

Transboundary Water Governance in the Hindu Kush Himalaya Region

Beyond the dialectics of conflict and cooperation



Consortium members



ICIMOD

teri



About HI-AWARE Working Papers

This series is based on the work of the Himalayan Adaptation, Water and Resilience (HI-AWARE) consortium under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with financial support from the UK Government's Department for International Development and the International Development Research Centre, Ottawa, Canada. CARIAA aims to build the resilience of vulnerable populations and their livelihoods in three climate change hot spots in Africa and Asia. The programme supports collaborative research to inform adaptation policy and practice.

HI-AWARE aims to enhance the adaptive capacities and climate resilience of the poor and vulnerable women, men, and children living in the mountains and flood plains of the Indus, Ganges, and Brahmaputra river basins. It seeks to do this through the development of robust evidence to inform people-centred and gender-inclusive climate change adaptation policies and practices for improving livelihoods.

The HI-AWARE consortium is led by the International Centre for Integrated Mountain Development (ICIMOD). The other consortium members are the Bangladesh Centre for Advanced Studies (BCAS), The Energy and Resources Institute (TERI), the Climate Change, Alternative Energy, and Water Resources Institute of the Pakistan Agricultural Research Council (CAEWRI-PARC) and Alterra-Wageningen University and Research Centre (Alterra-WUR). For more details see www.hi-aware.org.

Titles in this series are intended to share initial findings and lessons from research studies commissioned by HI-AWARE. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the HI-AWARE consortium, they have only undergone an internal review process.

Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

About the Authors:

Ankita Shrestha, ICIMOD

Rucha Ghate, ICIMOD

Corresponding Author: Ankita Shrestha, ankita.shrestha@icimod.org

Cover photo: The only path in Darchula (Nepal) in the mid-hill region of the Nepal-India border, set by the Mahakali River which is a contiguous international river that forms borders; on the right is a settlement near the riverbed in Dharchula (India)

Acknowledgement

This work was carried out by the Himalayan Adaptation, Water and Resilience (HI-AWARE) consortium under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with financial support from the UK Government's Department for International Development and the International Development Research Centre, Ottawa, Canada.

Transboundary Water Governance in the Hindu Kush Himalaya Region Beyond the dialectics of conflict and cooperation

Authors

Ankita Shrestha

Rucha Ghatge

Published by**HI-AWARE Consortium Secretariat**

Himalayan Adaptation, Water and Resilience (HI-AWARE)
c/o ICIMOD
GPO Box 3226, Kathmandu, Nepal

Copyright © 2016

Himalayan Adaptation, Water and Resilience (HI-AWARE)
All rights reserved. Published 2016

ISBN 978 92 9115 434 0 (electronic)

Production team

Doris Canter Vischer (Editor)
Debabrat Sukla (Communication Officer, HI-AWARE)
Dharma R Maharjan (Graphic designer)
Asha Kaji Thaku (Editorial assistant)

Photos: Jitendra Raj Bajracharya - pp cover, 3, 7, 10, 22; Amitangshu Acharya - p 11; Rucha Ghate - p12; Giovanna Gioli - p16

Disclaimer: The views expressed in this work are those of the creators and do not necessarily represent those of the UK Government's Department for International Development, the International Development Research Centre, Canada or its Board of Governors.

In addition, they are not necessarily attributable to ICIMOD and do not imply the expression of any opinion by ICIMOD concerning the legal status of any country, territory, city or area of its authority, or concerning the delimitation of its frontiers or boundaries, or the endorsement of any product.

Creative Commons License

This Working Paper is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Articles appearing in this publication may be freely quoted and reproduced provided that i) the source is acknowledged, ii) the material is not used for commercial purposes, and iii) any adaptations of the material are distributed under the same license.

This publication is available in electronic form at www.hi-aware.org

Citation: Shrestha, A., Ghate, R., (2016) *Transboundary water governance in the Hindu Kush Himalaya region: Beyond the dialectics of conflict and cooperation*. HI-AWARE Working Paper 7. Kathmandu: HI-AWARE

Contents

Acknowledgements	iv
Abstract	v
1. Introduction	1
2. The Status of Transboundary Water Governance in HKH Countries	3
3. Finding the Rationale for Transboundary Water Governance	7
4. Scenarios Beyond Conflict and Cooperation for HKH	21
Bibliography	24
List of tables	
Table 1: Transboundary river water alliances with evaluation of successes and failures	13
Table 2: Transboundary rivers in the HKH with assessment of water treaties	18

Acknowledgements

The authors of the paper would like to thank Dr M P Ram Mohan (TERI University, New Delhi), Ms Anvita Dulluri (National Law School of India University, Bengaluru) and Dr Kallur Subramanyam Murali (IDRC) for their valued comments. The gratitude is well extended to Dr Anjal Prakash (ICIMOD) along with other HI-AWARE colleagues for their inputs. Thank you to the anonymous reviewer(s) who have helped to improve the paper significantly.

Summary

The querulous nature of transboundary water governance is as old as the concept and practice of transboundary water management. Its discourse is now overwhelmed by attempts made and lessons learnt in transboundary water management. Against this background, this paper presents a systematic inquiry into the rationale behind transboundary cooperation in order to reinforce and inform further research on and practice of transboundary water governance in the Hindu Kush Himalaya (HKH) region. Why should riparian countries collaborate with each other to form a transboundary alliance? This narrative review attempts to provide a justification for a pragmatic approach to transboundary water governance that goes beyond the dialectics of conflict and cooperation, particularly for countries in the HKH, where research evidence suggests that such a governance system could have momentous socio-economic as well as political implications. Research dedicated to finding this rationale is restricted to secondary-data analysis based mainly on national and international level research-based perspectives on the need for transboundary water management. The main objective of the review is to aid the understanding of the current status and conceivability of transboundary water management in HKH countries to ultimately help in policy and decision making.

Executive Summary

The querulous nature of transboundary water governance is as old as the concept and practice of transboundary water management. Its discourse is now overwhelmed by attempts made and lessons learnt in transboundary water management. At the core of the rationale lies the question why countries should collaborate with each other to engage in transboundary alliances. Against this background, this narrative review presents a systematic inquiry into the rationale behind transboundary cooperation in order to reinforce and inform further research on and practice of transboundary water governance in the Hindu Kush Himalaya (HKH) region. It provides a justification for a pragmatic approach to transboundary water governance that goes beyond the dialectics of conflict and cooperation, particularly for countries in the HKH, where research evidence suggests that such a governance system could have momentous socio-economic as well as political implications.

There are two broadly framed justifications for countries to engage in transboundary management of water resources. The first is the realisation that interdependencies in the upstream and downstream areas in a river basin cannot be neglected, as conflicts may arise due to such indifference. The second is the recognition that countries are bound to enjoy better policies and management practices in water and other sectors through collaboration. The inclusion and participation of all riparian countries becomes dire in order to ensure that all riparian countries have the opportunity to tap into whatever benefit the river-basin may provide as a whole. Transboundary water alliances may not just be a necessity for some countries linked inextricably by their riparian interdependencies. They could also become an opportunity to manage water resources, especially to enjoy benefits incurred by such an alliance in non-water sectors. Water has increasingly been linked to energy, agriculture, and food security in the HKH region. Indeed, hydropower and irrigation are the two most significant uses of water that have long been regulated through international treaties, and this trend of water use seems to be echoed in riparian HKH countries

Skepticism regarding net benefits coming through transboundary alliances has resulted in limited bi- or multi-lateral treaties, with limited management or endowment of water resources. At present research dedicated to finding rationale for cooperation is restricted to secondary-data analysis based mainly on national and international level research-based perspectives on the need for transboundary water management. It is believed that if collaborations are to be extended to transboundary agreements, the immediate potential benefits would be flood mitigation, disaster risk reduction (DRR), irrigation, and energy security, and long term benefits would include water security and conflict resolution.

If tangible benefits from improved water resource management for social and economic development can be demonstrated at local, national and river basin level, it is predicted that coordinated development and reform of policies, laws and institutions needed to build the capacity of co-management between stakeholders can indeed be advanced at the transboundary level. The principal challenge in water governance is how to develop and manage the various transboundary water sources sustainably and efficiently in full agreement and cooperation between the appropriate co-basin countries, so that they result in a 'win-win' situation for all parties concerned.

Introduction

Finite water resources are delimited by political and national boundaries that restrict resource ownership and use to a particular population or a country. Yet, over half of the world's fresh water flows through and across national borders, and 40% of the world's population lives near these water bodies (Bonvoisin 2013; Marton-Lefèvre 2013). The very nature of transboundary waters is such that regulations governing their management may not be restricted to national territories, as human dependencies on water in the upstream and downstream regions make its governance inherently political and contested. In this context, the distribution, ownership, and use of transboundary water resources are highly disputed subjects in academic, professional, and political arenas.

This querulous nature of transboundary water governance is as old as the concept and practice of transboundary water management itself. The 1992 Helsinki Convention¹ had introduced the first international water law of its kind, and ever since adopting the Convention, over 100 countries have either been engaged or have expressed interest in transboundary alliances with respect to more than 275 rivers across the world (UNESCO 2013). In theory, the water governance discourse is overwhelmed by the realities of attempts made and lessons learnt in transboundary water management. Research dedicated to covering different aspects of transboundary water management has ranged from studying the nature and history to benefits and institutional requisites of such waters (Kliot et al. 2001; Biswas 2008a; UNESCO 2013). Now, we believe a systematic inquiry into the rationale behind forming transboundary alliances can reinforce and inform further research as well as practice.

At the core of the rationale lies the question *why* countries should collaborate with each other to engage in transboundary alliances. The corollary question *how* they should collaborate falls outside the scope of this review and is reserved for future research. The paper steers clear of putting emphasis on issues surrounding conflict and cooperation, as such rationales alone have not been useful in breaching the lethargies of alliances (Biswas 2008a; Rasul 2014b). Similarly, the paper consciously leaves out the historically contentious concept of 'equity'² in transboundary water allocation (Wolf 1999; Lautze et al. 2006), as its comprehensive study would require extensive field research, feasible only at a subsequent stage. This paper is restricted to secondary-data analysis based mainly on national and international level research-led perspectives on the need for transboundary water management. It also acknowledges that investigating regional and ground level perspectives will require a different set of enquiry altogether.

Further, while transboundary alliances have already been part of water governance structures of many countries, some transboundary rivers still remain largely unmanaged, as in the Hindu Kush Himalaya (HKH) region. This review paper attempts to provide a justification for a pragmatic approach to transboundary water governance that goes beyond the usual opposition between the need to avoid conflict and develop cooperation strategies, particularly for countries in the HKH where research evidence suggests that such a governance system could have momentous socio-economic as well as political implications (Biswas 2008a; Shrestha et al. 2013; Rasul 2014b). The plausibility of finding a rationale for forming transboundary alliances in the HKH on which to base further research is deemed well worth pursuing such an inquiry.

¹ In 1992, countries of the pan-European region, member states of the United Nations Economic Commission for Europe (UNECE), signed and adopted the Convention on Protection and Use of Transboundary Waters and International Lakes, thereby forming an international water law, as new borders emerged through the dissolution of the Soviet Union, Yugoslavia, and Czechoslovakia. Rivers that previously flowed through national borders now crossed new borders due to the change in political boundaries, and competing use of water became an international rather than a domestic affair (Bonvoisin 2013).

² The concept of equity appeared in transboundary-water literature such as the 1966 Helsinki Rules and, later, a paper on the 1997 United Nations (UN) Convention on the Non-navigational Uses of International Water Courses (IWC), in which transboundary water laws are dedicated to the 'equitable utilisation of the waters of an international basin' (Lautze et al. 2006, p.93). While many definitions of 'fairness' in water allocation are prevalent at regional and nation-state levels, the term 'equity' appears in some water agreements applied only at basin level. However, it remains largely unclear how effective the semantics of 'equity' are in making transboundary accords more equitable.

The main objective of the review is to aid the understanding of the current status and conceivability of transboundary water management in HKH countries, to help in policy and decision making. It is essentially a narrative review for which specific studies on transboundary water governance were selected, summarised, and analysed. Theories found in the reviewed articles were put into perspective to find the fundamental logic behind countries opting for transboundary water management. The paper also analyses the development of transboundary water governance research and practice over time and presents a current evaluation of the subject in the HKH context. It begins by describing the current status of transboundary governance in the HKH countries, which is followed by an analysis of the rationale justifying the importance of the transboundary approach. Existing transboundary alliances across the world are then tabulated and their strengths and weaknesses discussed. The review then documents various treaties signed within the HKH and ends by exploring possibilities of taking discussions on transboundary water governance beyond issues of conflict and cooperation.

The Status of Transboundary Water Governance in HKH Countries

It has been duly recognised in water governance³ literature that the water crisis of the 21st century is primarily a crisis of governance, which is to say a failure of institutions to manage water resources efficiently for the well-being of humans and ecosystems (Biggs et al. 2013; Gupta and Pahl-Wostl 2013). The United Nation's mandate to coordinate water issues is limited, and water laws are rather regional than global in nature, indicating a vacuum in water governance at the global level (Gupta, Pahl-Wostl and Zondervan 2013). Regional cooperation in water management is said to hold the "recipe for wider cooperation" (Jagerskog 2013, pp. 52). However, the level of securitisation in a river basin still acts as an impediment to a functionalist approach to cooperation, as states are preoccupied with national security, thereby limiting the room for regional perspectives (Jagerskog 2013). In this wider context of transboundary water governance, let us first briefly explore the status of transboundary waters and its governance in the HKH before investigating the rationale for transboundary water cooperation in the region which takes as a point of departure the current reality of transboundary alliances which has still not evolved despite, or perhaps as a result of, disparate political will.



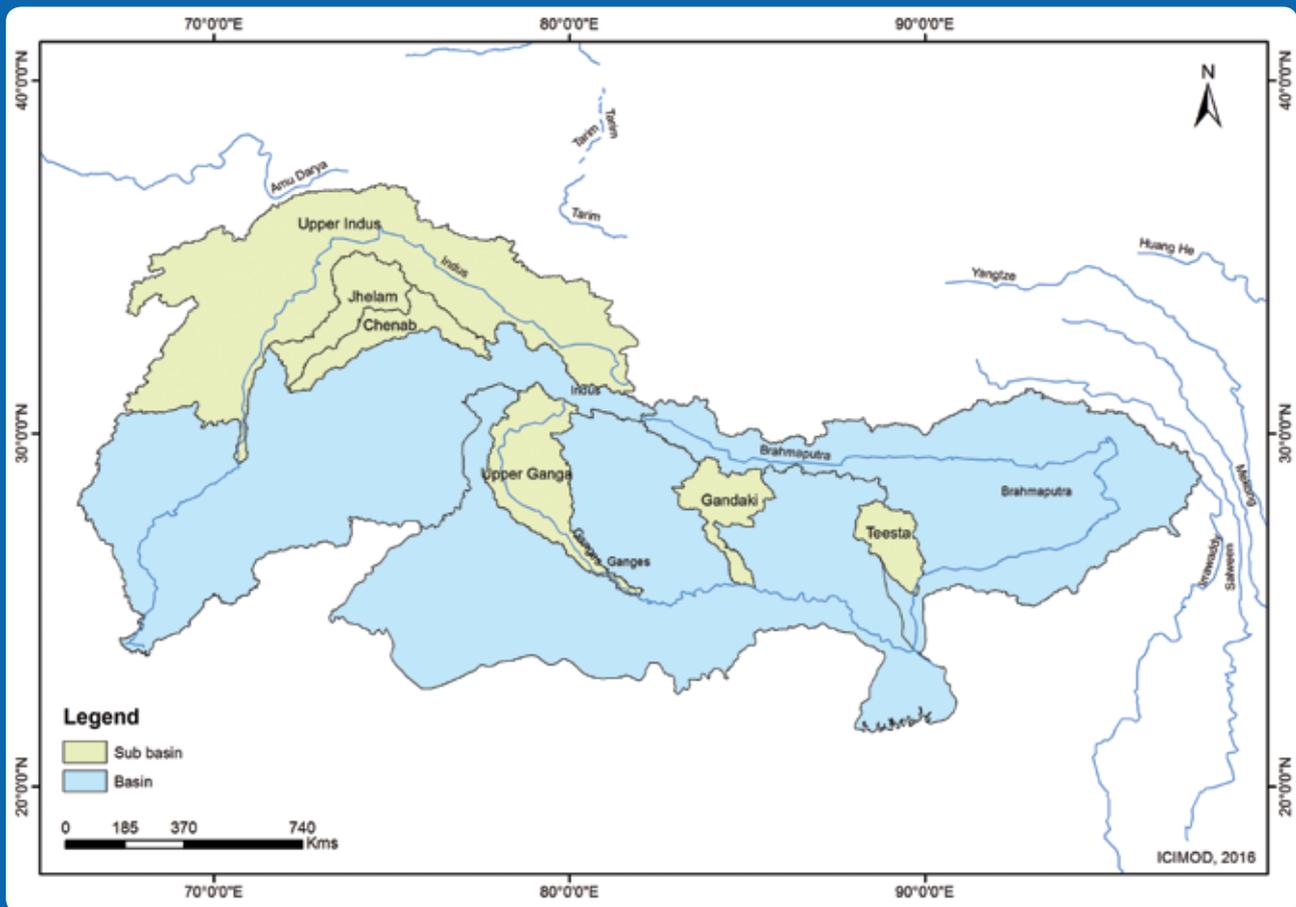
Treacherous mid-hill topography near the Mahakali River, Nepal

³ The United Nations Development Programme (UNDP) defines water governance as the political, social, economic, and administrative systems that influence the use and management of water. Who gets how much, when and how, and who has the right to water and related services, and to their benefits, is decided through the engagement of related actors in water governance. It determines the equity and efficiency in water resource and services allocation and distribution, and balances water use between socio-economic activities and ecosystems. Governing water, therefore, includes the formulation, establishment, and implementation of water policies, legislation, and institutions. It also includes clarification of the roles and responsibilities of the government, civil society, and the private sector in relation to water resources and services. The outcome depends heavily on how stakeholders act to the rules and roles that have been taken by or assigned to them (UNDP undated).

Similarly, the Global Water Partnership (Rogers and Hall 2003) defines water governance as the range of political, social, economic, and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society. These two definitions are the most prominent in research and practice of 'water governance'. It rose as an idea of governing water wisely to ensure good governance, at the Second World Water Forum in The Hague in 2000 (Lautze et al. 2011, p. 3).

The current, widely-accepted definition of water governance comprises the processes and institutions by which decisions that affect water are made (ibid., p. 8).

Figure 1: A map of major transboundary rivers and corresponding basins in the HKH



The Hindu Kush Himalaya region has a complex geography of high mountains, valleys and plateaus. It is home to some of the world's tallest peaks with over 60,000 kilometre square of glaciers and about 760,000 kilometre square of snow cover, thus becoming a perennial source of freshwater for agriculture, food production, water supply, sanitation, health, energy, tourism, industry and biodiversity systems. The region contains an expanse of ten river basins- the Amu Darya, Brahmaputra, Ganges, Indus, Irawaddy, Mekong, Salween, Tarim, Yangtze and Yellow- which connect upstream and downstream areas in terms of culture, communication, trade, commerce and resource management. It also provides goods and services directly or indirectly related to water to 1.3 billion people including 210 million that live in the HKH. (Shrestha et al. 2013)

It is found that developing countries in particular are far from formulating and implementing water policies, which explicitly consider water use for energy and irrigation, as its implications in terms of resource availability and use still remain undecided (Biswas 2008a). Against this background, transboundary water management seems like a far-fetched reality, especially in the HKH where riparian countries in question are still limited to national environmental debates and domestic water policies (Blaikie and Muldavin 2004) and transboundary collaborative arrangements and institutions⁴ for water resource management do not yet exist (Tiwari and Joshi 2015). Indeed, it is found that water management in that region has been exacted mostly at state rather than at regional level. Centralised management systems have yet to accommodate the interests of multiple actors, both at local and supranational levels, especially in addressing challenges common to the region's riparian countries (Shrestha et al. 2013). Even within countries, despite the availability of adequate fresh water supplies, there is severe water insecurity due to ineffective governance and inequitable access to water (Biggs et al. 2013; Khalid et al. 2014).

⁴ Tiwari and Joshi underscore the need for capacity building and the development of partnerships and horizontal and vertical linkages among local, regional and national institutions. These practical advances would facilitate improved access to new knowledge, technology and critical information and encourage the movement of financial resources to local levels (2014, p.66).

In addition, upstream-downstream interdependencies have not yet been backed by strong scientific evidence and research in this region, as exploration is on-going. On the one hand, studies have concluded that countries should cooperate for socio-economic and political benefits, poverty eradication, aversion of disasters, and sustained improvement in living conditions (Biswas 2008a; Bakker 2009; Biswas 2011; Rasul 2014a; Rasul 2014b). On the other hand, they still remain rather general, and are yet to conclude whether these countries are both willing and able to enter into a transboundary alliance.⁵ In the light of this finding, it becomes difficult to conclude that their current national water policies and management practices either reflect or welcome international water priorities.

Biswas encapsulates in two of his seminal papers the importance of transboundary waters, specifically in this region, highlighting their magnitude, complexities, and potentials. The first presents an overview of the management of transboundary waters (2008) and the second analyses the situation of conflict and cooperation in transboundary water management in South Asia (2011). The first 'overview' paper concludes that the principal challenge in water governance is how to develop and manage the various transboundary water sources sustainably and efficiently in full agreement and cooperation between the appropriate co-basin countries, so that they result in a 'win-win' situation for all parties concerned (Biswas 2008a, p. 5). The study also finds that if co-basin countries adopt a constructive and positive approach, it will contribute to the creation of virtuous alliances, the absence of which could mean that potential benefits would be lost to both people and countries of the concerned region. This conclusion has since been echoed and reiterated in later research undertaken on finding a justification for countries in the HKH to consider transboundary cooperation (Huitema et al. 2009; Biggs et al. 2013; Rasul 2014b).

In his second 'conflict' paper (2011), Biswas goes beyond the relatively generic observations he made in his 'overview' study and presents a more realistic picture of concurrent bilateral and multilateral cooperation in the South-Asian region. The study recognises that the political agendas of riparian countries in the region do not seem to prioritise transboundary water management, giving preference to bi-lateral or multi-lateral agreements and treaties. While it is evident that these countries have political differences, his study claims that focus should be shifted from 'conflict' and 'crisis' to 'cooperation', especially in issues related to the range of development sectors with which water is infused, such as agriculture, energy, transportation, and industry.

Biswas illustrates this argument by presenting a case study of four countries in the region that are engaged in such agreements, namely India, Nepal, Bhutan, and Bangladesh. A comparison is made between the alliance shared by Bhutan and India and by Bangladesh, India, and Nepal. He finds that Bhutan and India have experienced a 'win-win' alliance with respect to the use of their transboundary water for hydroelectricity since the mid-1980s, contributing substantially to Bhutan's national income. However, Bangladesh, India, and Nepal, although believed to be capable of receiving similar socio-economic benefits, have been unsuccessful in engaging in a transboundary alliance due to deep-seated mistrust and attitudinal differences (Biswas 2011; Khalid et al. 2014). One may conclude that real progress to use the water of the rivers as a catalyst for infrastructural development and poverty alleviation in the region has been minimal due to the absence of transboundary water management systems (Biswas 2011).

Research evidence, according to Biswas, seems to point to three possible scenarios for transboundary cooperation in the HKH: pessimistic, optimistic, and plausible. A pessimistic scenario may mean a 'business-as-usual' approach, with no changes in the way transboundary cooperation is perceived in the region (Biswas 2011; pg. 669). In contrast, an optimistic one may be an overly ambitious, unattainable, and unrealistic approach, which may prove to be equally deterrent. Biswas posits that a plausible scenario may be one in which countries seek sustainable water resource management strategies for the region through cooperation and collaboration. This finding is flanked by

⁵ In this paper, transboundary alliances refer to water treaties and alliances that have resulted from compliance with certain international conventions or laws, which regulate relationships between states on the use of water resources viewed as a shared common good. This means that, from a legal standpoint, a riparian country does not have sole control over a transboundary river under international law. The UN Convention on the Law of Non-Navigational Uses of International Water-Courses provides a common framework for cooperation within international river-basins. Various international organisations such as the Institut de Droit International, the International Law Association (Helsinki Rules), and the UN Affiliated International Law Commission each prepared a draft of rules for the use of international water resources. These drafts were reinforced by the International Court of Justice and other tribunals in their decisions and rulings (Kliot et al. 2001, p. 232). The words 'treaties' and 'alliances' have sometimes been used interchangeably in this review to refer to transboundary water agreements between two or more nations also.

Rasul's research on the benefits incurred by the riparian countries in this region (2014b). The principle benefits were outlined as follows:

- flood mitigation;
- augmentation of dry season water availability through economic and timely distribution;
- generation of hydropower and clean energy;
- regional energy security and conflict resolution.

Rasul's study picks up from where Biswas leaves his, as the latter's recommendation of seeking and finding a sustainable water resource management strategy is rather unfinished. Both studies, however limited they may be, are found to contribute immensely to assessing the feasibility of and providing a theoretical rationale for transboundary cooperation in water management in the HKH.

Finding the Rationale for Transboundary Water Governance

There are two broadly framed justifications for countries to engage in transboundary management of water resources. The first is the realisation that interdependencies in the upstream and downstream areas in a river-basin cannot be neglected, as conflicts may arise due to such indifference (Nepal et al. 2014). The second is the recognition that countries are bound to enjoy better policies and management practices in water and other sectors through collaboration (Kliot 2001; Biswas 2011; Rasul 2014b). International water laws governing transboundary waters have evolved out of experiences and past examples of water management, and it is now widely believed that basin-wide cooperation is the ideal solution to the problem of managing transboundary river-basins.⁶ In the absence of cross-border and cross-sectorial integration, it is found that riparian countries of a river-basin can get into a state of conflict over shared waters (Kliot 2001; Mirumachi and Allan 2007; Zeitoun et al. 2011; Akanda 2012).



Linking road that connects Nepal with Tibet

While focusing on upstream downstream interdependencies and potential water-related conflict alone cannot create an enabling environment for cooperation (Biswas 2011), resolving such conflicts, mainly over water allocation, seems to be the first rationale for forming transboundary alliances (Wolf 1999). Secondly, such alliances have proven to be helpful not only in better management of shared water resources but also in bringing improvement in other sectors, mainly political and developmental, in concerned riparian countries, as particular situations in many transboundary alliances all over the world have revealed. This section will explore these two aforementioned core rationales that existing transboundary water alliances have brought to the fore and synthesise lessons learnt from existing transboundary waters, while endeavouring to find their relevance for the HKH.

⁶ River-basins have long evolved as an optimum unit for water resource management. Molle (2009) argues that during much of the 20th century rivers and aquifers catered to the water necessities of all people. Earlier, water was not thought to be a scarce resource, and effects on the environment of such extraction were incremental, and went largely unnoticed. The present-day situation of the use and misuse of water has meant a depletion of water quality, threatening ecosystems, and an expanding demand for water management.

At this point, we need to divert our attention momentarily to ask why the river-basin concept is indispensable for transboundary waters. Transboundary water governance has respected the tenets of hydrology⁷, opting for a more unified approach to water resource management. At the same time, river-basin governance, in reality, is now assuredly moving towards division and decentralisation, with increased recognition of politically sovereign units within a basin. Considering these opposing trends, the question arises whether there is a theoretical space in which a rationale for transboundary collaboration may be developed through an understanding of the river-basin scale.

Historically, the domestication of water marked a pivotal moment in the cultural trajectories of many regions in the world where states and societies developed. This enabled the consolidation and framing of farming practices and necessitated water management systems, which have now evolved across 275 transboundary waters mostly at the river-basin scale (Mithen 2010; UNESCO 2013). While a meticulous chronicling of the rise and fall of river-basin management ideologies throughout history falls outside the scope of this review, it is necessary to mark the distinct phases in which the river-basin concept has picked up pace until now. This is done to recognise the river-basin as an evolving unit of transboundary water resource management and not a singular conceptual occurrence.

We stretch no further back in time than the 1930s, when the concept of regionalism put forth the idea that the 'region' should become the unit for action, and planning would be used to achieve development as a solution to the Great Depression.⁸ The rhetoric of scientific, rational, and political planning slowly gave way to river-basin planning, mainly to provide justification for navigation, irrigation, and power projects, paralleled by the concept of river-basin accounting, which expanded cost-benefit analysis to multipurpose projects of the water resources department in the United States of America (Molle 2009).

A parallel evolution took place in Europe with central issues of drainage, pollution, and hydropower, eliciting institutional changes and readjusting planning to include the river-basin as a management unit. It helped to realign power structures to include local, national and regional levels. In the 1950s, the UN General Secretary stated that river-basin development was recognised as an essential feature of economic development. However, the river-basin concept was picked up only in the 1990s as a unit for development. By then, pollution and water quality issues became the subject of prominent debates in all industrialised countries and bolstered the need for a river-basin scale of management, since the complexities of local problems at basin level and administrative conflicts had taken centre stage (Molle et al. 2007; Molle 2009). This paved the way for a unified, comprehensive, and integrated approach to water resource management, reflected in the river-basin model. With the rise of the concept of integrated water resource management (IWRM), focus was directed to river-basins as the efficient planning and management unit to implement IWRM principles from the 1990s onward.

Now, at the institutional level, the IWRM concept has been formalised through the establishment of River-basin Organisations (RBOs) in countries like Brazil, Indonesia, Morocco, Sri Lanka, and Vietnam, which were particularly influenced by the French and the Australian RBO models⁹ promoted by the Global Water Partnership (GWP) and the International Network for Basin Organisations (INBO). Although deemed to be 'old-wine-in-a-new-bottle' approach (Biswas 2008b; pg. 16), IWRM and its Integrated River-basin Management (IRBM) derivative have now become influential in mainstream thinking on water management (ADB 2000; GTZ 2001; WWF 2001; OECD 2003; Molle 2009).

The river-basin scale has become central to a globally hegemonic discourse of river water governance, but it is also a contested scale in which multiple interests at local, national and regional levels are now deployed, and therein lies a paradox. Widely accepted by donors, governments, and NGOs alike as a way to democratise water

⁷ The mutable nature of water, understood through the hydrological cycle and acknowledged in hydrology, does not respect the human concept of geo-political boundaries, thus defining transboundary waters or waters that cross border concepts.

⁸ As part of the New Deal, Roosevelt established the Tennessee Valley Authority (TVA) in 1933. It became a major experiment in large-scale planning, tying industry, agriculture, forestry, and flood prevention into a unified whole. The TVA became the most seminal of regional development projects and propounded the high-modernism ideology that scientific knowledge and systematic rational planning could radically change society (Molle 2009, p. 487).

⁹ Institutional arrangements such as the Murray-Darling River Commission in Australia and the French Water Agencies are some RBO forms. As councils, they provide a platform for negotiation, conflict-solving, and minimal regulation of allocation of water resources. This approach has also been adopted in Mexico, South Africa, and Zimbabwe (Molle 2009).

management, rationalise water resource use, and manage conflict between water users in river-basins (Warner et al. 2014), river-basin management is thought to have normalised and, therefore, undermined some of the conditions underlying these water management trends. Warner et al. claim that systemic approaches like the river-basin invites 'centralising, synoptic management models, blueprints, and end products [deemed to be] cathedrals of progress' (Warner et al. 2014, p. 478). This is exemplified when river-basin management is often manipulated for political ends, as this management scale allows states to continue to guard their sovereignty and use infrastructure to reinforce sovereign interests.

Further, while river-basin councils and platforms do challenge conventional, centralised decision-making and expertise, which fail to cater to the complexities of water-related problems, basin-level participation is increasingly being questioned. That is to say, river-basin may not be the ideal scale to promote participation across the board, as levels of involvement in reality are interweaved and composed of political networks that are difficult to disentangle (Molle 2007; Hoogesteger 2012). Still, the river-basin has been a constantly evolving management unit, which has a pronounced relevance in today's context as a geographical unit for water resources development and management. But what consequence does the river-basin scale of management have for transboundary water governance, and is it relevant for the HKH?

Touted to be the future of water management in adaptive governance literature, the river-basin approach adopts the bioregional perspective and the bioregion scale as a co-management strategy across country borders (Huitema et al 2008). It advocates the need to create institutional collaboration either by transferring existing responsibilities to the basin level and creating a unitary river basin organisation or by combining existing political jurisdictions to create collaborative decision making structures supported by legislature (Schlager and Blomquist 2000), even though the feasibility and desirability of RBOs is questioned (Biswas 2004). Critical, however, to the success of such transboundary collaboration is the level of authority national government grant to RBOs to manage the respective basins, as the most successful existing RBOs are highly supported by basin governments and legislation (WRI 2006). As such, HKH countries would have to re-evaluate their own stance in conceding authority over their waters to a river-basin authority, the occurrence of which is rather contestable but worth exploring. Further, river-basins also remain the optimum unit of management thanks to their upstream-downstream interconnectedness (Molle 2009) essential to the ecological and political context of the HKH (Shrestha et al. 2013). Consequently, exploring upstream and downstream interests may help in and bolster the argument for finding, at once, a unified and a decentralised approach to water governance in transboundary river-basins.

Upstream-downstream interdependencies

Transboundary water governance may be vital in regions with interdependencies in upstream and downstream regions. Such interdependencies within a river-basin mean that differential management needs arise in different parts of a river-basin, as land and river systems are strongly affected by human actions across spatial scales (Allan 2004). This necessitates countries to co-manage water resources even more when river-basins cross borders¹⁰ (Pigram 2000; Moellenkamp 2007). Therefore, integrated land and water resources planning and management on river-basin scale become necessary to give due regard to the linkages between upstream and downstream catchment areas. This is particularly relevant in river-basins in the HKH with large differences in elevation, where climatic and geological conditions differ at the source of the river or the headwater systems¹¹ from those downstream (Nepal et al. 2014).

Further, events in the upstream area can directly affect situations downstream and when these two areas fall in two different countries, one side may not endorse river-basin regulations upheld by the other which hinders governance

¹⁰ International rivers, either successive, crossing borders, or contiguous, forming borders, challenge political boundaries of nations. Further, these rivers have three absolute positions that are relevant to management: upstream, midstream, and downstream. The underlying hydrological structure of an international river requires management that accepts perceived influences of the interdependence of upstream and downstream interests, making it critical to consider transboundary collaboration to take into account such interdependencies.

¹¹ Headwater systems are areas from which water originates within a channel network and are characterized by interactions among hydrologic, geomorphic, and biological processes that vary from hills slopes to stream channels. They are important sources of sediments, water, nutrients, and organic matter for downstream reaches (Gomi et al. 2012).



Kailash landscape in Khasha (Nepal); the Kailash Range, which forms part of the Transhimalaya in Tibet, is a water source for the Indus, Sutlej, Brahmaputra and Karnali River in the HKH

of transboundary waters. Transboundary basin linkages become even more challenging in the Himalayan region, for it consists of sparsely populated upstream regions with remote accessibility and has a fragile geology. It is also the source of major rivers that flow into basin areas, which are home to approximately one-fifth of the world's population (Gomi et al. 2002; Shrestha et al. 2013). Research suggests that resource management in the upstream region has both positive and negative effects on communities living in the downstream region, either providing better opportunities for or limiting these and, in addition, degrading environmental and water conditions for downstream areas¹². This in turn makes it imperative for downstream areas to have a legitimate interest in land and water resource management decisions made in the upstream areas (Gomi et al. 2002).

Benefits of water in international river-basins are largely undermined by a lack of consideration of interdependence in water resource planning. However, research also shows that in many cases an overestimation of such interdependencies has also been contributing to a lack of cooperation, especially in the HKH (Wu et al. 2013). In the Ganges basin, for example, there is a widely held belief that dams in Nepal produce large downstream benefits for India, which creates expectations of proportionate recompense. However, it was found that constructing large dams on the upstream tributaries of the Ganges may in fact have more limited effects on controlling downstream floods than was thought, and that the benefits of low-flow augmentation¹³ delivered by storage infrastructures are currently low (ibid., p.104). Similarly, it was thought initially that the level of interdependence between Bangladesh, Nepal, and India was high regarding uses of water for hydropower and other purposes. Consequently, initiatives taken by Nepal and India were not welcomed by Bangladesh because of the potential effect on the availability of water during the dry season in Farakka. However, studies showed that the trade-off between hydropower production and downstream water uses was next to negligible, since not even a significant use of water for hydropower affected irrigation in India or low-flow augmentation in Bangladesh.

¹² Due to forest and watershed degradation in the Churia hills, siltation poses a serious threat in the Terai region of Nepal. In an assessment of upstream Churia hills and downstream Terai linkages, Singh (undated) claims that heavy exploitation in the Churia hills for the extraction of timber, firewood, non-timber forest products, grazing resources, gravel, sand, and boulders was carried out by local communities and the local government to gather revenue. In doing so they were converting fertile and productive arable lands into barren river beds at a fast rate. For example, the Jalad River in Dhanusha district originating from the Churia hills causes siltation and turns 25 hectares of arable lands into barren riverbeds every year. Singh posits that these hills should instead be conserved for environmental services of the watershed to the entire Terai region rather than for provisioning tangible forest products services only to upstream communities.

¹³ Low flow augmentation is the provision of water through the development of new water storage facilities or the purchase of storage space in existing water storage facilities, or both, equal to the amount of consumptive use.



Women collect tall grass growing on the riverbed of the Ganges River near a barrage in Bettiah (India)

These outcomes advise against an overestimation of the effects of riparian interdependencies, which could create obstacles for cooperation in transboundary river-basins, for it may rationalise anxieties and fears of downstream countries regarding the effects of large upstream infrastructures (Wu et al. 2013). Further, studies also claim that a better understanding of the actual interdependence between respective countries could not only be more cost beneficial in terms of infrastructural development but also allow the riparian countries to be more open to mutual benefit-sharing, as some of the apprehensions that arise from unrealistic perceptions of dependence and ensuing tension may be moderated (Biswas 2011; Nepal et al. 2014; Rasul 2014b). While research on such analysis is on-going, we take due account of current research which recognises the existence of upstream and downstream interdependencies and need for a transboundary approach to cater to resulting water governance needs.

Benefits in water and other sectors

Many research studies have focused on calculating and analysing the benefits of adopting a transboundary water management structure. That is to say, a structure in which different national government bodies will have to collaborate in order to manage issues that cross jurisdictional boundaries and fall into different policy sectors (Huitema et al. 2009, p. 26). Existing transboundary alliances across the globe have mainly negotiated water usage for navigation, irrigation, hydro-energy, fishing, pollution and flood control, and drinking water distribution (Conti 2013; Jagerskog 2013). In the HKH, transboundary alliances are still limited to bi- or multi-lateral treaties, with limited management or endowment of water resources.

If collaboration were to be extended to more vigorous transboundary agreements, the immediate potential benefits would be identified as flood mitigation, disaster risk reduction (DRR), irrigation, and energy security, while long-term benefits would include water security and conflict resolution (Biswas 2011; Shrestha et al. 2013; Rasul 2014b). While it has been enthusiastically argued in many studies that sowing the seeds of efficient transboundary water management at the regional level can enable countries to reap the aforementioned benefits in water as well as other sectors (Biswas 2011; UNESCO 2013; Rasul 2014), some studies claim that one may be stretching the boundaries of the achievements made through the water sector slightly too far by making such claims (Jagerskog 2013).



West Bengal's Department of Tourism installed a road-side hoarding board displaying a tourism park construction plan, in Gajaldoba in downstream Teesta River; Teesta is a successive international river that crosses borders

In view of this contradictory finding, it may be better, then, to consider how policy and practice across and beyond the water sector have been affected by transboundary water alliances. To this effect, we first examine some of the most prominent existing international transboundary water treaties and analyse the nature of the postulated mandates of these alliances. Then, we assess water treaties retained within the region of South Asia, examining their status, structure, and functionalities. See Tables 1 and 2, which tabulate key features of several transboundary river-basins across the globe, including those in the HKH.

The objectives of this exercise are twofold:

- to evaluate the nature of existing transboundary alliances, their successes and failures; and
- to assess the benefits incurred through alliances in different sectors.

This exercise is thought to help to determine why such alliances are useful, and what would happen in their absence. At this point, we note that scientific evidence is lacking with respect to the exact nature of overall economic as well as specific sector benefits incurred by each riparian country. Research is also still wanting on the willingness of each HKH country to agree to a binding agreement with concerned riparian countries. For this would oblige them not only to a bi-literal or multi-lateral treaty but also to an international convention on transboundary river waters, which would potentially limit sovereign rights of a country to govern its water resources.

Table 1: Transboundary river water alliances with evaluation of successes and failures

Trans boundary river-basin	Riparian countries	Water conventions, treaties and institutions	Nature of water sharing	Water uses as per treaty	Failure or weaknesses	Successes or strengths
Danube*	Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova, Ukraine; 17 co-basin states, European Commission, UNDP, UNEP, World Bank, WWF are members and co-riparian parties	Internationalisation of Danube Basin Treaty of Versailles 1919-1939; followed by 1948 Belgrade Convention; Environmental Programme for Danube River Sofia Convention, ratified in 1992 and 1994	Limited territorial sovereignty; previously each riparian had exclusive control of its share; dissolution with 1948 Belgrade Convention	Water transport; navigation; improve water quality by reducing pollution	Upstream-downstream conflict over pollution of river; no organisation reflects European Community interest in elimination of all pollution from Europe's international waters; no equitable management of water	Monitoring powers attained through convention accords; final recommendations brought to ministerial level of member states, which quickens discussions and enactment of recommendations
Elbe**	Germany, Czech Republic, and EU	International Commission for the Protection of the River (ICPE) of 1990; ICPE preceded by International Commission of the Elbe 1919-1936 (based on the Treaty of Versailles) which previously included Czechoslovakia, Germany, Great Britain and France only	IPCE allows limited sovereignty	Clean water for drinking, irrigation, restoration of eco-systems; prior to IPCE water use limited to navigation, customs transit	Slow implementation	Recommendations reach environmental ministers of member states responsible for implementation; downstream countries very proactive in engaging in co-operation on water quality management
Nile***	Egypt, Eritrea, Sudan, South Sudan, Ethiopia, Uganda, Kenya, Tanzania, Burundi, Rwanda, Congo	The Nile Treaty of 1929 replaced by the Nile Treaty of 1959; Egypt and Sudan; no upper riparian included; both Egypt and Sudan claimed prior appropriation rights and adhered to the Doctrine of Absolute Riparian integrity against the upper riparian; the Permanent Joint Commission is responsible for implementation of the 1959 Treaty; all other riparian countries implement unilateral national water resources development plans	Equity on water use of the Nile between Egypt and Sudan; 'no harm' position toward Ethiopia	Various water projects	Downstream riparian countries almost entirely dependent upon upstream flow, and have better water infrastructure and institutions; intra and inter-country conflicts and political instabilities perpetuate inclusion as upper riparian countries are not participating; Egypt has larger influence, since treaty reflects its regional power, while Sudan is subordinate; involvement of only few riparian countries may have led to less effective alliance	Data collection; water projects; coordination of planning in participating riparian countries; Egypt allowed Ethiopia to undertake small irrigation project

* Kliot, N., Shmueli, D., and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. *Water Policy*, 3, 229-255.** Kliot, N., Shmueli, D. and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. *Water Policy*, 3, 229-255.; and Moellenkamp, S. (2007). The 'WFD-effect' on upstream-downstream relations in international river-basin-insights from the Rhine and Elbe basins. *Hydrology and Earth System Sciences Discussions Journal*, 4, 1407-1428.*** Seid, A. H., Fekade, W. and Olet, E. (2013). The Nile Basin Initiative: Advancing Transboundary Cooperation and Supporting Riparian Communities in Free Flow: Reaching Water Security through Cooperation. UNESCO; and Nile Basin Initiative. (2016). Nile Basin Initiative. [online] Available at: <http://www.nilebasin.org/index.php/about-us/mile-basin-initiative> [Accessed: 8 November 2015].

Table 1: Transboundary river water alliances with evaluation of successes and failures

Trans boundary river-basin	Riparian countries	Water conventions, treaties and institutions	Nature of water sharing	Water uses as per treaty	Failure or weaknesses	Successes or strengths
Nile		<p>Nile Basin Initiative (NBI) of 1999 and 2012 established as platform for dialogue among all riparian states; priority to building transboundary institutions and raising awareness and cooperative development; through NBI riparian countries shared data, owned jointly-developed decision support system, and worked together in planning water resource development projects with transboundary significance</p> <p>The NBI formed the Framework Agreement (CFA) which outlines principles, rights, and obligations for cooperative management and development of the Nile Basin water resources; the Treaty intends to establish a framework to promote integrated management, sustainable development, and harmonious utilisation of the water resources of the Basin as well as their conservation and protection; the Treaty envisages the establishment of a permanent institutional mechanism, the Nile River-basin Commission (NRBC), which would serve to promote and facilitate the implementation of the CFA, and to facilitate cooperation among the Nile Basin States</p>	Treaty accepts customary principles of inter-national water law, the principle of equitable and reasonable utilisation, the obligation not to cause harm, and the principle of protection and conservation of the river's ecosystem	Hydro-power generation; transboundary fisheries; watershed management and irrigation projects; drainage study project	Not established yet; Egypt and Sudan have strong reservations and have not yet ratified or signed the CFA	CFA intends to establish principles, rights and obligations to ensure long-term and sustainable management and development of shared Nile waters; Nile Basin States would assume obligation to cooperate on conservation, management, and development of Basin and its waters; Treaty would act as legal basis with NBRC and ensure national development projects are coordinated with basin-wide development; Treaty could play key role in catalysing economic growth, reducing poverty, facilitating regional integration, promoting regional peace and stability, and facilitating access to international finance and relations to development partners from the public and private sector
Senegal#	Mauritania, Mali, Senegal (Guinea withdrew); involvement of donor countries, Arab banks, EEC, USAID, OPEC, UNDP, and World Bank	The Senegal River-basin Authority 1972; the Doctrine of community international water, the doctrine of limited sovereignty	Equity; prevention of harm; free navigation; multi-purpose and basin-wide comprehensive development and planning	Navigation, irrigation, hydro-power; other water related projects	Disputes resolved by the uppermost authority Conference of heads of state 1988-Senegal-Mauritania and not by the concerned Authority, which may indicate failure of the institution to resolve conflict	Useful in navigation, promotion of irrigation and hydropower production, and construction and operation of projects
Niger##	Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Guinea, Mali, Niger, Nigeria, and Chad are members in the Niger Basin Authority; external involvement of African Commission for Technical Cooperation, World Bank, UNDP, CIDA, USAID, FAO provided technical and financial support	The Niger River Commission 1964-1979 followed by the Niger Basin Authority 1980	Early notification of projects and plans; prevention of harm to water resources	Navigation and prevention of harm	Too many riparian countries with opposing interests; institutional failure in mobilisation of foreign aid	Cooperation for study and execution of projects and coordination of plans

Brachet, C. and Valensuela, D. (2013). Participation in the management of the Niger, Senegal and Congo river-basins in Free Flow: Reaching Water Security through Cooperation. UNESCO.

Table 1: Transboundary river water alliances with evaluation of successes and failures

Trans boundary river-basin	Riparian countries	Water conventions, treaties and institutions	Nature of water sharing	Water uses as per treaty	Failure or weaknesses	Successes or strengths
Mekong ^{###}	Thailand, Laos, Viet Nam, Cambodia, China and Myanmar; China and Myanmar have observer status since 1995, were excluded till then	The Mekong Committee (MC) established in 1957 with help from the United Nations and based with the TVA in the United States; focused on infrastructure development through Indicative Basin Plan mainly for hydro-electricity; in 1995 Mekong River Commission (MRC) was developed, whereby joint planning and management for hydropower, flood control, fishing, irrigation, navigation, and water supply were highlighted	Sustainable basin-wide management; equity	Hydropower, flood control, fishing, irrigation, and water supply	Dams building threat to lower riparian countries; growing conflict between upper and lower riparian; legal and political differences and complexities in implementation; involvement of only few riparian countries may have led to less effective alliance	Data collection; coordination; training programmes; planning studies; management of water for developmental uses; ministerial level reach in the Commission for political influence
Jordan [§]	Jordan and Israel; Lebanon, Syria, and Palestine were not included	Treaty of Peace 1994; coordination body; forum for data exchange, research and technical advice; conflict resolution; Israel upheld absolute territorial sovereignty over Jordan until 1967	No harm approach; equitable apportionment of the water resources of the Jordan, Yarmouk; early notification of water projects	NA	No particular stipulations for water resources in the Treaty; conflict on water resources and local water wars were frequent in 1950s and 1960s as part of Israel-Arab conflict	NA
Colorado and Rio Grande ^{§§}	United States and Mexico	International Boundary and Water Commission (IBWC/CILA) established series of treaties; USA held the Harmon Doctrine (with absolute sovereignty) to the Doctrine of Limited Sovereignty	1906 convention explicitly mentioned equitable division; 1944 treaty stressed equitable distribution of water	Water allocation; water quality; salinity; sewage; ground-water management; pollution control	Conflicts on water allocation to USA and Mexico led to the conclusion of 1906 and 1944 treaties	Unique, because it deals with both border and water issues, encompassing two rivers in the same institution; forum for conflict resolution
Ganges [§]	Bangladesh and India	Ganges Water Sharing Treaty between two countries to share Ganges water at Farakka in 1996; India adopted 'Harmony Doctrine', while Bangladesh adopted legal attitude, advocating mediation and negotiation; limited only to Farakka, no basin-wide agreement exists	The joint committee agreed that water extraction at Farakka will be according to Treaty, which is during dry season; Treaty explicitly mentions equity, fairness, and no harm to either party; the committee is also a forum for conflict resolution	Shared water distribution during dry season	Disputes have continued for more than 36 years and concern lack of water for Bangladesh, as India uses most of it; Farakka dam was constructed without Pakistan's consent, and India as regional superpower shapes much of conflict as also reluctant to cooperate, leading to difficulties in implementing treaty; involvement of only few riparian countries may have led to less effective alliance	Treaty was carried out and found useful during dry seasons of 1998 and 1999

^{##} Brachet, C. and Valensuela, D. (2013). Participation in the management of the Niger, Senegal and Congo river-basins in in Free Flow: Reaching Water Security through Cooperation. UNESCO.

^{###} Guttman, H. (2003). The Mekong River-basin: Practical Experiences in Transboundary Water Management in Free Flow: Reaching Water Security through Cooperation. UNESCO.

[§] Kliot, N., Shmueli, D. and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. Water Policy, 3, 229-255.

^{§§} Ibid.

[§] Biswas, A. K. (2011). Cooperation or Conflict in Transboundary Water Management: Case Study of South Asia. Hydrological Science Journal, 56(4), 662-670.

Transboundary alliances were typically formed out of the necessity to resolve conflicts arising out of water scarcity, rapid population growth, mal-distribution and over-utilisation of water resources. It is found that institutions involved in safeguarding the protraction and sustenance of these alliances gradually moved from norms of customary law to mandatory international laws governing transboundary waters. Subsequently, the latter required riparian countries to limit the sovereignty of their state over water resources when entering a transboundary alliance, since it would mean joint management of and sharing of control over water sources. It is found that these norms evolved from a lengthy process in which disputes on the utilisation of shared water resources were frequently observed and sometimes resolved (in the case of the Danube and Elbe River-basins, see Table 1).

Transboundary water institutions have long proven to be effective forums for conflict resolution¹⁴, with spill-over effects in the political arena. For it may be argued that in many parts around the world water scarcity coupled with haphazard population growth, mal-distribution, and over-utilisation of water resources may have pushed certain areas around the world into 'arenas of conflict' (Kliot 2001, p. 252). Still, it is postulated that water wars may never be waged over disputes on transboundary water sharing alone, for countries may choose instead to move to conflict resolution through better management and utilisation of shared waters (as exemplified in the Nile Basin, see Table 1).



Road linking India and Nepal over the Gandak Barrage on the Nepal-India border

Some transboundary alliances, such as those for the Indus, Jordan, and Ganges, have also evolved after long periods of mostly unresolved and evolving conflicts with one or more riparian country or countries (Tiwary 2000). For this reason, these alliances include only a few riparian member states, since forming alliances meant excluding some contending parties. However, the hydrological nature of a river-basin is such that any activity in one part of a river-basin results in outcomes, positive or negative, in other parts of the basin. Kliot (2001) found that treating the river-basin as one unit prevented harm from being caused to some riparian countries and helped distribute benefits

¹⁴ Attention should be drawn here to the fact that conflict is not an insulated concept or occurrence but rather a term for situations that are produced by and inextricably linked to environments that enable them to perpetuate. Such environments may be characterised by over-population and over-use of resources, or in some cases, lack of use of resources, producing conditions that lead to conflict over allocation, use, and preservation of water resources.

more equally among them. Indeed, it was found that excluding riparian countries falling within one river-basin unit resulted in transboundary alliances with limited scope and future, leading to potential conflict when non-member riparian countries would demand their share. This is exemplified by the Nile, Mekong, Indus, and Ganges situations (see Tables 1 and 2).

The inclusion and participation of all riparian countries becomes dire in order to ensure that all riparian countries have the opportunity to tap into whatever benefit the river-basin may provide as a whole. Transboundary water alliances may not just be a necessity for some countries linked inextricably by their riparian interdependencies. They could also become an opportunity to manage water resources, especially to enjoy benefits incurred by such an alliance in non-water sectors. Water has increasingly been linked to energy, agriculture, and food security (Rasul 2014a) in the HKH. Indeed, hydropower and irrigation are the two most significant uses of water that have long been regulated through international treaties, and this trend of water use seems to be echoed in riparian HKH countries (see Table 2).

The most positive examples of use of transboundary water agreement in the HKH may be the alliance shared by Bhutan and India, claimed to be mutually beneficial to both countries. Water-based development projects such as the Chukka and the Kuri Chu (see Table 2) are said to have led not only to regional peace and stability but also to national economic gain. As a smaller riparian member nation, Bhutan's per capita Gross Domestic Product (GDP) increased from the lowest in South Asia to the highest in the Ganga-Brahmaputra-Meghna (GBM) region (Biswas 2011). Similarly, studies have claimed that the economic, environmental, social, and political benefits incurred through multi-purpose river projects could be enormously beneficial and realistically achievable, if at varying degrees. By drawing from transboundary examples around the world, it is found that such projects have helped store monsoon water, mitigate droughts and other water-related disasters, augment dry-season river flows, expand irrigation and navigation facilities, and generate hydropower that riparian HKH countries could also use (Biggs 2013; Shrestha et al. 2013; Rasul 2014a; Rasul 2014b).

Further, some existing transboundary alliances have instigated water-related development projects, generating hydropower, irrigating agricultural lands, mitigating natural disasters, and improving navigation, benefiting the entire river-basin (as exemplified in the Senegal Basin, see Table 1). If tangible benefits from improved water resource management for social and economic development can be demonstrated at local, national and river-basin level, it is predicted that coordinated development and reform of policies, laws and institutions needed to build the capacity of co-management between stakeholders can indeed be advanced at the transboundary level (Marton-Lefevre 2013). Therefore, provided that the involvement of each riparian in a transboundary alliance is not overshadowed or hampered by another, it may be safe to conclude that such alliances could have more on offer than at stake.

Table 2: **Transboundary rivers in the HKH with assessment of water treaties**

Transboundary river	Riparian HKH countries	History of water treaties, agreements and institutions	Nature of water sharing and use (as per treaty)	Weaknesses and strengths
Mahakali*	Nepal and India	Treaty of Mahakali of 1996 to remain valid for 75 years from date signed and to be revised every 10 years; integrated development of the Mahakali River, specifically Sarada Barrage, Tanakpur Barrage and Pancheshwar Multipurpose Project (hereafter the 'Project'); Mahakali River Commission (hereafter the 'Commission') formed to ensure equality, mutual benefit, and no-harm policy; the Commission is to seek information on and inspect all structures included in the Treaty, to make recommendations to take steps necessary to implement the provisions of the Treaty, to provide expert evaluation of projects and recommendations, to coordinate and monitor plans of actions for implementation, and to examine differences in interpretation and application of the Treaty	Guided by principles of equality, mutual benefit and no harm to either party; equal number of representatives from both parties; equal partnership to define obligations and corresponding rights and duties regarding water use; water distribution of the Mahakali River in dry and wet season to both India and Nepal; water for hydroelectricity; both parties have equal rights to draw their share of waters from the Tanakpur Barrage, priority given to Nepalese requirement; the Project to incur maximum net benefit in hydropower, irrigation, flood control; equal amount of hydro-energy to be derived from power stations of equal capacity on either side of the border; cost of the Project borne by either party; a portion of Nepal's share of energy sold to India at a mutually agreed cost	Arbitration tribunal dedicated to resolve differences arising under the Treaty; equal representation of national arbitrators with a third neutral arbitrator presiding over the tribunal (as written in Treaty agreement); provision for planning, survey, development, and operation of any work on the tributaries of the Mahakali River to be carried out independently by either party in its own territory
Koshi**	Nepal and India	The 1954 Agreement on the Koshi Project (revised in 1996); construction of barrage, head works three miles upstream of Hanuman Nagar town in the Koshi River with afflux, flood banks, canals and protective works on land lying within the territories of Nepal; agreement to maintain friendship and good relation subsisting between Nepal and India; jointly formed Indo-Nepal Koshi Project Commission acting as the coordination committee for Koshi Project; equal number of representatives from both countries	Flood control; irrigation; generation of hydro-electricity and prevention of erosion in Nepal areas on the right side of the river, upstream of the barrage; surveys and investigations necessary for proper design, construction and maintenance of the barrage and connected works; navigation and fishing rights reserved by Nepal	Disputes or differences resolved through arbitration whereby arbitrators are nominated from each side within 90 days of delivery of notice of dispute arising from either party and the arbitrators' decision is binding; in case arbitrators disagree, an umpire is appointed by both parties whose decision is final and binding
Gandaki***	Nepal and India	Gandak River Treaty of 1959 followed by the Agreement of Gandak Irrigation and Power Project 1975; construction of a barrage, canal head regulators, and other works 1000 feet below Tribeni canal head regulator; Agreement decides on matters of investigation and surveys, authority for the execution of works and their maintenance, land acquisition, quarrying, communication, ownership, operation and maintenance of work (India bears project ownership and cost); irrigation provision and power development reservation for Nepal; protection of Nepal's riparian rights (to withdraw water from Gandak and its tributaries) for irrigation; sovereignty and territorial jurisdiction for Nepal made available to India for investigation, execution, and maintenance of the project	Irrigation and hydro-power development in both countries; investigation and surveys; communication	No assessments yet

* Stiftung, F. E. (2001). Treaty of Mahakali. [online] Available at: http://www.nepaldemocracy.org/documents/treaties_agreements/indo-nepal_treaty_mahakali.htm [Accessed 27/06/2015].

** Ministry of Water and Power. (1975). Agreement between His Majesty's Government of Nepal and the Government of India on the Gandak Irrigation and Power Project. Kathmandu: Ministry of Water and Power, Government of Nepal.

*** Ibid.

Table 2: **Transboundary rivers in the HKH with assessment of water treaties**

Transboundary river	Riparian HKH countries	History of water treaties, agreements and institutions	Nature of water sharing and use (as per treaty)	Weaknesses and strengths
Teesta and other water resources [§]	Bangladesh and India	The Joint Rivers Commission (JRC) of 1972 established by the Government of Bangladesh, Ministry of Water Resource to address issues related to sharing and management of transboundary waters; other objectives were to carry out a comprehensive survey of the river systems shared by the two countries; to formulate projects concerning flood control in both countries, flood warnings, flood forecasting, study on flood control, and irrigation projects on the major river systems, and to examine the feasibility of linking Bangladesh's power grids with adjoining areas in India	JRC addresses issues related to sharing water of common rivers; transmission of flood related data from India to Bangladesh; construction and repair of embankment and bank protection work along common/ border rivers	No assessments yet
Ganga-Brahmaputra-Meghna [#]	Bhutan and India	Indo-Bangladesh Treaty of Friendship, Cooperation and Peace; 25-year treaty signed in 1972; also known as Indira-Mujib Treaty; one of the provisions explicitly mentions that the contracting parties agree to make joint studies and take joint action in the field of flood control, river-basin development, and development of hydro-electric power and irrigation	No assessments yet	The Indo-Bangladesh Treaty of 1972 was not renewed in 1997 as both riparian countries declined renegotiation; India's role was seen as excessively imposing and Bangladesh's share was deemed unequal; disputes over water resources at Farakka Barrage, and India's perceived delayed withdrawal of troops added to contention; other political externalities
		Chukka Project of circa 1980; based solely on generating hydropower from the Wanchu Cascade at Chukka; India constructed a 336 MW run-of-the-river project on 60% grant and 40% loan basis; India supported planning, construction, and management of the project; Bhutan agreed to sell excess electricity to India at mutually agreed rate	No assessments yet	Project deemed highly successful; covered its cost by 1993 and increased capacity to 370 MW; provided impetus for Bhutan's industrialisation and commercial development; Bhutan moved from country with the lowest per capita income in South Asia during the 1960s to the highest in the Ganga-Brahmaputra-Meghna region (includes India, Pakistan, Bangladesh, Bhutan and Nepal), with a foreseeable stipulated earning of more than US \$100 million per annum with similar hydropower projects Kuri Chu, Chukka II, and Chukka III by 2015
Brahmaputra River/ Yalu Zangbu ^{##}	China and India	MOU on Hydrological Data Sharing on the Brahmaputra River/ Yalu Zangbu, signed in 2001, renewed in 2008 and 2013; to provide hydrological information on water level, discharge, and rainfall every year from June to October; new MOU on Strengthening Cooperation signed in 2013, agreeing to share information earlier in the year in May and to exchange views on other areas of mutual interest (not specified)	Data and information sharing on water level, discharge, and rainfall every year	No assessments yet

[§] Klotz, N., Shmueli, D. and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. *Water Policy*, 3, 229-255.

[#] Biswas, A. K. (2011). Cooperation or Conflict in Transboundary Water Management: Case Study of South Asia. *Hydrological Science Journal*, 56(4), 662-670.

^{##} Cumming, G. S. (2011). The Resilience of Big River-basins. *Water International*, 36(1), 33-95.

Table 2: Transboundary rivers in the HKH with assessment of water treaties

Transboundary river	Riparian HKH countries	History of water treaties, agreements and institutions	Nature of water sharing and use (as per treaty)	Weaknesses and strengths
Sutlej/Langquin Zangbu [§]	China and India	No treaty as such; China agreed to provide hydrological information during flood season; Implementation Plan was signed in 2011 whereby China was required to provide hydrological information, data transmission method, and cost settlement	Information for flood control; data sharing and transmission	No assessments yet
Indo-China River-basins [‡]	China and India	Expert-level mechanism formed in 2006 whereby expert group, made up of representatives from both sides discuss interaction and cooperation on provision of flood season hydrological data, emergency management, and other issues on an annual basis; first meeting held in 2007	Data sharing for flood control; emergency management, and other issues	No assessments yet
Indus [*]	India and Pakistan; Afghanistan and China are upper riparian but not members	Indus Treaty of 1960, calling for cooperation in development of the river but no joint planning has since taken place; exchange of data and early notification of plans are within the law; coordinating supervisory body with the main function to ensure that parties develop their water shares as stipulated; treaty also stipulates broader cooperation and technical services which are unrealised	Pakistan claimed historical rights and 'equitable apportionment' and India claimed prior use and preservation of status quo	Disputes on how water will be utilised and allocated later resolved through the World Bank's involvement as a mediator and arbitrator financier of the partition projects meant that the final treaty was planned and formulated by the Bank; involvement of only few riparian countries may have led to less effective alliance; only treaty of its kind to arise post-partition in the Indian sub-continent; the partition of the Indus happened after attempts at basin-wide development and planning failed; the treaty is still considered as a sub-optimal solution to the management of the Indus

[§] Ibid.

[‡] Ibid

^{*} Klotz, N., Shmueli, D., and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. Water Policy, 3, 229-255.

Scenarios Beyond Conflict and Cooperation for HKH

To restrict the actualities of transboundary water governance within the realms of conflict and cooperation is to incapacitate it. Transboundary relations are determined, above all, by political processes which operate in equivocal ways, and to argue the opposite would require delving into the abyss of the imaginary. Thinking about transboundary water relations in terms of either undesirable conflict or desirable cooperation simply overlooks the fact that transboundary waters involve countries with a differing approach towards transboundary collaboration, driven by considerations that no doubt include but also go beyond the water sector. Instead of directly addressing water sharing issues, development-oriented sectorial cooperation in areas such as hydropower generation is found to eventually widen the canvas of collaboration in the HKH.

Transboundary waters are also found to produce differing intensities of conflict and cooperation in transboundary relations between riparian countries, marked by different periods of interaction and non-interaction (Mirumachi and Allan 2007; Zeitoun and Mirumachi 2008; Zeitoun et al. 2011). Such a politically-framed perspective will allow for a broad way of thinking about transboundary water relations by systematically including power relations between riparian countries. This will help us to consider the political conditions along with the usual economic considerations enabling a successful transboundary alliance. Thus, it may be better to start with an understanding that countries may not only have different attitudes to and needs for water management regimes, but also be positioned to benefit differently from transboundary alliances. When realised, these needs may push alliances towards higher degrees of success.

Global experience dictates that transboundary water bodies are different from each other in terms of size, water availability, and use requirements (Biswas 2008a; UNESCO 2013). They are also different in terms of physical and environmental conditions (and changes within these conditions), institutional capacities, management structure requisites and capacities, historical relationships, power structures, economic conditions, and social aspirations of the people and the co-basin countries involved. This shows how transboundary water dynamics may necessitate adaptive resource management¹⁵ for more robust governance (Mirumachi and Allan 2007). It also shows how each transboundary alliance could be unique and rather difficult to replicate (Wolf 1999; Zeitoun and Mirumachi 2008; Zeitoun et al. 2011). Nowhere is this recognition more pertinent than in the HKH.

It is also necessary to point out the fact that transboundary water advocacy on a global scale has long moved beyond finding a rationale behind such water governance systems into implementation, as many transboundary alliances are already in place and effective. However, in the HKH, there are long-standing but defunct bilateral treaties regarding the use of water for hydropower and irrigation. The limited understanding of the transboundary rationale in this region needs to be expanded not only to take into account immediate sector benefits but also long term inter-sectorial and developmental benefits. Moreover, it requires the realisation that incurring potential benefits may not be sufficient enough criteria for collaboration, as the current disjointed situation reveals.

¹⁵ Adaptive governance assumes that governance structures cannot accommodate uncertainties that may arise at different levels of government. It is 'an approach that treats on-the-ground actions and policies as hypotheses from which learning derives, which, in turn, provides the basis for changes in subsequent actions and policies' (Stankey et al. 2005, p.1). At a time of increasing climate uncertainty, natural resource management may benefit from confronting uncertainties by adopting adaptive resource management as a governance response (Nichols et al. 2011). Adaptive resource management incorporates polycentric governance setups, public participation, an experimental approach to resource management, and management at a bio-regional scale. These are governance aspects thought to best address rapid changes. Moreover, problems such as transboundary pollution, tropical deforestation, and climate uncertainties are large-scale effects, which may necessitate a mix of institutions and designs facilitating experimentation, learning, and change (Dietz et al. 2003; Huitema et al. 2009; De Stefano et al. 2012).



Teesta III dam wall construction at Chunthang, Sikkim (India)

Thinking along this line, learning from good and bad practices in international transboundary alliances by conducting an extended research not only to determine factors aiding or hindering collaboration but also to see what may work for each riparian country involved in the HKH may be the way forward. Current research can only help us to understand the broad notions of potential benefits, both economic and political. It may, therefore, be easy to get swayed by unhinged optimism without knowing how each country in the region could be positioned to benefit from transboundary alliances differently (Biswas 2011). For no matter how high the promise of benefit, if the issues of equitable distribution, political asymmetry, and sharing of benefits are not resolved, transboundary water governance in this region may well be limited to the boundaries of existing research.

We recognise there are many areas of transboundary governance that have not been addressed in this paper. Keeping to the view that each transboundary position and experience of riparian countries is unique, we strive to steer clear of comparisons of international river-basins with those in the HKH with similar problems of water governance, at the cost of potentially weakening the transboundary rationale in the region. This is done in recognition of a most critical fact that, although transboundary water management is considered desirable at many levels, water is still seen as a sovereign wealth rather than a shared common in the HKH, where nation states have preferred guarding their sovereign riparian rights to incurring increased mutual benefits. The reasons for this may be too overwhelming to contextualise and historicise within the precincts of this paper; they would necessitate a historically-situated research on its own.

Further research could engage in scenario building and explore two options: either continue with and strengthen existing bi-lateral treaties or engage in a multi-lateral or transboundary alliance involving all concerned river-basin countries. If the second, research could inspect a hypothetical situation in which each HKH country decides to sign and ratify the UN Water Convention, studying the many rights and responsibilities of HKH countries under the international law and principles of the Convention. However, should the possibility of revising and bolstering of existing bi-lateral treaties be reserved, another research gap could be filled by determining the cost of 'inaction' for all riparian HKH countries in the event of business-as-usual scenario where countries continue to protect their sovereign rights over water resources. These currently vacant areas of research would help, first,

to conceive of countries' positions within a more vigorous transboundary alliance. It would also help to answer another fundamental question of what may be the different enabling conditions and institutional mechanisms to facilitate regional cooperation over shared river waters. Additionally, the role, capacity and limitations of regional institutions like the South-Asian Association for Regional Cooperation (SAARC) and ICIMOD in improving access to knowledge, technology, critical information and financial resources could be researched to find out whether such existing institutional platforms could indeed provide appropriate forums to develop a shared understanding of water governance in the region.

Bibliography

- ADB (Asian Development Bank) (2000). *Water for all: the water policy of the Asian Development Bank*. ADB, Manila.
- Allan, J. D. (2004). Landscapes and riverscapes: The influences of land use on stream ecosystems. *Annual Review of Ecology*, 35, 257–284.
- Akanda, A. S. (2013). South Asia's water conundrum: hydroclimatic and geopolitical asymmetry, and brewing conflicts in the Eastern Himalayas. *International Journal of River Basin Management*, 10(4), 307–315.
- Bakker, M. H. N. (2009). Transboundary River Floods and Institutional Capacity. *Journal of the American Water Resources Association*, 45(3), 553–566.
- Balint, P. J., Stewart, R. E., Desai, A., and Walters, L. C. (2011). *Wicket Environmental Problems: Managing Uncertainty and Conflict*. Washington DC: Island Press.
- Biggs, E. M., Duncan, J. M. A., Atkinson, P. M., and Dash, J. (2013). Plenty of Water, Not Enough Strategy: How Inadequate Accessibility, Poor Governance and a Volatile Governance can Tip the Balance against Ensuring Water Security: The Case of Nepal. *Geography and Environment*, 33, 388–394.
- Biermann, F., Betsill, M. M., Gupta, J., Kanie, N., Lebel, L., Liverman, D., Schroeder, H., Siebenhüner, and Zondervan, R. (2010). Earth System Governance: A Research Framework. *International Environment Agreements*, 10, 277–298.
- Biswas, A. K. (2004). Integrated water resources management: a reassessment. *Water International*, 29:398–405.
- Biswas, A. K. (2008a). Management of Transboundary Waters: An Overview in *Management of Transboundary Rivers and Lakes*. Varis, O., Tortajada, C., and Biswas, A.K. (eds). Heidelberg: Springer Berlin Heidelberg.
- Biswas, A. K. (2008b) Integrated Water Resources Management: Is It Working? *International Journal of Water Resources Development*, 24(1), 5–22.
- Biswas, A. K. (2011). Cooperation or Conflict in Transboundary Water Management: Case Study of South Asia. *Hydrological Science Journal*, 56(4), 662–670.
- Bonvoisin, N. (2013). *Transboundary Water Cooperation in Free Flow: Reaching Water Security through Cooperation*. UNESCO. Paris: UNESCO Publishing.
- Blaikie, P. M. and Muldavin, J. S. S. (2004). Upstream, Downstream, China, India: The Politics of Environment in the Himalayan Region. *Annals of the Association of American Geographers*, 94(3), 520–548.
- Blatter, J. (2003). Beyond Hierarchies and Networks: Institutional Logics and Change in Transboundary Spaces. *Governance*, 16(4), 503–526.
- Brachet, C. and Valensuela, D. (2013). Participation in the management of the Niger, Senegal and Congo river basins in in *Free Flow: Reaching Water Security through Cooperation*. UNESCO.
- Braga, B., Varella P., and Goncalves, H. (2011). Transboundary Water Management of the Amazon Basin. *International Journal of Water Resources Development*, 27(3), 477–496.
- Buck, S. J. (1998). *The Global Commons: An Introduction*. Washington DC: Island Press.
- Burchell, G., Gordon, C., and Miller, P. (1991). *The Foucault Effect: Studies in Governmentality*. Chicago: The University of Chicago Press.
- Crow, B. and Singh, N. (2009). The Management of International Rivers as Demands Grow and Supplies Tighten: India, China, Nepal, Pakistan, Bangladesh. *India Review*, 8(3), 306–339.
- Conti, K. I. (2013). Cooperation over Transboundary Aquifers: Lessons Learned from 10 Years of Experience in *Free Flow: Reaching Water Security through Cooperation*. UNESCO. Paris: UNESCO Publishing.

- Cumming, G. S. (2011). The Resilience of Big River Basins. *Water International*, 36(1), 33–95.
- De Stefano, L., Duncan, J., Dinar, S., Stahl, S., Strzepek, K. M., and Wolf, A. T. (2012). Climate change and the institutional resilience of international river basins. *Journal of Peace Research*, 49(1), 193–209.
- Dombrowsky, I., Hagemann, N., and Houdret, A. (2014). The River Basin as a New Scale for Water Governance in Transition Countries? A Comparative Study of Mongolia and Ukraine. *Environmental Earth Sciences*, 72, 4705–4726.
- Dore, J. and Lebel, L. (2013). Transboundary Water Diplomacy in the Mekong Region in *Free Flow: Reaching Water Security through Cooperation*. UNESCO. Paris: UNESCO Publishing.
- Earle, A. and Bazilli, S. (2013). A Gendered Critique of Transboundary Water Management. *Feminist Review*, 103, 99–119.
- EPA. (2012). Ground Water. [online] <http://water.epa.gov/type/groundwater/> [Accessed on 08/08/2015]
- Falkenmark, M. (1990). Global Water Issues Confronting Humanity. *Journal of Peace Research*, 27(2), 177–190.
- FAO. (undated). Concepts and Definitions. [online] <http://www.fao.org/docrep/005/y4473e/y4473e06.htm> [Accessed on: 25/08/2015].
- Fish, H. (1970). River Basin Management Practice in Great Britain. *Journal Water Pollution Control Federation*, 42(5), 758–771.
- Genderen, R. V. and Rood, J. (2011). Water Diplomacy: a Niche for the Netherlands? Netherlands Ministry of Foreign Affairs and the Water Governance Centre.
- Gerlak, A. K., Lautze, J., and Giordano, M. (2011). Water Resources Data and Information exchange in Transboundary Water Treaties. *International Environmental Agreements*, 11, 179–199.
- Gleick, P. H. (2005). Freshwater and Foreign Policy: New Challenges. *Foreign Policy Association*, 95–104.
- Gomi, T., Sidle, R. C., and Richardson, J. S. (2002). Understanding Processes and Downstream Linkages of Headwater Systems. *BioScience*, 52(10), 905–916.
- Grover, V. I. (2006). *Water: Global common and Global Problems*. New Hampshire: Science Publishers.
- GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2001). *Water – A Key to Sustainable Development*. GTZ, Bonn.
- Guha, R. (2000). *Environmentalism*. New Delhi: Oxford University Press.
- Gupta, J. (2011). An essay on global water governance and research challenges. Paper presented at workshop held in Delft, Netherlands, entitled *Principles of Good Governance at Different Water Governance Levels*. Van Der Valk, M. R. and Keenan, P. (eds.)
- Gupta, J., and Pahl–Wostl, C. (2013). Editorial on global water governance. *Ecology and Society*, 18(4), 54.
- Gupta, J., Akhmouch A., Cosgrove, W., Hurwitz, Z., Maestu, J., and Unver, O. (2013). Policymakers’ Reflection on Water Governance Issues. *Ecology and Society*, 18(1), 35
- Guttman, H. (2003). The Mekong River Basin: Practical Experiences in Transboundary Water Management in *Free Flow: Reaching Water Security through Cooperation*. UNESCO.
- GWP. (2012). History [online] <http://www.gwp.org/en/About-GWP/History/> [Accessed on: 3/9/2015]
- Ho, S. A River Flows through it: A Chinese Perspective in Bajpai, K., Huang, J., and Mahbubani, K. (Eds.), *China–India Relations: Cooperation and Conflict*. Oxon: Routledge.
- Hoogesteger, J. (2012). Democratizing Water Governance from the Grassroots: The Development of Interjuntas-Chimborazo in the Ecuadorian Andes. *Human Organization*, 71(1), 76–86.
- Huitema, D., Mostert, E., Egas, W., Moellenkamp, S., Pahl-Wostl, C., and Yalcin, R. (2009). Adaptive Water Governance: Assessing the Institutional Prescriptions of Adaptative (Co) Management from a Governance Perspective and Defining a Research Agenda. *Ecology and Society*, 14,1.
- ICIMOD. (2015). River Basins. [online] http://www.icimod.org/?q=rps_riverbasins [Accessed on: 05/08/2015].

- Jagerskog, A. (2013). Transboundary Water Management– Why it is important and why it needs to be developed in *Free Flow: Reaching Water Security through Cooperation*. UNESCO. Paris: UNESCO Publishing.
- Joy, K. J. and Paranjape, S. (2014). Water Conflicts, Contending Water Issues and Agenda for a New Policy, Legal and Institutional Framework in Prakash, A., Goodrich, C. G., and Singh, S. (Eds.), *Informing Water Policies in South Asia*. New Delhi: Routledge.
- Kark, S., Tulloch, A., Gordon, A., Mazor, T., Bunnefeld, N., and Levin, N. (2015). Cross–boundary Collaboration: Key to the Conservation Puzzle. *Current Opinion in Environmental Sustainability*, 12, 12–24.
- Khublaryan, M. G. (undated). Surface Waters Rivers, Streams, Lakes and Wetlands in UNESCO– Encyclopaedia of Life Support Systems. *Types and Properties of Water*, 1 [online] <http://www.eolss.net/sample-chapters/c07/e2-03-01-03.pdf> [Accessed on: 28/08/2015]
- Kliot, N., Shmueli, D., and Shamir, U. (2001). Institutions for management of transboundary water resources: their nature, characteristics and shortcomings. *Water Policy*, 3, 229–255.
- Lamont, M. and Fournier, M. (Eds.). (1992). *Cultural Differences: Symbolic Boundaries and the Making of Inequality*. Chicago: The University of Chicago Press.
- Lamont, M. and Molnar, V. (2002). The Study of Boundaries in the Social Sciences. *Annual Review of Sociology*, 28, 167–195.
- Lautze, J. and Giordano, M. (2006). Equity in Transboundary Water Law: Valuable Paradigm or Merely Semantics?. *Colorado Journal of International Environmental Law and Policy*, 17(1), 89–122.
- Lautze, J., De Silva, S., Giordano, M., and Sanford, L. (2011). Putting the cart before the horse: Water governance and IWRM. *National Resources Forum*, 35, 1–8.
- Lee, K. N. (1994). *Compass and Gyroscope: Integrating Science and Politics for the Environment*. Washington DC: Island Press.
- Lee, K. N. (1999). Appraising Adaptive Management. *Conservation Ecology*, 3, 2.
- Marton–Lefèvre, J., MacQuarrie, P., Iza, A., and Smith, M. (2013). Greater Cooperation through Water Diplomacy and Transboundary Water Management in *Free Flow: Reaching Water Security through Cooperation*. UNESCO.
- Mirumachi, N. and Allan, J.A. (2007) Revisiting Transboundary Water Governance: Power, Conflict, Cooperation and the Political Economy. Paper presented at International Conference on Adaptive and Integrated Water Management, Basel, Switzerland.
- Mirumachi, N. (2013). Securitising shared waters: an analysis of the hydropolitical context of the Tanakpur Barrage Project between Nepal and India. *The Geographical Journal*, 179(4), 309–319.
- Mithen, S. (2010). The Domestication of Water: Water Management in the Ancient World and its Prehistoric Origins in the Jordan Valley. *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, 368(1931), 5249–5274.
- Moellenkamp, S. (2007). The ‘WFD–effect’ on upstream–downstream relations in international river basin– insights from the Rhine and Elbe basins. *Hydrology and Earth System Sciences Discussions Journal*, 4, 1407–1428.
- Molden, D. J., Vaidya, R. A., Shrestha, A. B. G., and Shrestha, M. S. (2014). Water Infrastructure for the Hindu Kush Himalayas. *International Journal of Water Resources Development*, 30(1), 60–77.
- Molle, F. (2007). Scales and Power in River Basin Management: The Chao Phraya River in Thailand. *The Geographical Journal*, 173(4), 358–373.
- Molle, F. (2009). River–basin planning and management: the social life of a concept. *Geoforum*, 40, 484–494.
- Molle, F., Wester, P., Hirsch, P., Jensen, J. R., Murray–Rust, H., Paranjpye, V., Pollard, S., and van der Zaag, P. (2007). River basin development and management in Molden, D. (Ed.), *Water for Food, Water for Life*. Colombo: Earthscan.

- Nepal, S., Flügel, W. A., Shrestha, A. B. (2014). Upstream–downstream Linkages of Hydrological Processes in the Himalayan Region. *Ecological Processes*, 3, 19.
- Nichols, J. D., Koneff, M. D., Heglund, P. J., Knutson, M. G., Seamans, M. E, Lyons, J. E., (...) Williams, B. K. (2011). Climate Change, Uncertainty, and Natural Resource Management. *The Journal of Wildlife Management*, 75(1), 6–18.
- Nile Basin Initiative. (2016). *Nile Basin Initiative*. [online] Available at: <http://www.nilebasin.org/index.php/about-us/nile-basin-initiative> [Accessed: 8 November 2015].
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Ostrom, E. (2005). *Understanding Institutional Diversity*. New Jersey: Princeton University Press.
- Pahl–Wostl, C., Holtz, G., Kastens, B., and Knieper, C. (2010). Analyzing complex water governance regimes: the Management and Transition Framework. *Environmental Science and Policy*, 13, 571–581.
- Pahl–Wostl, C., J. Gupta, and Petry, D. (2008). Governance and the Global Water System: A Theoretical Exploration. *Global Governance: A Review of Multilateralism and International Organizations*, 14(4), 419–435.
- Peet, R., Robbins, P., and Watts, M. (Eds.). (2011). *Global Political Ecology*. Oxon: Routledge.
- Pigram, J. J. (2000). Towards Upstream–downstream Hydrosolidarity: Australia’s Murray–Darling River Basin, *International Water Resources Association*, 25(2), 222–226
- Prescott, J. R. V. (1987). *Political Frontiers and Boundaries*. London: Routledge.
- Priscoli, J. D. (1998). Water and civilization: using history to reframe water policy debates and to build a new ecological realism. *Water Policy*, 1, 623–636.
- Raghunath, H. M. (2006). *Hydrology: Principles, Analysis, Design*. New Delhi: New Age International Private Limited Publishers.
- Rahman, M. M. (2009). Principles of Transboundary Water Resources Management and Ganges Treaties: An Analysis. *Water Resources Development*, 25(1), 59–173.
- Rasul, G. (2014a). Food, Water and Energy Security in South Asia: A Nexus Perspective from the Hindu Kush Himalayan Region. *Environmental Science and Policy*, 39, 35–48.
- Rasul, G. (2014b). Why Eastern Himalayan Countries should Cooperate in Transboundary Water Resource Management. *Water Policy*, 16, 19–38.
- Rhodes, R. A. W. (1996). The New Governance: Governance without Government. *Political Studies*, 44, 652–667.
- Rogers, P. and Hall, A. W. (2003). *Effective Water Governance*. Global Water Partnership Technical Committee Background Papers, Sweden.
- Saravanan, V. S. (2009). Decentralisation and Water Resource Management in the Indian Himalayas: The Contribution of New Institutional Theories. *Conservation and Society*, 7(3), 76–191.
- Schlager, E., and W. Blomquist. (2000). Local communities, policy prescriptions, and watershed management in Arizona, California, and Colorado. In *Constituting the commons: crafting sustainable commons in the new millenium*. Eighth Conference of the International Association for the Study of Common Property, 31 May–4 June, 2000, Bloomington, Indiana, USA.
- Seid, A. H., Fekade, W., and Olet, E. (2013). The Nile Basin Initiative: Advancing Transboundary Cooperation and Supporting Riparian Communities in *Free Flow: Reaching Water Security through Cooperation*. UNESCO.
- Shah, T. and Koppen, B. V. (2006). Is India Ripe for Integrated Water Resources Management? Fitting Water Policy to National Development Context. *Economic and Political Weekly*, 41(31), 3413–3421.
- Shiva, V. (2008). Resources in Sachs, W. (Ed.), *The Development Dictionary*. London: Zed Books.

- Shrestha, A. B., Wahid, S. M., Vaidya, R. A., Shrestha, M. S., and Molden, D. J. (2013). Regional Water Cooperation in the Hindu Kush Himalayan Region in *Free Flow: Reaching Water Security through Cooperation*. UNESCO.
- Singh, B. K. (undated). Assessment of the Upstream Churia Hills and Downstream Terai Plains Linkage: An Environmental Services Perspective. *Banko Jankari*, 20, 1.
- Solanes, M and Gonzales-Villarreal, F. (1999). The Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Integrated Water Resources Management. *TAC Background Papers*, 3.
- Swyngedouw, E. (1999). Modernity and hybridity: nature, regeneracionismo, and the production of the Spanish waterscape, 1890–1930. *Annals of the Association of American Geographers*, 89(3), 443–465.
- Tir, J. and Ackerman, J. T. (2009). Politics of Formalized River Cooperation. *Journal of Peace Research*, 46(5), 623–640.
- Tiwary, R. (2006). Conflicts over International Water. *Economic and Political Weekly*, 41(17), 1684–1692.
- Tompkins, E. M. and Adger, W. N. (2004). Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change? *Ecology and Society*, 9(2), 10.
- Tortajada, C. (2010). Water Governance: Some Critical Issues. *Water Resources Development*, 6(2), 297–307.
- UNDP. (undated). What is Water Governance? [online] <http://watergovernance.org/governance/what-is-water-governance/> [Accessed on: 26/08/2015].
- UNESCO. (2013). *Free Flow: Reaching Water Security through Cooperation*. Paris: UNESCO Publishing.
- UN-Water. (2013). Water Scarcity [online]. http://www.unwater.org/downloads/water_scarcity.pdf [Accessed: 22/09/2015].
- Upadhyay, V. (2002). Water Management and Village Groups of Law. *Economic and Political Weekly*, 37(49), 4907–4912.
- Vaidya, R. A. (2015). Governance and management of local water storage in the Hindu Kush Himalayas. *International Journal of Water Resources Development*, 31(2), 253–263.
- Varis, O., Keskinen, M. and Kummu, M. (2008). Mekong at the Crossroads. *Ambio*, 37(3), 146–149.
- Venot, J., Bharati, L., Giordano, M., and Molle, F. (2011). Beyond Water, Beyond Boundaries: Spaces of Water Management in the Krishna River Basin, South India. *The Geographical Journal*, 177(2), 160–170.
- Vogler, J. (2012). Global Commons Revisited. *Global Policy*, 3(1), 61–71.
- Warner, J. F., Wester, P., and Hoogesteger, J. (2014). Struggling with scales: revisiting the boundaries of river basin management. *Wiley Periodicals*, 1, 469–481.
- Waterbury, J. (1997). Between Unilateralism and Comprehensive Accords: Modest Steps toward Cooperation in International River Basins. *Water Resources Development*, 13(3), 279–289.
- Weiss, T. G. (2000). Governance, Good Governance and Global Governance: Conceptual and Actual Challenges. *Third World Quarterly*, 21(5), 795–814.
- Winter, T. C., Harvey, J. W., Franke, O. L., and Alley, W. M. (1998). *Ground Water and Surface Water A Single Resource: US Geological Survey Circular 1139*. Colorado: U.S. Government Printing Office.
- Wolf, A. T. (1999). Criteria for Equitable Allocations: the Heart of International Water Conflict. *Natural Resources Forum*, 23(1), 3–30.
- World Resources Institute. 2006. *Transboundary environmental governance. The ebb and flow of river basin organizations*. World Resources Institute, Washington, D.C., USA. [online] <http://earthtrends.wri.org/text/environmental-governance/feature-46.html>.
- Wu, X., Jeuland, M., Sadoff, C., and Whittington, D. (2013). Interdependence in water resource development in the Ganges: an economic analysis. *Water Policy*, 15, 89–108.

- WWF (World Wide Fund for Nature) (2001). Elements of Good Practice in Integrated River Basin Management: A Practical Resource for Implementing the EU Water Framework Directive. WWF, Brussels.
- Zeitoun, M. and Mirumachi, N. (2008). Transboundary water interaction I: reconsidering conflict and cooperation. *International Environmental Agreements*, 8, 297–316.
- Zeitoun, M., Mirumachi, N., and Warner, J. (2011). Transboundary water interaction II: the influence of 'soft' power. *International Environmental Agreements*, 11, 159–178.

© HI-AWARE 2016

Himalayan Adaptation, Water and Resilience (HI-AWARE) Research
c/o ICIMOD

GPO Box 3226, Kathmandu, Nepal

Tel +977 1 5003222

Email: hi-aware@icimod.org

Web: www.hi-aware.org