920 million people could face conflict over the world's rivers by 2050: What our study found in Africa

June 26 2023, by Sophie de Bruin

Nile River, Aswan, Egypt. Credit: Unsplash/CC0 Public Domain

The Grand Ethiopian Renaissance Dam project on the Nile River started operating in February 2022. It reinforced tensions between Ethiopia, Sudan and Egypt. The three countries rely most heavily on the Nile's water. Sudan and Egypt consider the US$4.6 billion dam a threat to vital water supplies. Ethiopia sees it as essential for its development.

This is just one example of how conflicts can arise between states that share river basins. And there's a real risk that such conflicts will become more common as global temperatures rise.

Hundreds of rivers are shared between two or more countries. Sharing waters can be a source of cooperation or conflict. This depends on economic, cultural and institutional conditions. It also depends on historical relations between countries.

Although cooperation historically prevails over conflict and large-scale violent international conflicts haven't happened so far, tensions over water have long existed. They are also rising in several river basins.

Africa has 66 transboundary river basins. These include the Nile basin, and the Juba–Shebelle and Lake Turkana basins in the Horn of Africa. Conflict risk can rise as populations grow, water use intensifies and the climate changes.

There's no consensus on the precise mechanisms that fuel conflict in such basins. It is, however, possible to identify basins where risks are projected to compound. This can be done by combining data on conflict risk conditions identified in existing literature.

In a recent study I conducted with three water system researchers from IHE Delft, Utrecht University and Wageningen University & Research, we came up with three possible futures regarding conflict risk in global transboundary river basins.

Our study projects that if nothing substantially changes in how transboundary river basins are managed and with climate change worsening, 920 million people will live in very high to high conflict-risk basins by 2050.

If nations improve water use, strengthen cooperation and do more to prevent or mitigate conflict, this number drops to 536 million.

Water treaties and strong river basin organizations increase the likelihood of long-term, stable cooperation between states.

Our research

Our study combined projections on the construction of mega-dams and institutional resilience. It looked at hydroclimatic, governance and socio-economic risk factors. Combining these factors provided an idea of the overall conflict risk per transboundary river basin.

We used a broad interpretation of conflict over transboundary water resources. This ranged from accusations and diplomatic tensions to economic sanctions and violent disputes.

A lack of cooperation between countries can lead to a loss of benefits that could arise from joint activities. These include adapting to climate change, protecting the environment and developing socio-economically. Tensions between states over such issues can also spill over into other sectors, compromising regional political or economic relations.

Our findings

Our results show that under a business-as-usual scenario—where no major changes are made—920 million people out of the 4.4 billion

people living in transboundary river basins will live in very high to high conflict-risk basins by 2050. In Africa, this number includes people living in Eritrea, Ethiopia, Rwanda, Uganda, Kenya, Somalia, Burkina Faso, Mauritania and Niger. It also includes those in Mozambique, Malawi, Benin and Togo.

In the high ambition scenario—which implies improved water use practices and rising institutional resilience—this number decreases to 536 million. The low-ambition scenario implies some improvement in water use efficiency, institutional capacity and governance quality. Under this scenario, 724 million people would be living in very high to high conflict-risk basins by 2050.

Basins in Africa and Asia especially are projected to face high overall risks, since several risks collide here. In Africa, several basins face extra risks like high variability of water flows and limited water availability. There is also a dependence of downstream countries on upstream ones.

The current tensions in the Nile over Ethiopia's Grand Renaissance Dam, for instance, could escalate when Ethiopia decides to develop several new mega-hydropower dams. Egypt and to a lesser extent Sudan are highly dependent on basin-related water resources.

What it means

Our study shows that potentially, 11 more large hydropower dams could be built in the Nile basin. This is based on physical feasibility, energy yield and construction costs. The projection takes into account some restrictions, such as protected natural reserves.

Seven of these dams would be in Ethiopia, and the other four would be in South Sudan. The construction of these dams would be happening alongside rising water shortages, high water dependencies and limited

economic resources to deal with water-related risks.

These new dams could worsen regional climate change impacts and water demands, especially when the population and economy are both growing. Although scholars cannot predict when this will occur, a multi-year drought in the Nile basin is inevitable. This would have severe impacts on water allocation.

The prospect of a multi-year drought in parts of the Nile basin requires preparations today. And even if the impact of new dams will be moderate, the perception of risk could affect how Egypt, for instance, makes decisions over shared river cooperation.

Two other large basins—the Juba–Shebelle in Kenya, Somalia and Ethiopia, and the Lake Turkana basin in Kenya and Ethiopia—are projected to face high conflict risk levels. In these two basins, multiple issues, such as local conflict, low human development and limited water availability already collide today.

This may be worsened without additional efforts towards 2050 due to relatively high population growth and climate change impacts—without sufficient resources to adapt.

Even in our high ambition scenario—which implies substantial improvements in water management, overall domestic governance and institutional resilience—the Juba–Shebelle and Lake Turkana basins still face high risks.

The challenges and risks these basins face must be explicitly included in wider plans. For example, when large hydropower dams are built, their operation must not hinder the climate adaptation goals of the wider region.