

Summary

Transforming agricultural practices—or entire farming systems—may seem ambitious or even utopian. However, the trans4num approach promotes a stepwise, reflective and iterative process to integrate nature-based solutions (NBS). This method benefits individual farm sites and cumulatively contributes to a broader shift from linear to circular nutrient management.

The need

Intensive farming systems are increasingly challenged by persistent environmental issues such as nutrient runoff, soil degradation, and declining biodiversity. Traditional nutrient management practices often fail to address these challenges adequately, resulting in significant negative ecological impacts that extend beyond the farm. By integrating NBS such as cover crops, riparian buffer strips, and agroforestry, farmers have the opportunity to recycle nutrients effectively, improve soil fertility, and mitigate environmental damage.

A key challenge is that no single solution can be universally applied; each farm has unique characteristics such as soil type, climate, and existing management practices. A range of locally adapted strategies is necessary to generate meaningful, cumulative changes that pave the way for a transformation from linear to circular nutrient management.

Moreover, there is a critical need for a stepwise and reflective approach. Each intervention must be evaluated to ensure it contributes not only to local improvements but also to the transformation toward circular nutrient management. This methodical progression helps prevent missteps and ensures that the innovations adopted are both effective and sustainable over the long term.



The benefits

Adopting a stepwise approach in nutrient management offers several significant benefits for both individual farm operations and the broader agricultural community. **It creates a dynamic network among farmers, advisors, and other stakeholders who share a common interest in sustainable practices.** This collaborative environment facilitates the exchange of experiences, challenges, and solutions, thereby building a strong support system that can accelerate innovation adoption across regions.

By reflecting on the outcomes of each incremental change, farmers can continuously refine their practices. This ongoing evaluation process is crucial—it allows for adjustments based on real-world performance, ensuring that practices not only meet immediate operational needs but also contribute meaningfully to the goal of circular nutrient management. This reflective cycle fosters a culture of continuous improvement and learning, making the transition more resilient to unforeseen challenges.

Furthermore, a stepwise transformation process lowers risks associated with radical changes by breaking down the transformation into manageable phases. Each small success reinforces confidence and builds momentum, which can eventually lead to more substantial systemic shifts. The benefits extend to the environmental realm as well, as each incremental improvement can result in reduced fertilizer costs, better soil health, enhanced water quality, and increased biodiversity. Ultimately, this approach supports sustainable agricultural development that benefits current farm operations while ensuring a viable future for the next generations.



SMALL ACTIONS IN LIGHT OF TRANSFORMATION



trans4num solution

A Gradual Yet Transformative Approach

The trans4num project embodies an incremental yet transformative approach to rethinking nutrient management. Our strategy is built on the recognition that agricultural systems are inherently complex and that achieving radical change requires a gradual, well-monitored process. Rather than pursuing an abrupt overhaul, trans4num promotes a series of deliberate, small-scale innovations that cumulatively drive circular nutrient management transformation.

Local Implementation & Empirical Trial Sites

At the heart of the trans4num approach is the implementation of NBS at trial sites. These sites serve as living laboratories where local knowledge and innovative practices are harnessed to create tailored solutions that meet specific environmental and operational needs. By starting at a manageable scale, farmers can experiment with NBS such as cover crops or constructed wetlands, gather empirical data, and adjust practices accordingly before wider adoption.

Stepwise Adaptation & Scalable Innovation

Incremental steps are designed not just as isolated improvements, but as interconnected milestones that gradually shift the overall system towards circular nutrient management. Each small transition—from initial trials to broader implementation—adds to the momentum of change, demonstrating the practical benefits and feasibility of new approaches. Moreover, by continuously reflecting both short-term barriers (such as resource limitations and knowledge gaps) and lock-ins (like entrenched intensive practices and weak governance structures), the trans4num framework is able to dynamically navigate interventions in a way that ensures their transformative potential through stepwise adaptations. The solution also emphasizes scalability and adaptation. As successful local innovations are identified, they can be scaled out and up to other contexts, ensuring that the cumulative impact of individual initiatives contributes to the overarching goal of a circular, sustainable nutrient management system. This adaptive framework not only supports current improvements but also lays the groundwork for long-term structural changes.

What were the challenges / limitations in the implementation process?

- A key challenge in implementing transformative nutrient management lies in identifying and addressing barriers and drivers within complex agricultural systems. It requires an understanding of the current lock-ins—such as entrenched practices, institutional inertia, power dynamics and resource limitations—that can hinder change. Additionally, practitioners must continuously reflect on their own actions, knowledge, and limitations to ensure that each step taken genuinely contributes to transformation. This reflective process is essential to adapt strategies and overcome both immediate obstacles and entrenched constraints over time.

What kind of resources do you need to implement the proposed solution?

- Successfully implementing this solution calls for the mobilization of human and institutional resources, particularly by building networks of like-minded individuals and initiatives. Leveraging the experience of those who have already navigated similar practices is valuable, as they can share insights on effective strategies as well as potential hindering factors. Access to collaborative platforms, technical expertise, and financial support further strengthens the capacity to trial, adapt, and scale out NBS across diverse farming contexts.

SMALL ACTIONS IN LIGHT OF TRANSFORMATION



More information

- [Report on transformation pathways towards innovative NBS](#)
- [trans4num NBS site in Denmark](#)
- [trans4num NBS site in Hungary](#)
- [trans4num NBS site in The Netherlands](#)
- [trans4num NBS site in The United Kingdom](#)
- [trans4num NBS site in China](#)

