

Research Initiatives for Restoration and Regulation

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Ecological restoration offers unique opportunities for large-scale experiments grounded in fundamental ecological theory. However, there exists a notable gap between restoration of habitats and ecosystems from the practical application of restoration ecology to the conceptual underpinnings of ecological science. Efforts to bridge this divide have been underway since as early as 1987, with scientists recognizing the mutual benefits of integrating restoration ecology and academic-based conceptual knowledge. The declaration of a "decade of ecosystem restoration" by the UN in 2019 has propelled a surge in restoration science across diverse sectors, fostering numerous potential connections with previously isolated scientific theories.

As global interest and investment in restoration and ecosystem improvement continue to grow, there is a critical opportunity for experts and policymakers to leverage this momentum to enhance the scientific understanding of ecological restoration. Practitioners in various fields, such as carbon markets, regenerative agriculture, forest revegetation, wildlife biology, and waterway protection, can derive substantial benefits from a more seamless integration of practical application with conceptual theories. While emerging environmental markets can benefit, focusing on established markets, such as the 1972 Clean Water Act and the 2008 Federal Compensatory Mitigation Rule, may prove to be easier to integrate ecological theory into acceptable and widely adopted restoration ecology practices. In light of recent shifts in waterway protection policies at the Federal level, there is perhaps a more urgent need to increase the science and knowledge-base surrounding current restoration projects of our streams and wetlands.

While the stream compensatory mitigation field has high regulatory oversight, with both federal and state policies, there exists room for refinement in the scientific approach. Stream design engineers and ecologists alike can benefit from integrating ecological theory into restoration practices, including initial design of stream and riparian habitat restoration, as well as elevated sophistication in the types of data collected throughout required monitoring periods. Given the increased demand for comprehensive data to demonstrate the determined performance standards of waterway restoration projects, this field of restoration ecology is well-positioned to benefit significantly from the integration of ecological theory.

This presentation delves into the potential mechanisms for integrating ecological theory into the application of restoration ecology. Key topics include proposed research programs for inclusion in stream compensatory mitigation projects, including various data collection methods and hypotheses outlined in detailed flow charts. Additionally, considerations are given to potential coalitions capable of spearheading such initiatives, and the exploration of viable funding mechanisms.

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