Rivers and Climate Change

Water is a basic condition for life. It also plays a fundamental role in human development. Besides daily use, it is crucial for agriculture and industry. Inequality of access to the resource as well as its mismanagement undermines welfare, affects human security and creates risk of conflict. Thus, water scarcity is not limited to environment and development concern, it has become part of the political agenda and an important national security issue. However, in spite of many attempts in the post-Cold War period, the global water crisis remains unresolved and water shortages have the potential to threaten global peace, prosperity and stability. As the World Water Council argues: “This crisis has been aggravated by factors such as accelerating population growth, increasing inequalities, national or regional conflicts and the influence of climate change on the water cycle.”¹

Approximately 900 million people already live without clean drinking water, 2.6 billion people lack adequate sanitation, and 2.2 million children die every year from unsafe water related diseases.²

Above: The Kariba Dam, one of the largest in the world, is a hydroelectric dam in the Kariba Gorge of the Zambezi River basin between Zambia and Zimbabwe.
The origins of the global water crisis are well known and are not limited to climate factors alone. However, the crisis is of such a magnitude that it is growing into an issue of common global concern. This perspective puts the focus on international rivers, as approximately half of the global fresh water is available from 263 international basins in the world: of them, 59 are in Africa and 57 in Asia. About 1 400 million people inhabit river basins that suffer from water stress, defined as less than 1 000m³/capita/year. National politics complicate policies towards enhanced river basin management of shared rivers. Moreover, the management of international rivers in different parts of the world cannot follow a particular golden principle, as the value of water, its demand and supply vary from one basin to another. The existing knowledge and institutions we have relating to the governance of international rivers are increasingly turning volatile, due to the increased demand and decreased supply of fresh water. Further adding to the problem, the threat of global climate change has started undermining the ongoing regimes and institutions relating to water sharing and the management of international rivers.

While the exact impact of climate change is not yet known, it will have clear bearing upon access to shared water resources as it affects hydrological cycles from global to local levels. Some regions will become much drier, some wetter. The increase in the global surface temperature, through the greenhouse effect, is expected to increase the amount of water in the air. As a consequence, droughts will become more frequent, with more and more water vaporising from the land into the air. At the same time, the larger amount of water in the air will produce more intense, heavy precipitation and trigger floods. The results of droughts and floods will cause the resilience of old – and pose new – regional security challenges to states, particularly in Africa and Asia.

Due to mutual dependence, the withdrawal or pollution of river water of one riparian state can potentially not only lead to disputes, but also bring cooperation in the basin. Particularly in the last two decades, several competing riparian countries in Asia and Africa have moved towards establishing regimes and institutions for cooperation. River-sharing agreements for the Zambezi and Nile rivers in Africa and Mekong and Ganges rivers in Asia increased in the 1990s. However, these agreements are presently being severely stressed, due to increasing demand and decreasing supply of water resources. Moreover, the threat of global climate change has raised serious doubts about the future of these agreements. This article takes a macro-comparative perspective on transboundary river issues in Africa and Asia, and outlines foreseeable challenges for regional security, considering the impact of climate change.
Major Transboundary River Basins in Africa and Asia and Riparian Relations

The general climate trend suggests an increase in global surface temperatures, but climate data of the twentieth century shows that Africa is and will continuously be warming faster than the global average. Scholars are certain that there will be no generalised, single effect of climate change/variability on Africa, because of the long geographical stretch of the continent. As per the Intergovernmental Panel on Climate Change (IPCC) findings, two regional patterns are likely for Africa. Northern and southern Africa will become much hotter (minimum plus 4°C) and drier (about 10–20% less rain). Eastern and central Africa will experience increased rainfall by about 15%. In general, more regions will often suffer from droughts and floods. Considering the expectation of more frequent droughts and floods, the forecast of river flows and their interaction with extreme variations in precipitation becomes crucial.

Progressing desertification through increased vaporisation and changing rain weather patterns are cause for concern in riparian states, particularly in the Chad Lake Basin (Niger, Nigeria, Chad, Cameroon and Central African Republic); the Zambezi Basin (Zambia, Angola, Zimbabwe, Malawi, Botswana, Mozambique and Namibia); and the Nile Basin (Rwanda, Burundi, Congo, Tanzania, Kenya, Uganda, Eritrea, Ethiopia, Sudan and Egypt). The real effect of climate change on the flow of river systems in Africa is apparently unpredictable. Nevertheless, specialists estimate that, in drier areas, a decrease in rainfall by 10% would have a severe effect on river systems like the Zambezi and Limpopo in southern Africa. The Zambezi River will be particularly vulnerable to climate change, and already today causes
Water pollution, from industrial development along major rivers by upper riparian countries, affects lower riparian states significantly.

contestation among its riparian countries, particularly between Zambia and Zimbabwe. The Nile Basin is considered by many of having high potential to induce water conflicts in the region, due to increasing water demand and the unequal distribution of water and power in the basin. In 1999, when the World Bank encouraged the Nile Basin states to form the Nile Basin Initiative, there was hope and expectation that shared water resources would bring peace and cooperation in the basin. However, more than a decade later, that dream has not yet been realised. In the face of mounting pressure from upstream countries, Egypt and Sudan are working hard to maintain their historic rights over the Nile water. Ethiopia is trying everything possible to capture its share of the Nile water, which has been denied to it in the past due to its own political and economic weaknesses.

A major challenge to transboundary river cooperation is rooted in national politics. The direct and immediate national security challenges for the economy and the population is sacrificing basin-based cooperation. Agriculture, as the major economic activity in Africa, will be more severely affected by changing climate than the industrial sectors. About 60% of employment in Africa is provided by the agricultural sector – and, in many countries, this sector accounts for 50% of their gross domestic product (GDP). The agricultural sector is very sensitive to changes in climate – especially to shifting rainfall patterns. Some researchers claim that, by 2020, the crop yield in some countries will have halved and agricultural profits decrease by 90%. The Sahara region is seen as most vulnerable to agricultural losses, which are expected to lose about 2–7% of its GDP. Western and central Africa will lose about 2–4% of overall GDP, while the impact on northern and southern Africa is anticipated to be about 0.4% to 1.3% of overall GDP. Some models suggest a decrease in suitable rain-fed land for crops, and a 5–8% increase in arid or semi-arid land by 2080. It is predicted that, consequently, wheat production will disappear from Africa and maize production in southern Africa will be notably reduced.

In Africa, the scarcity of water resources will affect regional security and increase political tensions foremost among the southern African and Nile Basin states. The water scarcity of rain-fed rivers in Africa – such as the Nile, Orange and Zambezi – will affect the agricultural sector, which dominates African economies, particularly severely. This will lead to challenges in food and water security in the region.
To pre-empt the impact on its populations, states will most likely securitise water and will try to annex as much water as possible unilaterally from the shared sources. This sort of ‘water capture’ policy will not only harm the existing water-sharing agreements, it might also create new conflicts over water issues. Due to climate change challenges, the scenario of water wars in the near future in parts of Africa cannot be ruled out.

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Most of Asia is highly populated and also houses a larger number of the world’s poor. In recent years, besides the rapidly increasing population, a large part of the continent is also experiencing unprecedented economic growth. The impacts of global climate change are likely to be severe in the near future in many Asian countries, where people are highly dependent on natural resources for their livelihoods. Global climate change presents serious risks to the access of water resources in south and south-east Asia. In particular, the impact of climate change on glaciers will directly affect water flow in many of the major international rivers in these regions. In the Himalayan Basin, due to the increased rate of melting of the glacial area, the water flow in spring has increased and water flow during the remaining seasons – especially during summer when it is most needed – has decreased. The size of the Himalayan glaciers has decreased from 2 077 square kilometres in 1962 to 1 628 square kilometres in 2007, an overall reduction of 21%. This increased rate in glacier melting may add to the run-off of the rivers for some time but, at the same time, it will also bring more snow avalanches and glacial lake outburst floods (GLOFs) at high elevation. This phenomenon will not only pose a risk for the existing dams and other projects at the upper reaches of the river systems, but will also make it difficult to plan any hydro projects in the future. If the present trend continues, rivers originating in the Himalayas will soon experience an increase in the frequency of spring floods and serious flow reduction in the summer months.

Climate change-induced glacier melting will impact some major Asian river basins in particular – such as the Ganges Basin (Nepal, India and Bangladesh); the Indus Basin (India and Pakistan); and the Mekong River (China, Burma, Thailand, Laos, Cambodia and Vietnam). The quantity and nature of run-off is expected to change substantially in these Himalayan rivers as a result of climate change. While uncertainty remains regarding the accuracy of various climate change predictions, forecasts indicate that changes in climate will further exacerbate the existing variability of water flow in the rivers. Changes in the spatial and temporal distribution of precipitation and temperature are expected to interact in complex ways that change the equilibrium and attributes of run-off that reaches these rivers.

In the Ganges Basin, climate change is expected to increase temperatures, resulting in the retreat of glaciers; increased alteration in the precipitation pattern, which will result in a greater degree and rate of recurrence of droughts and floods; and even lead to a sea-level rise. There is enough water in the Ganges River during the wet season for both major riparian countries (Bangladesh and India) not to argue over the water supply; instead, flood control is their priority. During the dry season (December through May), the water supply dwindles – and during this period, ice and snowmelt from the Himalayas becomes critical. In the Indus Basin, water is one of the main conflict issues between India and Pakistan, with India securing water resources for its growing metropolis areas. While both these hostile neighbours have signed a water-sharing agreement on the Indus in 1960 – due to increasing water scarcity in the region – internal opposition in both countries is growing against the agreement. Islamic fundamentalist groups in Pakistan have been using the water issue to mobilise their support base against India. In the Mekong Basin, upper riparian China requires huge amounts of water to support its immense economic growth. This has severe effects on the lower riparian states along the Mekong, which experience extreme water variability because of the construction of major dams on the Chinese side. The Mekong, Indus and Ganges are also experiencing severe floods through heavy rains, as seen in 2010. At the same time, water pollution through industrial use is extreme and affects the lower riparian states. Increasing uncertainty over the availability of water from rainfall, river run-off and groundwater recharge due to the impact of climatic change poses a serious threat to food security in Asia. Overall, the management of international rivers in Asia is not conducive to long-term water sustainability. Due to climate change, increasing population growth and growing economies, riparian countries are taking – and will take – unilateral actions to secure water resources, while potentially damaging the river as well as relations between riparian states.

The sharing of international rivers in Asia in the face of climate change might also lead to the same regional security tensions as in Africa, considering Asia’s need to feed its large population. But such tensions might be not of the same intensity as anticipated for Africa. The reason for this is that the international river basin countries in Asia may be able to adapt to climate change challenges better than their African counterparts:
1. Many countries in these major Asian river basins, particularly China and India, are gradually shifting their economic focus from the agricultural sector to the industrial sector. Industry consumes much less water than agriculture. Thus, this economic shift might help Asian countries to adapt better to water scarcity challenges.

2. Climate change raises the certain possibility of large-scale variation in the water flow of shared river systems. With the help of large water development projects, basin countries might be able to address these run-off variations and uncertainty, at least for some time. Most Asian countries also possess better technological strength and larger financial capability to meet these climate change-induced water management challenges.

3. Climate change is rapidly emerging as a critical issue in the sharing of international river water negotiation processes. Many large Asian riparian countries possess sufficient numbers of qualified diplomats to negotiate successfully complex climate change challenges over their shared water resources compared to African basin states, thus decreasing their risk of violent water conflicts.

Addressing Climate Change Challenges

Without a doubt, Africa and Asia’s transboundary river management is advancing towards uncertain times with the increasing impact of climate change. To sustain and develop the resource that satisfies a basic condition of life will be the biggest challenge for basin states in this century. The key to transboundary river management towards cooperation rather than confrontation will be the smart governance of natural resources, and how politics deals with water issues and emerging threats. While Asia might be slightly more resourceful, it is likely to face the same challenges and tensions that are almost inevitable for Africa.

The existing water-sharing regimes in Africa and Asia do not have the capacity to address the emerging challenges that climate change will pose. Most of the ongoing cooperation in the international river basins in Asia and Africa originated from the active involvement of international donor agencies. Many of these initiatives only barely survive because of external help and assistance. Such reliance on minimal external help alone exposes the lack of interest of the basin states in Asia and Africa in creating effective and sustainable management of shared river resources.

To address the imminent problems of the existing water crisis – and the massive change in the run-off structure due to climate change – the ownership and, most importantly, the accountability of transboundary water management must be restored back to the countries in the regions. Of course, the international community should not stay out of regional water-sharing politics entirely, but must start to encourage riparian countries to find distinct emancipatory approaches to basin-based river management. These approaches should address the regions’ unique culture and history, as well as their economic disparity and ecological sensitivities. 

Dr Ashok Swain is a Professor in Peace and Conflict Research and the Director of the Uppsala Centre for Sustainable Development at Uppsala University in Sweden.

Florian Krampe is a Doctoral student at the Department of Peace and Conflict Research, and a pre-Doctoral Research Fellow at the Uppsala Centre for Sustainable Development at Uppsala University in Sweden.

Endnotes