SCALABLE REGULATORY MACHINE-LEARNING FRAMEWORK FOR U.S. WATER RESOURCES

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PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2025/015313	01/16/2025	2023-146

Additional Patent Pending

BRIEF DESCRIPTION

Navigating the complex regulatory landscape of the 1972 Clean Water Act often requires labor-intensive site visits and inconsistent jurisdictional determinations. To streamline this process, researchers at UC Berkeley have developed a machine learning framework that assesses which water resources fall under federal protection. By training a model on 150,000 historical jurisdictional determinations made by the Army Corps of Engineers and integrating high-resolution aerial imagery with geophysical data, the system can predict regulatory status with high precision. This technology quantifies the impact of shifting legal definitions, such as illustrating how a 2020 White House rule deregulates approximately 608,000 stream miles and 32 million wetland acres compared to previous Supreme Court standards.

SUGGESTED USES

» Regulatory Compliance: Providing developers and land managers with rapid, automated assessments of whether specific water bodies require federal permits.

» Policy Impact Analysis: Helping government agencies and environmental groups simulate the real-world effects of proposed changes to environmental rules.

» Conservation Planning: Identifying critical wetlands and streams that have lost federal protection to prioritize state-level or private conservation efforts.

» Infrastructure Design: Supporting large-scale project planning by mapping jurisdictional waters across entire counties or states using remote sensing data.

» Hydrological Mapping: Enhancing geophysical databases with high-confidence predictions of surface water connectivity and environmental significance.

ADVANTAGES

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INVENTORS

» Shapiro, Joseph S.

OTHER INFORMATION

CATEGORIZED AS

» **Computer**
» Software
» **Environment**
» Other
» Sensing
» **Imaging**
» Remote Sensing
» **Sensors & Instrumentation**
» Scientific/Research

RELATED CASES

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High-Throughput Analysis: Replaces manual, case-by-case determinations with a scalable system capable of evaluating thousands of sites simultaneously.

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Objective Consistency: Reduces the variability inherent in human jurisdictional determinations by utilizing standardized aerial and geophysical inputs.

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Dynamic Modeling: Allows for the immediate recalculation of federal jurisdiction across the entire country following Supreme Court rulings or executive rule changes.

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Data-Driven Transparency: Provides a clear, quantifiable template for how machine learning can be applied to complex regulatory implementation problems.

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Resource Optimization: Frees up personnel from the Army Corps of Engineers to focus on more complex field validations while the model handles routine screening.

RELATED MATERIALS

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