



Sediment Yield for all NHDPlusV2 Catchments of the Mississippi River Basin

Description

This project will establish sediment yields for all catchments of the Mississippi River Basin. The river network and catchment shapefiles of the Mississippi River Basin are shown in Figure 1, with more than 1.2 million river reaches. The project team performed Phase 1 of this analysis for the Ohio River Basin in Fiscal Year 2018 with promising results for many locations. Phase 1 used empirical regressions with available GIS, discharge, and sediment data to calculate sediment yields and quantify uncertainties. In Phase 2, the methods will be extended to cover the entire Mississippi River Basin (MRB) within the United States. The project will provide a valuable data set of approximate sediment yields which can fill spatial, or resource-limited, gaps. The accuracy of the resulting data set will be evaluated and presented using USGS observed sediment load data

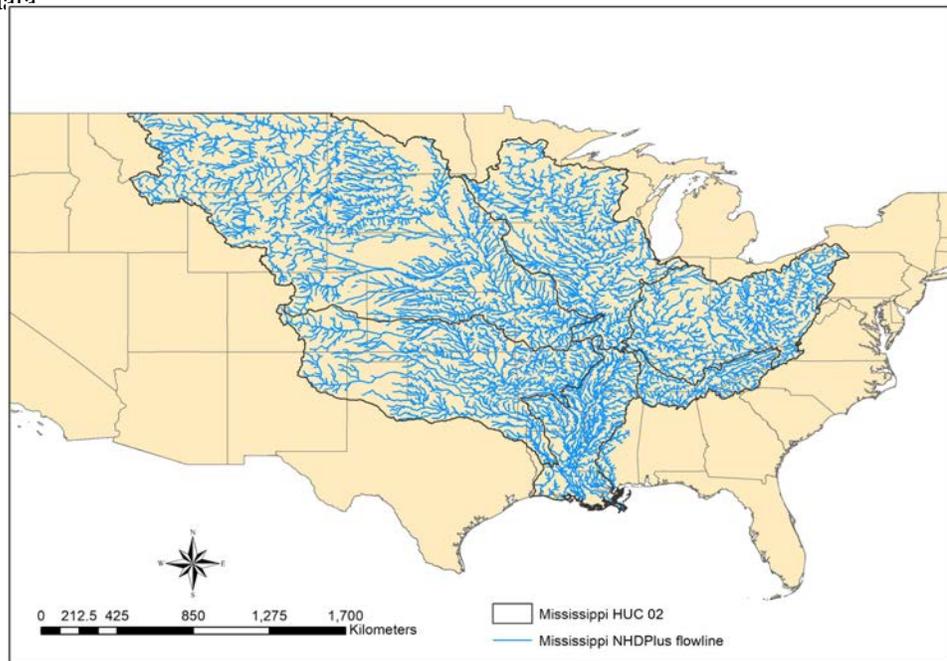


Figure 1. Map of the Mississippi River Basin with more than 1.2 million NHDPlus river reaches. Only river reaches with Strahler stream order higher than three are shown in this figure for clarity.

Issue/Challenge To Address

Estimation of watershed sediment at the continental scale of Mississippi River Basin is an important step to better understand the overall sediment behavior in a waterway. Distributed hydrologic and sediment models (such as HEC-HMS, GSSHA, SWAT, etc.) require large amounts of data for sophisticated calibration processes. Furthermore, uncertainty in model parameters and computational demands pose challenges for modeling continental-scale river networks. Under these conditions, a simple regression approach can provide quick and practical information over a wide range of spatial scales.

In Phase 1 of this project, empirical relationships between suspended sediment concentrations and runoff were developed to calculate sediment yield. The Phase 1 approach was refined using other available GIS data such as land cover data, catchment properties, soil type, etc. The modeling framework developed in the first phase of this



US Army Corps
of Engineers.
Engineer Research and
Development Center

National Regional Sediment Management Program Coastal and Hydraulics Lab, Rivers Branch:



Sediment Yield for all NHDPlusV2 Catchments of the Mississippi River Basin

project will be extended to the entire U.S. portion of the Mississippi River Basin. Uncertainty will be calculated based on the resulting comparisons with measurements.

The use of this data set will be beneficial for all three of the U.S. Army Corps of Engineers primary missions: Navigation, Flood Risk Management, and Environmental Restoration.

Lessons learned will be compiled during the duration of this study.

Successes Lessons Learned Expected Products

- Journal Technical Paper (draft within FY19)
- Data set of estimated annual sediment yield for all Mississippi River Basin catchments
- Automated scripts and intermediate data sets or relationships
- Publish results in the web access portal such as Navigation portal

Stakeholders/Users

Any regional USACE District needing approximate sediment yield information will be able to use this data set quickly. The data set will also be useful for other federal agencies, such as the USGS or EPA, state agencies, or regional water management personnel.

Projected Benefits Value Added

This data set will be used to answer any questions which may not require a complete hydrologic and sediment model (development of each model can easily be upwards of \$100,000). This data set will fill gaps, both in available resources and spatial coverage, by providing very high spatial resolution sediment yield information to entire 2-digit hydrologic units, the Mississippi River Basin (HUC 05, 06, 07, 08, 10U, 10L, and 11).

Leveraging Opportunities

This effort will leverage currently available data sets through the combining of NHDPlusV2 catchments, USGS sediment measurements, national GIS data sets (land cover, soil type, etc.), and the NLDAS runoff estimates to create a final product of sediment yield by high-resolution catchment.

Points of Contact

Ahmad A. Tavakoly, CEERD-HFR
Research Hydraulic Engineer, Coastal and Hydraulics Lab, River Engineering Branch
301-405-9180
Ahmad.A.Tavakoly@erdc.dren.mil

Participating Partners

USACE District Offices (Huntington, Kansas City, Little Rock, Louisville, Nashville, Omaha, Pittsburgh, Rock Island, St Louis, St Paul, Tulsa, Vicksburg)