From recovery to resilience: Measuring and evaluating river restoration programs

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Key points

- We evaluated the Riverbank Rehabilitation Project (2021–2026), a Local Land Services-led disaster recovery initiative established in response to the 2021–2022 NSW floods to deliver riverbank rehabilitation, landholder support, and waterways approvals improvements across two funded phases worth $18.5 and $30M, respectively.
- Each systems-based evaluation used a mixed-methods approach to assess river restoration outcomes, governance, monitoring systems, and long-term program effectiveness.
- Findings from the Phase 1 evaluation directly informed improvements to the $30M Phase 2 program, strengthening governance, monitoring systems, adaptive management, and stakeholder engagement.

Abstract

The Riverbank Rehabilitation Project is a joint NSW and Australian Government initiative delivered by Local Land Services to support recovery and long-term resilience in flood-affected catchments along the east coast of NSW following the 2021 and 2022 flood events. Funded under Disaster Recovery Funding Arrangements (Category D), the $48.5 million program conducted over two phases, focused on targeted stabilisation of severely eroded riverbanks, protecting high-value environmental, agricultural and cultural assets, and helping landholders navigate complex waterways approval processes.

Traditional linear evaluation approaches do not adequately account for the complexity of interactions that underpin riverine recovery. As such an independent systems evaluation conducted in 2025 assessed Phase 1 (2021-2026) against NSW Treasury Evaluation Guidelines and the project's Monitoring, Evaluation and Reporting Plan. Using a mixed-methods approach, the evaluation found the program evolved significantly during delivery. Early governance, monitoring, and administrative challenges were gradually addressed as systems, processes, and roles matured.

The evaluation acted as a catalyst for broader improvement. Evaluation findings directly informed the adaptive management of the $30 M Phase 2 (2023-2026) program, strengthening governance, embedding monitoring and adaptive management, and enhancing engagement with landholders and First Nations communities. These changes translated early lessons into a more refined delivery model, positioning Phase 2 to deliver stronger environmental outcomes and long-term riverbank resilience across NSW.

Keywords

Riverbank restoration, Flood recovery, Program evaluation, Adaptive management, Disaster recovery funding

Introduction

The Riverbank Rehabilitation Project (RRP) (Phase 1: September 2021–December 2026) was established in response to the severe flood events of 2020 and 2021, which caused widespread riverbank erosion and waterway damage across the North Coast, Greater Sydney, and Hunter regions of New South Wales. Further severe flooding in 2022 prompted additional investment through Phase 2 (November 2023–June 2026). Collectively, the NSW and Australian Governments committed $48.5

million under the Category D Disaster Recovery Funding Arrangements (DRFA) to rehabilitate and protect flood-affected riverbank sites across 11 priority catchments: Bellinger, Brunswick, Clarence, Hastings, Hawkesbury, Hunter, Macleay, Manning, Nambucca, Richmond, and Tweed.

This investment was unprecedented for environmental, agricultural, and cultural restoration under DRFA funding, which had previously focused on infrastructure protection. The program triggered formal evaluation requirements under NSW Treasury Evaluation Guidelines TPG22-22 (NSW Treasury, 2023), including assessment of outcomes, implementation processes, and value for money.

However, evaluating outcomes related to cultural, environmental, and agricultural values, community capacity and resilience, and First Nations engagement, remains challenging because of complex social and ecological processes, limited monitoring systems, long timeframes for outcomes to emerge, and difficulties in establishing clear causal relationships (Roni et al., 2018; Bariteau et al., 2013; Pinto et al., 2016; Marteau et al., 2018). The RRP therefore provides an important case study for how evaluation practice can be strengthened in large-scale river restoration and disaster recovery programs.

Case study: Riverbank Rehabilitation Project

The Phase 1 RRP ($18.5 million budget) operated across seven catchments and included two workstreams: on-ground works and landholder advisory support. Phase 2 RRP ($30 million budget) expanded the scope to include those seven catchments plus an additional four catchments. To achieve its intended Objectives and Outcomes (Table 1; Figure 1), RRP Phase 2 was conducted via five workstreams: on-ground riverbank works, Cultural Waterways Program, Riverbank Erosion Advisory Service, extension and engagement and streamlining the waterways approvals process for landholders.

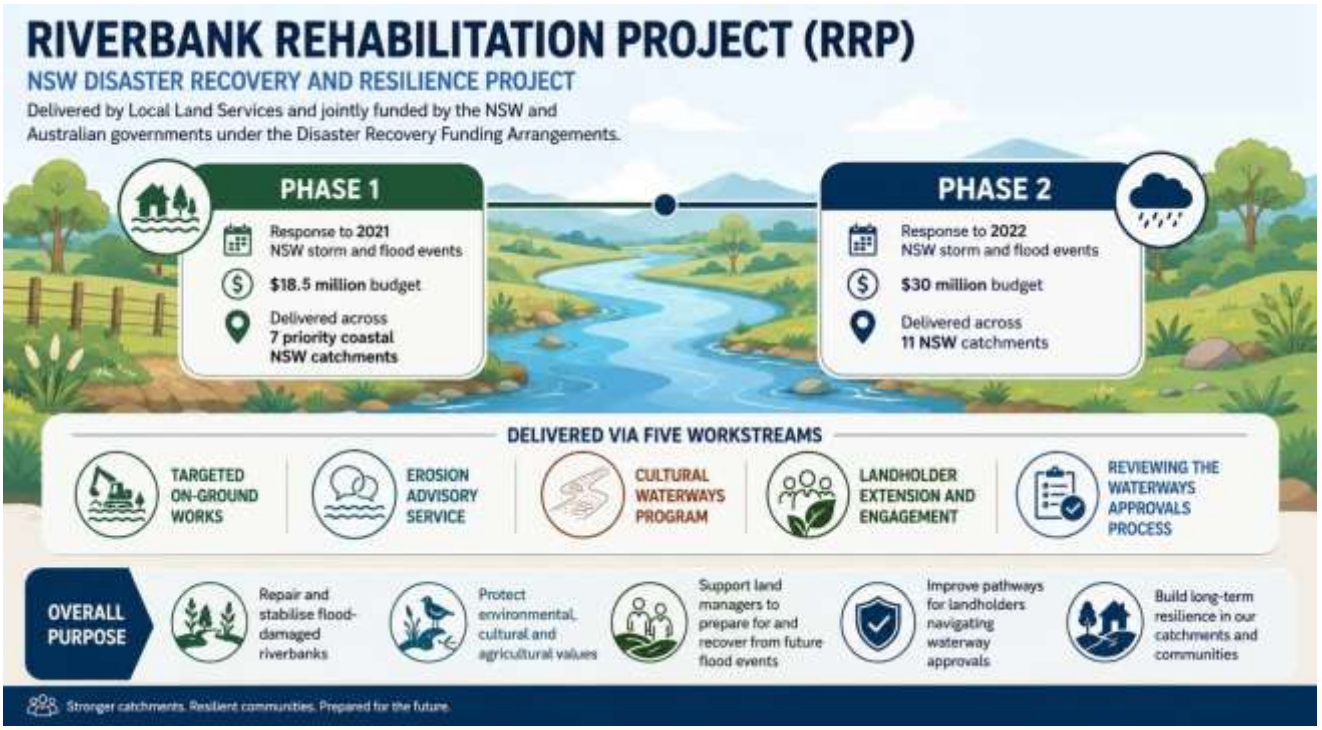

Figure 1 The Riverbank Rehabilitation Project

Table 1 RRP Outcomes and intended outcomes

Objective	Intended Outcome
Deliver Targeted Riverbank Rehabilitation works to protect and enhance environmental, cultural, and agricultural values	Sites of environmental, cultural and agricultural value are enhanced to be more resilient to further flood events.
Support land managers to prepare for, respond to and abate the impacts of future disaster events	Improved landholder willingness to seek approvals and undertake compliant riverbank rehabilitation works
Identify opportunities to streamline the waterway approvals process	Approving agencies improve the approvals process for landholders

Recognising that river restoration involves dynamic interactions between ecological, social, governance, and community systems rather than a linear sequence of inputs and outcomes, the RRP evaluation adopted a systems-based framework instead of a traditional program logic approach. Conducted in line with TPG22-22 (NSW Treasury, 2023), the evaluation was delivered in two stages: Phase 1 in 2025 and Phase 2 in 2026.

Each Phase of the project included targeted online workshops with key stakeholders, including the Steering Committee, Regional Working Group, and Soil Conservation Services, to gather qualitative evidence on program performance, governance, outcomes, and future delivery. Facilitated discussions aligned to the Key Evaluation Questions were used to test findings, identify changes over time, and assess program effectiveness, value for money, and lessons for future design. Findings were analysed alongside desktop review and other consultations to inform the final evaluation and future and continuing program decision-making.

At the time of writing, the Phase 2 evaluation is still underway. It applies the same systems-based methodology, with a stronger focus on adaptive management responses to Phase 1 recommendations, combined value for money across both phases, and capturing knowledge to support Local Land Services' future riparian management projects.

Challenges in evaluating riverbank restoration

Key challenges identified included the absence of baseline data to measure change over time, limited long-term monitoring data for environmental and social outcomes, a lack of stakeholder outcome data to assess behavioural change and community impacts, and short evaluation timeframes that constrained the assessment of long-term resilience and program legacy (2rog Consulting, 2025). These limitations reduced the suitability of a traditional linear evaluation approach focused on predefined inputs and outcomes, leading to the adoption of a systems-based evaluation framework better suited to capturing the complex, adaptive, and interconnected nature of river restoration across ecological, governance, and community systems.

Using a program logic-based evaluation framework versus a systems-based evaluation framework

Program logic–based evaluation frameworks are limited in complex environmental and disaster recovery programs because they assume linear relationships between activities and outcomes, overlooking dynamic system interactions, feedback loops, adaptive processes, and external influences such as climate variability, policy change, and stakeholder behaviour. In environmental restoration contexts, long-term outcomes often extend beyond standard evaluation timeframes, while limited baseline data and monitoring further constrain assessment, resulting in a focus on measurable outputs over broader resilience, behavioural change, and adaptive capacity.

In contrast, a systems-based evaluation framework recognises river restoration as a dynamic interaction between ecological, social, governance, and community systems rather than a linear sequence of inputs and outcomes (Dyehouse et al., 2009; Torres-Cuello et al., 2018) (Figure 2). Using document review, interviews and stakeholder workshops, the evaluations examined the contribution of

individual workstreams and their interaction as an integrated system. Findings highlighted how learning generated through one workstream informed the design and delivery of others, supporting adaptive program improvement. Together, the workstreams enhanced riverbank resilience through improved approvals processes, increased landholder capability, and targeted on-ground recovery and resilience works. The Cultural Waterways workstream demonstrated the RRP's integrated systems approach by linking Aboriginal knowledge, cultural values and risk management with river recovery activities, improving cultural outcomes and organisational capability, although through integrated evaluation it was found that cultural considerations were not always embedded early enough to influence site selection and investment decisions.

By focusing on interdependencies between ecological, social, community and governance systems, adaptation, and emergent outcomes, the framework enables assessment of system resilience, governance capacity, stakeholder behaviour, and long-term environmental recovery. The ongoing RRP evaluation therefore provides a robust, evidence-informed assessment of project performance and legacy, while informing Phase 2 delivery and broader post-disaster environmental program delivery.

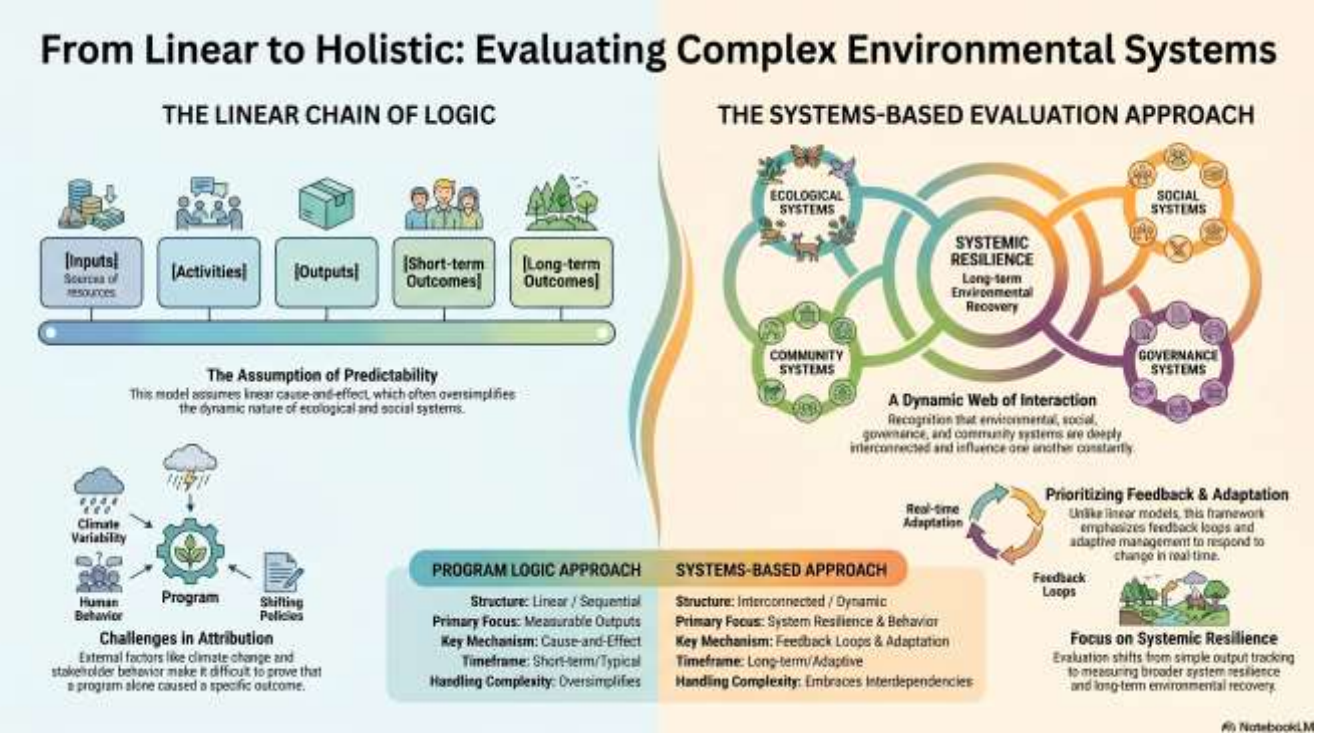

Figure 2 The Riverbank Rehabilitation Project Program Logic versus Systems evaluation approach

Conclusions

Evaluating river restoration programs is essential for ensuring effective investment and long-term resilience. The RRP highlights both achievements and limitations in current practice. By adopting structured, systems-based evaluation frameworks, future programs can better measure outcomes and improve performance over time. The RRP demonstrates that evaluation must be embedded from program inception. By using a system-based evaluation framework, and paying service to the complex interplay of environmental, social, agricultural, cultural and feedback loops should function as a continuous learning mechanism rather than a retrospective assessment of more linear approaches to evaluation of large-scale riverbank rehabilitation programs.

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