



IDEAS-Watersheds



IDEAS
WATERSHEDS

Interoperable Design of Extreme-scale Application Software (IDEAS) – Watersheds

What Is IDEAS-Watersheds?

The IDEAS-Watersheds project aims to improve the scientific community's capacity to simulate the hydrological and biogeochemical function of the nation's watersheds by advancing and demonstrating a software ecosystem of interoperable, high-performance simulation and workflow tools.

Why Model Watersheds?

The streams, rivers, ecosystems, and soils of healthy watersheds buffer precipitation events and remove or transform sediments, excess nutrients, and inorganic elements, thus helping ensure that clean and abundant water is available for energy production, ecosystem health, municipal use, and agriculture. Growing water demand, land-use change, and Earth system change are placing new stresses on watersheds and how they function. Advanced process-based modeling tools are essential for understanding and predicting the effect of those stressors on both water supply and quality.

Accelerating Watershed Science Through a Community-Driven Software Ecosystem

- **Agile capacity:** Interoperable components promote reuse and sharing of capabilities to minimize new development
- **Sustainable and reproducible:** Open-source high-quality software releases
- **Transferable:** Process-based models, informed by site data, allow observable system-level behavior to emerge from the interaction of coupled processes
- **Accessible:** Laptops to super-computers, native builds and ready-to-go containerization



11 BER PROJECTS USING
ECOSYSTEM CODES
AND TOOLS

5
OPEN-SOURCE
CODE RELEASES
PER YEAR

>90
ATTENDEES
OF SHORT
COURSES

Project Approach

IDEAS-Watersheds partners with interdisciplinary watershed-focused projects at national laboratories to enhance hydro-biogeochemical simulation capacity and demonstrate its application to targeted science questions. The partnerships jointly advance an ecosystem of interoperable high-performance software tools built from reusable, robust, and scalable components and libraries. To ensure reliability, sustainability, and reproducibility of the software ecosystem, the IDEAS-Watersheds project develops shared workflow tools to facilitate complex data-intensive simulations, supports software stewards who coordinate maintenance and development activities, and trains early career scientists in watershed modeling and modern software development practices.

Study Areas

IDEAS-Watersheds partnerships study watershed function over a wide range of scales and disparate land-use and ecosystem conditions. Study areas include the East River and Taylor River watersheds in the Upper Colorado River Basin, multiple watersheds within the Tennessee River Basin, and the Yakima River Basin.



More Information

IDEAS-Watersheds

ideas-watersheds.github.io



ESS Program

ess.science.energy.gov



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