OAK RIDGE NATIONAL LABORATORY

Streamlining Hydropower Licensing with the Environmental Decision Support Toolkit



Hydropower is a key renewable energy source, growing in importance because of its ability to support intermittent resources like wind and solar. However, licensing new hydropower projects or renewing the licenses for existing projects is a complex and lengthy process. Privately owned US hydropower facilities must secure or renew a license from the Federal Energy Regulatory Commission (FERC), which oversees licensing and ensures that the environmental impacts of hydropower projects are properly evaluated and mitigated. Unfortunately, this process can often take up to a decade, with the environmental impacts study phase being one of the lengthiest steps.

Objective

The online Hydropower Environmental Decision Support (EDS) Toolkit, developed by the Department of Energy's (DOE's) Oak Ridge National Laboratory (ORNL), is designed to streamline the initial phase of the hydropower licensing process by providing an understandable, consistent methodology for identifying potential environmental impacts of the proposed hydropower project and key information gaps. The primary goal is to assist stakeholders with varying degrees of experience and expertise—including hydropower licensees, federal and state agencies, environmental NGOs, tribes, local governments, and affected communities—in connecting the potential environmental impacts of a hydropower project to relevant studies, mitigation measures, regulations, and permitting requirements. The EDS Toolkit is available at hydroeds.ornl.gov.

METHODS

- COMPILED ENVIRONMENTAL DATABASE
- DEVELOPED RIVER FUNCTION QUESTIONNAIRE
- CREATED AND EXPANDED DECISION SUPPORT TOOLKIT

Methods

The EDS Toolkit was developed through a multiphase approach:

- **Database Creation:** ORNL researchers compiled a comprehensive database of over 3,000 environmental metrics from scientific literature pertaining to hydropower projects around the world. These metrics were grouped into six categories: Biota & Biodiversity, Water Quality, Geomorphology, Connectivity & Fragmentation, Hydrology, and Landscape & Land Cover.
- **Development of River Function Indicators (RFIs):** From this database, 42 RFIs were developed. Each RFI represents a group of environmental metrics used to determine whether an ecological function of the river could be affected by a proposed hydropower project.



R.C. Thomas Hydroelectric Project, Polk County, Texas (image courtesy of Simpson Gumpertz & Heger)

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- **RFI Questionnaire:** An integral part of the toolkit, this questionnaire includes up to 87 questions to help users identify project-specific environmental effects. The questions were framed using an eco-evidence approach so that "yes" answers lead toward more evidence for a given RFI being potentially affected by a project. This questionnaire is now embedded in the Impacts module of the EDS Toolkit.
- **Expansion with "What's Next?" Module:** In the third and current phase of the project, the EDS toolkit is being expanded with a "What's Next?" module to connect users to relevant studies, mitigations, and regulatory information based on key effects or uncertainties identified through the questionnaire. DOE's Hydropower Regulatory and Permitting Information Desktop (RAPID) Toolkit provides the regulatory information to help stakeholders efficiently navigate the regulatory landscape.

Results/Impacts

The EDS Toolkit provides a transparent, consistent methodology for identifying and discussing potential gaps in environmental information during hydropower project planning and licensing negotiations. By characterizing and summarizing the best-available science, the toolkit offers a common language and method for stakeholders to address environmental concerns comprehensively.

Pilot tests of the RFI Questionnaire with users from recently licensed hydropower projects have demonstrated the tool's utility and usability. Furthermore, the toolkit's integration with the RAPID Toolkit enables users to quickly explore relevant environmental studies and mitigations from previously licensed FERC projects, promoting greater certainty in federal authorization processes.

International collaboration with researchers from Norway's SINTEF and NINA research organizations has provided insights into making effective use of environmental decision tools such as the EDS, and in identifying barriers to their adoption and widespread use. Through collaboration with stakeholder advisory boards, including members representing hydropower developers, federal and state agencies, NGOs, tribes, and the scientific community, the EDS Toolkit has been refined to better meet user needs.

Norris Dam, Anderson County, Tennessee (image courtesy of Brennan Smith)



CONTACT

Esther Parish

Geographer and Landscape Ecologist
Environmental Sciences Division
Oak Ridge National Laboratory

parishes@ornl.gov
865-241-3118

ornl.gov/
waterpower

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