

SEA and integrated river basin plan for Upper Nyabarongo Basin, Rwanda

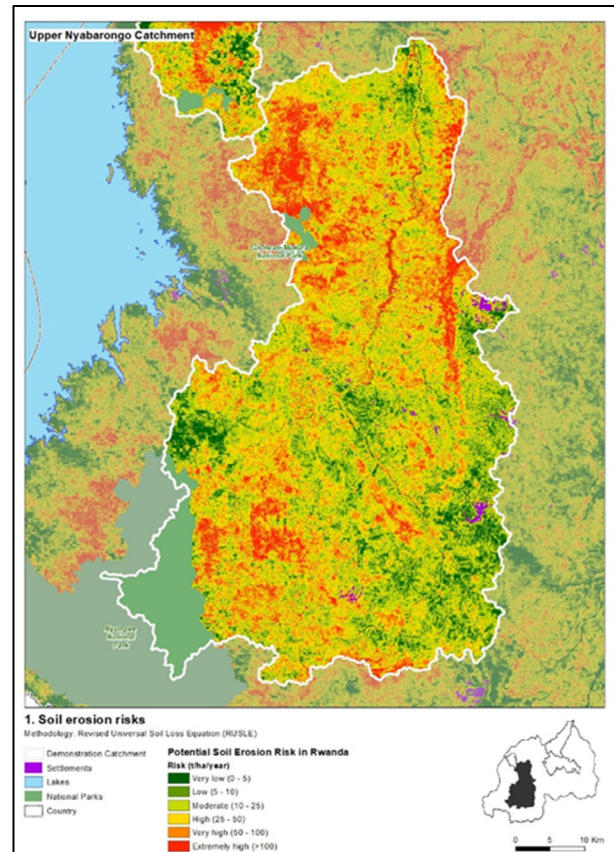
Source: NCEA (2021)

Plan: The Upper Nyabarongo basin represents 13% of the surface of Rwanda. It is part of the Nile Basin, and it has abundant water resources with an average annual rainfall above 1,600 mm and an elevation ranging between 1,460 and 2,950 meters. The predominance of steep slopes and high rainfall within this catchment make it highly potential for hydropower development. Currently, five hydropower plants are operational with a total capacity of 51.5 MW, and a new 120 MW plant is planned. In total, 1.2 million people live in this basin in high densities (900–1,500 inhabitants/km²).

Poverty rates are high. The cause of poverty has often been linked to high population growth and declining soil fertility in a largely agrarian-based economy. The rivers have very high sediment loads due to soil erosion from hillside agriculture, deforestation, and mining; see map. Mining may also lead to contamination with heavy metals, posing a human health risk. The sediment load results in high removal costs for drinking water intake, as well as turbines and related infrastructure for hydropower stations. Both hydropower and drinking water intake often need to shut down during periods of extreme sediment load, while operations also suffer from regular interruptions due to required sediment removal from settling basins associated with the intake. It also affects the lifetime of the hydropower plants, with the high shutdown time of the hydropower facilities being an important reason for the relatively high electricity prices.

The above-mentioned challenges hinder the sustainable use and further exploration of the opportunities for development. That was the main reason for the development of this river basin plan, aiming to *“effectively manage land, water, and related natural resources, to contribute to sustainable socioeconomic development and improved livelihoods, taking into consideration environmental flow, downstream water demands, and resilience to climate change, and minimize water-related disasters.”* One of the specific objectives is to reduce the sedimentation of the rivers, which is a serious threat for hydropower use and development.

SEA issues: This plan requires to be subject to SEA and have been integrated. A multi-sector institutional structure was developed to engage stakeholders and finally to approve the plan/SEA by a steering body represented by five ministries. During this integrated process, a list of interventions or projects was identified to improve or enhance basin management. Based on these measures, the following four alternatives were assessed and compared:



- A: increased water storage;
- B: increased water storage + sustainable land management;
- C: increased water storage + sustainable land management + water use efficiency;
- D: increased water storage + sustainable land management + water use efficiency + reduced irrigation.

Alternative C was selected as the preferred alternative. This alternative has the desired effect of balancing the need for energy security by maximizing the potential for hydropower development with food security while avoiding local water shortages. This can be achieved by combining the development of water storage, sustainable land management of 55,000 ha, enhanced water use efficiency in all sectors (especially in irrigation), afforestation on very steep slopes, terracing on agriculture land, and protection of buffer zones of rivers. The photo above shows the implementation of rehabilitation works.

Influence of SEA and plan

- With a focus on hydropower, measures that will stop and prevent soil erosion are implemented, both important to (i) secure the utilization of the existing hydropower capacity and (ii) find investors who are interested in developing new hydropower projects.
- Water allocation plans were made for all sub-catchments, per month, per water user (including environmental flow), and for the planning of 2024, 2030, and 2050, including environmental flow. These then formed the basis for water permits.