Working towards regional water, food and energy security through Virtual Water considerations

CRIDF is using the concept of Virtual Water to support alternative approaches to power and agricultural security in the region and help to reconcile the food, water and energy nexus in a time of climate change.

Background

The SADC region is characterised by countries with high rainfall in the North and drier ones in the South. Figure 1 shows that despite the north being vastly wetter, it is the drier south that exports more embedded water both to the wetter north of the region and internationally.

Water is needed in almost all energy generation processes, and in the production of food. Population growth and rapidly-expanding economies are placing increasing demands on what is recognised as a water, food and energy nexus. Climate projections indicate that the South will get drier and the North will get wetter, with increased incidence

Figure 1: Diagrammatic outline of Virtual Water flows in and out of SADC from Mekonnen and Hoekstra (2011), & CRIDF data.

and intensity of both floods and droughts. The multiplier effects of climate change will place additional stress on the region and its water resources.

Since the majority of the region's waters are found in shared basins and aquifers, an exclusively sovereign focus is likely to have increasing transboundary implications. While there is a deep political commitment to peaceful cooperation and shared growth across SADC, the inter-dependence of climate change and socio-economic drivers such as demographic changes, unless carefully managed, may increase regional pressures on water. In South Africa, the largest economy in the region, challenges with meeting the demand for water, sanitation and energy infrastructure has become a highly politicised issue which has both national and regional implications for social instability and financial, economic, trade and human migration.

Key Activities

CRIDF is breaking disciplinary silos to promote cross-sector planning by introducing the concept of 'Virtual Water' which represents water that is 'embedded' in crops, livestock, industrial services, and electricity. Initial analysis of total Virtual Water flows in and out of, as well as between the wet North of SADC and dry South has highlighted key implications for navigating the nexus on a regional basis. While the stronger economies of the dry south drive large Virtual Water inflows, this region also exports a considerable volume of Virtual Water in agricultural products – both into the wetter north but predominantly to the rest of the world. This provides valuable foreign exchange earnings, these earnings represent an export of water which may provide alternative and perhaps greater economic and social value if used domestically. More importantly, there is very little transfer of Virtual Water from the wet North to the dry South, perhaps presenting a significant lost opportunity for the region as a whole.

On the back of its initial regional analysis of Virtual Water, CRIDF has selected two areas of focus for further work which could help break down silo thinking and promote more climate resilient transboundary water management for the benefit of the poor. These areas include firstly, working with
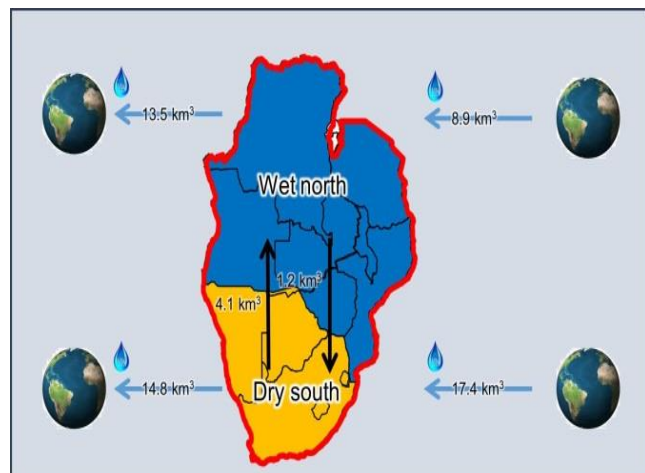
the Southern Africa Power Pool (SAPP) to develop an energy and water modelling tool to illustrate the impact of climate change on power planning in the region. Secondly, CRIDF is working in the Kavango-Zambezi Transfrontier Conservation Area (KAZA) area with tourism lodges to identify opportunities to develop local agricultural supply chains. These are explained in more detail below.

Sothern Africa Power Pool (SAPP)

Analysis of the Virtual Water component of electricity trading has highlighted that it may be possible to simultaneously reduce the overall carbon footprint of energy production in SADC, reduce water demands in the dry south, and promote regional growth by managing energy production conjunctively with water and irrigation demands.

CRIDF is working with the Southern African Power Pool to develop an enhanced tool which enables climate change to be taken into account in long-term SAPP power planning, highlighting the environmental benefits of mobilising water resources in the north of SADC to supply energy to the south. This will inform SAPP regional power planning decision-making, thereby optimising future infrastructure planning.

Agriculture and trade flows in KAZA

CRIDF is working with KAZA to support shared economic growth. Based on a detailed Virtual Water database that specifies the amount of water contained in goods and services together with their carbon footprint and where they are traded, CRIDF is supporting the KAZA secretariat to identify products that could be locally produced and brought into the formal tourism value chain, rather than being imported.

The analysis is based on the principles of supply and demand, promoting shared economic growth based on participation in the tourism value chain, climate resilient development pathways based on optimising natural capital and improved transboundary cooperation amongst member states.

The Strategic Significance

Shifting established water allocations and trade patterns to optimise regional Virtual Water trade is legally, politically and socially challenging, and concerns relating to national energy and food security must be addressed. CRIDF is therefore examining politically savvy ways to carry the message to the right people in the right positions through exchanges and sharing of information.

Despite complexities, it is clear that there are opportunities for Virtual Water transfers to be an important component of peaceful cooperation and shared growth in SADC with individual states' sovereign interests being best served by pursuing regional water, food and energy security. This work is novel in SADC, and in the wider global context, and has the potential to transform the way policy and decision makers think, conceptualise, plan, operate and maintain water infrastructure.