Author: Peter Croal
Environmental consultancy

SEA for a hydropower plan in Vietnam

Hydropower Plan for the Vu Gia-Thu Bon River Basin

Type of impact assessment	Mandatory Strategic Environmental Assessment (SEA)
Type of project/plan	Hydropower Development Plan (spatial rural and energy planning)
Climate change related issues	Increased rainfall intensity and variability; floods, larger sediment transport, sea level rise, increased evapotranspiration, lower dry season flows, salinity intrusion
Influence of the SEA	'Safe operations' identified to cope with climate change induced disasters; climate change parameters incorporated in design and management of infrastructure

The SEA for this hydropower plan showed that the pace and scale of the proposed activities were at an unsustainable level. Measures were taken to make the design and management of the infrastructure more climate smart.

Climate change in the Basin

During the past decade, energy demand in Vietnam has grown at a rate of 13-15% annually. Over the next decade, demand is expected to grow at a similar high pace and the share

of hydropower is likely to increase from 60% to 80%.

The Vu Gia – Thu Bon River Basin in Quang Nam province is ranked fourth in Vietnam for potential hydropower generation. The hydropower potential of the Basin is estimated at 1,300 MW with an annual energy potential of 6 TWh.

Fisheries are of crucial importance in Quang Nam province, providing a major source of protein for residents and producing substantial export turnover. Potential impacts of hydropower on biodiversity could directly affect these fisheries.

UNFCCC forecasts heavy precipitation events to increase in frequency by mid-century in Vietnam. Intense tropical cyclone activity may also increase. The Basin already experiences extreme fluctuations in annual precipitation, which is expected to intensify with climate change. Upstream watershed erosion from degraded watersheds supplies increasing amounts of sediments to river systems, building up sediment deposits within the river channels. With continuing watershed degradation and climate change, the severity of

Quang Nam Province, Vietnam

flooding is expected to increase in downstream areas. Global increases in temperature will increase evapotranspiration, leading to decreased flows during the dry season.

Sea level rise worldwide will affect flooding in the seaward parts of the Delta. Trends towards larger extreme flood flows associated with worldwide climate change will cause much larger extreme sediment

transport events, because of enhanced erosion and enhanced fluvial transport capability of the river system. Long term average sediment transport will also increase. Flooding associated with temporary and permanent deposition of fluvial sand will worsen.

Assessing climate change risks for the River Basin

In an SEA for the hydropower plan for this Basin, climate change was considered as one of 15 key issues. However, some climate change concerns were not quantifiable as predictive or spatial models for the study area, particularly for the 20 year time frame of the study, were not available. The analysis of climate change impacts was therefore largely qualitative, based on extrapolation from available literature. A range of important climate change impacts on the hydrology of the basin was identified: increased rainfall intensity and variability; increases in size of extreme flood flows, resulting in larger sediment transport and sand excavation; sea level rise affecting flooding in the seaward parts of the Delta; increases in temperature and higher evapotranspiration leading to lower dry season minimal flows with effects on salinity intrusion.

Climate smart alternatives in the SEA

The incorporation of climate change in the SEA has led to actions that address the climate variability that will occur in the future. The SEA demonstrated that the pace and scale of the proposed hydropower developments were at an unsustainable level and recommended a number of fundamental principles to enhance the sustainability and equity of the hydro sector in the basin. One of these principles highlights “safe operations”, recommending the implementation of operational regimes and institutional arrangements to reduce droughts and floods, and prepare for disasters. The SEA also underscores the need to incorporate climate change parameters in design and management of all hydro infrastructure. In addition, the results from the climate change analysis gave support to some strategic recommendations regarding the need for (i) integrated river basin management; (ii) coordinated management and water release programmes for the 60 dams considered; (iii)

needs for improved data collection on climate related issues.

Conclusion: Climate smart design of the plan

The SEA provided an overview of how variable weather and rainfall patterns of the river basin would be affected by climate change. This resulted in the identification of "safe operations" and development principles to ensure equity and sustainability can be achieved during the construction and operation of the hydropower facilities.

In addition, the SEA underscored the importance of integrated and coordinated river basin management as well as the need for more long term climate data gathering and analysis.

References

ICEM, 2008, Strategic Environmental Assessment of the Quang Nam Province Hydropower Plan for the Vu Gia-Thu Bon River Basin, Prepared for the ADB, MONRE.

OECD DAC Network on Environment and Development (ENVIRONMENT), 2008, Strategic Environmental Assessment and Adaptation to Climate Change.

Characteristics of climate smart(er) plan:

- Three-step approach applied ✓
- Climate smart(er) plan design ✓
- SEA increased commitment for plan ✓

Climate smart(er) because:

- Rainfall variability and intensity characteristics are incorporated into hydropower infrastructure planning and operations.
- "Safe operations" are incorporated into the overall hydropower scheme to take into account climate change induced floods/droughts.
- Climate change data are gathered and analysed during the project.

This case is part of the publication 'Environmental Assessment for Climate Smart Decision Making: Good practice cases', published by the NCEA in 2017. See www.eia.nl for the other cases.