

DIGO JAL BIKAS PROJECT

ENVIRONMENTAL FLOW CALCULATOR

OVERVIEW

The Western Nepal Environmental Flow Calculator (WENEFC) is a software package for desktop assessment of Environmental Flows (EF) in the Karnali-Mohana and Mahakali rivers of Western Nepal. The WENEFC offers two methods for estimating EF: the Hydrological Method based only on hydrological considerations and the Holistic Method based on hydrological, ecological and socio cultural considerations. This is the first EF assessment tool for Western Nepal.



WHAT ARE ENVIRONMENTAL FLOWS?

Managing how water is allocated between multiple uses, including the environment, is essential to address issues related to water scarcity, sustainable water resources management, and the maintenance of river health. Managing allocations in the water-energy-food nexus calls for a practical tool. It calls for scientific evidence that presents stakeholders with information about the total requirement of water within a river, wetland or coastal zone so as to maintain ecological integrity, and the goods and services of rivers and their associated ecosystems. Having this information can help them make decisions about water allocation and development activities.

Environmental flows (EFs) represent such a scientific tool. EFs take into account natural variability of river flows, and fluctuations in water demand; for instance, fish spawning and migration, transporting sediment, and inundating wetlands require higher than normal flows at specific times. EFs aim to mimic the dynamism of a natural flow regime and should not be considered a “minimum” or a “threshold” requirement.

WHAT CAN IT DO?

In addition to using the built-in flow data to understand environmental flow requirements at specific sites within the two river systems, users can also input their own river flow data into the calculator and obtain EF estimates. The WENEFC has a user friendly map-based interface and a help file to assist users. EFs can be used in environmental impact assessments and water infrastructure planning to define the quantity and timing of water flows required to sustain river biodiversity, ecosystem services and livelihoods.



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HOW DOES THE WENEFC WORK?

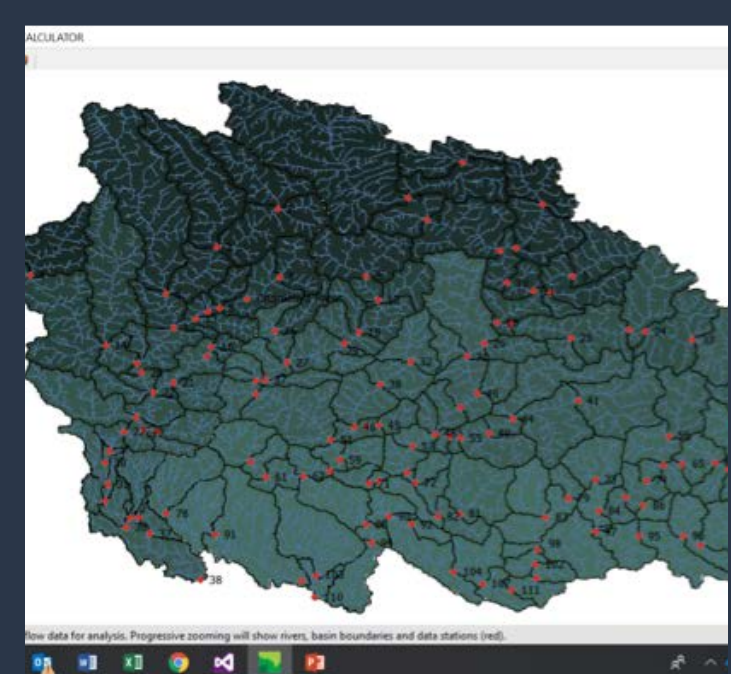
The WENEFC incorporates a built-in database of monthly flow values at 157 locations on the Karnali-Mohana and Mahakali rivers, which have been simulated using Soil and Water Assessment Tool (SWAT) hydrological models. Both Hydrological and Holistic Methods start by constructing the “Natural Flow Duration Curve,” which illustrates the probability that a given flow value is met or exceeded at a particular location. An “Environmental Flow Duration Curve” is then selected considering the environmental condition the river can be maintained at (Environmental Management Class), ranging from “pristine” to “highly modified”, based on a comparison of the amount of water naturally available at that location, the amount demanded by various uses and the amount required to remain in the river for hydrological, ecological, social and cultural requirements. The amount of water that needs to remain in the river in order to maintain a certain environmental condition (i.e. pristine), can be calculated as monthly flow values too.



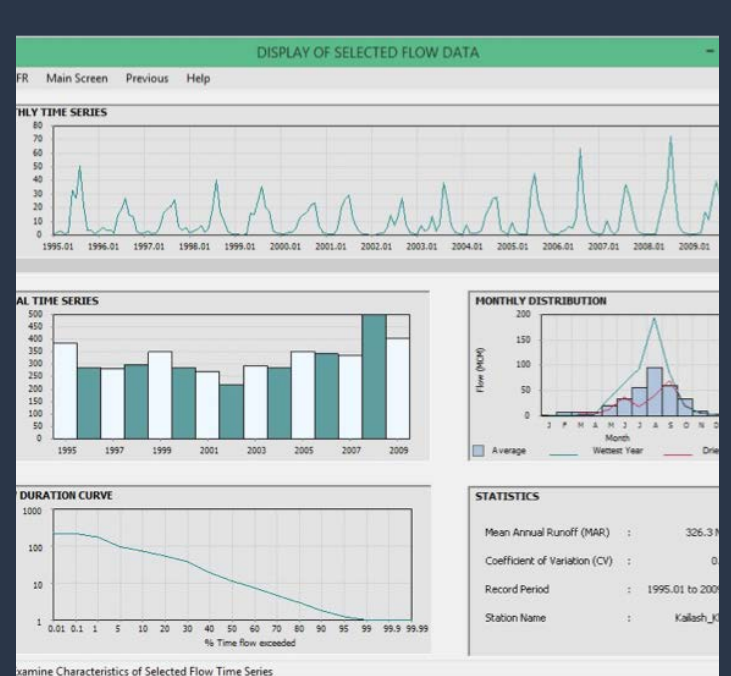
HYDROLOGICAL OR HOLISTIC?

The Hydrological Method estimates the Environmental Flow Duration Curves for six Environmental Management Classes and can be determined at all locations where simulated flow data is available. The Holistic Method, on the other hand, has only two environmental management classes, and is currently limited to upstream reaches of Karnali-Mohana and Mahakali rivers. However, the Holistic Method provides a more comprehensive assessment of the true water requirements of a river, considering social, cultural, and ecological needs in addition to the hydrological needs assessed by the Hydrological Method.

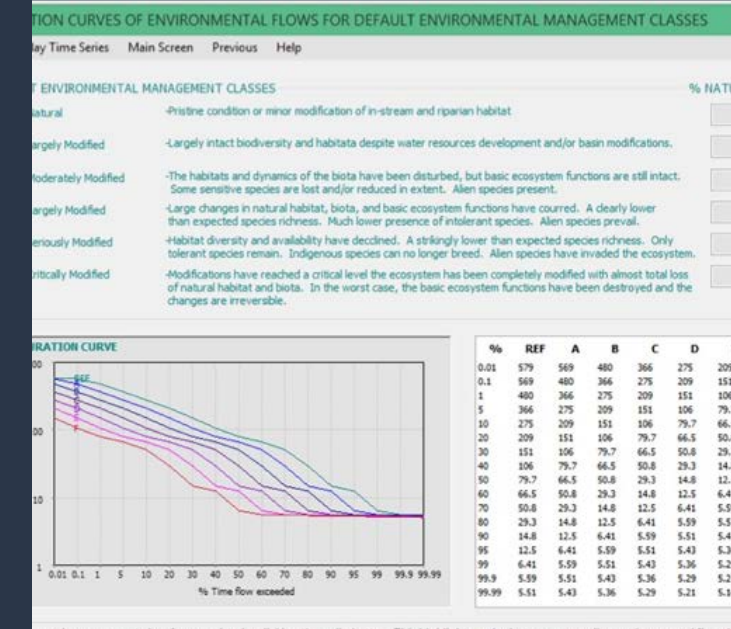
STEP 1



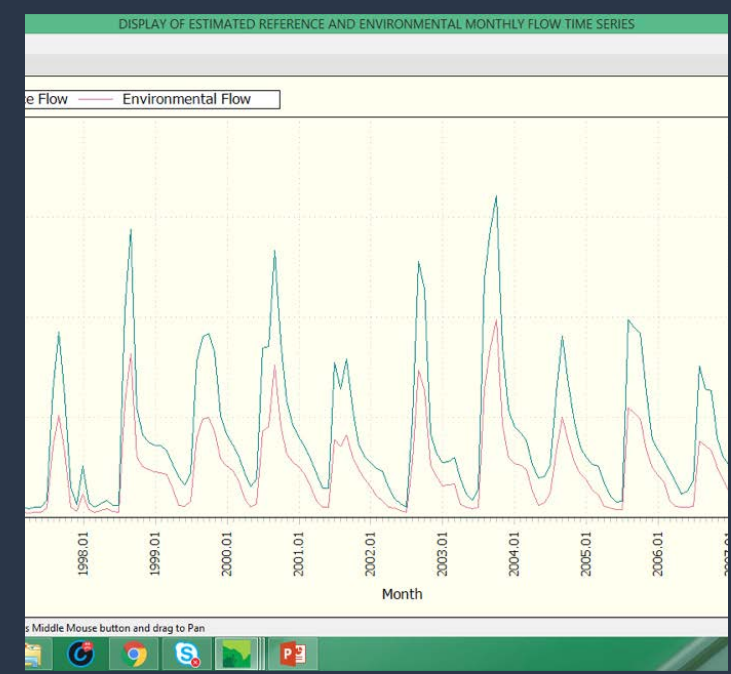
STEP 2



STEP 3



STEP 4





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