



# Leading at the Edge

A Roadmap to Advance  
Edge of Field Practices in Agriculture



## COMMITTED COLLABORATION

A sector-wide commitment is needed to take action that brings us closer to an integrated, whole-farm, landscape-based approach to working lands conservation. To accelerate this movement, The Nature Conservancy (TNC), the Soil and Water Conservation Society (SWCS), and Meridian Institute brought together more than two dozen experts: senior leaders from agriculture, the supply chain, civil organizations, as well as former government officials. These experts partnered on the development of a cohesive set of recommendations that, if implemented together, will accomplish our collective goal for working lands conservation.

Partners met virtually six times over the course of six months in 2020. They analyzed the current state of the science underpinning edge of field (EoF) practices, reviewed the current policies and programs in place, and developed a shared understanding of efforts underway that both encourage and discourage EoF practice adoption. Building upon this knowledge base, the partners engaged in an iterative process to brainstorm and refine ideas for transformative change. These ideas were synthesized into a framework for action and the nine recommendations that comprise the Roadmap. (See back page for list of Partners.)

## CALL TO ACTION

This Roadmap is a call to action for conservation groups, policy makers, farmers, farm organizations, supply chain companies and other agricultural stakeholders. Working collaboratively, stakeholders can elevate public awareness of EoF practices and the role they can play in helping the U.S. agricultural system meet environmental goals. If implemented, this Roadmap can help drive EoF adoption at scale, which is essential for improved water quality and resilient communities. Greater collaboration between agriculture stakeholders and a clear process for advancing adoption of practices will lead to greater sharing of EoF information, resources, and success; increased partnerships; and coordinated action. We invite you to dive deeper into the Roadmap and learn about the science, policy, and market opportunities identified. Then, join the movement to transform our agricultural landscapes—both in-field and on the leading edge of agriculture.

Download the full [Edge of Field Roadmap report at: nature.org/EdgeofField](https://www.nature.org/EdgeofField)

◀ Cover: Prairie strip © NRCS/SWCS photo by Lynn Betts  
■ This page: Saturated buffer © NRCS/SWCS photo by Lynn Betts  
▶ Pages 4-5: ©TNC (Illustration by Liam Munroe)

Many of the photos in this document came from the Soil and Water Conservation Society's Conservation Media Library, a multimedia resource open to all: [www.swcs.org/resources/conservation-media-library](http://www.swcs.org/resources/conservation-media-library)

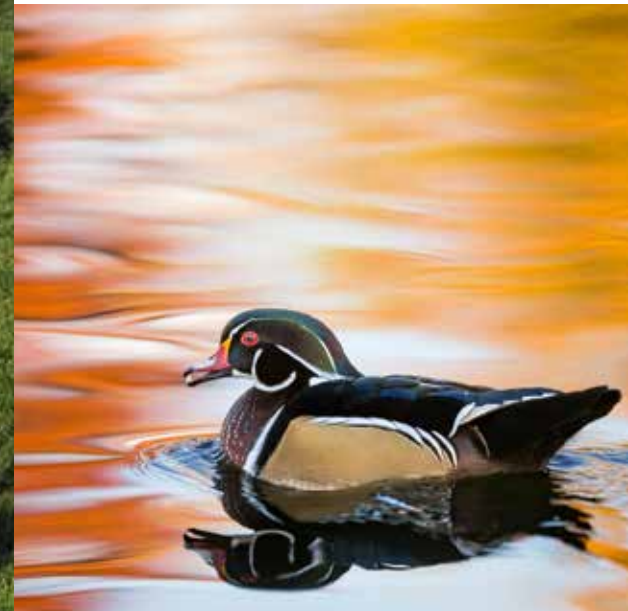
# EXECUTIVE SUMMARY

## INTRODUCTION

Farmers hold the key to help solve a number of environmental challenges. Science indicates that moving to a regenerative agricultural system—one that is focused on improving nutrient management and rebuilding soil health in farm fields—can deliver dramatic benefits for farmers and improve environmental outcomes. Research also suggests that tackling nutrient loss challenges within the field is not enough. Even widespread adoption of soil health and nutrient management practices won't meet state and regional water quality goals or restore critical habitat for wildlife. We must create conservation opportunities at the edges of farm fields, as well.

Farmers across the United States have successfully installed edge of field (EoF) practices to better manage water and filter nutrients and sediments from water leaving their fields. Individual farmers have seen the benefits of these conservation practices firsthand. Yet, more farmers need to implement these practices on a larger scale and at a faster rate to achieve meaningful environmental improvements. How can that happen? Coordinated and collective actions across the agriculture community can increase incentives, create more technical capacity and knowledge, and expand awareness and acceptance—all aimed at catalyzing widespread adoption of EoF practices to meet water quality and biodiversity goals.

**We must create conservation opportunities at the edges of farm fields, as well.**



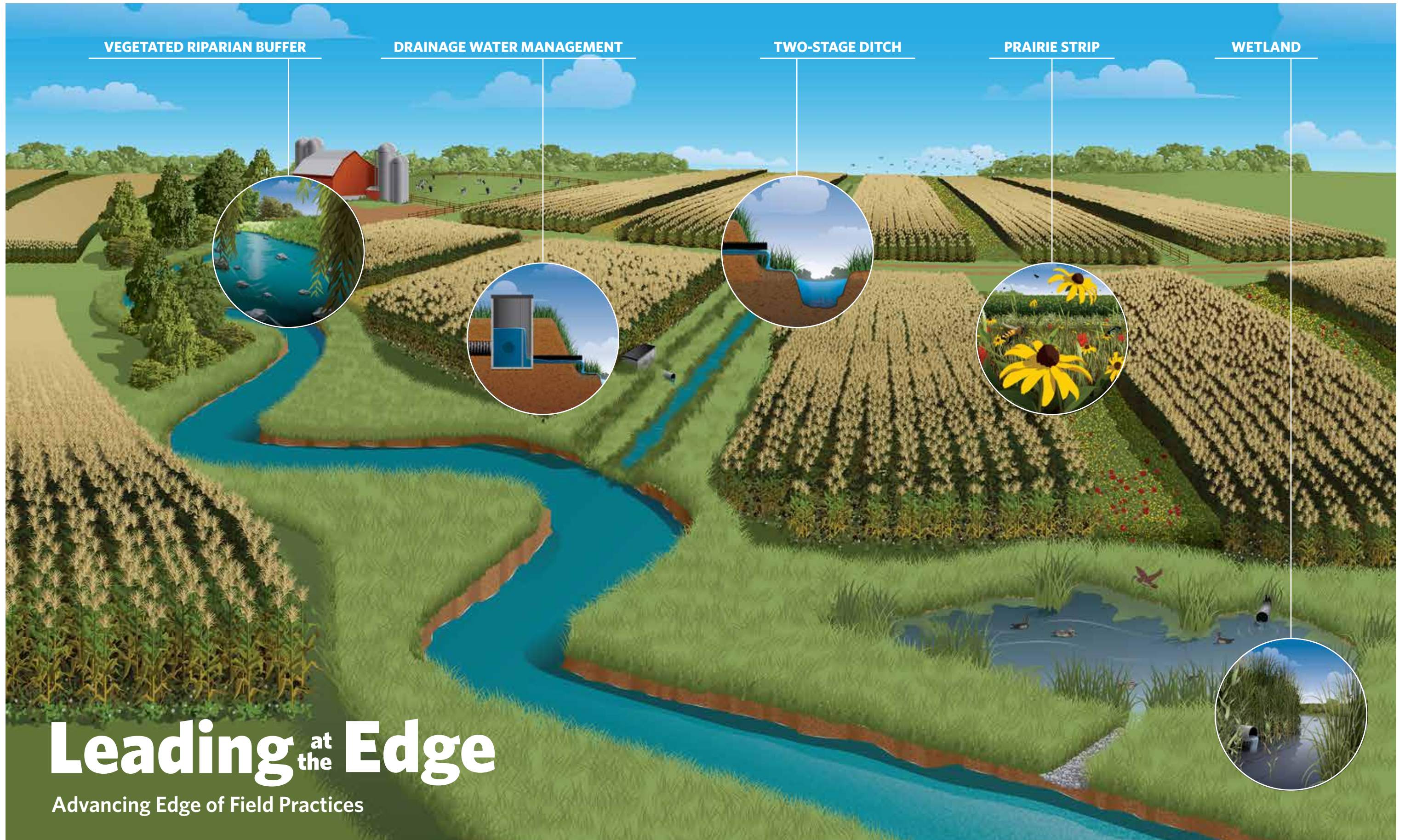
▲ Edge of field wetlands help remove harmful nutrients from water runoff before it reaches major bodies of water. These wetlands also provide habitat for wildlife like this wood duck. © Jeff Goudy

## THE NEED

Throughout the United States, many of the natural landscape features that would slow, filter, and store water leaving farm fields have been altered or removed to support increased agricultural and urban development. Over a 200-year period beginning in the 1780s, the United States lost more than 50% of its historical wetlands. The portion of wetlands lost jumps to 80% in the Midwest states of Illinois, Indiana, Iowa and Ohio for the same time period (Dahl 1990). Also, habitat along rivers and streams has declined by an estimated 65% nationwide (Swift 1984), and only small remnants of once expansive grasslands remain. Additionally, the altered hydrology resulting from extensive implementation of tile drainage in some parts of the country has transformed and accelerated the ways water and nutrients move over and through the landscape (Sugg 2007).

These landscape changes have fragmented wildlife habitat, increased nutrient loads to surface waters, and made our watersheds more vulnerable to extreme precipitation events. On farms, increased flooding has led to crop failures, limited access to fields for planting, and reduced crop yields (Jager et al. 2020). Due to high nitrate levels, some downstream communities incur higher costs to provide safe drinking water (Tang et al. 2018). Further downstream, nutrient losses from agricultural fields contribute to significant long-term water quality challenges that impact people and nature.

Each year in the Gulf of Mexico, a hypoxic zone—an area of low to no oxygen—covers on average more than 5,400 square miles, an area roughly the size of Connecticut (USEPA 2000). This “dead zone” is uninhabitable to marine life and is devastating for the fishermen and women whose livelihoods are linked to a clean and healthy Gulf. In Lake Erie, phosphorus losses fuel the growth of harmful algal blooms in the western basin, threatening drinking water supplies and a multi-billion dollar sport fishery. Increased losses of nitrogen and phosphorus contribute to eutrophication, algal blooms, and hypoxic areas affecting freshwater and coastal systems across the U.S. and around the world (Diaz and Rosenberg 2008; Jenny et al. 2016). These impacts are the result of myriad environmental factors but can be significantly addressed through working lands conservation.



VEGETATED RIPARIAN BUFFER

DRAINAGE WATER MANAGEMENT

TWO-STAGE DITCH

PRAIRIE STRIP

WETLAND

# Leading at the Edge

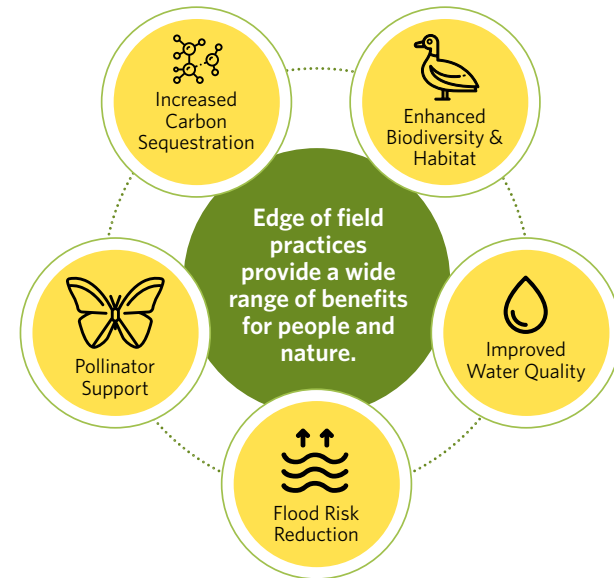
Advancing Edge of Field Practices

## THE OPPORTUNITY

Implementation of conservation and stewardship practices at the edges of farm fields represents a crucial, but underutilized, conservation opportunity to reduce nutrient and sediment loss from farm fields and restore functional landscape features that benefit people and nature. These practices include tried and true interventions such as vegetated buffers and wetlands, along with engineered practices like saturated buffers, bioreactors, and controlled drainage systems designed to treat nutrients lost from tile drainage systems.

EoF practices are a critical and effective component of landscape scale watershed improvement efforts in the United States, including in the Chesapeake Bay watershed, Lake Erie, and the Mississippi River Basin, which have ambitious goals related to nitrogen and phosphorus reduction. For example, TNC estimates that **approximately 550,000 acres of restored and constructed wetlands could treat nutrient loss from 50 million acres of cropland** and, in combination with in-field practices and targeted floodplain restoration, help meet current water quality goals in these iconic basins. In other words, targeted restoration of less than 0.4% of agricultural lands in these three basins could help meet approximately one-third of the nutrient loss reduction goals, enhancing freshwater ecosystems and reducing the threats to drinking water supplies.

In addition to water quality benefits, TNC estimates that widespread implementation of restored and constructed wetlands could sequester 7.4 million tons of soil organic carbon adjacent to working lands over a 10-year period, a possible revenue stream for farmers who enroll in ecosystem services markets and a boon to climate change mitigation efforts gaining momentum across the food and agriculture sector. Strategic placement of wetlands in headwaters also has the potential to reduce flooding impacts in downstream communities (Tang et al. 2020). Overall, EoF practices can improve water quality, store more carbon, reduce flooding, support pollinators, and provide wildlife habitat connectivity in working landscapes.



## THE EDGE OF FIELD ROADMAP AS OUR GUIDE

This Roadmap outlines the path to successfully achieve the scale of action needed to realize the widespread water and wildlife benefits previously described. Developed through a months-long collaborative effort, the Roadmap charts actionable steps and describes the necessary tools to help the food and agriculture sector transform U.S. working landscapes and achieve its conservation goals.

### An Integrated Approach

Expanding adoption of EoF practices is one part of a **three-pronged approach** to achieve a robust, agricultural economy and resilient landscapes. A combination of **in-field, edge of field, and downstream practices** is needed to significantly reduce nutrient loss, rebuild soil health, enhance habitat, and improve resilience across working landscapes.

### Edge of Field Pillars

To catalyze large-scale EoF practice adoption, three actions must take place simultaneously:

- **Build the economic case.** Enhance the value proposition for farmers to adopt EoF practices via payments for ecosystem services, improved targeting of state and federal programs, and whole-farm management that diversifies profitability and optimizes resilience.
- **Increase technical assistance and capacity to implement EoF practices.** Invest in and diversify the technical assistance that supports farmers' conservation efforts and integrate this capacity with in-field technical support.
- **Elevate a culture of conservation and innovation in agriculture.** Leverage farmer networks and momentum around soil health and nutrient management to grow the shared understanding that EoF practices are an essential part of a systems approach to improving management and conservation in agriculture.

## Cross-cutting Themes

To cement the pillars as the foundation for an EoF movement, there are three cross-cutting themes that are essential to scaling adoption of EoF practices:

- **Invest in science, technology, and data** to increase understanding of the effectiveness of practices and provide farmers and conservation professionals with the information necessary to inform EoF practice implementation.
- **Align policies and programs** so they work in tandem and amplify corporate supply chain efforts and emerging ecosystem services markets to create watershed-level improvements.
- **Communicate a vision of a more holistic, regenerative U.S. agriculture system** to develop a shared appreciation of the importance of EoF practices among farmers, landowners, and others throughout the value chain.

## Roadmap Recommendations

The Roadmap lays out recommendations we can take to advance effective public policy, support innovative private sector action, and create partnerships to advance EoF practice adoption. Together, we can:

- 1. Elevate and replicate successful or promising local, state, and regional policies and initiatives.**  
Advance and replicate local, state, and regional programs and initiatives that show promise or have been successful in increasing EoF implementation.
- 2. Remove administrative barriers to conservation practice implementation.**  
Improve the delivery of incentives and technical assistance by reducing burdensome program requirements and simplifying application and approval processes.
- 3. Increase technical assistance by supporting the multiple sources of conservation expertise.**  
Strengthen the capacity of conservation professionals to administer, advise on, and help producers implement these practices.
- 4. Integrate EoF as a nature-based water management policy solution.**  
Advance policies and programs that recognize the importance of EoF as a nature-based solution for water management, flood risk reduction, and resilience.
- 5. Increase funding and better target conservation programs to achieve watershed-scale impacts.**  
Increase investment in state and federal conservation programs that encourage regional approaches that aggregate implementation and achieve larger-scale conservation impacts.
- 6. Expand innovative funding approaches like ecosystem services markets.**  
Support and advance innovative financing methods that seek to improve environmental outcomes while providing new revenue streams for producers and landowners.
- 7. Accelerate sustainable supply chains and corporate commitments to water and biodiversity.**  
Activate corporate climate, water, and biodiversity commitments to increase investments in EoF practices as a cost-effective strategy to improve the sustainability of supply chains.
- 8. Harness and extend efforts to rebuild soil health to recognize the vital role of EoF in working landscapes.**  
Learn from and build upon the success of the soil health movement to grow awareness of the essential role of EoF practices to the vitality of working landscapes.
- 9. Harmonize and coordinate national agriculture policy.**  
Improve alignment of national policies to increase the efficacy of public investment in working lands and ensure the economic and ecological viability of the agricultural sector into the future.

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