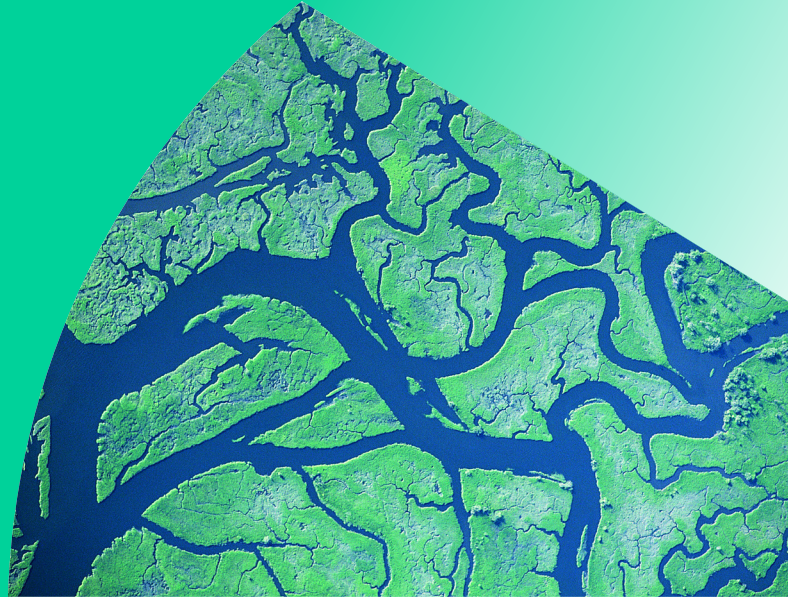


WEAP: Water evaluation and planning system

A tool for sustainable water analysis



SEI fact sheet
March 2023

WEAP[®] is a software tool for integrated water resources planning. It provides a comprehensive, flexible and user-friendly framework for policy analysis. A growing number of water professionals find WEAP to be a useful addition to their toolbox of models, databases, spreadsheets and other software. A detailed technical description is available in the WEAP User Guide, available for download from weap21.org.

Many regions face increasingly formidable freshwater management challenges, grappling with issues such as allocation of limited water resources, environmental quality and policies for sustainable water use. Conventional supply-oriented simulation models are not always adequate.

Background

WEAP incorporates an integrated approach to water development into a practical tool for water resources planning, encompassing demand-side issues, water quality and ecosystem preservation and protection. It places water demand – water use patterns, equipment efficiencies, reuse, costs and allocation – on an equal footing with the supply side – streamflow, groundwater, reservoirs and water transfers. WEAP is a laboratory for examining alternative water development and management strategies.

The tool is comprehensive, straightforward and easy to use, serving to assist rather than substitute for the skilled planner. As a database, WEAP provides a system for maintaining water demand and supply information. As a forecasting tool, WEAP simulates water demand, supply, runoff, stream flows, storage, pollution generation, treatment and discharge, and instream water quality. As a policy analysis tool, WEAP evaluates a full range of water development and management options, and takes account of multiple and competing uses of water systems and costs.

The WEAP approach

WEAP is useful for municipal and agricultural systems, single subbasins or complex transboundary river systems. Moreover, WEAP can address a wide range of issues, such as sectoral demand analyses, water conservation, water rights and allocation priorities, rainfall runoff and baseflow, groundwater and streamflow simulations, reservoir operations, hydropower generation, water quality, ecosystem requirements, and financial analyses.

It captures the complexities of a water system: its various supply sources; withdrawal, transmission and wastewater treatment; ecosystem requirements, water demands and pollution generation. The data structure is customizable to accommodate a particular analysis or limits of data availability.



WEAP screen © SEI



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Stockholm Environment Institute is an international non-profit research and policy organization that tackles environment and development challenges. We connect science and decision-making to develop solutions for a sustainable future for all.

Our approach is highly collaborative: stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions, and equip partners for the long term.

Our work spans climate, water, air, and land-use issues, and integrates evidence and perspectives on governance, the economy, gender and human health.

Across our eight centres in Europe, Asia, Africa and the Americas, we engage with policy processes, development action and business practice throughout the world.

WEAP highlights

- Integrated water resources planning system
- Scenario-based analysis
- GIS-based graphical interface
- User-defined variables and equations
- Dynamic links to MODFLOW, MODPATH, QUAL2K, and other models and spreadsheets
- Financial cost-benefit analysis
- Fast solution algorithms
- Flexible data structures
- User-friendly interface
- User guide, tutorial and online user support forum

Scenarios

Scenario analysis is central to WEAP. WEAP can address a wide range of questions, such as:

- What if **demographic or economic patterns** change?
- What if **water conservation** is introduced?
- What if **ecosystem requirements** are tightened?
- What if the **mix of agricultural crops** changes?
- What if **groundwater** is exploited more?
- What if **reservoir** operating rules are altered?
- What if **climate change** alters demand and supply?
- How will changes affect **financial costs and benefits**?
- How does **pollution** affect water quality?
- How do **short-term weather forecasts** affect supply?
- How will **rising CO₂ levels** affect crop yields?

Powerful tools

An intuitive **GIS-based** graphical interface allows users to construct, view and modify the user-designed schematic of the water system overlaid on ArcView and other standard GIS files. Data can be edited directly with a click. **Wizards** and prompts provide advice throughout the program. With WEAP's flexible and comprehensive reporting system, the user can **customize reports**, which may be saved as "favorites." All tables can be exported directly into Excel. Extend WEAP's built-in models by using scripting and links to external models and data.

Applications

Hundreds of projects in more than 180 countries have used WEAP for integrated water resource planning and applying Robust Decision Support, including:

- **China:** developing scenarios to support a multi-stakeholder dialog on competing uses of water resources and water-energy-food (WEF) nexus
- **Africa:** addressing issues of water resources including a new WEAP feature to calculate water stress (SDG 6.4.2), development and infrastructure, as well as macroeconomic modeling and WEF nexus
- **Central Asia:** macroeconomic modeling with WEF nexus for climate resilience
- **Colombia:** evaluating climate and land use change impacts on environmental flows and river flooding
- **Middle East:** establishing alternative water development and allocation scenarios in a process involving Jordanian, Israeli and Palestinian participants
- **India and Nepal:** exploring water supply and conservation options in the region's diverse water conditions
- **California:** evaluating effects of climate and policy changes on water supply and ecosystem services, and WEF nexus

Learn more, read the latest enhancements, watch a demo and more at weap21.org.

