11
[145] Source: ZAMCOM Governance Structure http://www.zambezicommission.org/about-zamcom/zamcom-governance
[146] Zambezi Water Course Commission, Rules and Procedures for Sharing of Data and Information Related to the Management and Development of the Zambezi Watercourse, adopted by the ZAMCOM Council on 25th February 2016, effective 26th of March 2016

the "equitable and reasonable utilisation, management and sustainable development of the Zambezi Watercourse".[147] Therefore, at the outset of the rules, a clear link to the principles of international water law and to the notion of 'sustainable development" is made. The Rules and Procedures consist of two components: rules which apply to cost sharing and the roles of institutions, and the technical procedures and specifications identifying the data to be shared and the procedures which should be used to do so. Overall, the objective of the rules is to:

> "…ensure that relevant and quality assured data and information are shared timely between the Member States in order to facilitate that the Member States – through ZAMCOM – will be able to take informed decisions in relation to the planning and management of the shared water resources in the Zambezi watercourse".

The application of the rules and processes contained within the document should therefore provide a degree of uniformity across all of the basin states. Further, Article 4 specifically links the use of the Rules and Procedures to the implementation of relevant basin and regional laws on sharing of data and information, namely the ZAMCOM Agreement and SADC Revised Protocol.[148] In terms of implementation mechanisms, the Rules and Procedures state that each Member State 'shall" appoint a National Focal Institution, that will be responsible for carrying out Member State's duties with respect to all data and information. However, it is not clear where National Focal Institutions fit within the governance structure of ZAMCOM as they are not included within the structure which is provided on the website.[149]

The type of information which is to be shared is provided within a non-exhaustive list and includes hydrology, meteorology, water quality, socio-economic, environment, and planning instruments.[150] National water policy documents, relevant legislation, strategies and plans and documents relating to major water development projects are included within the information to be shared.[151]

Procedures for Notification of Planned Measures

Adopted in February 2017, the "Procedures for Notification of Planned Measures"[152] aims to provide Member States with detailed "notification requirements" including timelines, formats and supporting documents. In the same vein as the Procedures and Rules on sharing of information described above, the document begins by demonstrating a clear link to international water law, as well as linkages to both Article 16 of the ZAMCOM Agreements and Article 4 of the Revised SADC Protocol on Shared Watercourses. The notification measures go on to further describe obligations of notification under international law, describing obligations under both international water law or customary law, as below.

> "Customary International Law, either as an element of the general (customary) duty to cooperate with co-basin states over shared water resources or as an element of the procedural due diligence requirement of Watercourse States to take all reasonable measures to prevent significant transboundary harm and to utilise shared waters in an equitable and reasonable manner."

Similarly, with the Procedures and Rules for sharing data and information, the procedures on notification for planned measures, reemphasises the guiding principles of sustainable development and equitable and reasonable utilisation of watercourses.[153] It is significant to note that the measures reinforce the ZAMCOM Agreement, Article 16(1) which states that notification must take place if an activity will "adversely affect the Zambezi Watercourse or any other Member State". The threshold

[147] Zambezi Water Course Commission, Rules and Procedures for Sharing of Data and Information Related to the Management and Development of the Zambezi Watercourse, adopted by the ZAMCOM Council on 25th February 2016, effective 26th of March 2016, Article 2

[148] Article 4

[149] See ZAMCOM Governance Structure http://www.zambezicommission.org/about-zamcom/zamcom-governance

[150] Article 5(1)

[151] Part II: Technical Procedures and Specification for Data and Information Sharing, Section 5.1

[152] ZAMCOM, "Procedures for Notification of Planned Measures" (Zambezi Watercourse Commission, adopted by the ZAMCOM Council on 23rd February 2017

[153] Ibid, Section 3

which is therefore put in place is lower than both the SADC-PC and the UNWC, which requires notification in relation to 'significant adverse effects; only upon other watercourse States, noted in Article 4(1)(b) and Article 12 respectively. However, the ZAMCOM notification measures defines "adversely affect" as "a planned programme, project or activity [that] has the potential to have a significant impact on the water quality, flow regime or ecosystem of the Zambezi Watercourse".[154] While to some extent, this is reflective of the definition given in the SADC-PC, the document instead refers to Article 1 of the ZAMCOM Agreement, which does not define "adverse effects". Therefore, while the addition of these supplementary notes may be useful in terms of providing more in-depth procedural guidelines for states, questions can be raised regarding their accuracy when referring to provisions of legal documents.

A number of other cooperative programmes have been established under ZAMCOM, including the Water Resources Information System (ZAMWIS)[155], Zambezi Basin Strategic Planning (ZSP)[156] and the ZAMCOM Institutional Development and Basin-Wide Cooperation (ZICP).[157] ZAMWIS implements Article 15 of the ZAMCOM agreement regarding the sharing of data and information and therefore also directly relates to the technical procedures and specifications which are given in the document on the Rules and Procedures on Information Sharing.

Another two institutional structures with more specific roles have also been formed under the SADC umbrella: the SADC Drought Monitoring Centre and the Southern African Climate Outlook Forum. The Drought Monitoring Centre is responsible for delivering regular regional weather forecasts at sub-regional level, particularly rainfall. It also assists with the alleviation of weaknesses in hydrometric networks within the region. The Southern African Climate Outlook Forum is a collaboration of a number of different organisations, which includes the drought monitoring centre and also includes the World Meteorological Organisation (WMO), the United Nations Inter Agency International Strategy for Disaster Reduction (UN/ISDR), the Department of Meteorological Services of Lesotho and other partners. The group convenes annually to provide forecasts for the next rainy season.[158]

ZAMCOM is also in the process of finalising the development of the Strategic Plan for the Zambezi Watercourse (ZSP) which is expected to be in place by January 2019. The ZSP is aims to enhance cooperation among the ZRB states to bring joint benefits of energy and food security, amongst others.[159]

Institutional Structure of ZRB States

Angola

In Angola, the formation of the new government in 2008 saw the Water Division separated from Energy and the Secretariat for Water (SEA) created.[160] Below the SEA sits the National Directorate of Water, which is responsible for the execution of all activities relating to water resources nationally. Within the National Directorate are three departments which oversee water resources, water supply and sanitation and licensing and supervision, respectively. At the basin level, basin offices

[154] ZAMCOM, "Procedures for Notification of Planned Measures" (Zambezi Watercourse Commission, adopted by the ZAMCOM Council on 23rd February 2017, page 9

[155] "ZAMCOM Water Resources Information Systems (ZAMWIS)" http://www.zambezicommission.org/programmes-activities/zambezi-water-resources-information-systems-zamwis

[156] "Zambezi Basin Strategic Planning (ZSP)" http://www.zambezicommission.org/programmes-activities/zambezi-basin-strategic-planning-and-development-zsp

[157] "ZAMCOM Institutional Development and Basin-Wide Cooperation" http://www.zambezicommission.org/programmes-activities/zamcom-institutional-development-and-basin-wide-cooperation

[158] "The Zambezi River Basin: Multi-Sector Investment Opportunities Analysis", Volume 3, State of the Basin, The World Bank, June 2010, pg. 159 http://siteresources.worldbank.org/INTAFRICA/Resources/Zambezi_MSIOA_-_Vol_3_-_State_of_the_Basin.pdf

[159] See, ZAMCOM, Strategic Plan for the Zambezi Watercourse http://www.zambezicommission.org/sites/default/files/publication_downloads/zsp.pdf Global Water Partnership, "Enhancing Cooperation through the Strategic Plan for The Zambezi Watercourse", 12th July 2018 https://www.gwp.org/en/GWP-SouthernAfrica/About-GWP-SAF/more/News/enhancing-cooperation-through-the-strategic-plan-for-the-zambezi-watercourse/

[160] Global Water Partnership, National IWRM Status Report: Angola https://www.gwp.org/globalassets/global/gwp-saf-files/angola-iwrm-report.pdf

are responsible for the coordination and supervision of integrated water resource management at the basin level. Within urban areas such as Luanda and Bengula, services relating to water and sanitation are carried out by provincial governments. However rural and peri-urban areas struggle regarding a lack of structure, with no coordinating bodies in place for the management of water resources. Angola also has in place an Inter-ministerial Commission for international Water Agreements, which was established in 2003 and aims to coordinate management over different sectors. It seeks to progress the implementation of international agreements and oversees a number of technical commissions which work within the water sector. There is also an Inter-ministerial Commission Technical Support Group which provides technical support to the Inter-ministerial Commission as well as a number of Commissions relating to the management of international basins. Overall very little information exists regarding the water sector in Angola, largely as a result of the 27 years of civil water. As a result, the water resource institutions which are in place are still relatively young but are progressing in a positive direction.

Botswana

The Department of Water Affairs is housed within the Ministry of Minerals, Energy and Water Resources (MMEWR) within Botswana. MMEWR holds the overall responsibility for the nations water governance activities, relating to planning, development and protection of the water resources. The Water Utilities Corporation sits below the MMEWR and is responsible for delivering potable water to the entire country and the delivery and management of wastewater treatment services. A Water and Energy Regulator is also in place, which aims to ensure financial sustainability across the water sector as well as checking compliance with service standards. The Department of Water Affairs is responsible for ensuring the management of water resources across all sectors, including *inter alia,* agriculture, domestic use and industry as well as contributing to the formation of legislation and policy. A Water Resources Board is also in place and is made of all major stakeholders relating to water resource management, the board monitors the use of water resources and advises Catchment Management Committees which are responsible for local level planning.[161]

Mozambique

The institutional structure within Mozambique was established by Law No. 16/91 of the 3rd of August (Water Law 1991). A National Water Policy is also in place. Water is included within the Ministry of Public Works and Housing, with the National Water Directorate responsible for the water sector directly. The National Water Directorate subsequently delegates more local responsibilities to regional water authorities (of which there are five).

Malawi

There are several levels of responsibility within the institutional structures governing the water sector in Malawi. The Ministry of Agriculture, Irrigation and Water Development sits at the top of the water governance structure. Within the Ministry sits the Irrigation and Water Development Department, which is responsible for the overall management of water resources. Previously, as per the 1969 Water Resources Act, a Water Resources Board sat below the Department, however the Board was repealed under the 2013 Water Resources Act and the National Water Resources Authority (NWRA) was put in its place. A number of Water Boards sit below the NWRA which are responsible for water resource management at a district level, at the local level a number of Water Users Associations are in place to ensure that there is equitable distribution of quantities of water from sources and to resolve any conflicts which may arise.

Tanzania

The institutional structure for water governance in Tanzania occurs at multiple levels. At the top of the structure sits the Ministry of Water which is responsible for coordinating all aspects of water

[161] Department of Water Affairs – Ministry of Minerals, Energy & Water Resources (2013), Botswana Integrated Water Resources Management and Water Efficiency Plan (L.Dikobe, Ed.) Gaborone, Botswana. Government of Botswana. < https://www.gwp.org/globalassets/global/activities/impact-stories/further-reading/iwrm-we-plan.pdf>

use. At a regional level sits the Prime Minister's Office-Regional Administration and Local Government (PMO-RALG), this is followed by Basin Water Boards and Catchment Committees at district level. District Councils are expected to participate fully within the Basin Water Boards and Catchment Committees.[162] At the local level Water Users Associations (WUAs) or Water User Groups (WUGs) are in place. District Councils have the responsibility for the management and coordination of rural water supply, including the distribution of water for livestock, irrigation and domestic purposes. However, in some cases District Councils have been found to have weak financial and technical capacity and are therefore not always able to fulfil their mandate.[163]

Namibia

The core body relating to the management of water resources in Namibia is the Ministry of Agriculture, Water and Forestry (MAWF). MAWF is responsible for the overall management of water resources, as well as coordination of the sector. The Namibian Water Corporation or NamWater is also involved in activities relating to water governance, with responsibility for bulk water supply, however it exists as a public institution, rather than a governmental structure.[164] Sitting below MAWF and NamWater are regional and local authorities. Within MAWF sits the Department of Water Affairs which hosts two Directorates: The Directorate of Water Resources Management and the Directorate of Rural Water Supply. It was outlined in the Water Resources Management Act (No. 11 of 2013) that the Ministry of Agriculture, Water and Forestry should establish new institutions for the governance of water resources, namely: The Water Advisory Council, the Water Regulator and the Water Tribunal, as outlined in the 2013 Act. The Water Advisory Council was put in place in September 2016 and advises Ministers on overall water resources management and discusses any issues which are raised by Basin Management Committees. The Water Regulator which the Act also states should be established is not yet in place but will be responsible for the determination of fees and tariffs for the provision of water, as well as charges for license fees. It will also keep track of targets for water service providers. The Water Tribunal has also not yet been put in place but will act as an appeal body which will hear and decide on appeals which are made to the Minister on water related issues such as licensing or pollution. At the basin level, Basin Management Committees are in place which manage the resources of that particular basin and report back to the Minister. At the local level Water Point Committees and Local Water Committees control the supply of resources.

Zambia

Water resources in Zambia are vested in the President, with a number of organisations and authorities tasked with the administration of the resources. At the highest level sits the Ministry of Water Development, Sanitation and Environmental Protection, the Ministry along with the Water Board and the Department of Water Affairs have overall responsibility for water resources management and development. At the regional and local level, water management is the responsibility of a Water Resources Management Authority (WARMA) which subsequently delegates activities to catchment and sub-catchment councils and Water User Associations (WUAs). The need for such local structures was derived from the need to manage competing uses and disputes.

Zimbabwe

At the top of the water governance structure in Zimbabwe sits the Ministry of Water Development, which is the overall custodian of water rights. Beneath the Ministry sits the Department of Water Development which is responsible for the formulation of national policies and standards for the development of water resources. The Zimbabwe National Water Authority is a quasi-government agency which is responsible for providing advice to lower level institutions such as Catchment and Sub-Catchment councils, as well as managing the operationalisation of water pricing systems,

[162] Tanzania National Water Policy 2002

[163] Zacharia S. Masanyiwa et al. "Institutional arrangements for decentralized water and health services delivery in rural Tanzania: differences and constraints" Basic Research Journal of Social and Political Sciences (2012) 1(4) 80

[164] See Government of Namibia, "Gazette: No. 12 Namibia Water Corporation Act, 1997", No. 1703, October 10, 1997

planning, coordination and management of water resources. At a lower level sits the Catchment Councils which prepare plans, determine applications and grant permits for water rights. The day-to-day management of water resources is then carried out by the Sub-Catchment Councils. Other institutions which are relevant to the management of water resources include the Department of Irrigation under the Ministry of Agriculture and Rural Development. As the Department of Irrigation is viewed as a specialise unit, they have their own mandate, and the Zimbabwe National Water Authority can only try to influence the way such institutions use water but cannot necessarily make any calls regarding conservation of the resource. There is therefore potential for some conflict between different governmental departments.

Institutional Structures Zambezi: Summary

The capacity of ZAMCOM to effectively manage the river basin is limited by the lack of effective and uniform institutions across the member states. Riparian countries suffer from a shortage of capacity, technical assistance and financing. Stakeholder participation is also not well advanced within the basin, as a result, in many cases stakeholders may not be aware of the activities occurring within the basin in relation to water resources planning, development and management. While the existence of institutional structures at both a regional (SADC), basin (ZAMCOM) and national level illustrates the strong commitment to the key legal principles identified within the governance model, the interaction between such institutions is not clear. Overlapping duties likely adds to difficulties relating to lack of capacity and may add to strain of financial and technical capacity. The interactions between institutions at all scales should therefore be made clearer in order to strengthen the effectiveness and efficiency of the cooperative framework.

2.4.2 Omo-Turkana River Basin

Similarly, to the institutional frameworks within the Zambezi, both Kenya and Ethiopia have progressively moved towards decentralised systems for water management.

Kenya

The aim of the 2016 Water Act was to further devolution and decentralisation of management, in line with the 2010 Kenyan Constitution. The Water Act therefore recognises that water resources are the shared responsibility of both national government and county government. At the top of the water governance structure sits the Ministry of Water and Irrigation which is responsible for the formation of policy and strategy, the mobilisation of funds, as well as the coordination and monitoring of all activities within the water sector. A number of additional bodies sit below the Ministry but still at national level, these include the Water Resources Authority which is responsible for protecting, conserving, controlling and regulating the use of water resources through a national water resource strategy. The water services regulatory board is responsible for approving tariffs and licenses and enforcing water service standards. The Water Sector Trust Fund also operates at a national level, holding responsibility for ensuring pro-poor financing of infrastructure, the Water Tribunal also serves to provide financing and implementation of major infrastructure works and the National Water Storage Authority is responsible for the regulation of water services. On a regional level, service provision is the responsibility of Catchment Areas Advisory Committees and Water Services Boards, which work the basin level a Basin Water Resources Committee, formed of a number of committees under the Water Resources authority, seeks to manage water resources at the basin level and facilitate the establishment of Water Resource User associations. At the local level a number of Water Resource Users Associations and Water Service Providers are in place. Water Users Associations act as community-based association for the management of water resources and assist with the resolution of conflict over water resources.

In Kenya, separate ministries are set up for energy, agriculture and water. Kenya's energy sector chiefly comprises the Ministry of Energy which designs policy, the Energy Regulatory Commission responsible for regulation, and the Kenya Electricity Generating Company, which is the main energy generation company in the country. Concurrently, the agricultural sector is led by the Ministry of Agriculture, Livestock and Fisheries and its associated bodies. Finally, the National Environment

Management Authority is an important body in regard the environmental aspects of water related activities.

Kenya has also established the Water Institute via the Kenya Water Institute Act in 2001.[165] According to the Act the institute is formed to provide directly, or work in collaboration with, other institutions of learning, consultancy or human resources as well as the public sector to provide support through training programmes, seminars and workshops to maintain appropriate standards in the water sector.

Ethiopia

Ethiopia operates through a federal system of government, with nine respective regional state governments and two autonomous administrations. Each national regional state enjoys greater autonomy, operating with its own constitution. The federal constitution has provided for give levels of government: federal, regional, zonal, woreda and kebele. This structure is also replicated within the institutional structure for water governance. At the highest level of water governance sits the Ministry of Water, Irrigation and Energy which is responsible for the formulation of national water policies, strategies and action plans, as well as for setting national standards with regards to water quality, infrastructure and other associated standards. The Ministry is also responsible for supervising the implementation of policy and strategy instruments, as well as providing technical support to regional water bureaus. The Bureau of Water Resources Development operates at a regional level and is responsible for the implementation of federal policies, regulations, guidelines and plans. Water Bureaus also fulfil a number of regulatory duties which are delegated to them by the Ministry. At a local level, Zonal Water, Mine and Energy Departments provide support to the Water Bureaus and technical support to the Woreda Water Offices and Town Water Supply Office. The Zonal Offices are responsible for the coordination of activities and plans, as well as collecting reports from the relevant Woredas, they effectively provide a link between the local level Woredas and the regional level Bureaus. In addition, River Basin High Councils and Authorities have been established to promote and monitor the implementation of integrated water resources management in river basins which fall within their jurisdiction. At the lowest level sits the Woreda Water Resources Development Offices which are responsible for the research, design and implementation of small-scale water supply schemes.

Water and energy are considered indivisible sectors, with the Ministry of Water, Irrigation and Energy responsible for the management of the nation's water, irrigation and energy resources, including the development of policies, strategies, and programmes, and the implementation of laws and regulations. Despite a decentralized model being in place the presence and dominance of central government in water resources development in Ethiopia remains focused on large-scale infrastructure such as dams and estates.[166] The formulation of water plans continues to follow a "top-down approach" meaning that targets and budgets are passed from a federal to a regional level. At each level of government, a strategic plan for water incorporates the targets which are set at higher tiers of government.

There are several subsidiary bodies of the Ministry concerning energy specifically. The Ethiopian Electric Power Corporation (EEPCO) is a government owned public enterprise and is a key actor in the construction of dams on the Omo and other rivers. Principally, it "engages in the production, transmission, distribution, and sale of electrical energy. Its projects include hydro, transmission construction, wind, geothermal, IT projects, and waste to energy projects". It is responsible for supplying bulk electricity to the Ethiopia Electric Utility (EEU), which is responsible for distribution. It is recently reported that EEU may be devolved in to regional states. Additionally, the Ethiopia Energy Authority was established in 2014 to regulate the energy sector through rules, regulations and directives in terms of efficiency, conservation, safety and quality. The Environment Protection

[165] Kenya Water Institute Act No 11 of 2001, L.N. 116/2002

[166] R Hailu et al. "Water institutions in the Awash basin of Ethiopia: the discrepancies between rhetoric and realities", International Journal of River Basin Management (2018) 16 (1) 107

Agency is an important department regarding the environmental aspects of water and energy development activities and works in coordination with regional environmental protection agencies.

Institutional Structures Omo-Turkana: Summary

In the Omo-Turkana basin there is a need for the formation of a permanent cooperative basin-wide framework, to be established and subsequently implemented. While there are some collaborative frameworks in place (such as joint agreements on electricity and border arrangements), as described, there is no embedded institutional mechanism for joint governance of the basin. Further, from the research conducted, it is apparent that there are duplications of authority in the sector of water governance. There is therefore a need to revise the current institutional structure, towards the formation of a basin level institution and away from the currently fragmented system. Both countries are aspiring to move away from top-down institutional structures towards more locally driven governance arrangements. However, despite both countries having gone through a process of reform to create the appropriate frameworks for the change, there has been a lack of implementation.

2.5 KEY CONSIDERATIONS FOR GOVERNANCE MODEL

This research has compiled an extensive list of legal documents on all levels relevant to the ZRB and OTB, which completes the important data collection task under subtask 2.1.6 (DoA, p14). The analysis of these documents under subtask 2.2.4 (DoA, p.15) has led to the identification of several key legal principles that set out duties and obligations in relation to use of these water resources. While a list of legal principles cannot be exhaustive due to the wide scope and constantly evolving nature of the law, 13 broad categories of principles relevant to both basins have been identified to underpin the governance model presented in the next section. In order to limit the infinite scope of the analysis, these principles relate directly to the use and management of water resources only, although the model presented below is designed to allow for further expansion of scope.

The doctrinal analysis has given rise to issues that are consequently considered and addressed in the development of the governance model. Namely:

- The principle of equitable and reasonable use is a core umbrella principle of international water law that is central to regulating States" actions in the use of a transboundary watercourse and is particularly relevant in evaluating and deliberating trade-offs in a WEF nexus context. Therefore, the governance model should focus on this principle in particular.
- The general categories of principles may have varied wording in legal instruments, but with the same meaning. A list of key words in relation to each category must therefore be identified (provided below). This is important so that the presence of a principle within a document is not missed in a search due to variation of language. A declaration of these key words must be made clear for transparency of methods.
- While a legal document may contain a listed principle, the legal strength of that principle may be varied. The governance model must therefore capture the variation of legal force through the language within a document, as well as the legal status of a document itself.

2.5.1 Key Legal Principles

As previously stated in the section above, the governance model is limited to 13 legal principles in order to provide a defined scope. These principles can be divided into six substantive principles and seven procedural principles.

Principle 1: Equitable and Reasonable Use (Substantive)

Equitable and reasonable use, as previously mentioned, acts as an umbrella principle for the governance of shared watercourses under international water law. The principle provides the rationale

for reconciling different water uses and has been recognised as a principle of customary international law by the International Court of Justice in the Gabčikovo-Nagymaros case.[167] According to Article 5 of the UNWC, States must utilise international waters within their respective territories in an equitable and reasonable manner, with a view to attaining optimal and sustainable utilisation thereof and benefits therefrom, while taking into account the needs of the watercourse concerned. The Article is key for promoting WEF nexus approach due to the guiding factors in Article 6 which can provide a mechanism for benefit-sharing and guidance for the establishment of trade-offs among competing water uses. The list of factors given in Article 6 is non-exhaustive, and its applicability will vary on a case-by-case basis due to the varied natural and man-made characteristics of a basin. Links with the WEF nexus can be clearly made through these factors. The factors of socio and economic needs, development and economy of the watercourse and potential uses of the watercourse can all encompass the link between water, energy and food. While no explicit links are made within the UNWC between the issues relating to the WEF, further detail can be derived from additional parts of the DAFNE project. For instance, Deliverable 4.3 of the DAFNE Project "Models of Demographic, Cultural and Social Developments in the Omo-Turkana and Zambezi River Basins" conducts a social, cultural and demographic analysis which can be tied to the provisions of Article 6. Some examples of the linkages are provided below.

Table 7 – Relationship between Equitable and Reasonable Use, WEF Nexus and DAF Indicators[168]

Relevant Factors & Circumstances	**Relationship to WEF Nexus**	**Relationship to DAF Indicators**
Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character	Rising demand for energy is associated with deforestation which in turn leads to more sedimentation. Increased sedimentation subsequently has a negative impact on water availability and quality. As detailed in Deliverable 3.6 (DAFNE Project) on water quality, mega dams may raise serious concerns with regard to the quality of water that flows downstream (stratification). Changes to the natural flow of water can have ecological impact downstream, particularly on fish populations. This can however be mitigated by using environmentally friendly dam operation rules which make the harm/effect of the dam preventable at best and manageable at worst. Deliverable 3.6 further details the impacts which water obstruction for irrigation purposes may have on water quality and downstream fisheries. Once again, if environmental flow is maintained through environmentally responsible dam operation rules the negative impact on water quality can be mitigated.	Flooding requirements – duration/magnitude of natural flooding patterns. Water quality (fisheries, drinking, agriculture, ecosystems)
The social and economic needs of the watercourse States concerned	Changing social and economic needs within a riparian state can create new demands on water use. As detailed in Deliverable 4.3 (DAFNE Project), the needs of riparian states may differ and occasionally have competing priorities.	Energy production from hydropower Food production from large-scale agriculture

[167] Gabčikovo-Nagymaros Project, Hungary v Slovakia, Judgment, Merits, ICJ GL No 92, [1997] ICJ Rep 7, [1997] ICJ Rep 88, (1998) 37 ILM 162, ICGJ 66 (ICJ 1997), 25th September 1997, International Court of Justice [ICJ]

(Table 7 continued)

The population dependent on the watercourse in each watercourse State	As described in Deliverable 4.3 (DAFNE Project) population growth, and urbanisation specifically, is leading to development challenges within cities as a result of increased demand on water resources, as well as food and energy. The risking demand for energy and water is strongly linked to the construction of new hydropower demands in the Zambezi. However, often the construction of such hydropower dams leads to displacement of people in rural areas, reinforcing urbanisation trends. On the other hand, the construction of hydropower dams facilitate more water reservoirs which improve the availability of water. As a consequence, agriculture expands which has a strong positive impact on food production and therefore food security.	Population density and growth
The effects of the use or uses of the watercourses in one watercourse State on other watercourse States	This factor is very broad and could cover a number of different uses of water which could related to many aspects of the WEF nexus. As detailed within Deliverable 3.6 (DAFNE Project), the effects of major interventions can be serious or minimal depending on several factors including appropriate operational rules for dams.	Agricultural area – water supply needed for agricultural productivity
Existing and potential uses of the watercourse	Higher demand for food results in changing agricultural practices, often associated with the use of more fertilisers. While fertilisers are strongly linked to greater food production, it also leads to lower water quality and lower quality of soils. While low water quality has a great impact on human health, low quality soils also have an impact on the production of food.	Water requirements for fish
Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect	This provision is concerned with the efficiency of water use. Can be regarded as requiring caution on behalf of states not to be wasteful with water resources.	Crop water productivity
The availability of alternatives, of comparable value, to a particular planned or existing use	Requires states to give consideration of the availability of water from other resources. Meaning that priority should be given to the satisfaction of the water requirements which cannot be met by other water supplies. The other water supplies should be of a “corresponding value”.	

As previously stated, the operationalisation of the Article 6 is not made clear within the UNWC. Article 6(2) states that the weight which is to be given to each of the different factors should be determined by its importance in comparison to other relevant factors. While this is supportive of taking a nexus approach, it does not provide a clear indication of how the “importance” and “weight” of issues should be divided. To provide further clarity on the issues, which should be taken into account, the Legal Assessment Model (LAM) created by Wouters et al. (2005) aims to support the

implementation of Article 6 by providing a methodology for considering all relevant factors within each case.

It is also important to note that the uses of a watercourse are subject to change over time and therefore while a particular use of a transboundary watercourse may be regarded as equitable and reasonable at one given point, this may be reversed by further assessment at a later stage. This notion is stated within the ILA Helsinki Rules, which state that an existing reasonable use may continue in operation unless the rules justifying its continuance are outweighed by other factors leading to the conclusion that it be modified or terminated so as to accommodate a competing incompatible use (Article VIII). Given the continuously evolving nature of the assessment required, it is therefore vital that riparian states establish a cooperative framework whereby the needs of each state can be regularly updated and reviewed to meet demands.

Table 8 – Example Methodology for Equitable and Reasonable Use

What?	Natural context, covering the physical or natural characteristics of the watercourse	Surface/groundwater Geography Hydrological Climatic Environmental Services
Who?	Details the population in the area dependant on the watercourse	Population (growth) Migration patterns Demography
What uses?	Identifies the demands on or the uses of the watercourse and the benefits related to such uses	Domestic Industrial Agricultural Recreational Cultural
What impact?	Identifies the consequences of the uses, both within a nation and the effects of use in one state on others	Economic gains Social benefits Environmental degradation
What options?	Consideration of alternative with comparable feasibility, practicability and cost-effectiveness	Different uses Different means Different source
Case specific	Reserved for additional factors that might be considered to be relevant in a particular situation	

[Source: Legal Assessment Model (LAM) created by Wouters et al., 2005]

As previously mentioned, there is no priority of use of watercourses, according to the UNWC (Article 10.1), it is stated that in the event of a conflict special regard must be given to the requirements of vital human needs (Article 10.2). Vital human needs fall within the remit of socio and economic needs of a watercourse state, with regards to equitable and reasonable use. Therefore, while there is no priority of use as such, it is likely that priority of vital human needs would be given over other uses. This principle is further highlighted in the ILA Berlin Rules which comprise both international and national water resources, and clearly state that in determining equitable and reasonable use States should allocate water to satisfy vital human needs first (Article 14). In the commentary of the ILC, it is stated that in the UNWC vital human needs refers to water to sustain human life, including not only drinking water, but also water required for the production of food in order to prevent starvation. The ILA Berlin Rules outline that vital human needs means waters used for immediate human survival which includes cooking and sanitary needs, as well as water needed for the sustenance of a household (Article 2.2). The requirement to fulfil vital human needs first can also be further reinforced by the human right water and the human right to food.

Therefore, under international water law, equality does not mean that each State is entitled to an equal share of the uses or to identical quantitative portions of water. Instead, it means that the reconciliation of different water uses has to be based on the idea that each watercourse is entitled to uses and benefits from a watercourse in an equitable manner. Therefore, in order for different water uses to be balanced using a nexus approach and for the application of concepts such as benefit-sharing to be demonstrated, there must be an assessment of those uses derived from relevant data and indicators found within other aspects of the DAF.

Principle 2: No Harm Rule (Substantive)

The no harm rule is linked to the principle of equitable and reasonable use and places an obligation on a State not to cause significant harm to other States when utilising an international watercourse in their territories. The UNWC provides that all States shall take all appropriate measures to prevent causing significant harm to other watercourse States and eliminate and mitigate such harm by having due regard for the principle of equitable and reasonable utilisation (Article 7). The ILA Helsinki Rules clearly render the no-harm rule as subordinate to the principle of equitable utilisation by stating, for instance, that water pollution which would cause substantial injury to another State must be prevented in keeping with the principle of equitable and reasonable use. The threshold of significant harm or transboundary impact as well as the sufficiency and appropriateness of the measures taken can be assessed in detail only on a case-by-case basis. The use of a watercourse that causes harm to other States is not necessarily inequitable or unreasonable if all appropriate measures have been taken to minimise transboundary impacts.

Principle 3: Ecosystem Protection (Substantive)

Article 20 of the UNWC places an obligation on states to “individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses. It is notable that the provision requires states to both “protect” and “preserve” the ecosystems. The obligation of protection can be seen to fall under the umbrella of equitable and reasonable use as “a specific application of the requirement contained in Article 5 [equitable and reasonable use] that watercourse states are to use and develop an international watercourse in a manner that is consistent with the adequate protection thereof”. The duty to protect states that ecosystems must be protected from ‘significant threat of harm” which gives rise to a precautionary approach, as will be detailed below in principle 6. The extent of the obligation to protect is unclear within the provision. McCaffrey (2000) states that there is no qualification given with the provision, meaning that it does not state that ecosystems must be protected only if failure to do so may harm another riparian state, but rather they must be protected regardless.[169] He also goes on to state that Article 20 amounts to an obligation to exercise due diligence to protect and preserve water ecosystems, but which also takes into account the capabilities of the state involved. Another notable part of the provision is that states must act “individually, and where appropriate, jointly”, recognising that in some instances acting alone will not be sufficient for the protection of ecosystems. This requirement therefore also presents a need to have joint or other forms of governance mechanisms in place between riparian states to support cooperative mechanisms.[170]

Principle 4: Pollution Prevention (Substantive)

Within the context of this report, the principle of pollution prevention is derived from no significant harm. The principle can however also be related to the polluter pays principle which, within broader

[169] Stephen McCaffrey, “An Overview of the U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses”, Journal of Land, Resources and Environmental Law (2000) 20 (1) 57

[170] The principle of ecosystem protection can also be seen as laying a foundation for ecosystem services, *see* A Rieu Clarke and C Spray, “Ecosystem Services and International Water Law: Towards a more effective determination and implementation of equity” 2013 (16) 2 PER/PELJ

international environmental law, means that the person who damages the environment should rectify the cost of the damage caused. This principle is also noted in Principle 16 of the Rio Declaration, which states that "the polluter should, in principle, bear the cost of pollution".[171]

Principle 5: Intergenerational Equity (Substantive)

Intergenerational equity is a well-known principle within international law and can be found within a number of international Conventions including the UNECE[172], the CBD[173] and the UNFCCC[174]. The principle also appears in principle 1 and 2 of the Rio Declaration. In essence, the principle dictates that current activities should not detrimentally impact future generations.[175] The principle is also included within the preamble of the UNWC which states "the optimal and sustainable utilisation thereof for present and future generations".

Principle 6: Precautionary Principle (Substantive)

The precautionary principle was stipulated in Principle 15 of the Rio Declaration, "in order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." The principle dictates that where there is a lack of scientific certainty regarding a development activity which could have an environmental impact, protective anticipatory action should be taken. It is included here as one of the key principles as its presence in legal instruments creates a high standard of due diligence by states in their utilisation of shared watercourses.

Principle 7: Environmental Impact Assessment (Procedural)

An Environmental Impact Assessment (EIA) is a key element of planning for projects which may have an impact on any aspect of the environment. The UNWC does not directly require a State to carry out an EIA, instead stating that if a State which may be impacted by planned works asks the planning state to provide an EIA, the requesting State would have to bear the costs. However, it could be stated that the obligation to conduct an assessment of potential environmental impacts on a transboundary project is part of the customary obligation not to cause significant transboundary harm. This has been supported in the International Court of Justice judgement of the Pulp Mills Case which linked the interstate notification of planned measures to the satisfaction of the due diligence obligation to prevent significant transboundary harm. Within the judgement it is stated that an EIA "may now be considered a requirement under general international law" with regard to activities which "may have a significant adverse impact in a transboundary context".[176]

The ECE Water Convention and the ILA Berlin Rules (Article 29) both require that an environmental impact assessment be applied within the authorisation regime of a planned measure, whereas the UN Watercourses Convention states that the notification of planned measures must include the results of any environmental impact assessment (Article 12). The International Court of Justice has since stated in a case concerning *pulp mills* on the River Uruguay in 2010 that an environmental impact assessment can be considered a requirement under general international law where there is a risk that a proposed industrial activity may have a significant adverse impact in a transboundary context, particularly on a shared resource. Therefore, customary law includes a requirement for an environmental impact assessment wherever there is a risk that a planned water use activity may have significant and adverse transboundary impact. Reservations on the use of the EIA are

[171] Rio Declaration on Environment and Development, UN Doc.A/CONF.15/26 (vol.1); 31 ILM 874 (1992)
[172] Article 2(5)(c)
[173] Preamble
[174] Article 3(1)
[175] Ban Ki-moon Ban, "UN Secretary-General Ban Ki-Moon on Intergenerational Equity" (2013) 39 Population and Development Review 727. p.728.
[176] Pulp Mills on the River Uruguay, Argentina v Uruguay, Order, Provisional Measures, ICJ GL No 135, [2006] ICJ Rep 113, (2006) 45 ILM 1025, ICGJ 2 (ICJ 2006), 13th July 2006, International Court of Justice [ICJ], para 204

expressed by the Dams Commission who state that the EIA consists mostly of measures to compensate or mitigate the planned impacts and render them acceptable when the decision to proceed has already been taken. This is reflected by the tendency for EIAs in the 1990s to focus on mitigation plans.[177]

Principle 8: Transboundary Impact Assessment (Procedural)

Under Article 11 of the UNWC, watercourse states must exchange information, consult and, if necessary, negotiate on the possible effects of planned measures on the condition of an international watercourse (Article 11). The Convention includes specific rules on the consultation processes regarding planned measures (Arts. 12-18). According to the ILA Helsinki Rules, a State should serve notice of any proposed construction or installation that would alter the regime of the basin in a way which might give rise to a dispute, while the Berlin Rules call for basin States to promptly notify other States or competent international organisations that may be affected significantly by a programme, plan, project or activity and set out provisions on consultations.

Principle 9: Provision for Establishment of Joint Body/Mechanism (Procedural)

The UNWC only suggests that watercourse States may consider the establishment of joint mechanisms for the facilitation of cooperation (Article. 8.2). However, stronger obligations can be found in other international water law agreements. In the UNECE Water Convention, watercourse States are required to enter into bi- or multilateral agreements or other arrangements which provide for the establishment of joint bodies (Article 9). Under the ILA Berlin Rules, basin States have the right to participate in the management of water of an international drainage basin (Article 10), and they should establish a basin wide or joint agency or commission with the authority to undertake the integrated management of international waters (Article 64). Therefore, whilst there is nothing to legally compel states to form a joint mechanism, some form of institutional arrangement is vital for effective cooperation within a transboundary context.

Principle 10: Information/Data Exchange (Procedural)

The procedural obligation to exchange information and data flows from the general obligation to cooperate under Article 8 of the UNWC. Under the UNWC, States must regularly exchange available data and information on the condition of the watercourse and should employ their best efforts to comply with the request of non-readily available data by another watercourse State (Art.9). In most cases this procedural obligation forms one of the first steps towards the fulfilment of equitable and reasonable use. This principle requires “regular” exchange of information, as opposed to the *ad hoc* provision of information contained in Article 11 of the Convention.

Principle 11: Notification (Procedural)

As well as the general obligation to exchange information and consult each other on the possible effects of planned measures, the UNWC states that before a project is implemented there should be notification which is “accompanied by available technical data and information, including the results of any environmental impact assessment in order to enable the notified State to evaluate the possible effects of the planned measures”.[178]

Notification triggers a process of consultation – notified States have 6 months to respond, or to extend for another 6 months.[179] Articles 14-16 elaborate on the obligations of States during this period, while Article 17 details the nature of the consequent consultation and negotiations as occurring “with a view to arriving at an equitable resolution”. Although conducting a transboundary environmental impact assessment (EIA) is not a requirement under the UNWC, it is arguably an important step in complying with Article 7 regarding the duty to take appropriate measures and not

[177] WCD, “Dams and Development, A New Framework for Decision-Making: The Report of the World Com-mission on Dams” (World Commission on Dams 2000) 182-183.
[178] UNWC, Article11
[179] UNWC, Article 72

cause significant harm, as well as Article 12 on notification concerning planned measures with possible adverse effects.

Principle 12: Consultation (Procedural)

Article 17 of the UNWC requires that, where there has been a communication containing a finding that the implementation of the planned measures would be inconsistent with the provisions of Article 5 or 7, then states should enter into consultations and, where necessary, negotiations which aim to lead to an equitable resolution of the situation.

Principle 13: Dispute Settlement (Procedural)

Article 33 contains dispute settlement provisions which are residual in nature, meaning that they apply where the watercourse states concerned do not have an applicable agreement for the settlement of such disputes.

3. MODELLING METHOD: DEVELOPING MATRICES TO APPLY LEGAL PRINCIPLES IN THE RIVER BASIN CONTEXT

The DAFNE Project takes the approach that integrated and adaptive water resources planning and management should directly address the WEF Nexus in a participatory and multidisciplinary manner. The Project Agreement states that the DAF should:

> "quantitatively assess the social, economic, and environmental impact of expanding energy and food production in complex physical and political contexts, where natural and social processes are strongly interconnected, and the institutional setting involves multiple stakeholders and decision-makers."[180].

Through close analysis of two the transboundary case studies, the OTB and ZRB, the DAFNE Project outcomes are expected to deepen understanding of the WEF Nexus. Moreover, it aims to provide a mechanism, through modelling, for cooperative, equitable and sustainable management and planning solutions for both basin stakeholders, and broader society affected by these decisions. To enable this integrated and multidisciplinary approach, scenarios are to be developed across the project work packages, providing inputs to each disciplinary model which in turn provides quantitative indicators as outputs. The governance model should therefore provide an indication of the legal frameworks in relation to certain actions or combination of actions related to the WEF nexus. A lawyer would apply a process of legal reasoning when faced with such questions. Thus, the governance model presented here uses the basic tenets of legal reasoning as the methodology behind its design. This section first it sets out the "actions" and "indicators" the model needs as inputs and outputs for its operationalisation. It next presents a set of "legal principles matrices", which provide the substantive infrastructure required to simulate a governance modelling process, which will finally be applied in section 4.

The model developed draws upon literature and other models developed in international water governance, such as that developed by Rieu-Clark et al (2012), which identified a series of questions which must be asked in relation to the principle of equitable and reasonable use. Ultimately, the model provides a mechanism to gauge the level of legal expectation in relation to key legal principles across the two case study basins.

It is possible that this model could be related to relevant physical, environmental, economic and social data for consideration in transboundary decision-making and WEF nexus trade-offs, in a way that conforms to and is guided by international water law, which would provide an elaborate model for the governance of transboundary watercourses. However, the formation of such an elaborate model is not possible within the remit of this report.

It must be noted that the model created within this report cannot be used to identify whether a particular project, such as the building of a dam or an agricultural development project are legal *per*

[180] DoA, p3

se, instead it can be used to examine whether the project will give rise to legal expectations with regards to key principles of international water law and the extent to which it may contribute to the realisation of relevant SDGs. As a result, information can be derived which discusses whether the project is sustainable, whether it promotes cooperation, the extent to which it is equitable and reasonable and ensuring that it is not going to cause significant harm.

3.1 ACTIONS AND INDICATORS FOR GOVERNANCE IMPLICATIONS

3.1.1 Actions and pathways

By definition within the DAFNE Project an action is an intervention aimed at solving an issue. These actions can be:

(a) **Infrastructural**: concerning physical changes in the watercourse system and altering its functioning, e.g. new dam
(b) **Normative**: concerning changes in rules and regulations
(c) **Operational**: concerning changes in the way infrastructure is operated or managed (e.g. water withdrawal regulations)

A pathway is in turn a sequence of actions enabling the exploration of adaptation options to changing environmental and societal conditions. The final actions and pathways will be identified by the project team based on stakeholder input and an iterative process of refinement in the final year of DAFNE. However, for the purposes of simulating the governance models for preliminary findings, the following actions are defined as inputs, based upon preliminary suggestions from stakeholders in the NSL:

While these actions/inputs could all be used within the governance model, sufficient information regarding a potential action would be required which could then be applied to the model. As it is not within the constraints of this report to apply the model to each of the actions given above, the example of hydropower projects in each of the basins will be used to demonstrate the application of the model instead.

Table 9 – Preliminary actions for governance modelling

Infrastructural	Building a dam Hydropower project (development/ expansion) Water Transfer Scheme Irrigation Scheme Changes to navigational channel Agricultural development Mining expansion
Normative	Degazetting of protected areas Creation of protected areas Change in water allocation rights
Operational	Flood control scheme Water Hyacinth Control Programme

3.1.2 Governance indicators as scales of legality

The actions will in turn be measured by indicators to ascertain the merits and demerits of an action or pathway. In order to be integrated within the DAF, indicators across each of the partners will be both of a quantitative and qualitative nature. Due to the qualitative nature of legal analysis, indicators will be based on the strength of legal language used, with scores derived from scales. By creating a scale which has assigned values, the indicators can signify the likelihood of a governance implication of a particular action. It will not be possible to provide a definitive and detailed overview

of governance implications, but rather contributes to a broad understanding of the type of implications which may arise. The scale indicates the level of legal expectation which is likely to arise in relation to a particular action.

Table 10 – Possible Impacts relating to actions

Impact	Relationship to wef nexus	Relevant legal principles
Water quality	**Water**: water for consumption may be polluted. Damage to ecosystems may occur. **Energy**: no impact **Food**: water may be unsuitable for crops and livestock, fish populations may be impacted **Additional impacts**: biodiversity loss, wetlands damaged, species endangered, protected areas at risk	No Significant Harm Rule Ecosystem Protection Pollution Prevention Intergenerational Equity Precautionary Principle
Water quantity	**Water**: water for consumption may be limited. Damage to ecosystems may occur. **Energy**: water quantity requirements for all hydropower projects may not be met. **Food**: water for crops and livestock may be limited, fish populations may be impacted **Additional impacts**: biodiversity loss, wetlands damaged, species endangered, protected areas at risk. Water supply deficit may lead to migration and displacement.	Equitable and Reasonable Use No Harm Rule Ecosystem Protection Pollution Prevention Intergenerational Equity Precautionary Principle
Water flow	**Water**: water for consumption may be limited. Damage to ecosystems may occur. **Energy**: water quantity requirements for all hydropower projects may not be met. **Food**: water for crops and livestock may be limited, fish populations may be impacted Alterations in flooding patterns may cause multiple socio and economic impacts. Biodiversity loss, wetlands damaged, species endangered, protected areas at risk. Water supply deficit may lead to migration and displacement.	Equitable and Reasonable Use No Harm Rule Ecosystem Protection Pollution Prevention Intergenerational Equity Precautionary Principle

As demonstrated in Table 10, changes to the quality, quantity and flow patterns of water could lead to a variety of environmental, social and economic impacts. It should however also be noted that such impacts are not only negative. Actions within the basin are likely to always result in both positive and negative impacts, such as clean energy provision, food security, water supply and recreational activities. Each of the impacts identified would give rise to a legal expectation under the majority of the legal principles identified. Therefore, on this basis, further demonstration of the linkages between impacts and legal principles are not given within this document as the nature of an impact would be dependent on each specific action.

3.2 A MODEL TO IDENTIFY LEGAL EXPECTATIONS

The method of applying legal rules to a specific context is conducted through legal reasoning. Consequently, legal reasoning methods are used to produce the model by calculating the level of legal expectation which is likely to arise in relation to a particular action. As well as identifying legal principles, legal reasoning is largely based upon the legal force of an instrument, and the strength of

the language of the principles contained within those instruments. It is, therefore, these two components of legal reasoning which are drawn upon to develop a matric that can produce a quantitative score.

3.2.1 Methodology

Both international and national legal and policy frameworks relating to the WEF nexus across both the ZRB and OTB were analysed. Relevant law and policy documents were compiled for Milestones 4 and 57 and utilised the same methodological approach as was employed in the development of the Environmental Policy Model (DAFNE Project, Deliverable 4.2). Legal and policy documents were obtained from the DAFNE database and government websites and were supplemented by online searches. The search targeted documents within the water sector in particular, but also included NDPs and sectoral policy strategies relating to energy and agriculture/food security. The search procedure used was as follows:

1) Search of DAFNE database for relevant law and policy documents
2) Search of national government or individual ministry/agency websites of each member state for documents relating to water sector governance
3) General search using Google with search terms of [country name] + water + policy OR law
4) Search of online legal databases (FAOLEX, ECOLEX) using the same search terms
5) Search for academic literature using Google Scholar using the same search terms

A number of documents were subsequently excluded due to irrelevance for this report. Those documents which were excluded were documents which focused on regulatory procedure or administrative processes and duplicates or repealed versions of the documents. The total number of documents which are included within the model are provided within Table 11. National Developments Plans were not included within the quantitative scoring due to their broad nature but were instead subject to independent analysis in Sections 2.2.4 and 2.3.4 respectively.

As previously mentioned with regards to the formation of legal principles, it became clear in the research process that different law and policy documents across countries use different wording for the same meaning. In order to account for this variation a number of alternative words were also included within the legal analysis. These alternative wordings are provided for in Table 12.

Within the analysis each piece of legislation was given two scores: the first on the level of legal force, dependant on the legal status of the document and the second on the language used dependant on whether the principle was or was not found within the relevant legislation. Once the scores from Stages 1 and 2 were found, both values were multiplied to give an overall score for that principle within the specific law or policy.

Table 11 – Documents used within governance model

Country	Number of documents analysed	Number of documents excluded	Included legal documents	Included policy documents
Angola	17	3	14	0
Botswana	61	35	21	5
Malawi	35	12	19	4
Mozambique	23	2	20	1
Namibia	46	24	17	5
Tanzania	41	17	21	3
Zambia	28	12	16	3
Zimbabwe	20	5	13	2
Kenya	54	35	15	4
Ethiopia	37	23	12	2

Table 12 – Word Variations Utilised in Model

Word variation used	
Equitable and reasonable use	Equity, reasonable, equal, fair
No harm rule	Adverse impact, impact, harm
Ecosystem protection	Natural resources, ecological, ecosystem
Pollution prevention	Prevent, control, reduce, pollution, pollute
Intergenerational equity	Sustainable, generation, future generations
Precautionary principle	Protect, risk, caution
Environmental impact assessment	EIA, impact, assessment, environment
Transboundary impact assessment	Transboundary, riparian, shared, borders, boundary
Provision for Joint Body Establishment	Joint, shared, commission
Information/data exchange	Information, knowledge, share, shared
Notification	Inform, notify
Consultation	Consult, discuss, liaise
Dispute settlement procedures	Dispute, conflict

Stage 1: Level of Legal Force

Table 13 – Legal Force Index, adapted from FAO (1997)

Legal force of international document	**Legal force of document**	**Scale value(*)**
Absence / no signature	Absence	**0**
Policy under signed treaty	Draft national policy	**2**
Policy under ratified treaty	Policy is in place	**4**
Signature (treaty)	Draft legislation	**6**
Ratification (treaty)	Legislation	**8**

(*) The scale of 0-8 was adapted from an original score of 0-5 in order to more clearly illustrate the differences across international and national legal frameworks.

Stage 2: Use of Language

Table 14 – Legal Language Index (quantitative analysis)

Classification	**Rationale**	**Example**	
No provision	Principle is absent		**0**
Preamble	Principle is mentioned only in the Preamble	"Bearing in mind the principle of…"	**1**
Non-binding guidance	Principle is mentioned using guiding language only	"may"	**1.5**
Ambiguous negative obligation	Abstain from violation (vague / ambiguous / no elaboration or guidance)	'shall" "reasonable"	**2**
Unambiguous negative obligation	Abstain from violation (specific / unambiguous / elaboration or guidance given)	'shall" "any" "all"	**2.5**
Indefinite positive obligation	Obligation to take action (actions not prescribed or suggested)	'shall"	**3**
Flexible positive obligation	Obligation to take action (guiding action(s) suggested)	'shall" "consider" "take into account"	**4**
Definite positive obligation	Obligation to take action (imperative action(s) prescribed)	'shall" "requires" "all"	**5**

Stage 3: Identification of Legal Expectation

Table 15 – Legal Expectation Matrix and Scale

Legal Expectation Matrix		**Legal Force Index**				
		0	**2**	**4**	**6**	**8**
		Absence	Draft policy / policy under signed treaty	Policy in place / policy under ratified treaty	Draft legisla-tion /signatory to a treaty	Appearance in law / ratified treaty
Legal Language Index						
No provision	0	0	0	0	0	0
Preamble	1	0	2	4	6	8
Non-binding guidance	1.5	0	3	6	9	12
Ambiguous negative obligation	2	0	4	8	12	16
Unambigu-ous nega-tive obliga-tion	2.5	0	5	10	15	20
Indefinite positive ob-ligation	3	0	6	12	18	24
Flexible posi-tive obliga-tion	4	0	8	16	24	32
Definite posi-tive obliga-tion	5	0	10	20	30	40

Table 16 – Scale of Legal Expectation

Scale of Legal Expectation		**Level of Expectation**
Value range	*Indicator*	
0-2	Very Low	The lowest score relates to the weakest level of expectation. With a score of 0-1 the relevant legal framework or policy only mentions the relevant principle but places no further expectation on a state with regard to conduct.
2-10	Low – Medium	A low-medium score sees the legal principle included within the framework, but within a manner which does not place strictly binding expectations upon a state. Use of language such as “may” results in flexibility around the operation of the provision which is included.
10-20	Medium	At a medium level the level of expectation begins to become more specific, here provisions begin to describe the steps which should be taken by a state towards the fulfilment of the key principles.
20-30	Medium – High	A medium-high obligation provides further specification and places a positive obligation upon a state with regards to conduct, the use of language such as ‘shall” and “requires” are used
30-40	High	The highest level of expectation is given to provisions which provide specific obligations to take action and provide detail regarding how to do so.

Documents across a multitude of sectors which are relevant to water governance within the WEF nexus were analysed within the course of creating this governance model. However, only scores derived specifically from legal and policy documents related specifically to the water or environmental sector are included within Table 17 for the ZRB and Table 18 for the OTB. The scores presented in Table 17 (Table 18 for the OTB) represent the highest level of legal expectation related to key principles of water governance at a national level (N) and an international level (I). References relating to each of the scores can be found in Annex 1.

In the process of analysing the data some attempts were made around producing an overall average score, either to be representative of the legal expectation relating to each key principle within each State or within the basin overall. However, when such averages were calculated it demonstrated an inaccurate depiction of the level of legal expectation. Very low scores relating to some legal and policy documents drove down higher scores present in others, consequently representing a reductionist approach to the legal analysis. Therefore, average scores have not been used in Table 19, instead only the score which relates to the highest level of legal expectation across the frameworks for water governance have been provided

Higher scores of legal expectation are illustrative of the presence of legal principles within law/policy frameworks using strong language. If implemented well, it is therefore likely that equitable and sustainable use of shared water resources will result where such high scores are present. Conversely, a lower expectation score is often indicative of a policy or legislative gap, although this is not an absolute factor in determining compliance with legal rules and standards as legal frameworks may not be representative of governance on the ground.

As full analysis of legal and policy frameworks has been previously given in Milestones 4 and 57, only an overview of the national legal frameworks will be given here. Specific attention will however be paid to the incorporation of the two central tenets of international water law – equitable and reasonable use and no significant harm.

Angola and Mozambique

Analysis of legislation and policy frameworks in Angola and Mozambique was limited due to the language barrier. Analysis therefore relied upon translation programmes and secondary resources, which may not give a comprehensive and accurate portrayal of the documents. While it was possible to obtain translated versions of Angolan law and policy frameworks, information with regards to Mozambique's legal frameworks is fragmented. To a large extent the content of the legal and policy frameworks remains unknown.

Angola

According to a water policy review conducted by the SADC, reform in the water sector in Angola has been on-going since the early 1990s, most recently resulting in the Water Law 2002 and the Water Sector Development Strategy which was prepared by the National Directorate of Water.[181] Articles 19 and 76 of the 2002 Water Law refer specifically to transboundary resources, stating that transboundary cooperation is of cardinal importance and the provisions of the water law must not compromise the fulfilment of Angola's obligations under any ratified international agreements.[182]

Mozambique

Full analysis of the legal and policy frameworks of Mozambique have not been possible within the remit of this report due to difficulties with translation. From the documents which have been sourced and from secondary literature, the legal framework of Mozambique appears fragmented. However, positively, key principles such as the necessity to conduct an EIA and the obligation to prevent pollution are strongly present within national law.

[181] Peter Robinson, Angola Water Policy Review, SADC Water Sector, 2003, pg. 8
[182] Peter Robinson, Angola Water Policy Review, SADC Water Sector, 2003, pg.9

Table 17 – Scores for Zambezi Basin

Legal Principles	Equitable and Reasonable Use	No Significant Harm	Ecosystem Protection	Pollution Prevention	Intergener. Equity	Precaution. Principle	EIA	Transbound. Impact Assessment	Provision for Establishm. of Joint Body	Information /Data Exchange	Notification	Consultation	Dispute Settlement Procedures
Angola (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Angola (N)	16	24	16	32	8	0	40	0	0	0	0	0	0
Botswana (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Botswana (N)	18	24	12	40	12	12	40	40	12	16	16	16	0
Malawi (I)	40	40	40	40	40	30	20	24	40	40	40	40	40
Malawi (N)	12	12	24	40	12	24	32	0	24	12	0	16	32
Mozambique (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Mozambique (N)	24	8	24	32	~	0	32	~	~	~	~	~	~
Namibia (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Namibia (N)	8	16	32	40	8	12	40	0	32	24	8	8	8
Tanzania (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Tanzania (N)	24	24	24	40	32	40	40	24	24	16	0	0	0
Zambia (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Zambia (N)	40	40	24	40	24	24	40	24	32	16	0	16	16
Zimbabwe (I)	40	40	40	40	40	40	20	32	40	40	40	40	40
Zimbabwe (N)	24	24	16	40	24	16	40	40	12	12	0	0	16

Table 18 – Scores for Omo-Turkana Basin

Legal Principles	Equitable and Reasonable Use	No Significant Harm	Ecosystem Protection	Pollution Prevention	Intergener. Equity	Precaution. Principle	EIA	Transbound. Impact Assessment	Provision for Establishm. of Joint Body	Information /Data Exchange	Notification	Consultation	Dispute Settlement Procedures
Kenya (I)	24	18	24	24	24	24	12	0	24	18	0	24	30
Kenya (N)	24	12	32	40	20	16	40	40	16	0	0	0	40
Ethiopia (I)	24	18	18	24	24	24	12	0	24	18	0	0	0
Ethiopia (N)	16	8	24	40	0	0	40	24	12	24	0	18	40

Botswana

The legal framework for water resource management in Botswana is relatively dated compared with those of other Zambezi riparian's, as is illustrated by a new legal framework regarding water resources being in progress, however the draft has been in bill form since 2005.[183] The National Water Policy of 2012 identifies the relationship between both agriculture and energy stressing the need to improve water use efficiency.[184] Section 12 of the policy focuses specifically on international cooperation stating that shared watercourses must be managed in accordance with the obligations and entitlements found in international, regional and bilateral agreements, including the UNWC and the SADC-PC. The section also makes reference to benefit sharing mechanisms for the management of transboundary watercourses, as well as ensuring a comprehensive and compatible monitoring system to support the collection, processing and exchange of data.[185]

Malawi

In Malawi, The Water Resources Act (No. 2 of 2013) does not explicitly enact many of the provisions of the UNWC, where such provisions are included, the language used does not denote positive obligations to take action, but rather is often framed within the language of steps which "may" be taken if deemed appropriate.[186] The National Water Policy of 2005 promotes international cooperation in the management of transboundary water resources, referring to the ZRB in particular, the policy states that "the management of these transboundary waters will have to conform to the regional and international agreements and protocols without compromising the country's sovereignty, security and territorial integrity".[187] As with the other Zambezi states, the policy also focuses on principles of IWRM, and states that water resource programmes will be carried out in an integrated manner.[188] The policy also acknowledges the WEF nexus, stating the need for linking water resource management with agricultural practices including irrigation, as well as the promotion of alternative energy sources such as hydropower.

Tanzania

Part XII of the Water Resources Management Act (No.11 of 2009) of Tanzania specifically focuses on transboundary waters. With regards to regional and international agreements, the provision states that the Minister shall initiate and prepare legislative proposals for the purposes of implementing such agreements.[189] The provision also states that the Minister may engage in a number of activities which would assist with the management of transboundary resources including promoting cooperative institutional arrangements such as joint projects.[190] Article 100 refers specifically to the collection and analysis of relevant data concerning transboundary rivers. The Act also lists a number of key principles of water resources management and sustainable development as guiding principles for implementation, including the precautionary principle, ecosystem integrity, international cooperation of shared environmental resources and common but differentiated responsibilities.[191]

Namibia

As is the case in the other Zambezi basin states, the Namibian Water Resources Management Act (No. 11 of 2013) states that the management of water resources in Namibia will be conducted in

[183] Botswana Draft Water Bill 2005

[184] Botswana National Water Policy 2002, pg. 21 and 24

[185] Botswana National Water Policy 2002 pg. 28 Section 12.1.6 – 12.1.8

[186] Water Resources Act (No. 2 of 2013) (Malawi). For instance, Article 141 discusses the establishment of bodies to implement international agreements but does so from the perspective that they "may" be formed and that they "may" share relevant information with other states.

[187] National Water Policy 2005, Government of Malawi

[188] National Water Policy 2005, Government of Malawi, Section 3.4.4

[189] Water Resources Management Act (No. 11 of 2009), Article 98 (Tanzania)

[190] Water Resources Management Act (No. 11 of 2009), Article 99 (Tanzania)

[191] Water Resources Management Act (No. 11 of 2009), Article 5 (Tanzania)

accordance with IWRM. Part 6 of the Act specifically focuses on internationally shared water resources and lists the international agreements relating to shared watercourses which are binding on Namibia, including ZAMCOM.[192] Article 28 of the Act describes the functions of the Minister in relation to the joint management of water resources including the creation and maintenance of a common database system, the development and improvement of human resource capacity and the establishment of mechanisms for the management, prevention and resolution of disputes.[193]

Zambia

In Zambia, Part VII of the Water Resources Management Act (2011) covers the management of shared watercourses and water resources and states that the Government will uphold basic principles and rules of international law relating to water resources. Article 56(b) further states that Zambia will work in cooperation with other riparian states to develop legal instruments on the use of water, the monitoring of pollution and its effects in any shared water resources, the putting into place of adaptation measures to deal with climate change and the control of long-range transport of pollution.[194] It also states that mechanisms will be set up for sharing knowledge and technology for the collection of data for any planned developments and that Zambia will work in cooperation with other riparian states to formulate water resource strategies.[195] Article 57(2) mirrors Article 6(1) of the UNWC with regards to the factors which should be taken into consideration when determining equitable and reasonable use. The provision in the Zambian legislation adds some additional factors such as ecosystem protection, the regulation of flow and the protection of the aquatic environment, all of which are found elsewhere in the UNWC, but it also removes UNWC Article 6(1)(d) which states that the effects of the use or uses of the watercourse in one watercourse state on other watercourse states should be taken into account. However, under Part VIII which covers the use of water, it is stated that the use of water shall "avoid or minimise the adverse impact of that use on other users of water"[196], however it is likely that this provision is aimed towards other water users within Zambia, rather than neighbouring states. Article 60(1)(a) also states that the uses of water should maximise social and economic benefits to the community. Article 61 details the allocation of water and the prioritisation of use, included within which is ensuring that water reserves are set aside for priority purposes and environmental needs.[197] Environmental needs are listed as secondary to domestic and non-commercial purposes.[198]

The Zambian National Water Policy was put in place in 2010 and as such is out-of-date in the sense that it does not reflect the Water Act. However, the policy is still reasonably progressive in the sense that it reflects some of the principles of the UNWC. It also talks specifically of the Zambezi, as the largest river basin within the country. The policy also lists the main purposes of water which include agriculture and energy, demonstrating the WEF nexus. One of the objectives of the policy is also to "ensure inter-sectoral linkages in the development of the water resources so as to support cross-sectoral development needs". The policy also cites the UNWC and the Revised SADC Protocol as key frameworks for the management of water resources

Zimbabwe

The most recent water governance framework, the National Water Policy of 2002 emphasises the importance of water to the countries development and recognises the WEF nexus discussing the importance of water for energy and for food production. The policy also states that Zimbabwe will promote a policy of "good neighbourliness" in relation to international waters "whilst safeguarding national interest", it continues to state that this will include cooperation between riparian states and the shared benefits of developing and utilising resources.[199] It also states that it will share data "in

[192] Water Resources Management Act (No. 11 of 2013), Article 29 (Namibia)
[193] Water Resources Management Act (No. 11 of 2013), Article 28 (Namibia)
[194] The Water Resources Management Act (No. 21 of 2011), Article 56(1)(b) (Zambia)
[195] The Water Resources Management Act (No. 21 of 2011), Article 56(1)(d) (Zambia)
[196] The Water Resources Management Act (No. 21 of 2011), Article 60(1)(c) (Zambia)
[197] The Water Resources Management Act (No. 21 of 2011), Article 61(2)(c) (Zambia)
[198] The Water Resources Management Act (No. 21 of 2011), Article 61(2)(e)(ii) (Zambia)
[199] National Water Policy, Ministry of Water Resources Development and Management, 2012, Section 7.6.9

the spirit of adopted international agreements" including the Revised SADC Protocol on Shared Watercourses. Therefore, while the legal framework is not particularly robust in Zimbabwe, the National Water Policy 2012 is comprehensive and forward looking, including many aspects of the UNWC.

Equitable and Reasonable Use

Equitable and reasonable use is most explicitly demonstrated within the legal framework of Zambia. Zambia's 2011 Water Resources Management defines "equitable" as "fair, reasonable and just" in Article 2 and ensuring in Article 57 that "the principles of equitable, reasonable and sustainable utilisation of shared water resources" are operationalised, by taking into account the factors of equitable and reasonable use as set out within the UNWC (Article 6). The principle is also included within Article 98(1) of Tanzania's 2009 Water Resources Management which states that "the Minister may develop policies and strategies for the purposes of ensuring sustainable, equitable utilisation and management of transboundary waters".

Although not specifically incorporating the principles of equitable and reasonable use, Namibia's 2013 Water Resources Management Act advocates the "furtherance of the objectives of the Southern African Development Community Revised Protocol on Shared Watercourses" in Article 28(b) which intrinsically includes the provision of equitable and reasonable use. Water legislation in Mozambique also states that international cooperation should aim to adopt coordinated measures for the management of watercourses within the same river basin, taking into account the interests of all States concerned, which demonstrates the spirit of equitable and reasonable use.[200] Equitable and reasonable use is not implemented within the legal framework of Zimbabwe, however it does provide for the promotion of equitable, efficient and sustainable allocation and distribution of resources nationally.[201] In addition, Zimbabwe's National Water Policy of 2012 states in Section 7.6.5 that it "promotes efficient and equitable utilisation of water resources", although this is not stated in the context of transboundary resources. A similar provision is also found in Article 23 of the 1998 Water Act. Angola similarly calls for "fair and reasonable allocation" of waters of common interest in its national water law.[202] Botswana's 2005 Draft Water Bill also refers to the promotion of "equitable and effective regional cooperation in the management of shared water course systems",[203] it further states that the Minister shall "keep under review any bi-lateral and multilateral regional agreements for the purposes of promoting Botswana's interests in the mutual co-operation of States on shared waters on an equitable basis and in line with any developing international legal norms".[204]

In the OTB, the Constitution of Kenya States in Article 174(g) that there should be "equitable sharing of national and local resources throughout Kenya" and Article 27(j) of the 2016 Water Act sets out the power and function of basin water resources committee to advise government on the "equitable water sharing within the basin area through water allocation plans". The principle of equity is also present within Ethiopia's legislation which states that a river basin plan should aim to guarantee equity and sustainability in water resource use.[205] Ethiopia's 1999 Water Policy further states that there should be meaningful and mutually fair Regional cooperation and agreements on the joint and efficient use of transboundary water within Riparian countries based on "equitable and reasonable" use principles.[206]

Therefore, the principle of equitable and reasonable use is, to some extent, found within the legal or policy frameworks of all ZRB and OTB States. However, the level of legal expectation attached

[200] Mozambique: 1991 Act No. 16/91 regulating water resources belonging to the public domain.
[201] Zimbabwe: 1998 Zimbabwe National Water Authority Act [Chapter 20:25], Article 5(1)(d) and 1998 Water Act [Chapter 20:24], Article 6(1)(c).
[202] Angola: 2002 Law No. 6/02 on Water Use Articles 10 and 19
[203] Botswana: Draft Water Bill 2005, Article 55
[204] Botswana: Draft Water Bill 2005, Article 55
[205] Ethiopia: 2007 River Basin Councils and Authorities Proclamation (No. 534 of 2007), Article 2(1)(8).
[206] 1999 Ethiopian Water Resources Management Policy (Federal Democratic Republic of Ethiopia, Ministry of Water Resources 1999).

to its inclusion is varied by the strength of the language used and the type of document it is incorporated within, varying from a very low level of legal expectation to very high.

No Significant Harm

Implementation of the principle not to cause significant harm has primarily taken place through environmental legislation. Zambia's 2011 Water Resources Management Act states in Article 60(1)(c) that the use of water shall "avoid or minimise the adverse impact of that use on other users of water". However, this does not make the application to transboundary states explicit. A more explicit reference to transboundary resources is given in the 2011 Environmental Management Act which states in Article 85(1) that "the Minister may…collaborate with the relevant countries on environmental management programmes and measures to avoid and minimise transboundary environmental impacts" as well as requiring in Article (2)(b) that State of the Environment Report shall describe any significant adverse effects caused or likely to be caused and identify the causes and trends. In a similar vein, Tanzania does not explicitly provide for no significant harm to States within its water laws, however it does provide in Article 59 of the 2005 Environmental Impact Assessment and Audit Regulations that:

> "where a project or an undertaking is likely to have a transboundary impact, the developer or proponent shall, in consultation with the Director of Environment, ensure that appropriate measures are taken to mitigate any adverse impacts taking into account any existing treaties and agreements between the United Republic and the other States."

The 2002 Zimbabwe Environment Management Act Article 99(c) and(d) states that the contents of an EIA report must "give a detailed description of the likely impact the project may have on the environment or any segment thereof, covering the direct, indirect, cumulative, short-term and long-term effects of the project" and 'specify the measures proposed for eliminating, reducing or mitigating any anticipated adverse impacts". Legislation in Botswana refers specifically to the principle of no significant harm with regards to EIAs.[207] The 2013 Water Resources Management Act of Malawi states as one of its objectives:

> "to allow for the orderly development and use of water resources for all purposes including domestic use, the watering of stock, irrigation and agriculture, industrial, commercial and mining uses, the generation of hydroelectric or geothermal energy, navigation, fishing, preservation of flora and fauna and recreation in ways which minimize harmful effects to the environment"[208]

In Zimbabwe a provision relating to significant harm is given in the 2002 Environmental Management Agency Act, Article 99(e) states that an EIA report on a project shall "indicate whether the environment of any other country is likely to be affected by the project and any measures to be taken to minimise any damage to that environment". Similarly, in Angola the 1998 Environmental Law states that "all actions or actions with immediate or long-term effects on the environment must be considered in advance so as to minimise any harmful effects".[209] In Namibia the 2007 Environmental Management Act states in Article 3(2)(d) states that harmful effects to environmental resources must be prevented.

There is no explicit mention of the principle of no significant harm within the OTB, however Article 3 of the Ethiopian Water Resources Management Proclamation states that it must be ensured that "harmful effects of water are prevented". In Kenya, Article 70(2)(a) states with regard to the enforcement of environmental rights that the court may make an order to "prevent, stop or discontinue any act or omission that is harmful to the environment".

Implementation of the principle of no significant harm at a national level is therefore piecemeal in nature. While the principle has clearly been implemented in Zambian legislation any mention of the principle the remaining ZRB and OTB States is vague. As the principle is recognised as customary

[207] Botswana: Environmental Assessment Act (No.10 of 2011) Form E, Regulation 8
[208] Malawi: 2013 Water Resources Act (No. 2 of 2013), Article 4
[209] Angola: 1998 Environmental Law No. 5/98, Article 4

international law, it would be a positive step for the States of both basins to explicitly include the principle within national law.

Observations relating to the ZRB:

- The ZRB has a comprehensive framework in place across the majority of the key principles of water governance demonstrated within the governance model
- The key principles used within the model are in place throughout the basin, largely as a result of the regional level SADC instruments (including the SADC-PC) and the operational framework of ZAMCOM.
- Sub-regional and basin-level institutional frameworks provide a strong framework for cooperation, however improvement in effectiveness and coordination in realising the key legal principles of the governance model should be a priority
- Despite the positive trend around environmental protection issues, there is a lack of consistent domestication of international legal commitments. However, the fact that some key principles are absent in domestic frameworks does not necessarily suggests lack of commitment, as commitment is clearly demonstrated at an international level. Nonetheless, clear reference to the key principles of international water law would be a positive progression.
- In relation to the legal principles used within the model, legal expectations with regard to EIA and Transboundary Impact Assessments have the lowest score
- Prevention of pollution has the highest score and is the most widely recognised principle throughout the basin
- Uncertainty relating to the application of key principles may deter certain countries from incorporating them within national legal frameworks, particularly Angola, Malawi and Zambia, given their position in the basin. Strong legal commitments can nonetheless be seen in Zambia.

Observations relating to the OTB:

- No international, regional or basin scale instrument applies directly to water governance within the OTB. However, regional agreements such as IGAD and the ACCNNR provide some level of legal expectation with regards to the key legal principles.
- As the SUPSED Agreement is not available its principles cannot be identified. However, regional agreements such as COMESA and IGAD demonstrate legal commitments to environmental protection and create a framework for cooperation and joint management within the OTB. These agreements can therefore be relied upon as a foundation for future negotiations on joint management to be built. It may be the case that the gap in the regional framework in the OTB will be filled by the finalisation and implementation of the IGAD Regional Water Policy and Regional Water Protocol.[210]
- National level frameworks within both Ethiopia and Kenya implement a number of the key legal principles used within the governance model. Pollution prevention, EIA, Transboundary Impact Assessments and Dispute Settlement procedures are both present in both Kenya and Ethiopia at the highest level of legal expectation demonstrated within the model.
- However, the principle of notification is absent from national level frameworks.
- While Kenyan and Ethiopian laws and policies have similarities, there are also inconsistencies These should be read in light of the institutional deficiency at basin-level but the availability of several institutions and processes at domestic level. The latter is a good opportunity to manage shared water resources effectively and sustainably. Focus should be placed on ensuring a sound balance between centralised national approaches to addressing the WEF nexus within internationally recognised standards and rules.

[210] IGAD Regional Water Resources Policy & Protocol Presentation, May 2017 < https://www.unece.org/fileadmin/DAM/env/documents/2017/WAT/05May_16-18_Workshop_Kisumu/10.4_Mwango_IGAD_Policy_and_Protocol_Principles___lessons.pdf>

3.2.2 Limitations and the necessity of *ad hoc* legal analysis

The extent to which international water law can be used to create a governance model is limited to the level of cooperation between States. Both the substantive and procedural obligations placed on riparian countries become weak and meaningless when applied in situations in which states are not willing to cooperate. However, when implemented appropriately, international water law provides a framework through which cooperation can be built. International water law can also provide an institutional framework upon which to build a nexus approach, but it does not specify exactly how procedural aspects should be conducted. The formation of these arrangements is left to the watercourse States. As such, while this report has aimed to demonstrate a means of creating a quantitative legal model, the limitations of such a framework must be recognised. In analysing legal provisions in such a manner, a large degree of the context of the provisions is lost and the inherently subjective approach creates the risk of failing to take into consideration the operationalisation of such provisions on the ground. In addition, the model which has been created is static and would need to be updated with progress made in regard to legal and policy frameworks. As such, it can only capture the legal and policy frameworks at one specific point in time. Such limitations therefore necessitate *ad hoc* legal analysis taking place when evaluating any specific actions with regards to the watercourses. The following sections of the report will seek to utilise the model created to demonstrate its use within current activities within the river basins. As such, it will become clear that while the model does serve a purpose in highlighting where gaps within the legal and policy frameworks exist, it does not provide a comprehensive mechanism through which it is possible to determine the "legality" of any given project or proposal.

4. APPLICATION: GOVERNANCE MODELLING IN THE ZAMBEZI AND OMO-TURKANA BASINS

4.1 IDENTIFYING LEGAL EXPECTATION THROUGH GOVERNANCE MODELLING

While a number of actions are taking place within both the ZRB and OTB, it is not possible to discuss the interaction between the governance model and multiple actions within the remit of this report. It is anticipated that in due course discussions of the application of the governance model to specific actions within the DAFNE project will be possible as more data and information becomes available. Therefore, for the purposes of this report hydropower developments have been selected as actions to provide an overview of the application of the water governance model.

4.1.1 Simulating River Basin Scenarios

Hydropower dams are a key intervention within both the OTB and ZTB. However, the construction and operationalisation of such dams has been subject to controversy. The Report of the World Commission on Dams (WCD, 2000) stated that the negative influences of dams on the environment in many cases exceeds positive results. Dams have led to a significant and irreversible loss of species and ecosystems and in many cases efforts to mitigate such impacts have not been successful. Dams can result in many changes taking place to the river regime such as changes in water temperature and oxygenation, changes to the water flow as well as alterations to the composition of the water in terms of nutrients and particles.[211] Vast quantities of literature exist on the impacts of dams, particularly within developing countries.[212] However, in many cases such literature

[211] Richard Kornijów, "Controversies around dam reservoirs: benefits, costs and future" Ecohydrology & Hydrobiology (2009) 9 2-4, 141-148

[212] Giuseppina Siciliano and Frauke Urban, "Equity-based Natural Resource Allocation for Infrastructure Development: Evidence From Large Hydropower Dams in Africa and Asia" 134 Ecological Economics 130; Peter Longo and Richard Cummings, "Dam Policy: The Need For Global Governance" (Littleton) 2 Journal of International Energy Policy 31; Zygmunt J. B. Plater, "Damming the third world: multilateral development banks, environmental diseconomies, and international reform pressures on the lending process. (Symposium: International Development Agencies, Human Rights and Environmental Considerations)" 17 Denver Journal of International Law and Policy 121

fails provide a balanced analysis and rarely demonstrates the potential benefits which can be derived from dams. Dams have undoubtedly contributed to human development, providing vital water storage for drinking water and irrigation, as well as for hydropower use and recreational activities (WCD, 2000). It is also likely that with changing climatic patterns dams will become even more important for providing vital water storage. The costs and benefits of dams cannot therefore be demonstrated comprehensively within the remit of this report. Indeed, the same is true of activities relating to irrigation for agriculture. The needs of the WEF nexus are so comprehensive in nature that it will likely only be at the conclusion of the DAFNE project when such an evaluation of the interventions (such as dams and irrigation) within the OTB and ZRB will be demonstrated. The following section will therefore seek to utilise the data contained within the governance model to qualitatively discuss the application of key legal principles to scenarios within the OTB and ZRB, subsequently making tentative suggestions for possible pathways to align governance frameworks with such key principles for the sustainable development of the shared watercourses.

As discussed in Deliverable 3.6 “Water Quality Response in the Omo River to Reservoir Management Scenarios” and Deliverable 3.2 (DAFNE Project) “Water Quality Response in the Zambezi River to Reservoir Management Scenarios”, dams included within the remit of the DAFNE project have the potential to cause a number of negative impacts on the environment. However, the application of correctly formed operational rules to reservoirs can potentially prevent adverse impacts occurring downstream. In addition, comprehensively conducted environmental and social impact assessments prior to the dam’s formation should also go some way to reducing any impacts on both the environment and upstream and downstream populations.

4.1.2 Application of Key Principles of Water Governance

As stated at the outset of this report, while a number of key principles of water governance have been utilised within the governance model, the principle of equitable and reasonable use is a core umbrella principle of the governance of shared watercourses. As such, it is the application of the principle of equitable and reasonable use which will be focused on within the following section, although brief mention of the relationship between hydropower actions and the other key governance principles will also be given.

According to Article 5 of the UNWC, watercourse States should utilise international watercourses with a view to attaining “optimal and sustainable utilisation” and deriving “benefits” while “taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse”. In determining equitable and reasonable use, as previously discussed, Article 6 subsequently requires all relevant factors and circumstances to be taken into consideration. While the factors provided within the UNWC are not exhaustive, they provide a useful starting point for the identification of matters to be taken into consideration. Examples of such factors in relation to the OTB and ZRB and provided in Table 19. Subsequently an overview of the hydropower activities within each basin is provided.

Table 19 – Hydropower Developments and Factors of Equitable and Reasonable Use

Factors of Equitable and Reasonable Use	**Examples to be taken into consideration with relation to OTB and ZRB**
Geographic Needs	• Requirements relating to each area of a river basin should be taken into account such as differences in need relating to grasslands and wetlands.
Hydrographic & Hydrological Needs	• Consideration of all needs relating to hydrology of basin
Climatic Variability	• The climatic circumstances of the river basin must be taken into consideration. In addition to the current climatic circumstances, adaptive management strategies should be put in place to ensure effective governance corresponds to future climatic variability.

(Table 19 continued)

Ecological Needs	• Ecological needs relate to the requirements of wetlands, biodiversity, forests, grasslands etc. [213] • Minimum environmental flow (e-flow) requirements (needs for the preservation of natural ecosystems). • Operational rules which mimic the natural flow of water resources from dams can have a positive impact on downstream ecosystems by providing a regulated and predictable flow of water. However, if not managed correctly, higher flows can also lead to river bed erosion and increased water turbidity.
Social and Economic Needs	• Requirements within river basins in relation to social needs such as domestic use of water or water for livestock should be taken into consideration. • Water use for irrigation relating to agriculture should also be considered, both in relation to food security and economic value. • Water use for hydropower development links to both social development in the provision of electricity and to economic growth through the export of additional energy generated.
Population Dependant on Watercourse	• Rising demand from population growth is an important factor within both basins.[214] • Hydropower developments contribute positively to increasing populations by providing water availability and increase irrigation for agriculture leading to food security. • However, dam construction and large-scale irrigation projects can also result in displacement of persons which can subsequently reinforce urbanisation.
Existing and Potential Use of Watercourse	• Existing uses (environmental, social, economic) should be taken into consideration, as well as any potential future uses of watercourses.
Conservation, protection, development and economy of use of water resources	• Overall consideration of the efficient use of a watercourse with relation to conservation, protection, development and economy of use.
Availability of alternatives of comparable value	• In assessing new interventions on shared watercourses, alternative interventions which would meet the same goals which are of comparable value should also be considered.

The Omo-Turkana Basin

Continued economic growth in Ethiopia, partly driven by construction and manufacturing sectors has led to increased energy needs.[215] Forecasts of population growth in Ethiopia estimate the population doubling before 2035.[216] According to the World Bank, approximately 42.9 percent of the population of Ethiopia have access to electricity. The majority of energy provision is within urban areas, with only 26.5 percent of the rural population having access to electricity.[217] Access to electricity in Kenya is similar, with 39.3 percent of the population having access, with the majority residing in urban areas.[218]Large portions of the population in both riparian states continue to live in con-

[213] The requirements of key ecosystems and ecosystem services with relation to the OTB and ZRB are detailed within Deliverable 3.4, Fritz Kleinschroth et al. "Key ecosystems and ecosystem services in the Omo-Turkana and Zambezi River Basins" 31st August 2018

[214] For details regarding population growth see Deliverable 4.3, pg. 20 and 21

[215] Federal Democratic Republic of Ethiopia, Ethiopian Electric Power, Koysha Hydroelectric Project, Environmental and Social Management Plan, March 2017, pg.1

[216] Federal Democratic Republic of Ethiopia, Ethiopian Electric Power, Koysha Hydroelectric Project, Environmental and Social Management Plan, March 2017

[217] World Bank Data, Access to Electricity, Ethiopia < https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=ET>

[218] World Bank Data, Access to Electricity, Kenya < https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?locations=KE>

ditions of relative poverty and energy insecurity. Traditional energy uses such as the use of firewood contribute to a multitude of environmental issues such as deforestation, soil erosion and soil degradation. Under the GTP II plan, Ethiopian Electric Power (EEP) intends to expand electricity coverage from the current 32% to 61% and boost the number of customers from 2.5 million to 7 million. EEP is focusing on developing the country's hydropower potential in medium to large-scale schemes.[219] Such schemes are already underway as illustrated by the Gibe I, Gibe II and Gibe III dams, the latter of which is the largest hydroelectric plant in Ethiopia. The construction and operation of the dam has been subject to criticism, with accusations of failure to conduct a comprehensive environmental and social impact assessment.[220] However, many news reports and literature on the topic fail to provide a balanced perspective of the projects.[221]

In addition to the Gibe dams, a fourth dam, the Koysha Hydroelectric project has also been selected as one of the country's key hydropower schemes to provide generation capacity to meet domestic demand and increase exports of electricity. A detailed Environmental Social Impact Assessment (ESIA) for the project has been conducted which has demonstrated a number of possible impacts which may be caused as a result of the project. Water pollution is cited as one of the key impacts of the project. The ESIA states that surface and/or groundwater may be contaminated by improper utilisation or storage of construction materials which are toxic or hazardous. Further, it is anticipated that there will be great impact on annual flooding patterns which are relied upon to provide essential water for both humans and livestock, depositing fertile silt, which almost half of local communities rely upon to grown subsistence crops. Annual floods are also vital for the re-greening of grazing fields for livestock. In addition, both the river and small lake-like ponds and swamps which are created by the river provide fish which form a vital component of the diet of local communities. In order to ensure these essential tasks, continue, the project aims to put in place an Artificial Flood Release (AFR) management plan.

Table 20 – Application of Equitable and Reasonable Use to Hydropower in the OTB

Equitable and Reasonable Use	
Geographic Needs	• Requirements of both Ethiopia (upstream) and Kenya (downstream) must be considered. • The upper northern part of the OTB is dominated by forests and agriculture and the southern part around Lake Turkana is mostly desert and shrubland with some seasonal grassland (*See* DAFNE Project, Deliverable 3.4). • Lake Turkana is the world's largest permanent desert lake and provides water resources and extremely valuable habitats within an otherwise arid region.
Hydrographic & Hydrological Needs	• The Omo River contributes the majority of freshwater input to Lake Turkana. • The Omo River periodically floods and inundates the plains of the Lower Omo valley, this is likely to be affected by the operation of Gibe III, however quantitative information is not currently available.[222] • Groundwater is also an important source of water at local scale for the communities in the riparian states of the OTB, but data regarding its contribution is largely absent.

[219] Federal Democratic Republic of Ethiopia, Ethiopian Electric Power, Koysha Hydroelectric Project, Environmental and Social Management Plan, March 2017, pg.1

[220] Jon Abbink, "Dam controversies: contested governance and developmental discourse on the Ethiopian Omo River dam" (Oxford, UK) 20 Social Anthropology 125

[221] *See* ibid

[222] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018 Section 3.2.2

(Table 20 continued)

Climatic Variability	• Climatic variability in the Omo-Turkana region is very strong, ranging from a tropical sub-humid climate in the northern part of the Ethiopian highland to desert climate towards Lake Turkana.[223]
Ecological Needs	• Five major water supplying ecosystems have been identified. Lake Turkana in particular is a major water dependant ecosystem. • Major wetlands occur along the rivers and streams of the OTB. One of major ecological importance is the Alemogono which is internationally recognised for its importance for migrating and endemic birds (*See* DAFNE Project, Deliverable 3.4). • Grasslands represent the most important grazing resources in the lower Omo (*See* DAFNE Project, Deliverable 3.4).
Socio Economic Needs	• In the OTB, Ethiopia is categorised as a low-income economy while Kenya is a lower middle-income economy. As a result, the development needs and priorities across each of the basin countries will differ.[224] • Ethiopia has suffered from chronic electricity shortages in recent decades and energy demand is projected to increase. Ethiopia aims to become a regional power hub.[225] Kenya is still hampered by an inadequate energy sector. • Agricultural practices are diverse throughout the OTB, the area is utilised for food production from crops, livestock and fisheries.[226] However on both sides of the border agricultural activities can be categorised as pastoralist.[227] Increased irrigation has been cited as a means of increasing agricultural activities to meet the needs of the growing population.[228] • Flood recession agriculture is depended on by both Kenya and Ethiopia, particularly within the Lower Omo Valley (*See* DAFNE Project, Deliverable 3.4). • Fish catch is significant and therefore streamflow regimes should focus on ensuring there is little or no impact to the fish population. • Some parts of the basin also suffer from a calorie deficit.

[223] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018, Section 3.2.1

[224] Malawi, Mozambique, Tanzania and Zimbabwe are categorised as low-income countries, Zambia and Angola are lower middle-income countries and Botswana and Namibia are upper middle-income countries.

[225] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018, Section 3.3.1

[226] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018, 3.4.2

[227] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018, Section 3.9.2

[228] Sean Avery and Emma Tebbs, "Lake Turkana, major Omo River developments, associated hydrological cycle change and consequent lake physical and ecological change" Journal of Great Lakes Research (2018) 44 1164-1182

(Table 20continued)

Population Dependant on Watercourse	• The demographic structure of the OTB is fragmented. The majority of the more than 14 million inhabitants of the OTB live in smaller settlements and rural communities spread out over the basin. (DAFNE Project, Deliverable 3.4) • The estimated total population in the Kenyan portion of the basin is between 1.2 million and 1.7 million. The number of people living within 50km of Lake Turkana is around 215,000. (DAFNE Project, Deliverable 3.4) • Rural populations, as is the majority within the basin, are much more highly dependent on the direct provision of ecosystem services (DAFNE Project, Deliverable 3.4)
Existing and Potential Use of Watercourse	• Water Use (human need, domestic) • Hydropower production • Ecosystems • Fisheries • Seasonal flooding for enabling cultivation on the river banks for indigenous groups.[229] • Irrigated sugarcane development – Kuraz Sugar Development Project – will create a number of jobs which are beneficial for livelihoods and the economy, but also has the potential to lead to nutrient run-off in the watercourse and displacement of indigenous populations.[230]
Conservation, protection, development and economy of use of water resources	• The shores of Lake Turkana are Kenya's only archaeological national park, Sibilio. The site is of great archaeological interest due to the finding of early human remains, described as the "cradle of mankind".[231] Sibiloi is also part of the UNESCO National Parks World Heritage Site. • The World Heritage Committee is concerned that the Gibe III and agricultural irrigation activities may threaten the lakes outstanding natural value. The site was placed on the list of world heritage sites in danger in June 2018.[232]
Availability of alternatives of comparable value	Unknown

With regards to water quality and impact upon ecosystems, Deliverable 3.6 (DAFNE Project) demonstrated that temperature and oxygen regimes can have direct and acute impact on aquatic ecosystems as many aquatic organisms rely on a natural thermal regime in order to complete their reproductive life cycles. Therefore, given that the Gibe III reservoir is likely to develop periodically stratified water columns, unless managed with environmental impact in mind, this may pose significant risk for downstream ecosystems. Further, a number of socio-economic, cultural and demographic factors which also need to be taken into consideration in the formation of governance arrangements were provided in Deliverable 4.3 (DAFNE Project) "Models of Demographic, Cultural and Social Developments in the Omo-Turkana and Zambezi River Basins". For instance, the model

[229] Benedikt Kamski, "The Kuraz Sugar Development Project (KSDP) in Ethiopia: Between 'sweet Visions" and Mounting Challenges" (2016) 10 Journal of Eastern African Studies 568.

[230] Benedikt Kamski, "The Kuraz Sugar Development Project (KSDP) in Ethiopia: Between 'sweet Visions" and Mounting Challenges" (2016) 10 Journal of Eastern African Studies 568.

[231] Sean Avery and Emma Tebbs, "Lake Turkana, major Omo River developments, associated hydrological cycle change and consequent lake physical and ecological change" Journal of Great Lakes Research (2018) 44 1164-1182

[232] *See* "Lake Turkana National Park site (Kenya) inscribed on List of World Heritage in Danger" 28th June 2018 < https://en.unesco.org/news/lake-turkana-national-park-site-kenya-inscribed-list-world-heritage-danger>

demonstrated that with regards to the OTB, dam construction from the Kenyan perspective was discussed as potentially leading to more poverty due to increased water scarcity. Conversely, Ethiopian stakeholders regarded the dam construction positively with relation to the regulation of floods, water availability and food and energy production which can lead to sharing costs and benefits of development projects.

One of the main purposes of the Gibe III dam is to provide water for irrigation. As a result, water abstraction will occur constantly or seasonally for agricultural purposes. This decrease will have an impact on the volume of water in the reservoir which may have some impact on the hydrodynamics of the reservoir. However, as stated in Deliverable 3.6 (DAFNE Project), the depths of the intake from irrigation are likely to be similar to that for hydropower and as such it is not anticipated that there will be an impact on the outflow water quality. However, the volume of water withdrawn for agricultural purposes has a direct relationship to the volume of water which, following agricultural use, will likely have higher nutrient levels. High nutrient levels have the potential to have strong impact on the biogeochemical cycles in the reservoir (Deliverable 3.6, pg. 8).

The evaluation of the impact of hydropower developments within the OTB is largely tentative at this stage as data regarding water quality in the OTB is largely absent. For this reason, the conclusions reached in Deliverable 3.6 (DAFNE Project) and the potential impacts discussed within this report are hypothetical and based upon existing literature, rather than definitively based on data from the OTB itself. However, what can be demonstrated is that while there may be a number of costs and factors which must be taken into consideration in the context of hydropower developments in the OTB, particularly in relation to the Gibe III and Koysha, there are also potential for benefits to be derived from the structures and shared between Kenya and Ethiopia. To an extent this is already being demonstrated through existing power sharing arrangements, however this could also be extended to ensuring ecosystem services are optimised and communities are engaged. The most efficient method of ensuring the creation of such a framework would be through the formation of a joint mechanism or other cooperative framework within the OTB.

- **Equitable and Reasonable Use:** Taking into account the various factors of this principle including the desperate socio-economic needs of over its 100 million population, Ethiopia's hydropower and agricultural projects may be considered as equitable use of its water resources within its territory. However, the use of the Omo River for Agriculture development has the potential to not be equitable towards Kenya, specifically with regards to Lake Turkana. It is however possible that the differences in water use could be compensated through the use of Benefit Sharing arrangements, as will be described in Section 4.1.3. To some extent this is already taking place through the formation of power sharing agreements between the two countries, although the content of such agreements is unknown. Although the principle of equitable and reasonable use is not strongly in place within the OTB, it can still be enforced as an international customary law obligation. In addition, the scores provided in Table 20 demonstrate an overall medium level expectation in the basin, as a result of the growing number of regional level instruments such as IGAD, ACCNNR. This is likely to be increased to a strong level of expectation as a result of the IGAD Regional Water Policy and Protocol, assuming it is ratified by both States.
- **No Significant Harm Rule:** Ethiopia must ensure that all measures are taken to ensure that the creation and operationalisation of hydropower developments such as the Gibe III do not result in significant harm being caused. While the principle of no significant harm only has a low-medium level expectation within the OTB, the duty is still applicable through international customary law. In addition, this principle will likewise be increased to a strong level of expectation upon conclusion of the IGAD Regional Water Protocol, if ratified.
- **Ecosystem Protection:** a full evaluation of all ecosystems dependant on the watercourse should be conducted. The level of legal expectation with regard to the protection of ecosystem is medium-high within the OTB states, as a result of regional agreements. For instance, it is widely documented that several important fish species migrate from Lake Turkana upstream in the Omo River for breeding (DAFNE Project, Deliverable 3.4).
- **Pollution Prevention:** the level of legal expectation with regards to pollution prevention is high within the OTB. Therefore, both states must ensure that any activities on the watercourse do not

result in pollution to the Omo-Turkana. Although this is not a major concern with regards to hydropower developments itself, this should be particularly emphasised with relation to agricultural nutrient run-off from planned irrigation activities.

- **Intergenerational Equity:** intergenerational equity is a "medium" level obligation within Kenya and is emphasised throughout Vision 2030. Ensuring that the environment, including freshwater shared resources are preserved should be a priority for both states. Fulfilment of the principle of intergenerational equity will also contribute to the realisation of the SDGs.
- **Precautionary Principle:** both states should conduct activities with regard to the precautionary principle, particularly given the lack of available data within the basin which could allow potential impacts to be more clearly assessed.
- **Environmental Impact Assessment:** a high level of legal expectation exists at a national level with regard to both EIA and transboundary impact assessments exists within the OTB. Therefore any planned activities should be subject to comprehensive assessments.
- **Transboundary Impact Assessment:** as above.
- **Provision for Establishment of Joint Body:** the formation of a joint body or cooperation mechanism is a key recommendation for the OTB, provision for which is found within national and regional frameworks. Until such a body is established cooperation within the basin is likely to remain fragmented. Strengths and weaknesses should be learned from the ZRB with relation to the formation and implementation of such arrangements.
- **Information/Data Exchange:** linked to the need for a joint body, the availability of information and obligation to exchange data is lacking or is not disclosed within the OTB. This should form a key provision of a cooperation framework in order to ensure the future sustainability of the basin and increase transparency.
- **Notification:** duties of notification and consultation within the basin are not present within the OTB. Once again, cooperation would be improved if such principles were in place and implemented through a joint arrangement.
- **Consultation:** consultation is incorporated to some extent within regional agreements, however it is not likely to apply to cases of shared water resources. It should be noted that for cooperation to be strengthened greater transparency is needed between the two states.
- **Dispute Settlement:** both states have dispute settlement procedures in place at a national level.

The Zambezi Basin

There are more than 15 dams already planned or under construction in the ZRB. There are also plans to expand existing irrigated agriculture within the basin. The four largest reservoirs are the Itezhi-Tezhi, Kafue Gorge, Kariba and Cahora Bassa. While the formation and operationalisation of such dams are crucially important for the economic and social development of the economies of the ZRB, they also have the potential to significantly impact the aquatic ecosystem due to alteration of the rivers natural flow regime. In addition, the Kariba Dam has become the subject of controversy in recent years due to its deteriorating structure. A rehabilitation project for the dam is now underway.[233] It is therefore worthy to note that sustainability plans must be in place for the future of the dam during planning stages. The lessons of the Kariba dam can be drawn on in the OTB with relation to the maintenance of on-going and planned hydropower developments.

Deliverable 3.2 (DAFNE Project) demonstrates that outflows from dams could be conducted in a manner which minimises impact to downstream communities and ensures that targets for water management are met. However, while more data is available with regard to the ZRB in comparison to the OTB, analysis of water quality in the Zambezi is still limited by the available data for model calibration and validation and as such, many of the observations are once again tentative. What can be demonstrated, as is the case with the OTB, is that the combination of the natural physical

[233] World Bank, Kariba Dam Rehabilitation Project http://projects.worldbank.org/P146515?lang=en and ZRA Kariba Dam Rehabilitation http://www.zaraho.org.zm/kdrp/

characteristics of the basins, as well as hydropower developments create many challenges, as well as opportunities.

Table 21 – Application of Equitable and Reasonable Use to Hydropower in the ZRB

Equitable and Reasonable Use	
Geographic Needs	• The ZRB contains a relatively dense network of perennial rivers, the streamflow regime of which is strongly influenced by the latitude at which the river basin is located. The basin is host to a large number of wetlands which provide a broad range of ecosystem services. The perennial character of the rivers and local topography conditions favours development of large and medium hydropower schemes which, along with irrigated agriculture schemes, alter the natural regime of many streams.[234]
Hydrographic & Hydrological Needs	• Hydrologically divided into three main regions: the Upper Zambezi, Middle Zambezi and Lower Zambezi (DAFNE Project, Deliverable 3.4) • As demonstrated in Deliverable 3.2 (DAFNE Project) with regard to the Kariba Dam, the operation of the dam imposes significant artificial alterations to the Zambezi thermal and oxygen regimes downstream of the reservoir. • Water reservoirs associated to hydropower plants alters the natural discharge regime in the ZRB river system
Climatic Variability	• The climate is unfavourable to rainfed agriculture, resulting in high demand for irrigation.
Ecological Needs	• Forests: most parts of the basin are covered by forests and bushland. However, in the Zambian part of the basin more than 5% of the land surface has been permanently deforested between 2000 and 2012, with less than 1% subsequently regaining tree cover. High rates of deforestation are also found in Mozambique, Tanzania and Malawi, while Botswana, Namibia and Zimbabwe have relatively low values (*See* DAFNE Project, Deliverable 3.4). Forests provide a number of basin needs such as food, shelter and health (*See* DAFNE Project, Deliverable 3.4). • Wetlands: wetlands cover large areas within the ZRB, the functioning of which is largely dependant on the seasonal dynamics of the river. Wetlands also play a key role in basin hydrology, impacting how water is routed, stored and evaporated (*See* DAFNE Project, Deliverable 3.4). • There are a number of Dambos within the basin which are of high importance for biodiversity and for water supply to downstream river networks. Floodplains are also vital for agriculture and grazing. They are the most threatened wetlands within the ZRB as a result of anthropogenic pressures (*See* DAFNE Project, Deliverable 3.4).

[234] DAFNE Partners, Baseline Scenario, Deliverable 2.1, October 2018, 2.9.2

(Table 21 continued)

Socio Economic Needs	• It should also be noted that according to the World Bank Atlas Method states within the ZRB range from low income to upper middle income and as such can be illustrated as having a diverse range of development needs.[235] • An energy deficit exists in many of the basin states. There is, however, no general food deficit, although significant differences exist across the basin dependant on population density and agricultural development. • Fish is the main sources of animal protein for the majority of rural communities in the ZRB (*See* DAFNE Project, Deliverable 3.4). • Livestock grazing is an important activity for many people in the ZRB (*See* DAFNE Project, Deliverable 3.4). • Flood recession agriculture is a major contributor to agricultural activity in some parts of the ZRB (*See* DAFNE Project, Deliverable 3.4).
Population Dependant on Watercourse	• Around 40 million people live within the ZRB. • The majority of the population lives in Malawi, Zambia and Zimbabwe • The majority of water used for water supply and sanitation is used by the cities (*See* DAFNE Project, Deliverable 3.4). • The human population is increasing within the basin, as a result the requirements for water will also increase.[236] • There are a number of regional imbalances throughout the basin in relation to all aspects of the WEF Nexus.
Existing and Potential Use of Watercourse	• As highlighted in Deliverable 4.1 water use regarding different aspects of economic activity are prioritised in the following order: - Agriculture and fishing - Residential Water Supply - Mining and Quarrying - Energy Sector (including hydropower production) • Many vital ecosystems dependant on river • Vital for agriculture and fisheries. Hydropower dams may provide reliable water supply but may also result in alterations to the natural system which are detrimental to both agriculture and fisheries. • Wetlands dependant on river which could be impacted by alterations to natural system. • Industry (mining, agriculture) users of water resources/potential pollutants • Water transfer schemes to supply urban centres are currently a significant use of the ZRB. • Considerable navigable stretches present opportunities for tourism and transportation

[235] World Bank Country Classification by income < https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>

[236] SADC/SARDC and others. (2012). Zambezi River Basin Atlas of the Changing Environment. Gaborone, Harare and Arendal: SADC, SARDC, ZAMCOM, GRID-Arendal, UNEP.

(Table 21 continued)

Conservation, protection, development and economy of use of water resources	• A number of areas within the ZRB are subject to protection (see D3.2). Of particular significance in relation to the ZRB is Victoria Falls, a designated World Heritage Site and key tourism area.[237]A warning has been issued that the Victoria Falls World heritage site could be impacted by the impoundment behind the planned Batoka gorge dam.[238]
Availability of alternatives of comparable value	Unknown

A high level of legal expectation exists for all of the key principles contained within the governance model with respect to the ZRB as a result of the comprehensive regional and basin agreements which are in place, namely ZAMCOM and the SADC-PC. However, at a national level the implementation of key legal principles into national law and policy is piecemeal and should be improved to enhance efficacy of implementation and improve cooperative arrangements within the basin.

- **Equitable and Reasonable Use:** given the vast size of the ZRB, equitable and reasonable use is difficult to measure in terms of water allocation and use. It is therefore vital to ensure that the cooperative frameworks and procedures which are in place through ZAMCOM and the SADC-PC are implemented and utilised to provide arrangements which can be demonstrated to be equitable across the basin. In particular, models of benefit sharing should be utilised to create such arrangements.
- **No Significant Harm Rule:** the principle of no significant harm is binding on the ZRB states and as such any hydropower (or any other actions) must ensure all steps are taken to avoid causing any harm to other riparian states.
- **Ecosystem Protection:** the ZRB is filled with a number of vital ecosystems which must be protected under international and national legal frameworks. Steps must therefore be taken to mitigate any impact on ecosystems within the basin.
- **Pollution Prevention:** the principle of pollution prevention has the strongest level of legal expectation within the ZRB. All actions must therefore ensure that steps are taken to avoid any pollution occurring to the watercourse.
- **Intergenerational Equity:** the principle of intergenerational equity is present across all of the ZRB states. Existing cooperative mechanisms such as ZAMCOM should therefore be utilised to adopt future sustainability pathways and explicitly link any developments to realisation of the SDGs.
- **Precautionary Principle:** the precautionary principle is present across the national frameworks of all ZRB states except Mozambique and Angola (where the principle may be present, but unknown due to translation issues), in addition to being present at an international level. Therefore, a precautionary approach must be adopted to all planned actions.
- **Environmental Impact Assessment:** EIAs and transboundary impact assessments have the weakest level of legal expectation within the ZRB, although the obligation does still exist. A recommendation could therefore be made to make obligations of EIA and particularly transboundary impact assessments more explicit within national frameworks across the basin.
- **Transboundary Impact Assessment:** as above.
- **Provision for Establishment of Joint Body:** comprehensive mechanisms for joint cooperation are in existence within the ZRB, focus should be placed on strengthening implementation, ensuring that such frameworks are followed and creating uniformity across the ZRB states.
- **Information/Data Exchange**: despite comprehensive frameworks for joint cooperation being in place, data remains fragmented within the basin. Steps should be taken to create a uniform approach to data collection to improve its utilisation.

[237] UNESCO World Heritage, Mosi-oa-Tunya/Victoria Falls https://whc.unesco.org/en/list/509
[238] UNESCO World Heritage, Mosi-oa-Tunya/Victoria Falls, Decision 41 COM 7B.22 http://whc.unesco.org/en/decisions/7025

- **Notification:** as above, measures for notification are in place, focus should be placed on strengthening implementation of existing frameworks.
- **Consultation:** as above.
- **Dispute Settlement:** dispute settlement procedures are in place within the ZRB, should they be required.

4.1.3 Potential utilisation of Benefit Sharing Frameworks

As previously mentioned, the key point with regard to benefit sharing is not that the flow of water or ecosystem functions must be shared *per se*, but rather the benefits which arise from their use. This may take the form of compensation in the form of cash payments, capacity building and training, frameworks and allowances regarding land rights, technology transfer, reduced cost energy or other ecosystem services as appropriate within the river basin context. Benefit sharing schemes can provide a mechanism by which to operate this cost-benefit paradigm and also assist with contribution towards the reduction of poverty, the empowerment and participation of local groups, as well as food and energy security, thereby contributing towards the fulfilment of the SDGs and achievement of a WEF nexus approach.

Table 22 – Example Models of Benefit Sharing

Benefit Sharing Model	Example Form
Compensation	Provides compensation for any loss of livelihood, any assets lost (land, water etc.) which will likely take the form of cash payments.
Community-Focused	The communities which are immediately impacted by the intervention in all concerned jurisdictions are the subject of benefits derived therefrom. This could include cheaper energy or the allocation of land for agriculture.
Payments for Ecosystem Services	Payment for ecosystem services involves reward for on-going land use or changing practices in order to ensure that valued ecosystem services are maintained or enhanced.
Cooperative Approach	Inter-sector water sharing agreement between upstream and downstream countries where the downstream country offers a discounted price for hydropower exports to the upstream country in exchange for greater transboundary water flow which results in higher water reserve accumulation and therefore a higher production of hydropower, as is modelled in Deliverable 4.1 (DAFNE Project).

It is vitally important that local communities which are impacted by interventions are included within any potential benefit sharing arrangements. For this reason, models which are based purely on compensation arrangements often do not promote fairness and equitability as the benefits are not delivered at a local level.[239] As stated by Lebel et al. compensatory models focus on short-term benefit which often fails to provide any long-term benefit to local communities. Conversely, a community-focused approach will go beyond the provision of short-term compensation and will work towards the restoration of the livelihoods of those directly impacted by the development intervention. A model which focuses on payment for ecosystem services will go further beyond the community-focused approach by allocating some of the revenue gained from energy generation to communities with the direct aim of adopting sustainable practices such as sustainable land use. A cooperative approach has been modelled within the DAFNE project within Deliverable 4.1 (DAFNE Project) “Models of Economic Development in the Zambezi River Basin”. Under a cooperative

[239] Louis Lebel and others, “Benefit sharing from hydropower watersheds: Rationales, practices, and potential” 4 Water resources and rural development 12

framework, a downstream country will have the potential to increase water withdrawal without reducing hydropower benefits from the water stock reserves which it has access to by agreement. If the upstream country increases water diversion then the downstream country will reduce abstraction, subject to the agreement that is in place. Such an agreement must however be revaluated over time in order to account for changing priorities and benefits derived from the water resource and to avoid manipulation of the agreement by either upstream or downstream states.[240]

A history of benefit sharing exists within the ZRB, particularly with relation to power sharing agreements as illustrated by the ZRA. Power sharing agreements are also in place with relation to the OTB (although the content is at present unknown) and positive views towards benefit sharing have also been illustrated by Ethiopia with regards to hydropower in the Nile Basin.[241]

4.1.4 Integration with Sustainable Development Goals

The SDGs have been referred to throughout this report and form a key aspect of the wider DAFNE project. While analysis of legal and policy frameworks often results in discussion of negative implications of actions such as hydropower developments, it is also important to recognise that such projects have the potential to contribute towards the realisation of developmental goals, including the SDGs. While linkages can arguably be made across all of the SDGs, as a result of their cross-sectoral nature, much like the WEF nexus, only the most relevant of goals are listed Table 23.

Table 23 – Integration with Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere	1.1.1 Proportion of population below international poverty line	• Development interventions (hydropower, irrigation for agriculture) if managed responsibly can provide economic gains which could contribute to the reduction of poverty
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	• Irrigation activities provide the opportunity to work towards achieving improved productive and sustainable agriculture
Goal 6. Ensure availability and sustainable management of water and sanitation for all	6.3.2 Proportion of bodies of water with good ambient water quality 6.4.2 Level of water stress: freshwater withdrawal as a proportion of freshwater resources 6.5.1 Degree of integrated water resources management implementation 6.5.2 Proportion of transboundary basin with an operational arrangement for water cooperation 6.6.1 Change in the extent of water-related ecosystems over time 6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	• The formation of dam operational rules which take into consideration impacts on water quality can contribute to indicator 6.3.2. Freshwater withdrawal levels can also be optimised through the formation of appropriate operating rules. This will also contribute 6.6.1 by ensuring that ecosystems are not damaged over time. • The proportion of transboundary basin with an operational arrangement for water cooperation can be contributed to through the formation of joint mechanisms for cooperation, in line with the key legal principles identified within this model. In addition, local participation is imperative in the formation of such frameworks and mechanisms, the inclusion of which will contribute to 6.b.1.

[240] *See* Phoebe Khoundouri et al. "Models of Economic Development in the Zambezi River Basin" Deliverable D4.1, December 2017

[241] *See* Rawia Tawfik, "The Grand Ethiopian Renaissance Dam: a benefit sharing project in the Eastern Nile? Water International (2016) 41(4) 574-592

(Table 23 continued)

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	7.1.1. Proportion of population with access to electricity	• Hydropower developments have the potential to contribute to the proportion of the population with access to electricity, both domestically and within riparian states.
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation	15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits	• As advocated within this report, benefit sharing arrangements have the potential to provide a framework for the equitable and reasonable use of shared watercourses. The use of which will also contribute to the achievement of 15.6.1.

5. DISCUSSION AND CONCLUSION: GOVERNANCE MODELLING WITHIN THE DECISION ANALYTIC FRAMEWORK

5.1 LESSONS LEARNT FROM SIMULATING GOVERNANCE MODEL

As explained throughout this report, it is difficult to quantify legal analysis. Any attempt to do so risks creating a reductionist approach to complex legal processes. In order to counter this possibility, the model produced within this Deliverable has been based on intentionally broad variables and has not detailed an exhaustive specific list of legal expectations regarding particular actions and impacts. The rationale for this is that to do so, would have been to cast assumptions on circumstances which are unknown until the specific details of a particular action can be used to perform legal analysis. In other words, the attempt made to quantify the law can only provide a full picture of the legality or legitimacy of a given intervention when accompanied by qualitative analysis based on scientific data and other detailed information on a case-by-case or project-by-project basis. Therefore, while the model can be utilised to gauge an overall level of legal expectation within a given set of circumstances, it can only be utilised as a starting point for further research, negotiation and cooperation, to provide a broad understanding of the substantive and procedural duties at play which can then be built upon. The model may also be used by national governments, or indeed by regional entities (such as the SADC and IGAD) to illustrate the degree of incorporation of international water law (and broader international environmental law) principles. The identification of strengths and weaknesses may also assist the pathway to reform if and where it is needed. Furthermore, notwithstanding the sovereign rights of states to decide upon their laws, institutions and processes, the model would be useful in determining inconsistencies and gaps across national laws, procedures and institutions which can be determinantal to effective cooperation among states.

Similar points can be made with regard to the use of the SDG frameworks, while the targets contained within the SDGs are useful to track progression, they create the risk of a reductionist approach being formed which fails to demonstrate the complexity of the issues contained within the goals and may not accurately map the interactions between them. In this sense, the concept of benefit-sharing which aims to distribute advantages and associated costs among nations and communities may well be a useful tool to fill the legal and practical gaps which arise from major interventions and competitions. This concept enhances cooperation and responsibility over sharing and preservation of natural resources.

5.2 MODEL INTEGRATION FOR THE DAF

Work Package 5 aims to develop a robust Decision Analytic Framework (DAF) which will explore alternative pathways for advancing water management strategies under baseline (historical) and

future scenarios and identify efficient/robust pathways to be negotiated within the Negotiation Simulation Lab (WP6). To this end, the governance model provides a baseline of legal and policy frameworks within both the OTB and ZRB in their current status. It has also demonstrated gaps in governance which identify potential pathways to enhance legal and policy frameworks, as well as institutional mechanisms. This includes the use of models of benefit sharing and integration with the SDGs. It is hoped that such pathways can be the subject of discussion with stakeholders in future NSLs to ensure local participation and engagement, enhancing future governance scenarios.

5.3 RECOMMENDATIONS AND PATHWAYS

With regards to water governance, further work is required across both basins to harmonise the legal frameworks with regards to key legal principles which have been identified in the water governance model. A number of key aspects of possible reform with regards to institutional arrangements and potential pathways for integration into the wider DAF are provided below.

5.3.1 Pathway 1: Strengthened Implementation of Key Principles of Water Governance

Decision makers at basin, national, local and project level must consider key principles and processes of international water law when dealing with interventions on shared watercourses. Full consideration must be given to the application and implementation of the principle of equitable and reasonable use, the prevention of significant harm and the preservation of the natural environment including the protection of key ecosystems.

As illustrated by Lautze and Giordano with regards to equity, “the incorporation of equitable language has contributed, at least within Africa, to a body of basin level transboundary water law that is more equitable”.[242] While procedural requirements such as notification and consultation on planned measures must be followed, it is equally important that progress towards the achievement of the substantive principles is made, such as pollution prevention and ecosystem protection. With regards to ecosystem protection, environmental flow requirements must be considered. Ideally, release strategies for hydropower dams should mimic seasonal and yearly variation of actual inflow depending on the rainfall situation of the catchment area (DAFNE Project, Deliverable 3.4). Extensive modelling work has already demonstrated that dam operations can be modified to improve environmental benefits without affecting the productivity of the dam in the ZRB.[243] However, it has also been demonstrated that this may not be sufficient to achieve desired ecosystem services outcomes, such as the removal of invasive species (*See* DAFNE Project Deliverable 3.4 and Deliverable 3.2). Impact assessments should also include dam removal if it becomes necessary in order to ensure a river restoration strategy would be in place.

In this regard, the introduction or strengthening of basin-wide cooperative governance frameworks which are tailored to the context of each river basin country is highly recommended. While frameworks within the ZRB are more comprehensive than the OTB, improvements in implementation can still be made in relation to – *inter alia* – coordination, consistency, effectiveness and capacity building. The adoption and application of the key legal principles discussed within this model should ensure an approach which is consistent, effective and adaptable.

5.3.2 Pathway 2: Creation/Implementation of Comprehensive Institutional Mechanisms for Joint Management of Shared Watercourses

An effective water resources governance system must also go beyond the adoption of laws and policies: relevant social, economic, hydrological, environmental and climatic aspects must be considered in order to create a framework which provides for the most effective regulation and most appropriate mitigation measures. Within both the ZRB and OTB there have been a number of well-

[242] Jonathan Lautze and Mark Giordano, “Equity in Transboundary Water Law: Valuable Paradigm or Merely Semantics”, Colo. J. Int”l Environmental Law and Policy (2006) 17(1) 89

[243] P Schelle and J Pittock, Restoring the Kafue Flats: A partnership approach to environmental flows in Zambia” http://wwf.panda.org/?23434/Restoring-the-Kafue-Flats-A-partnership-approach-to-environmental-flows-in-Zambia

managed projects which may not pose significant threats to either downstream or upstream countries. However, there are some major projects which pose serious concerns. Such concerns must be addressed in a responsible way through appropriate operational rules and measures, the first stage in ensuring such operational procedures exist is the development of key institutions which will be responsible for implementation.

The creation of joint mechanisms and other forms of coordination are crucial to ensure that the process of monitoring and data sharing takes place in a manner which allows a dynamic form of iterative governance and adaptive management, as previously discussed. Joint mechanisms are also the first step towards the fulfilment of the duty to cooperate. As Dinar et al. (2010)[244] found, the existence of joint mechanisms also results in fewer state grievances with regards to water allocation and hydropower treaties. It is also crucial for the effective implementation of development cooperation projects such as DAFNE, as the existence of shared data between states allows resources to be focused at the appropriate scale (Cosens, 2003).[245]

A number of good practice principles for the creation of joint bodies for effective transboundary governance were created under the UNECE Convention which can be utilised by states:[246]

- The broad competence of a joint body, which on the basis of IWRM, addresses in a complex way the entire spectrum of issues related to the sustainable development, management, use (including infrastructure) and protection of transboundary waters;
- A clear definition of the waters which are subject to cooperation and clearly defined tasks and powers
- A sufficiently broad and complete representation of national authorities in the joint body, involving participation beyond the water management authorities to include representatives from other ministries such as the environment, fisheries, health, as appropriate;
- A certain flexibility of the agreement establishing the joint body that enables cooperation to develop progressively in terms of scope, mandate and the riparian countries involved;
- A regular exchange of information and consultation mechanisms;
- A process that facilitates the assessment of impacts (transboundary and intersectoral) from developments and the negotiation of an agreement on them among riparian countries involved;
- A regular exchange of information and consultation mechanisms;
- A process that facilitates the assessment of impact (transboundary and intersectoral) from developments, and the negotiation of an agreement on them among riparian countries;
- A framework for monitoring long-term impacts
- Mechanisms for public participation and stakeholder involvement, as well as neutral facilitators and external expertise

Within the formation of joint mechanisms for cooperation, due attention must also be paid to the perceived risks posed by such agreements, examples of such risks, as described by Subramanian et al. are illustrated in Box 2 below.

In order to mitigate such risks efforts should be made to improve transparency within all countries across both the OTB and ZRB. The formation of cooperative arrangements (OTB) and the effective implementation of arrangements (ZRB) will only be achieved if states on shared watercourses have a comprehensive picture of the basin. Risks of cooperation must also be balanced with risks of not cooperating, particularly with regards to changing climatic conditions.

[244] S Dinar et al. Climate change and state grievances: the water resiliency of international river treaties to increased water variability (2010) Insights 3(22): 1–32.

[245] B Cosens, Water dispute resolution in the west: process elements for the modern era in basin-wide problem solving (2003) Environmental Law 33 949.

[246] UNECE, Principles for Effective Joint Bodies for Transboundary Water Cooperation under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, ECE/MP.WAT/50, New York and Geneva (2018)

Box 2: Potential Perceived Risks of Cooperation

Potential Perceived Risks (Source: Subramanian et al., 2014)

- Capacity and Knowledge: confidence in ability to negotiate a fair deal; having enough and the correct information and knowledge to do so.
- Accountability and Voice: deliverability of benefits by the regional entity and co-riparian's, often related to trust; having a say in decision making in the governing structures of the regional entity
- Sovereignty and Autonomy: ability to act in best interest of the country without constraints; making decisions independently
- Equity and Access: fairness of (relative) benefits to country, including timing of benefits and costs and obtaining/retaining fair access to river.
- Stability and Support: longevity of potential agreement; in-country support of agreement, including ratification likelihood.

With regards to institutional mechanisms, in many cases what prevents a more integrated framework relating to a WEF nexus is the lack of intersectoral coordination, the absence of agreements and the limited mandates of institutions. The inclusion of several government ministries, departments and central and regional authorities creates a serious issue with regards to fragmentation. However, with respect to coordinating efforts to effectively, equitable and sustainably manage the ZRB and OTB at basin-level, the riparian countries, through their central governments and relevant ministries and departments should take steps to manage the WEF nexus. Existing and future projects should be managed in light of legal and policy good practices as highlighted in throughout this governance model. Although the two basins have different features in many respects, the OTB riparians should learn lessons from the ZRB practices. It is imperative for good governance that the OTB places emphasis on strengthening basin-wide institutions and processes.

5.3.3 Pathway 3: Models of Benefit Sharing utilised for Equitable and Reasonable use

The sharing of water by volume is the most controversial aspect of transboundary water governance. Agreements which focus on fixed shares fail to allow for the much-needed flexibility to account for changing hydrological variability, particularly within the current and future context of changing climatic and demographic patterns. Accepting that the competition and grievances over utilisation of shared water resources will continue, those countries which share such resources must work together to share the benefits and costs of major projects with the purpose of balancing such trade-offs. In other words, the country that makes major interventions within its territory, subject to the key principles and requirements of the cooperative process, should also make some concessions when sharing services or goods with other riparian states; in return the latter riparian should be compensated in line with benefit sharing arrangements. Benefit-Sharing is a useful mechanism for ensuring enforcement by states on the basis that the agreement formed will be arranged in such a way that defection by a state would result in loss for the same party (Sadoff and Grey, 2002).[247] While some of the practices in the Zambezi, particularly the Kariba dam arrangement are exemplary in sharing benefits and costs, some of the endeavours of sharing benefits from the OTB such as relatively cheap electricity derived from hydropower projects should also be acknowledge and further benefit sharing arrangements encourages within other sectors such as agriculture.

5.3.4 Pathway 4: Greater Integration with Sustainable Development Goals

From a governance perspective with relation to the DAF, the developments on shared resources of developing countries should have clear and shared objectives. The SDGs provide an appropriate operational framework whereby such a framework can be derived. Principles which relate to the SDGs include the attainment of universally accepted values such as eradicating poverty, energy

[247] C.W Sadoff and D. Grey, Beyond the river: the benefits of cooperation on international rivers, Water Policy (2002) 15 119–131.

provision, access to water and sanitation, each of which should be strived for without having a detrimental impact on the achievement of the attainment of the SDGs of other riparian states.

6. CONCLUDING REMARKS

This Deliverable has aimed to understand the developments and challenges of applying substantive and procedural legal rules in the context of transboundary watercourses and has aimed to develop a matrix to provide a mechanism for optimising good governance and sustainable use of the ZRB and OTB. The report has been comprised of 5 main sections. Section 1 provided an introduction and overview of the structure of the report. Section 2 of this report provided a summary of key concepts of water governance including IWRM and AM which have become common place within the arrangements managing shared watercourses. It also provided an introduction to the concept of benefit sharing and discussed the SDGs and their interaction with the governance model. Subsequently, Section 2 provided an overview of the legal and policy frameworks of both the ZRB and OTB, before discussing institutional and procedural mechanisms. A breakdown of the modelling method was given in Section 3 which discussed the methodology of the model, definition of the key legal principles used and limitations which were found in the course of research. Section 4 of this report attempted to utilise the data contained within the governance model to demonstrate how such legal principles apply to particular actions within the OTB and ZRB, namely hydropower developments. Section 5 was comprised of lessons learnt from the governance model and the identification of a number of pathways/recommendations for development of governance frameworks.

The water governance model has attempted to incorporate models which have been developed within other work packages within the DAFNE project so far in order to provide a demonstration of how governance frameworks are related to other disciplines. By using the data and findings of other work packages to understand issues of key importance in the OTB and ZRB, the governance model has subsequently attempted to demonstrated key gaps in legal and institutional frameworks and provide recommendations of pathways for integration into the DAF.

The quantification of law, as has been repeated throughout this report, is extremely difficult. As a qualitative discipline legal analysis often fails to provide appropriate consideration of the data and factual realities identified within other disciplines. As a multi-disciplinary project, DAFNE provides an opportunity to not only conduct an analysis of governance frameworks, but also to attempt to pull together the findings across the project to create linkages between legal and policy frameworks and potential scenarios within the river basins based on scientific findings. As the project continues to develop it is hoped that such tentative analysis can be expanded. The governance model is viewed as a snapshot of current arrangements and its form should not remain static, but rather, should be updated at regular intervals.

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"ZAMCOM Water Resources Information Systems (ZAMWIS)" http://www.zambezicommission.org/programmes-activities/zambezi-water-resources-information-systems-zamwis

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ZRB Basin

Key Laws	Key Policies
Angola	
• 2002 Law No. 6/02 on Water use • 2011 Presidential Decree No. 261/11 approving the Regulation on the quality of water. • 2004 Decree No. 51/04 approving the Environmental Impact Assessment Legislation. • 2012 Executive Decree No. 92/12 approving the Environmental Impact Assessment administrative procedures • 2014 Presidential Decree No. 82/14 approving the • Regulation of General Use of Water Resources. • 2000 Decree (Law No. 3/00) on the Ministry for Energy and Water. • 2003 Joint Executive Decree No. 35/03 on the Ministry for Energy and Water • 2013 Executive Decree No. 421/13 approving the • Regulation of the Cabinet of the Ministry of Energy and Water (GAB/MINEA) • o 2014 Presidential Decree No. 116/14 approving the Statute of the Ministry of Energy and Water (MINEA)	• 2003 Water Sector Development Strategy
Botswana	
• 1956 Boreholes Act • 1968 Water Act • 1962 Waterworks Act • 1970 Water Utilities Corporation Act • 2011 Environmental Impact Assessment Act • o 1981 Public Health Act	• 2012 National Water Policy • 2013 Integrated Water • Resources and Water • Efficiency Plan • 2003 National Water • Master Plan

- 2005 Draft Water Bill
- Department of Water Affairs – Ministry of Minerals, Energy & Water Resources (2013), Botswana Integrated Water Resources Management and Water Efficiency Plan (L.Dikobe, Ed.) Gaborone, Botswana. Government of Botswana. < https://www.gwp.org/globalassets/global/activities/impact-stories/further-reading/iwrm-we-plan.pdf>

Malawi

- 2013 Water Resources Act
- 1995 Waterworks Act
- 2001 Irrigation Act
- o 1996 Environmental Management Act

- 2005 National Water Policy
- 2008 Integrated Water
- Resources Management
- and Water Efficiency
- Plan 2008-2012

Mozambique

- 1991 Act No. 16/91 regulating water resources belonging to the public domain
- 1991 Decree No. 26/91 creating the Regional Water Administrations (ARA)
- 1991 Decree No. 25/91 enforcing the operation of
- the National Water Council
- 2005 Ministerial Order No. 70/2005 on the Regional Water Administration of Zambesi River
- (ARA-Zambese)
- 2009 Decree 47/2009 approving the Regulation for
- small water dams
- 2004 Ministerial Order No. 196/2004 approving the
- Statute of the Water Administration Institute for
- the Central Region of Mozambique (ARA-°©Centro)
- 2009 Decree No. 19/2009 creating the Water and
- Sanitation Infrastructure Administration
- 2002 Government Decree No. 92/2002 on the National Council for Water Supply
- 2015 Decree 54/2015 on environmental impact
- assessment

- 2007 Resolution n.46/2007 approving the Water Policy
- o Agenda 2025

Namibia

- 2013 Water Resources Management Act
- 1997 Water Corporation Act
- 1970 Mountain Catchment Areas Act
- 2007 Environmental Management Act
- 2011 Environmental Impact Assessment Regulations
- o 2012 Disaster Risk Management Act

- 2000 National Water Policy White Paper
- 2008 Water Supply and
- Sanitation Policy
- Government of Namibia, 5th National Development Plan (2017/18-2021/22)

Tanzania

- 2009 Water Resources Management Act
- 2009 Water Supply and Sanitation Act
- 2001 Energy and Water Utilities Regulatory Authority
- 2004 Environmental Management Act
- 2013 National Irrigation Act

- 2002 National Water Policy
- o Government of Tanzania, Five Year Development Plan (2016/17-2020/21)

- o 2008 Electricity Act

Zambia

- 1987 Zambezi River Authority Act
- 2011 Water Resources Management Act
- 1990 Environmental Protection and Pollution Control Act
- o 2011 Environmental Management Act

- 2010 National Water Policy
- 2016 National Water
- Supply and Sanitation
- Council Strategic Plan

Zimbabwe

- 1987 Zambezi River Authority Act
- 1998 Water Act
- 1998 Zimbabwe National Water Authority Act
- 2002 Environmental Management Agency Act
- o 2002 Electricity Act

- 2013 National Water Poliicy
- Government of Zimbabwe, Medium Term Plan (2011-2015) < http://ex-twprlegs1.fao.org/docs/pdf/zim151067.pdf>

OTB Basin

Key Laws

Kenya

- 2010 Constitution of Kenya
- 2016 Water Act
- 2001 Kenya Water Institute Act No 11 of 2001, L.N. 116/2002
- 2016 Natural Resources (Classes of Transactions Subject to Ratification) Act
- 1999 Environmental Management and Coordination Act
- 2003 Environmental (Impact Assessment and Audit) Regulations
- 2009 Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations
- o 2006 Environmental Management and Co-ordination (Water Quality) Regulations

Key Policies

- 1999 National Policy on Water Resources Management and Development
- 2007 National Water Services Strategy (2007-2015)
- 2013 National Environment Policy
- Kenya Vision 2030

Ethiopia

- 1995 Constitution of the Federal Democratic Republic of Ethiopia (adopted 8 December 1994; in force 21 August 1995)
- 2000 Ethiopian Water Resources Management Proclamation (No. 197 of 2000
- 2005 Ethiopian Water Resources Management Regulations (No. 115 of 2005)
- 2005 Council of Ministers Ethiopian Water Re-sources Management Regulations
- 2002 Water Resources Development Fund Establishment and its Administration Proclamation No. 268/2002
- 2002 Ethiopian Rural Energy Development and Promotion Center Establishment
- 1981 Water Supply and Sewerage Authority Establishment Proclamation
- 2002 Environmental Pollution Control Proclamation o 2002 Environmental Impact Assessment Proclamation

- 1999 Water Resources Management Policy
- 1997 Environmental Pol-icy of Ethiopia
- Growth and Transformation Plan I (GTP I) (2010/11-2014/15) (Federal Democratic Republic of Ethiopia, National Planning Commission, 2010)

- 2007 River Basin Councils and Authorities Proclamation No. 534/2007
- Agreement between the United Kingdom and Ethiopia relative to the Frontiers between British East Africa, Uganda, and Ethiopia (signed at Addis Ababa, 6 December 1907).
- Government Notice No. 7, Kenya-Ethiopia Boundary Commission, S/A XAF 3/2 IV, 22 December 1950
- o Kenya and Ethiopia Treaty respecting the boundary between the two countries (with maps, schedules and protocol) (Signed at Mombasa on 9 June 1970).

APPENDIX 1 – GLOSSARY

Convention: Conventions are formal agreements between States. The term "convention" is therefore synonymous with "treaty". Conventions are usually of a multilateral nature, open for participation to a large number of States or the international community as a whole. Article 38(1)(a) of the Statute of the International Court of Justice, when citing the sources of international law, states " "international conventions, whether general or particular, establishing rules expressly recognised by the contesting states."

Customary international law: One of the sources of international law, as set out in Article 38(1)(b) of the Statute of the International Court of Justice.

It refers to international obligations arising from established state practice, as opposed to obligations arising from the ratification of international treaties. Unless it is shown otherwise through the "persistent objector" doctrine, or if there is a more specific treaty obligation replacing a customary rule, customary international law is binding upon all States. Thus, a State cannot exempt itself unilaterally from the obligations imposed by a principle of customary international law.

Customary international law can be established by showing two elements:

(1) state practice (widespread and uniform practice of States shown through "acts" or "omissions" over time); and

(2) *opinio juris* (state practice occurring out of a sense of legal obligation).

While some customary international norms bind the international community as a whole, others might only constitute custom in local or regional contexts.

(see Crawford, 2012: p23-29)

De jure: As a matter of legal right (Law, 2018)

Entry into Force A treaty does not enter into force when adopted, but rather within its provisions the date at which it will enter into force is typically specified, based on ratification or accession by a fixed number of states.

General Principle of Law: General Principles of international law are one of the recognised sources of international law, listed in Article 38(1)(c) of the International Court of Justice as "general principles of law recognized by civilized nations".

Governance: A 'system for managing water according to objectives that reflect the goals of society" (Neal, 2014: p2).

This system includes, but is not limited to, various organisations such as government departments, as well as institutions such as laws, regulations, policies and social norms that operate at a variety of levels (Ashton et al. 2005).

Institution: Institutions are distinct legal systems which govern specific forms of conduct within the overall legal system.

Jus Cogens "A rule or principle in international law that is so fundamental that it binds all states and does not allow any exceptions. Such rules (sometimes called **peremptory norms**) will only amount to *jus cogens* rules if they are recognized as such by the international community as a whole. A treaty that conflicts with an existing *jus cogens* rule is void, and if a new *jus cogens* rule emerges, any existing treaty that conflicts with it automatically becomes void. States cannot create regional customary international law that contradicts *jus cogens* rules. Most authorities agree that the laws prohibiting slavery, genocide, piracy, and acts of aggression or illegal use of force are *jus cogens* laws. Some suggest that certain human rights provisions (e.g. those prohibiting racial discrimination) also come under the category of *jus cogens*."

(Law, 2018)

Jurisdiction: "1. The power of a court to hear and decide a case or make a certain order. (For the limits of jurisdiction of individual courts, see entries for those courts.)

2. The territorial limits within which the jurisdiction of a court may be exercised.

3. The territorial scope of the legislative competence of parliament.

In international law, jurisdiction can be exercised on a number of grounds, based on the following principles:

1. **(1)** the **territorial principle**, i.e. that the state within whose boundaries the crime has taken place has jurisdiction, irrespective of the nationality of the transgressor (*British Nylon Spinners Ltd v ICI* [1952] Ch 19 (CA) 26);
2. **(2)** the **nationality principle**, i.e. that a state has the power of jurisdiction over one of its nationals for an offence he has committed in another state (*Joyce v DPP* [1946] AC 347 (HL));
3. **(3)** the **protective principle**, i.e. that a potentially injured state can exercise jurisdiction in all cases when its national security is threatened (*US v Archer* 51 F Supp 708 (1943));
4. **(4)** the **passive personality principle**, i.e. that a state has jurisdiction if the illegal act has been committed against a national of that state (*Achille Lauro* incident of 1985);
5. **(5)** the **universality principle**, i.e. that when the accused has committed a crime in breach of a rule of *jus cogens* (such as a crime against humanity), any party having custody of the alleged lawbreaker is permitted to bring criminal proceedings against him (*Filartiga v Peña-Irala* 630 F 2d 876, 890 (2d Cir 1980)).”

(Law, 2018)

Ratification: “”“Ratification”, “acceptance”, “approval” and “accession” mean in each case the international act so named whereby a State establishes on the international plane its consent to be bound by a treaty” (Article 2(1)(b), Vienna Convention on the Law of Treaties)

Signatory state: ‘signature” of a treaty is a preliminary endorsement of the instrument. Signing does not create a legally binding obligation, but demonstrates the State’s intent to examine the treaty domestically and consider ratification.

Scope: “Unless a different intention appears from the treaty or is otherwise established, a treaty is binding upon each party in respect of its entire territory” (Article 29, Vienna Convention on the Law of Treaties, 1969)

Treaty: “”Treaty” means an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation” (Article 2(1)(a), Vienna Convention on the Law of Treaties).

Legally Binding The acceptance of a treaty generally signals greater domestic buy-in and compliance mechanisms. Additionally, legally binding (treaty and customary) obligations are capable of being applied by mutual cooperation and good-will, and when a dispute arises among parties to a treaty through various avenues of peaceful settlement of disputes such as negotiation, conciliation, mediation, inquiry, arbitration, adjudication and using regional mechanisms (UN Charter, Art 33). Enforcement of rules generally rests upon principles of cooperation, reciprocity and collective action by the international community of states.

Legal force: Legal force indication:

- UN General Assembly (UNGA) Vote: a state expresses a decision or recommendation that is not legally binding; UNGA Resolutions have an arguable impact upon legally binding customary law.
- Signature: a state expresses the intention to comply with the treaty; signing is not legally binding.
- Ratification: a state indicates its consent to be bound to a treaty; a treaty becomes legally binding.
- Established general practice accepted as law constitutes customary international law.

Legal Principle (used within this report): The legal principles used within this report are derived from principles of International Water Law (derived from the UNWC) and principles of International Environmental Law.

Pacta sunt servanda “Every treaty in force is binding upon the parties to it and must be performed by them in good faith” (Vienna Convention on the Law of Treaties, Article 26)

Party “”Party” means a State which has consented to be bound by the treaty and for which the treaty is in force” (Article 2(1)(g) Vienna Convention on the Law of Treaties).

Primus inter pares “First among equals” (Stimson, 1911)

Reservation ""Reservation" means a unilateral statement, however phrased or named, made by a State, when signing, ratifying, accepting, approving or acceding to a treaty, whereby it purports to exclude or modify the legal effect of certain provisions of the treaty in their application to that State" (Article 2(1)(d) Vienna Convention on the Law of Treaties)

APPENDIX 2 – REFERENCES FOR SCORES, ZAMBEZI BASIN

Country	Score	Reference
Equitable and Reasonable Use		
Angola (I)	40	ZAMCOM, Article 13
Angola (N)	16	2002 Law No. 6/02 on Water Use, Article 10(1) does not specifically discuss "equitable and reasonable use" however it does state that national policy on water resources management aims at "equality of treatment and opportunity for those involved in the process of water use", similarly Article 19 regarding international cooperation reiterates the need for "fair and reasonable allocation".
Botswana (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Botswana (N)	18	Botswana: Draft Water Bill 2005, Article 55
Malawi (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Malawi (N)	12	Malawi: 2013 Water Resources Act (No. 2 of 2013) Article 119(2)(b), Article 33; National Water Policy 2005 Section 2 and 3.3; Integrated Water Resources Management and Water Efficiency Plan 2008-2012
Mozambique (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Mozambique (N)	24	1991 Act No. 16/91 regulating water resources belonging to the public domain.
Namibia (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Namibia (N)	8	Water Resources Management act (No. 11 of 2013) Article 28 National Water Policy White Paper, August 2020
Tanzania (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Tanzania (N)	24	Water Resources Management Act (No. 11 of) Article 98(1)
Zambia (I)	40	SADC-PC, Articles 2(b), 3(7)(a) and (b), 3(8)
Zambia (N)	40	Water Resources Management Act (No. 11 of 2009), Article 2 and Article 57
Zimbabwe (I)	40	ZAMCOM, Article 13
Zimbabwe (N)	24	Water Act (No. 31 of 1998) Article 23(a)(i), National Water Policy Section 7.6.5
No Significant Harm		
Angola (I)	40	ZAMCOM, Article 14(2-4)
Angola (N)	24	Angola: 1998 Environmental Law No. 5/98, Article 4 under specific principles states "all actions or actions with immediate or long-term effects on the environment must be considered in advance so as to minimise any harmful effects".
Botswana (I)	40	SADC-PC, Article 3(10)
Botswana (N)	24	2011 Environmental Impact Assessment Act (No. 10 of 2011); Environmental Assessment Regulations 2012, Form E, Regulation 8
Malawi (I)	40	SADC-PC, Article 3(10)
Malawi (N)	12	Malawi: 2013 Water Resources Act (No. 2 of 2013), Article 4
Mozambique (I)	40	SADC-PC, Article 3(10)
Mozambique (N)	8	Ministerial Order (No.196 of 2004) approving the Statute of the Water Administration Institute for the Central Region of Mozambique (ARA-Centro) 2004, Article 3(j)
Namibia (I)	40	SADC-PC, Article 3(10)
Namibia (N)	16	Environmental Management Act (No.7 of 2007), Article 3(2)(d)
Tanzania (I)	40	SADC-PC, Article 3(10)

Tanzania (N)	24	Article 59 of the 2005 Environmental Impact Assessment and Audit Regulations
Zambia (I)	40	SADC-PC, Article 3(10)
Zambia (N)	40	Zambia: Water Resources Management Act (No. 21 of 2011) Article 60(1)(c)
Zimbabwe (I)	40	ZAMCOM, Article 14(2-4)
Zimbabwe (N)	24	2002 Environmental Management Act, Article 99(e)
Ecosystem Protection		
Angola (I)	40	ZAMCOM, Article 14(3)(a)
Angola (N)	16	Angola: 1998 Environmental Law No. 5/98, Articles 14(1)
Botswana (I)	40	SADC-PC, Article 4(2)(a)
Botswana (N)	12	Botswana: Integrated Water Resources Management & Water Efficiency Plan 2013, Section 10.10
Malawi (I)	40	SADC-PC, Article 4(2)(a)
Malawi (N)	24	Malawi: National Environmental Policy 2004; Integrated Water Resources Management and Water Efficiency Plan 2008-2012; National Water Policy 2007; Water Resources Act (No. 2 of 2013), Article 37(1)(b), 41(1)(e)(i)
Mozambique (I)	40	SADC-PC, Article 4(2)(a)
Mozambique (N)	24	Decree (No. 47 of 2009) approving the Regulation for small water dams 2009, Article unknown
Namibia (I)	40	SADC-PC, Article 4(2)(a)
Namibia (N)	32	2013 Water Resources Management Act (No. 11 of 2013), Articles 3, 37 and 45
Tanzania (I)	40	SADC-PC, Article 4(2)(a)
Tanzania (N)	24	2009 Water Resources Management Act (No. 11 of 2009), Articles 4(f), 5(c), 49(c) and 72(2)(c);; 2005 Environmental Impact Assessment
Zambia (I)	40	SADC-PC, Article 4(2)(a)
Zambia (N)	24	Zambia: Water Resources Management Act (No. 21 of 2011) Article 57(2)(i), Environmental Management Act (No. 12 of 2011) Article 6(e)
Zimbabwe (I)	40	ZAMCOM, Article 14(3)(a)
Zimbabwe (N)	16	2002 Environmental Management Act, Article 4(i), Article 60(4)(d)
Pollution Prevention		
Angola (I)	40	ZAMCOM, Article 14(3)(a)
Angola (N)	32	Angola: 2002 Law No. 6/02 on Water Use, Article 66 and 68; Presidential Decree No. 261/11 approving the Regulation on the quality of water; 2014 Presidential Decree No. 82/14 approving the Regulation of General Use of Water Resources; 1998 Environmental Law No. 5/98, Article 19
Botswana (I)	40	SADC-PC, Article 4(2)(b)
Botswana (N)	40	Botswana: 1968 Water Act [Chapter 33:01], Article 36;; 1962 Waterworks Act [Chapter 34:03], Article 22;; 1971 Public Health Act [Chapter 63:01], Part III
Malawi (I)	40	SADC-PC, Article 4(2)(b)
Malawi (N)	40	2013 Water Resources Act (No. 2 of 2013), Articles 88-103;; 1996 Environment Management Act (No. 23 of 1996), Articles 42-44;; 1995 Waterworks Act (No. 17 of 1995), Article 50
Mozambique (I)	40	SADC-PC, Article 4(2)(b)

Mozambique (N)	32	Mozambique: 1991 Act No. 16/91 regulating water resources belonging to the public domain;; 2007 Decree No. 43/2007 approving the Regulation for licensing the concessions of water use; 2004 Decree No. 15/2004 approving the Regulation on municipal water supply and wastewater treatment
Namibia (I)	40	SADC-PC, Article 4(2)(b)
Namibia (N)	40	2013 Water Resources Management Act (No. 11 of 2013), Articles 68(C), 84, 1997 Namibia Water Corporation Act (No. 12 of 1997), Article 11(b
Tanzania (I)	40	SADC-PC, Article 4(2)(b)
Tanzania (N)	40	2009 Water Resources Management Act (No. 11 of 2009), Article 39, 2009 Water Supply and Sanitation Act (No. 12 of 2009), Article 52, The Environmental Management (Water Quality Standards) Regulations 2007
Zambia (I)	40	SADC-PC, Article 4(2)(b)
Zambia (N)	40	Zambia: Water Resources Management Act (No. 21 of 2011) Article 48
Zimbabwe (I)	40	ZAMCOM, Article 14(3)(a)
Zimbabwe (N)	40	1998 Water Act [Chapter 20:24], Article 7(3)(1) and Article 13(1)(a)(iii);; 1998 Zimbabwe National Water Authority Act [Chapter 20:25], Article 5(1)(a)(ii);; 2002 Environmental Management Act [Chapter 20:27], Article 57; National Water Policy 2012 Section 1.3.8
Intergenerational Equity		
Angola (I)	40	ZAMCOM, Article 12(1)(e)
Angola (N)	8	Angola: 1998 Environmental Law No. 5/98, Appendix
Botswana (I)	40	SADC-PC, Article 3(7)(a)
Botswana (N)	12	Botswana: National Water Policy 2011, Section 1.2.4
Malawi (I)	40	SADC-PC, Article 3(7)(a)
Malawi (N)	12	Malawi: Malawi's Constitution of 1994 with Amendments through 1999, Article 13(d)(iii); National Environmental Policy 2004 Section 1.4 and 2.3
Mozambique (I)	40	SADC-PC, Article 3(7)(a)
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Article 3(7)(a)
Namibia (N)	8	Environmental Management Act (No.7 of 2007), Article 3(2)(a), National Water Policy White Paper 2000
Tanzania (I)	40	SADC-PC, Article 3(7)(a)
Tanzania (N)	32	2009 Water Resources Management Act (No. 11 of 2009), Article 4(1)(a); 2005 Environmental Impact Assessment and Audit Regulations (G.N. No. 349 of 2005), Article 3
Zambia (I)	40	SADC-PC, Article 3(7)(a)
Zambia (N)	24	Environmental Management Act (No. 12 of 2011) Article 6(a), Water Resources Management Act (No. 21 of 2011) Article 6(p)
Zimbabwe (I)	40	ZAMCOM, Article 12(1)(e)
Zimbabwe (N)	24	2002 Environmental Management Act [Chapter 20:27], Article 4(1)(b).
Precautionary Principle		
Angola (I)	40	ZAMCOM, Article 12(1(d)
Angola (N)	0	
Botswana (I)	40	ZAMCOM, Article 12(1(d)
Botswana (N)	12	National Water Policy 2011, Section 1.2.13

Malawi (I)	30	ZAMCOM, Article 12(1(d)
Malawi (N)	24	Malawi: National Environmental Policy 2004, Section 5.5(k), 5.8(c); Water Regulations 1969 Section 4(c)
Mozambique (I)	40	ZAMCOM, Article 12(1(d)
Mozambique (N)	0	
Namibia (I)	40	ZAMCOM, Article 12(1(d)
Namibia (N)	12	2000 National Water Policy White Paper, Section 2.2.2(5)
Tanzania (I)	40	ZAMCOM, Article 12(1(d)
Tanzania (N)	40	2009 Water Resources Management Act (No. 11 of 2009), Article 5(a) (provides the precautionary principle as a principle of sustainable water resources management), National Environmental Policy 2997, Section 81
Zambia (I)	40	ZAMCOM, Article 12(1(d)
Zambia (N)	24	Environmental Management Act (No. 12 of 2011) Article 6(c)
Zimbabwe (I)	40	ZAMCOM, Article 12(1(d)
Zimbabwe (N)	0	
Environmental Impact Assessment		
Angola (I)	20	SADC 2005. Southern African Development Community Regional Water Policy (adopted August 2005), Section 5.2.4
Angola (N)	40	Angola: 1998 Environmental Law No. 5/98, Article 10 and Article 16; 2012 Executive Decree No. 92/12 approving the Environmental Impact Assessment administrative procedures;; Presidential Decree No. 82/14 approving the Regulation of General Use of Water Resources
Botswana (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Botswana (N)	40	Botswana: 2011 Environmental Impact Assessment Act (No. 10 of 2011)
Malawi (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Malawi (N)	32	Malawi: 2013 Water Resources Act (No. 2 of 2013), Articles 40(5)(b), 41, 95 and 112;; 1996 Environment Management Act (No. 23 of 1996), Articles 24--29
Mozambique (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Mozambique (N)	32	Mozambique: 1991 Act No. 16/91 regulating water resources belonging to the public domain;; 1997 Act No. 20/97 approving the Environment Act;; Decree No. 45/2004 approving the Regulation on the Environmental Impact Assessment;; Ministerial Order No. 198/2005 on Environmental Impact Assessment (EIA);; Decree No. 54/2015 Regulations on the Environmental Impact Assessment Process
Namibia (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Namibia (N)	40	2013 Water Resources Management Act (No. 11 of 2013), Article 72(2);; 2007 Environmental Management Act (No. 7 of 2007), Article 2(c) and Articles 32--43
Tanzania (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Tanzania (N)	40	2009 Water Resources Management Act (No. 11 of 2009), Article 9, 74(a);; 2004 Environmental Management Act (No. 20 of 2004), Articles 81--103

Zambia (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Zambia (N)	40	Water Resour24ces Management Act (No. 21 of 2011) Article 30(c), Environmental Management Act (No. 12 of 2011) Article 29
Zimbabwe (I)	20	SADC. 2005. *Southern African Development Community Regional Water Policy* (adopted August 2005), Section 5.2.4
Zimbabwe (N)	40	2002 Environmental Management Act [Chapter 20:27], Articles 97--108.
Transboundary Impact Assessment		
Angola (I)	32	ZAMCOM, Article 12(1)(f)
Angola (N)	0	
Botswana (I)	32	ZAMCOM, Article 12(1)(f)
Botswana (N)	40	Botswana: 2011 Environmental Assessment Act (No. 10 of 2011), Article 68; Environmental Assessment Regulations 2012, Schedule 1
Malawi (I)	24	ZAMCOM, Article 12(1)(f)
Malawi (N)	0	
Mozambique (I)	32	ZAMCOM, Article 12(1)(f)
Mozambique (N)	0	
Namibia (I)	32	ZAMCOM, Article 12(1)(f)
Namibia (N)	0	
Tanzania (I)	32	ZAMCOM, Article 12(1)(f)
Tanzania (N)	24	The Environment Impact Assessment and Audit Regulations 2004, Article 12(c)
Zambia (I)	32	ZAMCOM, Article 12(1)(f)
Zambia (N)	24	Zambia: Water Resources Management Act (No. 21 of 2011) Article 60(c), Environmental Management Act (No. 12 of 2011) Article 85(1)
Zimbabwe (I)	32	ZAMCOM, Article 12(1)(f)
Zimbabwe (N)	40	2002 Environmental Management Act [Chapter 20:27], Articles 99(c) and (d)
Provision for Establishment of Joint Body		
Angola (I)	40	ZAMCOM, Article 3, Establishment of the Zambezi Watercourse Commission
Angola (N)	0	
Botswana (I)	40	SADC-PC, Articles 5(3) and 6
Botswana (N)	12	National Water Policy 2011Section 12.1.10, Integrated Water Resources Management & Water Efficiency Plan 2013
Malawi (I)	40	SADC-PC, Articles 5(3) and 6
Malawi (N)	24	2013 Water Resources Act (No. 2 of 2013), Article 141; Integrated Water Resources Management and Water Efficiency Plan 2008-2012, Executive Summary
Mozambique (I)	40	SADC-PC, Articles 5(3) and 6
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Articles 5(3) and 6
Namibia (N)	32	2013 Water Resources Management Act (No. 11 of 2013), Article 28, 2000 National Water Policy White Paper Section 1.1.2 and 2.1.1.2
Tanzania (I)	40	SADC-PC, Articles 5(3) and 6
Tanzania (N)	24	Water Resources Management Act (No. 11 of 2009), Article 99
Zambia (I)	40	SADC-PC, Articles 5(3) and 6

Zambia (N)	32	Water Resources Management Act (No. 21 of 2011) Article 56, Environmental Management Act (No. 12 of 2011) Article 85(2)
Zimbabwe (I)	40	SADC-PC, Articles 5(3) and 6
Zimbabwe (N)	12	National Water Policy Section 7.6.9
Information/Data Exchange		
Angola (I)	40	ZAMCOM, Article 15
Angola (N)	0	
Botswana (I)	40	SADC-PC, Articles 5(3) and 6
Botswana (N)	16	2011 Environmental Impact Assessment Act (No. 10 of 2011); Environmental Assessment Regulations 2012, Form E, Regulation 8
Malawi (I)	40	SADC-PC, Articles 5(3) and 6
Malawi (N)	12	2013 Water Resources Act (No. 2 of 2013), Article 141(3)
Mozambique (I)	40	SADC-PC, Articles 5(3) and 6
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Articles 5(3) and 6
Namibia (N)	24	2013 Water Resources Management Act (No. 11 of 2013), Article 28(a)
Tanzania (I)	40	SADC-PC, Articles 5(3) and 6
Tanzania (N)	16	National Water Policy Section 3.3 (vii) Water Resources Management Act (No. 11 of 2009), Article 99
Zambia (I)	40	SADC-PC, Articles 5(3) and 6
Zambia (N)	16	Water Resources Management Act (No. 21 of 2011) Article 56(c)(ii)
Zimbabwe (I)	40	ZAMCOM, Article 15
Zimbabwe (N)	12	National Water Policy Section 7.6.9
Notification		
Angola (I)	40	ZAMCOM, Article 16
Angola (N)	0	
Botswana (I)	40	SADC-PC, Article 4
Botswana (N)	16	2011 Environmental Impact Assessment Act (No. 10 of 2011); Environmental Assessment Regulations 2012, Form E, Regulation 8
Malawi (I)	40	SADC-PC, Article 4
Malawi (N)	0	
Mozambique (I)	40	SADC-PC, Article 4
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Article 4
Namibia (N)	8	2013 Water Resources Management Act (No. 11 of 2013), Article 28(b)
Tanzania (I)	40	SADC-PC, Article 4
Tanzania (N)	0	
Zambia (I)	40	SADC-PC, Article 4
Zambia (N)	0	
Zimbabwe (I)	40	ZAMCOM, Article 16
Zimbabwe (N)	0	
Consultation		
Angola (I)	40	ZAMCOM, Article 16
Angola (N)	0	

Botswana (I)	40	SADC-PC, Article 4(1)(g)
Botswana (N)	16	2011 Environmental Impact Assessment Act (No. 10 of 2011); Environmental Assessment Regulations 2012, Form E, Regulation 8
Malawi (I)	40	SADC-PC, Article 4(1)(g)
Malawi (N)	16	2013 Water Resources Act (No. 2 of 2013), Article 141; Integrated Water Resources Management and Water Efficiency Plan 2008-2012, Executive Summary
Mozambique (I)	40	SADC-PC, Article 4(1)(g)
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Article 4(1)(g)
Namibia (N)	8	2013 Water Resources Management Act (No. 11 of 2013), Article 28(b)
Tanzania (I)	40	SADC-PC, Article 4(1)(g)
Tanzania (N)	0	
Zambia (I)	40	SADC-PC, Article 4(1)(g)
Zambia (N)	16	Environmental Management Act (No. 12 of 2011) Article 85(1)
Zimbabwe (I)	40	ZAMCOM, Article 16
Zimbabwe (N)	0	
Dispute Settlement		
Angola (I)	40	ZAMCOM, Article 21
Angola (N)	0	
Botswana (I)	40	SADC-PC, Article 7
Botswana (N)	0	
Malawi (I)	40	SADC-PC, Article 7
Malawi (N)	32	Malawi: 2013 Water Resources Act (No. 2 of 2013), Article 129
Mozambique (I)	40	SADC-PC, Article 7
Mozambique (N)	0	
Namibia (I)	40	SADC-PC, Article 7
Namibia (N)	8	2013 Water Resources Management Act (No. 11 of 2013), Article 28(e)
Tanzania (I)	40	SADC-PC, Article 7
Tanzania (N)	16	Water Resources Management Act (No. 11 of 2009), Article 99(f)
Zambia (I)	40	SADC-PC, Article 7
Zambia (N)	16	Water Resources Management Act (No. 21 of 2011) Article 57(1)(a)
Zimbabwe (I)	40	SADC-PC, Article 7
Zimbabwe (N)		1998 Water Act [Chapter 20:24], Article 32(3)

APPENDIX 2 – REFERENCES FOR SCORES, OMO-TURKANA BASIN

Equitable and Reasonable Use		
Ethiopia (I)	24	2003 ACCNR Article 7(3); The Contonou Agreement (signed 23 June 2000; in force 01 April 2003; revised 25 June 2005 and 22 June 2010), Article 4; Agreement Establishing the Inter-Governmental Authority on Development (IGAD) (signed 21 March 1996; in force 25 November 1996), Article 6A
Ethiopia (N)	16	2007 River Basin Councils and Authorities Proclamation (No. 534 of 2007), Article 2(1)(8), 1999 Ethiopian Water Resources Management Policy (Federal Democratic Republic of Ethiopia, Ministry of Water Resources 1999).
Kenya (I)	24	2003 ACCNR Article 7(3); The Contonou Agreement (signed 23 June 2000; in force 01 April 2003; revised 25 June 2005 and 22 June 2010), Article 4; Agreement Establishing the Inter-Governmental Authority on Development (IGAD) (signed 21 March 1996; in force 25 November 1996), Article 6A
Kenya (N)	24	The Water Act (No.43 of 2016), Article 27(j), Article 116(1)
No Significant Harm		
Ethiopia (I)	18	2003 ACCNR Article XIII(2)
Ethiopia (N)	8	2005 Ethiopian Water Resources Management Regulations (No. 115 of 2005) , Article 3
Kenya (I)	18	2003 ACCNR Article XIII(2)
Kenya (N)	12	2010 Constitution of Kenya, Article 70(2)(a)
Ecosystem Protection		
Ethiopia (I)	18	1968 ACCNNR, Article 10; 2003 ACCNNR (Revised Version), Article 12.
Ethiopia (N)	24	River Basin Councils and Authorities Proclamation (No. 534 of 2007), Article 18
Kenya (I)	24	1968 ACCNNR, Article X; 2003 ACCNNR (Revised Version), Article 12.
Kenya (N)	32	The Fisheries Management and Development Act (No. 156 of 2016) Article 73
Pollution Prevention		
Ethiopia (I)	24	2003 ACCNNR (Revised Version), Article VII(2)(e)
Ethiopia (N)	40	Environmental Pollution Control Proclamation (No.300 of 2002), Article 3
Kenya (I)	24	1968 ACCNNR, Article V(4); 2003 ACCNNR (Revised Version), Article VII(2)(e)
Kenya (N)	40	The Water Act(No.43 of 2016) Article 58-59, 108, 110, 143
Intergenerational Equity		
Ethiopia (I)	24	2003 ACCNNR (Revised Version), Article IV
Ethiopia (N)	0	
Kenya (I)	24	2003 ACCNNR (Revised Version), Article IV
Kenya (N)	20	2010 Constitution of Kenya, Article 42
Precautionary Principle		
Ethiopia (I)	24	2003 ACCNNR (Revised Version), Article IV
Ethiopia (N)	0	
Kenya (I)	24	2003 ACCNNR (Revised Version), Article IV

Kenya (N)	16	1999 Environmental Management and Co-ordination Act Article 3(5)(e); 2009 Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, Article 5(1)(g)
Environmental Impact Assessment		
Ethiopia (I)	12	
Ethiopia (N)	40	Environmental Impact Assessment Proclamation (No.299 of 2002) Articles 2(10)
Kenya (I)	12	2003 ACCNNR (Revised Version), Article XIV
Kenya (N)	40	Environmental (Impact Assessment and Audit) Regulations 2003, See also 2016 Water Act (No. 43 of 2016), Article 40(4); 2006 Environmental Management and Co-ordination (Water Quality) Regulations Article 6(b).
Transboundary Impact Assessment		
Ethiopia (I)	0	
Ethiopia (N)	24	Environmental Impact Assessment Proclamation (No.299 of 2002) Articles 5, 6
Kenya (I)	0	
Kenya (N)	40	Environmental (Impact Assessment and Audit) Regulations 2003, Article 44
Provision for Establishment of Joint Body		
Ethiopia (I)	24	2003 ACCNNR (Revised Version), Article VII
Ethiopia (N)	12	Ethiopian Water Resources Management Policy 199, Section 2.2.8
Kenya (I)	24	2003 ACCNNR (Revised Version), Article VII
Kenya (N)	16	The Water Act(No.43 of 2016) Articles 24-29 refer to establishment of basin mechanisms, however no reference is made to transboundary resources
Information/Data Exchange		
Ethiopia (I)	18	2003 ACCNNR (Revised Version), Article VII
Ethiopia (N)	24	River Basin Councils and Authorities Proclamation (No. 534 of 2007), Article 6(7)
Kenya (I)	18	2003 ACCNNR (Revised Version), Article VII
Kenya (N)	0	
Notification		
Ethiopia (I)	0	
Ethiopia (N)	0	
Kenya (I)	0	
Kenya (N)	0	
Consultation		
Ethiopia (I)	18	2003 ACCNNR (Revised Version), Article VII
Ethiopia (N)	0	
Kenya (I)	24	2003 ACCNNR (Revised Version), Article VII
Kenya (N)	0	
Dispute Settlement		
Ethiopia (I)	0	
Ethiopia (N)	40	Ethiopia Water Resources Management Proclamation (No. 197 of 2000), Article 9
Kenya (I)	30	2003 ACCNNR (Revised Version), Article VII
Kenya (N)	40	The Water Act(No.43 of 2016), Part VI, Articles 119-125