Shoshone River Water Resources II

Quantifying Sediment Input in the Shoshone River in Wyoming using the Soil and Water Assessment Tool for Enhanced Water Quality Monitoring

Community Concerns

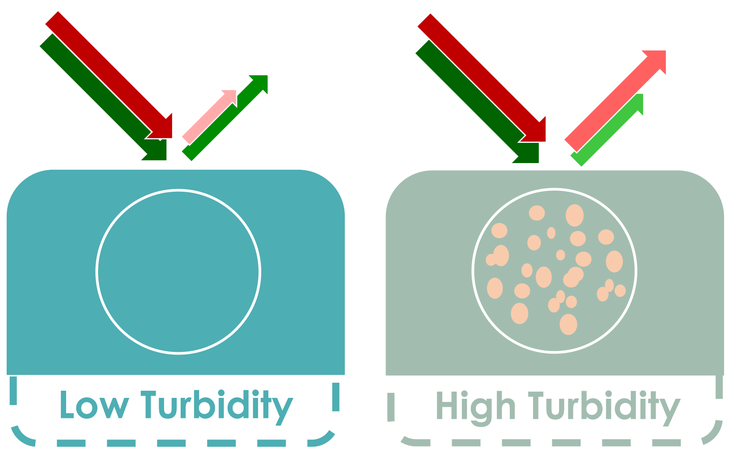
Sediment rapidly accumulates behind the Willwood Dam (northwestern Wyoming, USA). Sediment must be released downstream to continue operation of the dam. High concentration sediment releases can cause problems such as:

- Impaired fish spawning and aquatic insect habitat, **threatening native biodiversity**.
- **Diminished recreation opportunities** such as rafting and angling, which **reduces tourism profits** as well as community member quality of life.
- **Local agriculture** depends on continued dam operation for irrigation.

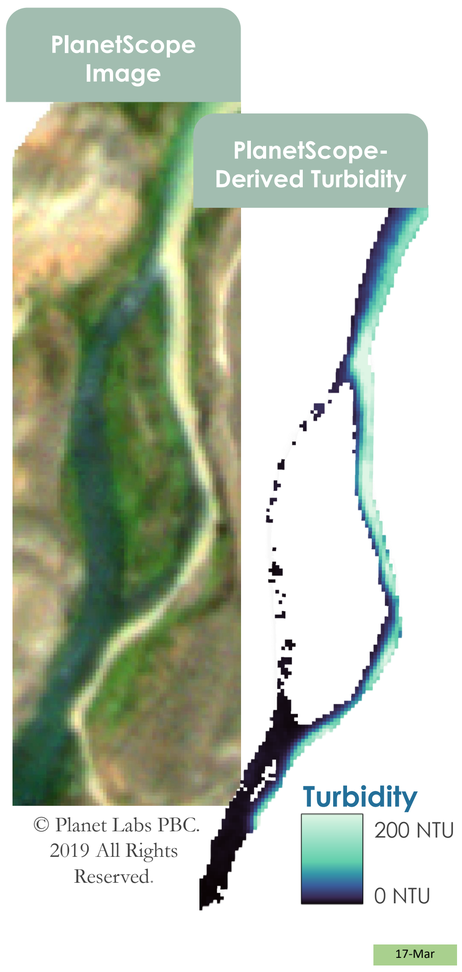
Solutions

① Turbidity Remote Sensing

Suspended sediments changes river surface reflectance, allowing turbidity (a measure of light scatter) to be measured by satellites.



This allows us to map turbidity along the Shoshone River and **identify tributaries causing sediment plumes**.



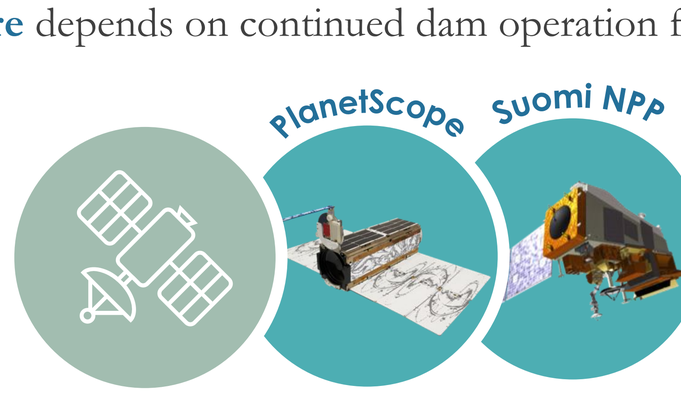


Image Credits: NASA, Planet Labs PBC

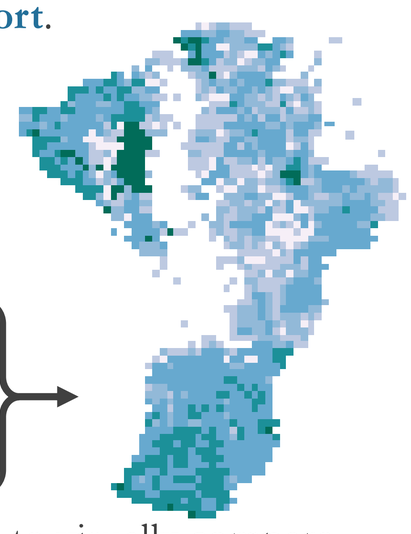
② Snow Cover Remote Sensing

Snow cover data, derived from Suomi NPP Visible Infrared Imaging Radiometer Suite snow product, was used to **correlate trends in snow cover** with other factors that **influence sediment transport**.

$$NDSI = \frac{(Green - SWIR)}{(Green + SWIR)}$$

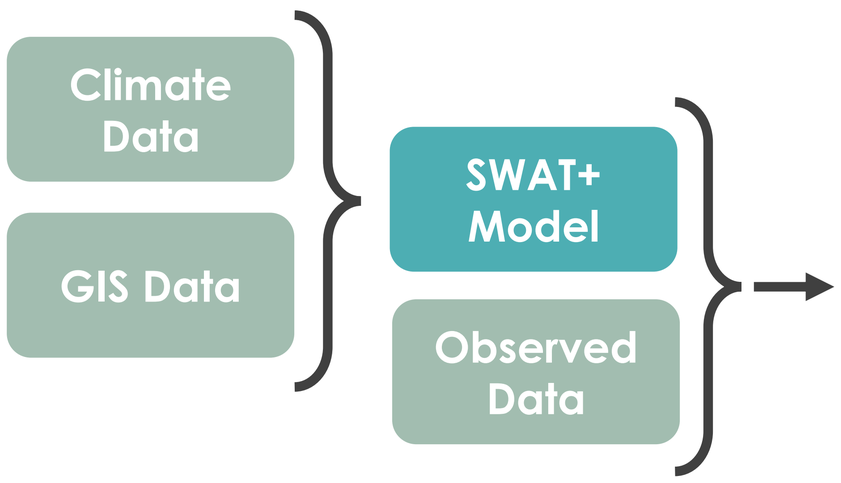
Values scaled for the VNP10A1F Product

NDSI	Classification
0-10	No Snow
10-100	Snow
>201	No Decision



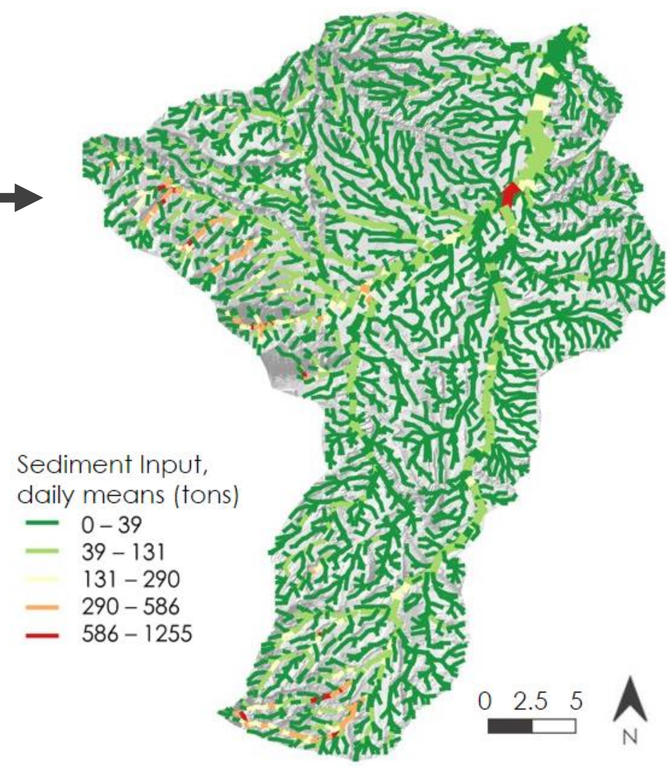
Time series graphs were used to visually compare multiple variables to better understand relationships among different hydrologic factors.

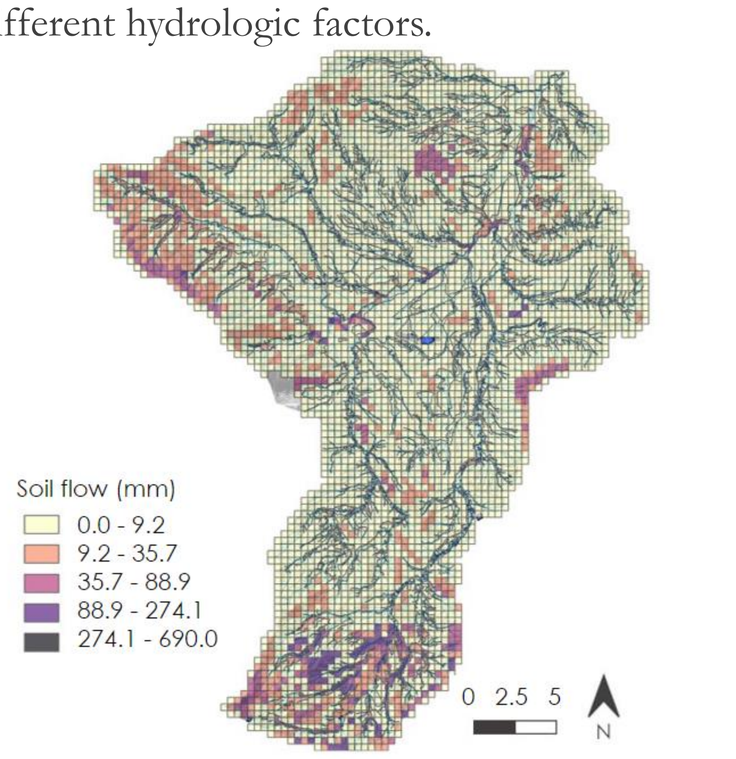
③ Hydrologic Modeling



Soil and Water Assessment Tool+ (SWAT+)

- Visualizes **sediment flow** by channel (left) and soil flow into channels (right)
- Identifies **high sedimentation** regions in the western and southern basins
- Highlights specific **target areas** for environmental remediation





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Project Partners

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