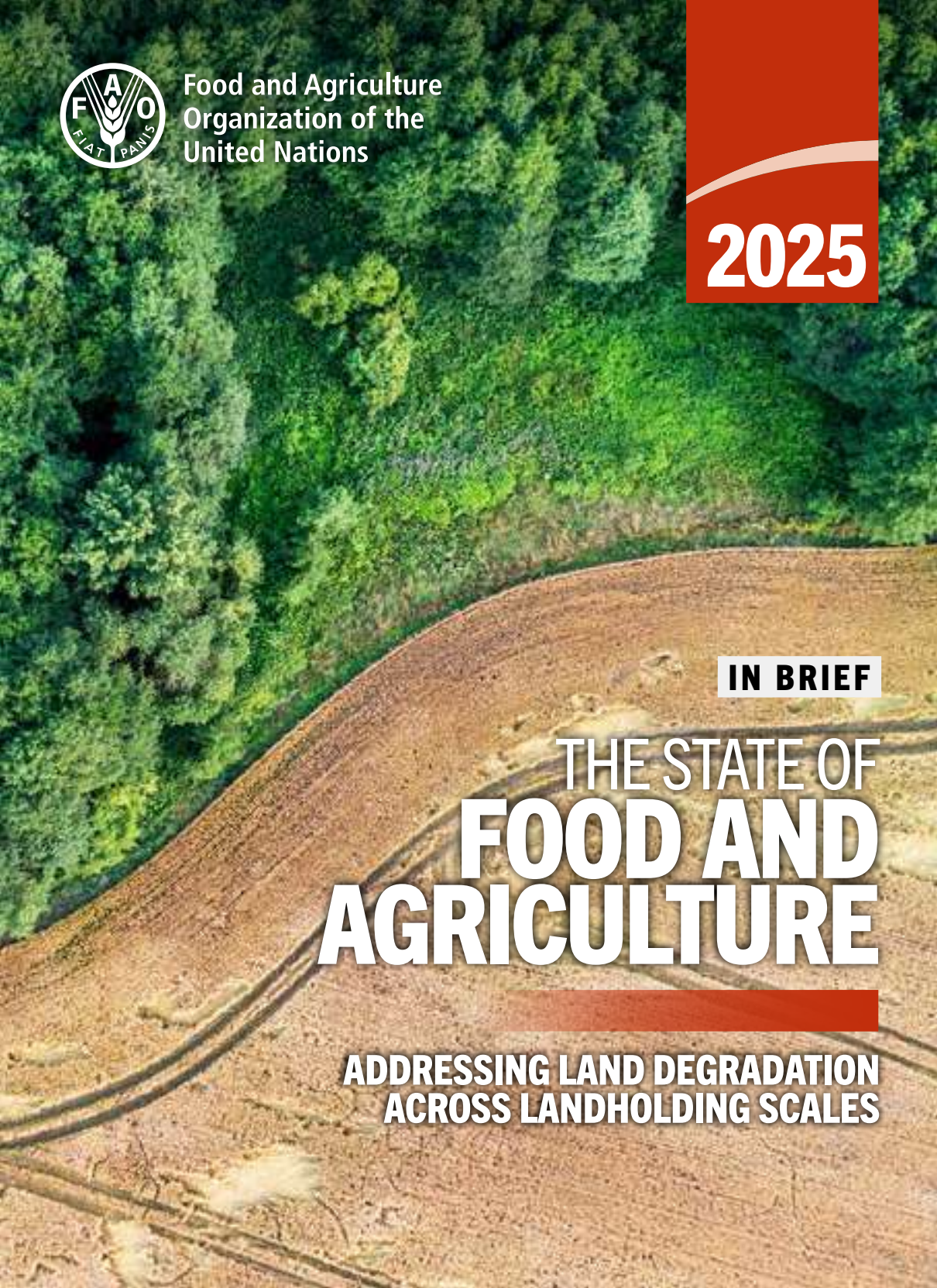

Food and Agriculture Organization of the United Nations

2025

IN BRIEF

THE STATE OF FOOD AND AGRICULTURE

ADDRESSING LAND DEGRADATION ACROSS LANDHOLDING SCALES

This booklet contains the core messages and content from *The State of Food and Agriculture 2025*. The numbering of tables and figures corresponds to that publication, available at: https://doi.org/10.4060/cd7067en

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COVER PHOTOGRAPH © iStock.com/Andrey Danilovich

RUSSIAN FEDERATION. Aerial view of cereal fields.

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CORE MESSAGES

1 Land is a finite, essential, non-substitutable resource that underpins food security, livelihoods, biodiversity, and mitigation of and adaptation to climate change. Yet, land degradation – driven by intensifying pressures – is now a pervasive and silent global challenge, eroding productivity and ecosystem health in countries of all income levels.

2 Land degradation – driven by human activities such as deforestation, overgrazing and unsustainable farming – refers to a persistent decline in land's ability to sustain ecosystem functions and services. Its impacts range from subtle productivity losses to complete agricultural abandonment – reinforcing the urgent need for sustainable land management or restoration.

3 Around 1.7 billion people live in areas experiencing sizeable degradation-induced crop yield losses. Middle-income countries are the most affected, accounting for nearly 1 billion people. In high-income countries, intensive input use sustains yields but masks degradation and increases environmental harm.

4 Farm size strongly influences land management and food production strategies, as well as farmers' ability to address land degradation. Of the world's 570 million farms, 85 percent are smaller than 2 hectares (ha) and cultivate just 9 percent of farmland, while the 0.1 percent of farms over 1 000 ha control nearly 50 percent. Medium-sized farms – those between 2 ha and 50 ha – play a particularly important role in Africa and Asia, where they manage about half of all agricultural land.

5 The vast diversity in farm size underscores the need for scale-sensitive approaches to land degradation, food security and sustainability. Smallholder farmers working under resource constraints and on marginal lands require targeted support to sustainably intensify production.

6 Closing yield gaps, especially in socioeconomically vulnerable hotspots in sub-Saharan Africa and Southern Asia, without further degrading land, depends on access to appropriate technologies and extension services, secure tenure, and inclusive financing, alongside enabling environments that break unsustainable patterns.

7 Tackling land degradation at scale hinges on engaging large commercial farms, whose management decisions shape most of the world's agricultural land. Effective policies, environmental compliance and incentive schemes that reward ecosystem stewardship are essential to align productivity goals with long-term sustainability.

8 The viability of farms of all sizes is central to ensuring food security. Medium and large farms produce, respectively, 26 percent and 58 percent of

the kilocalories provided by crops globally; they play a key role in global trade and supply chains. On the other hand, smallholders, while producing just 16 percent globally, are vital in low- and lower-middle-income countries, where they account for about 60 percent.

9 Restoration strategies must be tailored to the severity and context of land degradation. Severely degraded areas may require transformative interventions, while land still in production can benefit from improved management practices.

10 Agri-environmental policies aimed at improving land use and management are expanding globally, but their adoption remains uneven. While high-income countries have implemented a wide range of regulatory and incentive-based approaches, low-income countries face constraints in deploying such measures; this highlights disparities in policy priorities, institutional capacity and access to resources.

11 Regulatory measures consistently improve land conditions across all land cover types; on the other hand, agri-environmental payments are particularly effective on forest lands and croplands – but they require funding. A combination of both approaches generates the greatest potential to align private incentives with public benefits for reversing land degradation.

12 Land degradation is neither inevitable nor irreversible. Strategic investments in people, institutions and land-friendly practices can transform agriculture from a driver of degradation to a source of restoration, strengthening agrifood systems and safeguarding the natural foundations of human well-being.

FOREWORD

Agriculture stands as one of humanity's most transformative achievements. It has enabled the rise of civilizations, sustained growing populations, and shaped the landscapes we depend on today. It is a testament to our collective ingenuity, cooperation and capacity to adapt.

Yet, the very success of agriculture has brought new challenges. The land that has long sustained us is now under pressure. Agricultural expansion remains the leading driver of global deforestation. In some regions, cropland continues to expand at the expense of forests and rangelands, while in others, land is being abandoned due to degradation. Today, nearly 1.7 billion people live in areas where land degradation contributes to yield losses and food insecurity. These impacts are unevenly distributed: in high-income countries, degradation is often masked by intensive input use, while in low-income countries, especially in sub-Saharan Africa, yield gaps are driven by limited access to inputs, credit and markets. The convergence of degraded land, poverty and malnutrition creates vulnerability hotspots that demand urgent, targeted and comprehensive responses.

This year's *The State of Food and Agriculture* report focuses on land degradation – a growing threat to agricultural productivity, food security and ecosystem resilience. It presents new evidence on the economic costs of degradation and the potential for recovery across all scales of agricultural production. From smallholders managing marginal plots to large-scale commercial farms operating vast swathes of land, the report highlights how targeted investments and sustainable practices can contribute to land productivity and strengthen the resilience of agrifood systems. The report also provides updated global estimates on farm numbers and land distribution, offering new insights into who is producing what.

Of the approximately 570 million farms worldwide, 85 percent are smaller than 2 hectares, yet they operate just 9 percent of agricultural land. In contrast, farms over 1 000 hectares represent only 0.1 percent of all farms but manage half of the world's farmland. Despite persistent constraints, nearly 500 million smallholders contribute significantly to global food supply. At the same time, larger farms – particularly

those exceeding 50 hectares – have a disproportionate influence on land use and food provision, positioning them as key actors in the global response to land degradation. These patterns underscore the need for differentiated strategies that reflect the diversity of land users and their roles in shaping sustainable agrifood systems.

Encouragingly, the report offers a message of hope. Reversing land degradation on existing croplands through sustainable land use and management could close yield gaps to support the livelihoods of hundreds of millions of producers. Additionally, restoring abandoned cropland could feed hundreds of millions more people. These findings represent real opportunities to improve food security, reduce pressure on natural ecosystems, and build more resilient agrifood systems.

To seize these opportunities, we must act decisively. Sustainable land management requires enabling environments that support long-term investment, innovation and stewardship. Secure land tenure – for both individuals and communities – is essential. When land users have confidence in their rights, they are more likely to invest in soil conservation, crop diversity and productivity. Yet, gender disparities persist. In many countries, women remain less likely to hold secure land rights, despite evidence that empowering women leads to better outcomes for households and ecosystems.

Policy instruments must be tailored to context. Regulatory approaches such as land-use zoning and conservation mandates are essential, but their effectiveness can be enhanced by incentive-based mechanisms and cross-compliance schemes. Agri-environmental payments and conditional support can align private incentives with public benefits – but only if they are economically viable and well targeted.

At FAO, we are committed to supporting Members in achieving Land Degradation Neutrality targets and the Sustainable Development Goals. Through innovation, partnerships and targeted investment, we can transform agriculture into a force for regeneration – delivering on the Four Betters: better production, better nutrition, a better environment and a better life – leaving no one behind.

In 2025, FAO is reaffirming its commitment to sustainable land management. This edition of *The State of Food and Agriculture* is part of this commitment to provide a comprehensive evidence base to guide policy, investment and action at all levels.

The land has sustained us for millennia. Now, it is our turn to care for it – wisely, justly and together for a better food-secure future for generations to come.

Qu Dongyu
FAO Director-General

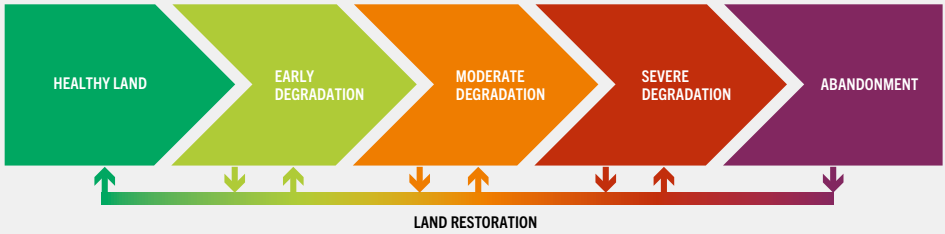
SUMMARY

Land is the foundation of our global agrifood systems, supporting over 95 percent of food production while providing essential ecosystem services that sustain life on Earth. As a finite resource, it faces unprecedented pressures from competing demands including urban expansion, biofuel production, and changing consumption patterns driven by rising incomes and shifting diets. This critical resource underpins not only food security but also biodiversity conservation, climate regulation and the livelihoods of 892 million agricultural workers globally.

The expansion of agriculture has fundamentally transformed land-use patterns across the planet over the centuries. In the twenty-first century, between 2001 and 2023, global agricultural area decreased by 78 million hectares (Mha) (–2 percent), with cropland area increasing by 78 Mha and permanent meadows and pastures decreasing by 151 Mha. These changes exhibit significant regional variations. Sub-Saharan Africa witnessed cropland expansion of 69 Mha accompanied by 72 Mha of forest loss, while Latin America saw 25 Mha of cropland growth alongside 85 Mha of net forest area loss. Agricultural expansion remains the primary driver of global deforestation, accounting for nearly 90 percent of forest loss. In this century, another important aspect to consider is that approximately 3.6 Mha of croplands are abandoned annually, with land degradation likely playing a significant role in these losses.

Human-induced land degradation represents a growing threat to agricultural productivity and food security. This long-term decline in land's capacity to provide essential ecosystem functions results from complex interactions between environmental pressures and human activities including deforestation, overgrazing, and unsustainable farming practices leading to nutrient

FIGURE 3 SPECTRUM OF LAND DEGRADATION AND RESTORATION PATHWAYS



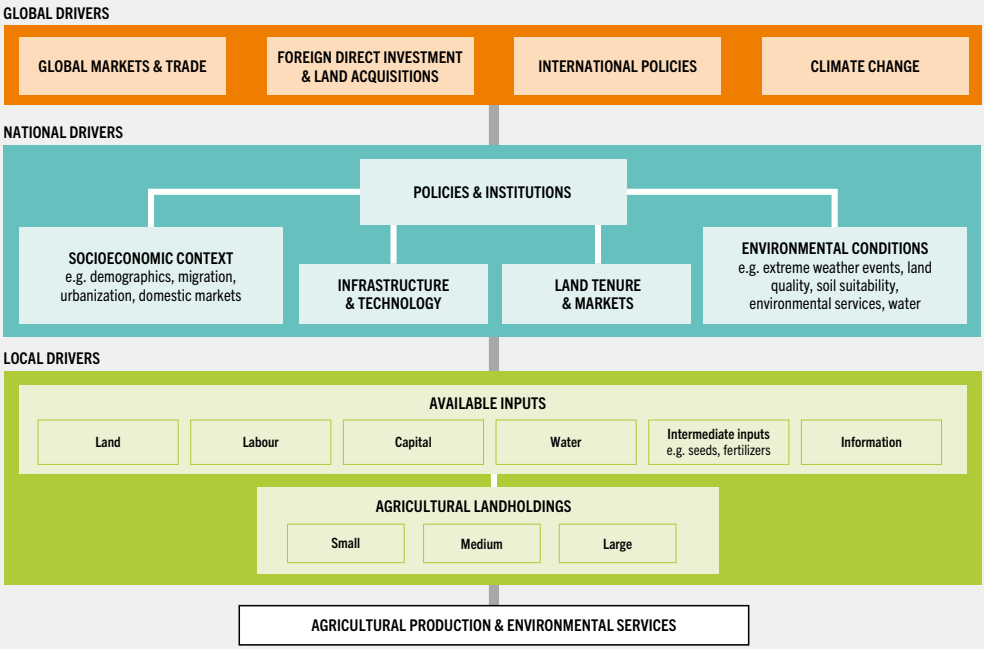
SOURCE: Authors' own elaboration.

depletion and salinization. Today, this degradation manifests across all agricultural landscapes, creating a spectrum of impacts from subtle productivity declines to complete agricultural abandonment.

This troubling pattern unfolds within a wider context of systemic strain on agricultural production systems. Despite remarkable productivity gains that have quadrupled global agricultural output since 1961 with limited land expansion, worrying trends have emerged. Total factor productivity growth, which reflects technological advancement and efficiency improvements, has declined since the 2000s, particularly in the Global South where some countries show negative growth rates. This decline, coupled with persistent yield gaps between potential and actual production, threatens future food security and may drive further agricultural expansion into fragile ecosystems.

The international community has recognized land degradation as a critical challenge, with over 130 countries committing to Land Degradation Neutrality under the United Nations Convention to Combat Desertification (UNCCD). Achieving this goal requires balancing degradation with restoration to maintain the total stock of healthy land. However, although restoration investments offer returns far exceeding costs, most benefits accrue to wider society well into the future, while costs fall on individual landholders today. This creates a misalignment between private incentives and public goods that necessitates supportive policies and public investment.

FIGURE 5 DRIVERS OF AGRICULTURAL LAND USE AND MANAGEMENT



NOTE: The depiction of small, medium and large agricultural holdings is conceptual; specific definitions used elsewhere in this report are small (<2 ha), medium (2–50 ha) and large (>50 ha).

SOURCE: Authors' own elaboration.

Land-use decisions emerge from a complex web of drivers operating at global, national and local levels. Global markets and trade allow countries to draw on resources from exporting nations while transmitting consumption impacts across borders. At national level, policies, infrastructure and institutions shape the context within which farmers operate, while local decisions reflect farmers' available resources including land size, capital, tenure, and access to inputs and information.

The heterogeneity in land management affects degradation of croplands in major ways. This matters for food security because

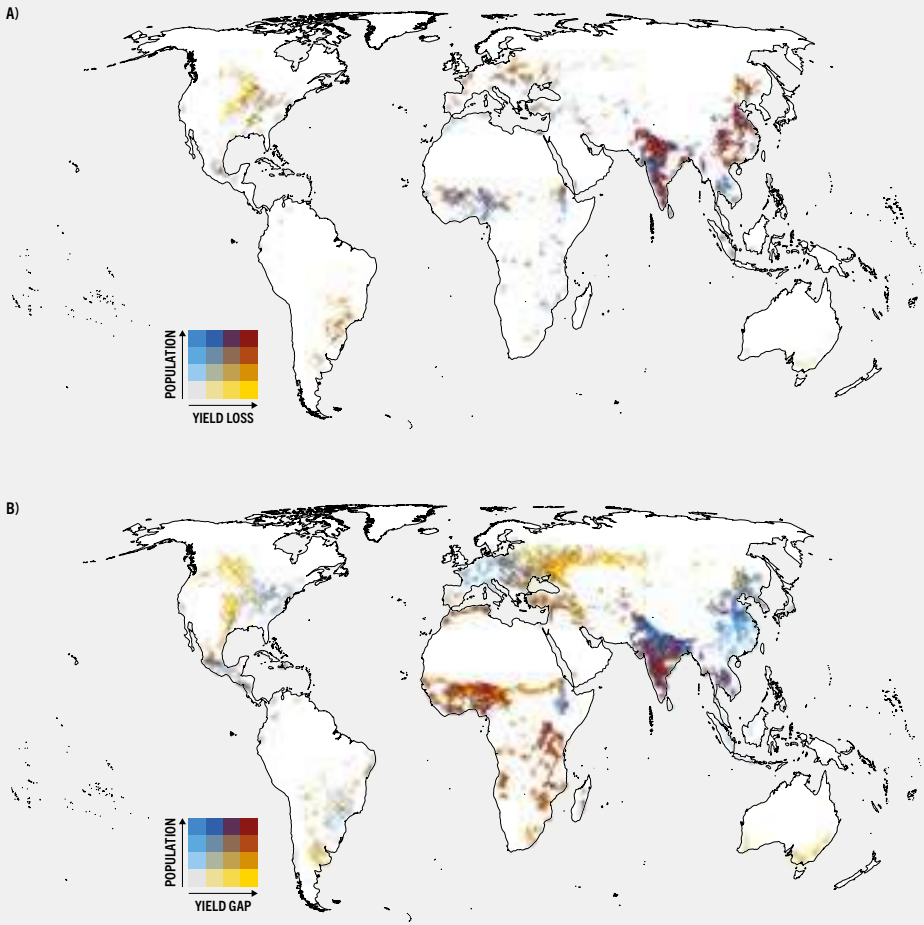
croplands produce the vast majority of global calories and proteins. However, understanding the true impact of land degradation on food production requires sophisticated analysis. This report presents new evidence establishing a causal relationship between historical land degradation and current yield losses on croplands, isolating the specific impacts of degradation from other factors affecting agricultural productivity.

The human toll of land degradation on croplands is sobering: approximately 1.7 billion people worldwide live in areas experiencing yield gaps linked to human-induced land degradation. The largest affected populations reside in Eastern and Southern Asia regions that have accumulated a substantial degradation debt and also have high population densities. Remarkably, reversing just 10 percent of human-induced degradation on current croplands could restore production sufficient to feed an additional 154 million people annually. However, these figures represent only a fraction of the true cost. First, these estimates overlook the role of degradation in land abandonment. Research suggests that restoring abandoned croplands to productive use could potentially feed between 292 and 476 million people. Second, the estimates exclude impacts on pasturelands and the broader ecosystem services that benefit society at large, making land degradation a challenge requiring collective action for the provision of these public goods.

The relationship between land degradation and agricultural productivity varies dramatically across regions and income levels. In high-income countries with intensive agricultural systems, the per hectare production losses from degradation are particularly severe, though often masked by heavy application of synthetic fertilizers and other inputs. This compensatory strategy creates a troubling paradox: while maintaining high yields in the short term, it generates diminishing returns, increases production costs, and often exacerbates the underlying degradation through soil acidification, nutrient imbalances and pollution. Furthermore, threshold effects associated with land degradation may lead to land abandonment in areas with a long history of intensive agricultural systems.

In stark contrast, most of sub-Saharan Africa exhibits relatively low degradation-induced yield losses, not because soils are healthier, but because other constraints – including limited access to inputs, mechanization, credit and markets – dominate as causes of yield gaps. This finding carries crucial policy implications: while avoiding land degradation remains important, addressing these constraints would have more immediate impact on closing yield gaps in these regions. However, this must be done carefully to avoid repeating the unsustainable intensification pathways that have led to costly degradation in today's high-input agricultural systems.

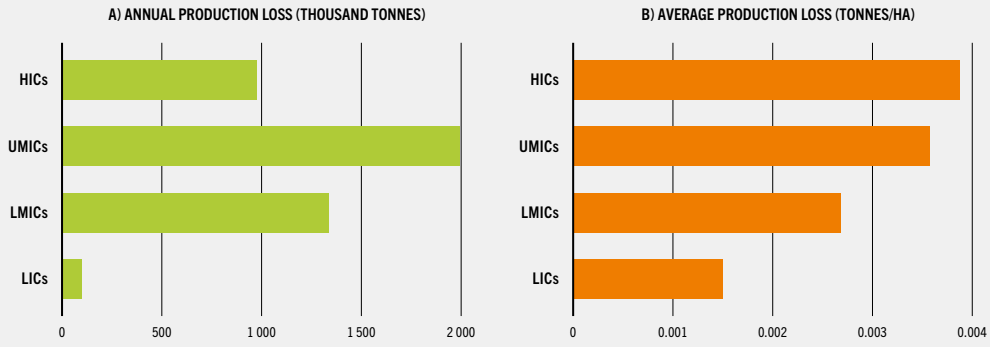
FIGURE 10 POPULATION HOTSPOTS EXPOSED TO DEGRADATION-INDUCED YIELD LOSSES AND ALL-CAUSE YIELD GAPS



NOTES: Refer to the disclaimer on the copyright page for the names and boundaries used in this map. Panel A indicates populations exposed to degradation-induced yield losses. Panel B indicates populations exposed to all-cause yield gaps.

SOURCE: Hadi, H. & Wuepper, D. 2025. *A global yield gap assessment to link land degradation to socioeconomic risks – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-16. Rome, FAO.

FIGURE 9 ESTIMATED ANNUAL AND AVERAGE PRODUCTION LOSSES DUE TO LAND DEGRADATION BY INCOME GROUP



NOTES: Panel A shows the total annual production loss for each income group associated with a simulated 1 percent increase in land degradation. Panel B shows the average national per hectare production loss for countries within each income group associated with a simulated 1 percent increase in land degradation. Country income groups are classified as low-income countries (LICs), lower-middle-income countries (LMICs), upper-middle-income countries (UMICs) and high-income countries (HICs), according to World Bank definitions for the reference year of the data. Losses are calculated based on estimated yield declines under degradation, applied to national crop production for the year 2020. Crop-level harvest area is from FAO & IIASA. 2025. *Global Agro-ecological Zoning version 5 (GAEZ v5) Model documentation*. [Accessed on 27 June 2025]. https://data.apps.fao.org/gaez/?lang=en. Licence: CC-BY-4.0.

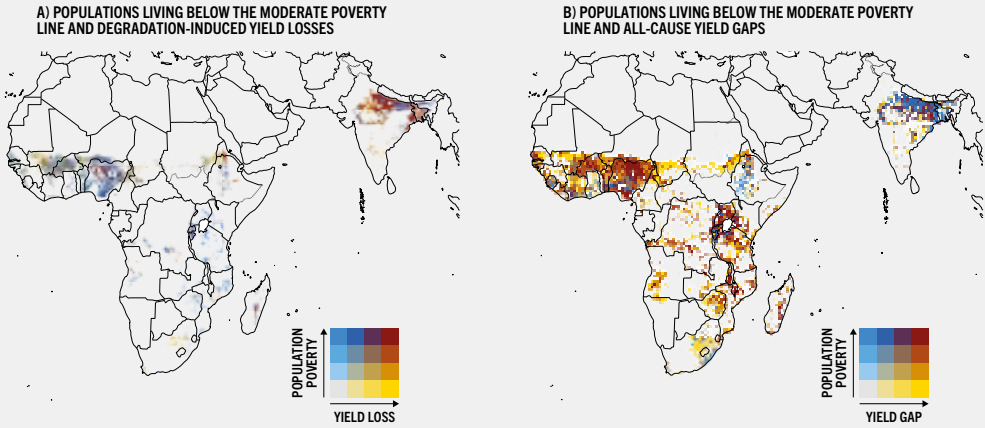
SOURCE: Author's own elaboration based on Hadi, H. & Wuepper, D. 2025. *A global yield gap assessment to link land degradation to socioeconomic risks – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-16. Rome, FAO.

https://doi.org/10.4060/cd7067en-fig09

The convergence of land degradation, poverty and food insecurity creates particularly concerning vulnerability hotspots. Analysis reveals that the most severe overlaps occur in Southern Asia and sub-Saharan Africa, where degraded lands coincide with high poverty rates and childhood stunting. Overall, 47 million children under five years of age suffering from stunting live in hotspots where stunting overlaps with significant yield losses from land degradation. These hotspots represent a convergence of environmental degradation and human deprivation that demands urgent and targeted responses.

The path forward requires navigation of complex trade-offs between agricultural intensification and environmental sustainability. Historical debates between land sparing (intensive agriculture on smaller areas) and land sharing (wildlife-friendly farming over larger areas) have evolved towards recognition that both approaches have

FIGURE 11 **POVERTY, DEGRADATION-INDUCED YIELD LOSSES AND ALL-CAUSE YIELD GAPS FOR SUB-SAHARAN AFRICA AND SOUTHERN ASIA**



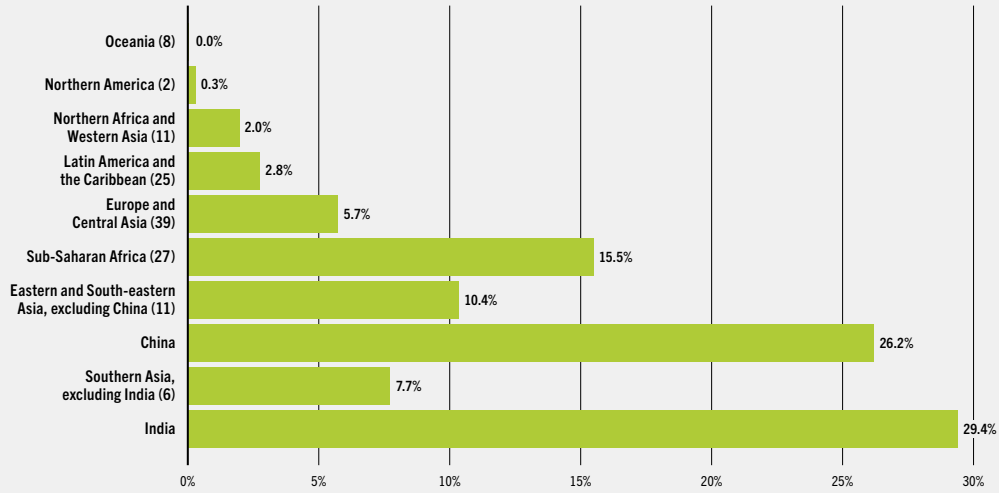
NOTE: Refer to the disclaimer on the copyright page for the names and boundaries used in this map. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.

SOURCE: Hadi, H. & Wuepper, D. 2025. *A global yield gap assessment to link land degradation to socioeconomic risks – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-16. Rome, FAO.

merit depending on context. Recent research demonstrates that improved crop technologies actually reduced global cropland by 16 Mha between 1961 and 2015 – challenging narratives about the negative environmental impacts of intensification. The most promising solutions combine strategies that enhance productivity while maintaining ecological integrity, requiring careful policy design that aligns economic incentives with environmental goals.

Beyond croplands, degradation affects all agricultural systems, undermining livestock production in rangelands and – through forest loss driven by agricultural expansion – disrupting climate patterns and biodiversity. The interconnectedness of these systems means degradation in one area cascades into other areas, creating feedback loops that amplify impacts. Nearly 90 percent of global deforestation stems from agriculture, with cropland expansion and pasture creation the primary drivers, highlighting the urgent

FIGURE 13 DISTRIBUTION OF 571 MILLION FARMS BY REGION, 2025



NOTES: The bars show each region/country's share of the world's farms (based on projections from 131 countries and territories). The numbers in parentheses are the number of countries and territories in each region. For the list of countries and territories covered, see Annex 1 of Lowder *et al*. 2025.

SOURCE: Authors' own elaboration based on Lowder, S., Arslan, A., Cabrera Cevallos, C.E., O'Neill, M. & de la O Campos, A.P. 2025. *A global update on the number of farms, farm size and farmland distribution – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-14. Rome, FAO.

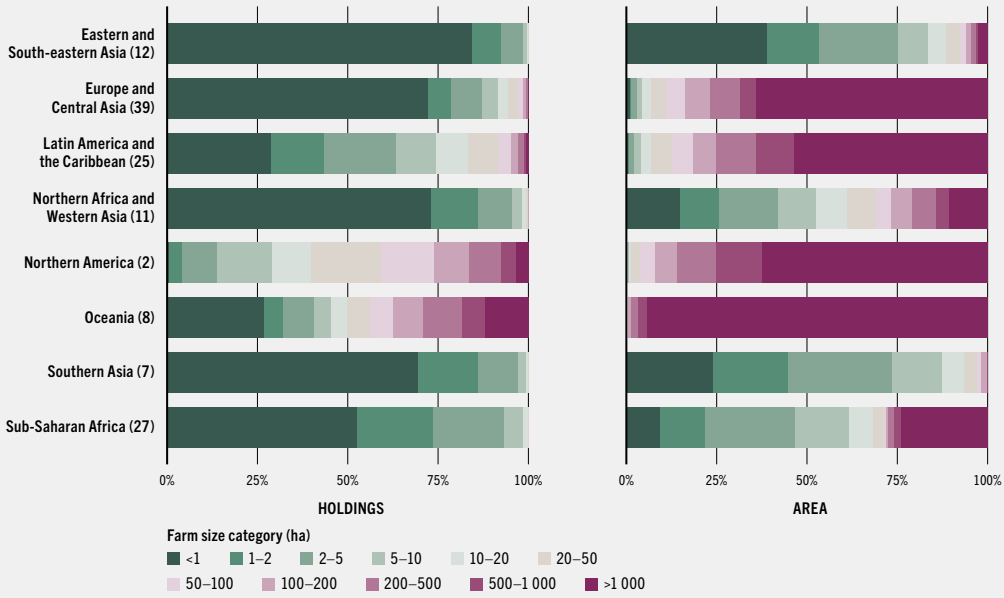
https://doi.org/10.4060/cd7067en-fig13

need for integrated landscape management approaches.

The findings underscore that land degradation is not an inevitable consequence of agriculture but rather the result of specific management choices and policy failures. Addressing this requires recognizing the challenges farms face in tackling land degradation and food security, and the underlying drivers. Both the incentive and the ability to invest in reducing, reversing and restoring degradation on croplands – while improving productivity – can differ significantly depending on farm size, land conditions and socioeconomic factors.

Farm size, while not the only factor influencing land management and food production, shapes all other determinants in important ways. Larger farms often have more resources to invest in advanced technologies that

FIGURE 15 PROPORTION OF HOLDINGS AND AREA OPERATED BY REGION



NOTES: The figure is based on the latest available census data from 131 countries and territories reported between 2006 and 2023. The numbers in parentheses are the number of countries and territories in each region.

SOURCE: Authors' own elaboration based on Lowder, S., Arslan, A., Cabrera Cevallos, C.E., O'Neill, M. & de la O Campos, A.P. 2025. *A global update on the number of farms, farm size and farmland distribution – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-14. Rome, FAO.

https://doi.org/10.4060/cd7067en-fig15

optimize input use and productivity – but which can exacerbate land degradation. However, these farms may also have greater incentives to maintain land quality, if it is clearly linked to long-term profitability. Conversely, smaller farms often contend with more vulnerable land conditions, and struggle with limited resources and multiple market constraints.

Understanding these dynamics is essential for designing effective policies that enable all farmers to contribute to both food security and environmental sustainability, ensuring that the land that feeds us today remains productive for generations to come.

Of the world's roughly 570 million farms, 85 percent are smaller than

FIGURE 18 SHARE OF DIETARY ENERGY, PROTEINS AND FATS SUPPLIED BY CROP PRODUCTION BY FARM SIZE

NOTES: Data cover 77 countries with crop production information from 2006 to 2023. Country level data are available in the Supplementary data at https://doi.org/10.4060/cd7067en-supplementarydata

SOURCE: Authors' own elaboration based on Arslan, A., Ranuzzi, E., O'Neill, M., Ricciardi, V., Lowder, S. & Vaz, S. 2025. *Revealing complementarities across farm scales in global food production – Background paper for The State of Food and Agriculture 2025*. FAO Agricultural Development Economics Working Paper 25-13. Rome, FAO.

https://doi.org/10.4060/cd7067en-fig18

2 ha yet cultivate only 9 percent of farmland, while the 0.1 percent exceeding 1 000 ha command about half of all agricultural land – a disparity that shapes strategies for land degradation control, food security and long-term resource governance. Regional patterns deepen the contrast: Latin America and the Caribbean host just 3 percent of farms because holdings are generally large; in Asia and Africa, smallholders dominate numerically, but farms of 2 to 50 ha work around half the farmland; and in Europe, the Americas and Oceania, farms exceeding 1 000 ha control the greater part of farmland.

Despite facing persistent constraints including limited access to land, credit, inputs, technology and markets, the world's 500 million smallholders make remarkable contributions to global food supply. The crops produced by these farmers contribute approximately 16 percent of global dietary energy, 12 percent of proteins, and 9 percent of fats derived from crops. Their contribution is

particularly significant for certain crop types: farms smaller than 5 ha produce almost 50 percent of global stimulants, spices and aromatic crops, while contributing between 20 and 30 percent of cereals, fruits and vegetables. This production profile reflects not only their importance to local agrifood systems and dietary diversity but also their role in high-value crops that can enhance rural livelihoods.

The dominance of large-scale operations in globally traded commodities underscores their outsized influence on food availability and their critical responsibility for sustainable land management. Large farms, particularly those exceeding 50 ha, dominate global production of cereals, pulses, sugars and oil crops – commodities that form the backbone of international trade and urban food systems. These operations produce more than 55 percent of global crop-derived nutrients, with the largest category (>1 000 ha) accounting for nearly one-sixth of global food energy from crops. This concentration is most extreme in Northern America, where these mega-farms produce almost half of the region's crop-derived dietary energy, driven primarily by industrial agriculture in the United States of America.

Farm size patterns are evolving differently across regions, defying simple narratives of consolidation. While average farm sizes have increased in Latin America, Europe and Central Asia over the past two decades, they have decreased in most of Asia and continue to shrink in sub-Saharan Africa. High-income countries show increasing polarization, with both mean and median farm sizes growing but the gap between them widening, indicating greater inequality. In Africa, the persistence of very small farms combined with poor soil fertility creates a double poverty trap: farmers can neither produce enough for household needs nor invest in restoring soil productivity, perpetuating cycles of degradation and food insecurity.

The intersection of farm size with land degradation reveals complex patterns requiring nuanced policy responses. All farm sizes face similar levels of accumulated soil organic carbon debt, yet the impacts and response capacities vary dramatically. Large farms in intensively cultivated regions of Europe and Northern America show the strongest causal relationship between historical degradation and current yield losses; the extent of land degradation is masked by heavy input use that maintains productivity at increasing economic and environmental cost. Conversely, smallholder-dominated regions in sub-Saharan Africa exhibit large yield gaps driven more by resource constraints than by degradation per se; still, degraded soils may respond poorly to inputs when they do become available.

Climate change adds another layer of complexity to these challenges, with differential impacts across farm scales.

Under projected warming scenarios, smallholder farms in tropical regions will face disproportionate exposure to heat stress, dry spells and extreme precipitation events. Medium-sized farms may experience the highest exposure to combined stressors, while large farms in temperate regions might benefit from reduced frost days.

Moving forward, policies must navigate the tension between supporting smallholder livelihoods and addressing the global environmental impacts of large-scale agriculture. With large farms controlling most agricultural land, they bear primary responsibility for implementing sustainable land management at scale. Yet the sheer number of smallholders and their vulnerability to both degradation and climate change demand targeted interventions that enhance productivity without repeating the unsustainable intensification pathways observed in high-income countries.

Success requires recognizing farms of all sizes as complementary components of agrifood systems, each facing distinct challenges and opportunities in the quest for land degradation neutrality and food security. Only through differentiated approaches that account for scale-specific constraints and potentials can agriculture meet growing food demands while preserving the land resources upon which future generations depend.

Addressing land degradation requires recognizing that it is not an inevitable consequence of agriculture. With thoughtful stewardship and regenerative approaches, farming can become a force for avoiding, reducing and reversing degradation while maintaining productivity. Tenure security emerges as a fundamental enabler of sustainable land management.

Secure land rights reduce uncertainty and encourage long-term investments in soil conservation and productivity improvements. However, significant gender inequalities persist, with women in 43 out of 49 countries with available data less likely than men to own or have secure rights to agricultural land. When women do have secure land rights, evidence shows increased investment in soil conservation, greater crop diversity and improved household food security, highlighting the critical importance of addressing these disparities.

Enabling environments are the foundation of sustainable land management, not guarantees. Secure and enforceable land tenure, along with transparent and well-functioning land markets, empower land users to make long-term investments in land quality, adopt sustainable practices, and access credit, insurance, and extension services. However, enabling environments alone are not sufficient. Land degradation persists even in contexts with strong enabling environments, underscoring that the alignment of private incentives with public benefits is not automatic.

A range of policy instruments exist, each with distinct strengths, limitations and implementation requirements. Policies are categorized into three broad types – regulatory, incentive-based and cross-compliance (or conditionality).

- *Regulatory policies* are often the most direct means of addressing land degradation. These include land-use zoning, deforestation bans, and soil conservation mandates. While effective in setting clear behavioural expectations, regulations can be costly to enforce, particularly in areas with many smallholders. Moreover, if poorly designed, they may create perverse incentives, such as regulatory avoidance by fragmenting landholdings.
- *Incentive-based policies* – such as payments for ecosystem services – offer financial or market-based rewards for sustainable practices. Such schemes are typically voluntary and flexible, making them attractive to land users. However, they often entail high transaction and monitoring costs, and their effectiveness depends on the level of compensation and the ease of participation. Larger farms may find it easier to engage with incentive-based schemes due to economies of scale, while smallholders may require additional support to overcome administrative and financial barriers.
- *Cross-compliance policies* link government payments to adherence to environmental standards. Widely adopted in high-income countries, conditionality ensures that public funding supports responsible land stewardship. Its success depends on the balance between compliance costs and the value of financial incentives provided, as well as the robustness of monitoring and enforcement mechanisms.

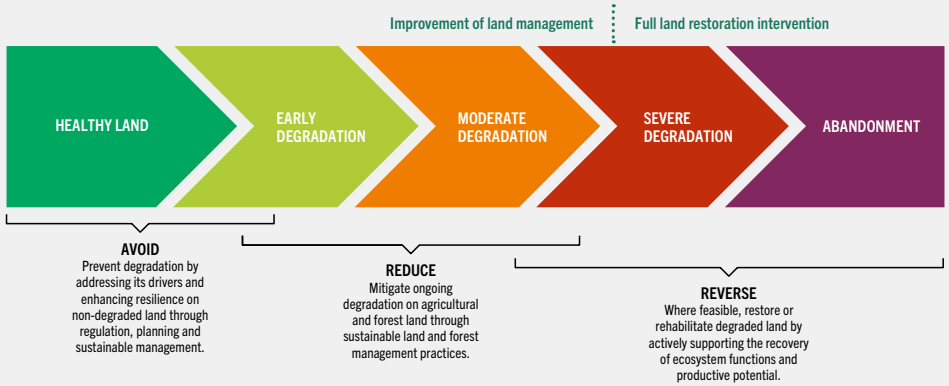
Since the twentieth century, countries have implemented an expanding portfolio of policy approaches related to agriculture, land use and the environment. A notable surge in public policy adoption occurred after 2000. Regulatory instruments have formed the backbone of these efforts, typically preceding the introduction of incentive-based approaches and cross-compliance policies. Over time, the policy landscape has evolved from a predominantly regulatory focus to a more diversified mix that increasingly incorporates both incentive-based mechanisms and cross-compliance schemes.

The ongoing United Nations Decade on Ecosystem Restoration has increased awareness of the public good nature of actions to address land degradation and provided impetus to governments around the world to pledge sizeable investments to accelerate progress towards land degradation neutrality. The growing commitments have contributed to the diversification of policy instruments supporting sustainable land use and management. Despite the increasing adoption of agri-environmental

TABLE 3 LAND MANAGEMENT VS LAND-USE CHANGE INTERVENTIONS BY TYPE OF POLICY INSTRUMENT

	LAND MANAGEMENT	LAND-USE CHANGE
REGULATORY		
Does farm size matter?	Regulation may apply across the board or only to farms above or below a certain threshold. Applying a threshold may affect incentives, leading to regulatory avoidance.	Regulation (e.g. land-use zoning or deforestation bans) tends to be applied across the board, because exemption of one farm size category leads to leakage. On small farms, land-use regulations may impose a proportionately higher burden.
Management burden	Burden falls on landholders to provide proof of compliance with regulations.	Burden is low because parties can rely on high-resolution earth observation and remote sensing data to resolve any dispute.
Monitoring requirements	Field-level checks can be resource intensive. Monitoring performance using outcome indicators is more challenging than monitoring the application of regulated practices.	Cost of monitoring is low with high-resolution earth observation data.
Financing needs	Public financing requirements are low and mainly for enforcement. Cost of applying regulated practices is borne by landholders.	Public financing requirements are low and mainly for enforcement. Cost of forgone land-use options is borne by landholders.
INCENTIVE-BASED		
Does farm size matter?	Smaller farms often have limited capacity to develop proposals and do the paperwork associated with contractual arrangements.	Large farms are likely to more easily incorporate land-use change for restoration purposes on part of the farm. On smaller farms, land-use change might affect overall economic viability depending on the level of incentive.
Management burden	Transaction costs are typically high, associated with agreeing on contracts for specific land management practices. Targeting participants based on the effectiveness of proposed actions and available budget requires effort on the part of the government.	As for land management practices – with the difference that, when the incentive is set-aside land, the contractual arrangement is simpler, because there are fewer land management practice options to consider.
Monitoring requirements	Field-level checks can be resource intensive and ensuring additionality is not always possible. Monitoring performance using outcome indicators is more challenging than monitoring the application of incentivized practices.	Cost of monitoring is low with high-resolution earth observation data.
Financing needs	Incentivizing uptake is costly in terms of public financing. It depends on the degree of financial incentives provided and the private benefits of land management practices received by the landholder. If these are sizeable, cost sharing between public financing and the landholder is feasible.	Compensating land rental value is costly in terms of public financing because it typically involves public funds. Costs are very high in the case of long-term land restoration projects – often cofinanced with donors or the private sector.
CROSS-COMPLIANCE (CONDITIONALITY)		
Does farm size matter?	Farm size matters as a function of the overlap of 1) who the regulation applies to, and 2) how payments to landholders are distributed.	On small farms, land-use regulations may impose a proportionately higher burden; therefore, they would need to receive substantial payments for cross-compliance to be effective.
Management burden	Release of payments is contingent on compliance with regulations; therefore, in principle, the additional burden for landholders is zero because this burden is already considered. Conditionality on compliance may result in an administrative burden, requiring systems integration.	As for land management practices.
Monitoring requirements	Monitoring of regulation- and incentive-based systems already in place might need to be aligned to make cross-compliance effective. Additional monitoring requirements are likely to be marginal.	As for land management practices.
Financing needs	Needs are minimal as interventions leverage existing programmes.	As for land management practices.

FIGURE 24 STRATEGIC RESPONSES ACROSS LAND DEGRADATION STAGES: FROM IMPROVING LAND MANAGEMENT TO FULL-SCALE LAND RESTORATION



SOURCE: Authors' own elaboration based on Figure 7 in Orr, B.J., Cowie, A.L., Castillo Sanchez, M.V., Chasek, P., Crossman, N.D., Erlewein, A., Louwagie, G. *et al*. 2017. *Scientific Conceptual Framework for Land Degradation Neutrality. A Report of the Science-Policy Interface.* Bonn, Germany, UNCCD. https://www.unccd.int/resources/reports/scientific-conceptual-framework-land-degradation-neutrality-report-science-policy

policies globally, their distribution remains highly uneven across regions. A significant concentration is observed in high-income countries. In contrast, low-income countries have implemented fewer agri-environmental measures, highlighting a disparity in priorities and resources that could be allocated to incentive-based schemes.

Given resource constraints, matching interventions to land condition and farm structure is key. Land degradation is not uniform. Even within a single farm, land parcels may vary in condition, requiring differentiated responses.

The "avoid > reduce > reverse" hierarchy promoted by the UNCCD as a strategic framework for intervention is a useful way of approaching the challenges of land degradation. The main premise is to pre-emptively *avoid* degradation on healthy, productive lands, *reduce* degradation, halting its progression through improved land management practices, and finally, *reverse* degradation on severely degraded land, which often requires transformative measures such as change in land use, ecological restoration, and long-term investment.

The choice of intervention must reflect both the severity of degradation and the potential for recovery. For example, lands operating near their biophysical yield potential may respond well to incremental improvements, while severely degraded or abandoned lands may require complete shifts in land use.

In terms of impacts on land degradation, land-use regulations consistently emerge as effective instruments for improving land conditions. Agri-environmental payments also show positive impacts, though with greater variability. They are particularly effective in forest conservation and contribute to improved cropland conditions globally. Overall, approaches that combine regulatory and incentive-based instruments offer strong potential to improve land conditions. Their effectiveness depends on careful tailoring to land cover types and local contexts. In croplands, for example, regulations can be complemented by payments supporting biodiversity in non-productive landscape features such as hedgerows. Ultimately, a context-specific approach that strategically combines policy instruments while considering economic and institutional capabilities is crucial for achieving meaningful improvements in land conditions worldwide.

The way forward. The evidence presented in this report underscores the urgency of reversing land degradation to safeguard food security, sustain livelihoods and preserve the ecological functions that underpin agrifood systems. Yet, the path forward must be as diverse and dynamic as the landscapes and land users it seeks to support.

Align global and local action. Land degradation must be understood within the broader context of land-use decisions – shaped by local choices and global drivers such as trade, climate change and demographic transitions. Farmers, as private actors, make decisions primarily based on productivity and profitability. This means that efforts to promote sustainable land management must consider the economic realities they face – including the time, labour and financial costs of implementation – and ensure that these do not outweigh the expected benefits. Land degradation intersects with climate change and biodiversity loss, making it central to the Rio Conventions (UNCCD, United Nations Framework Convention on Climate Change, Convention on Biological Diversity). Translating global commitments into local action requires institutional coherence, political will, and long-term financing.

Recognize the diversity of land users. The diversity of farm sizes and structures must be embraced as a central axis of policy design. Smallholder farmers, who often operate under resource constraints and on marginal lands, need targeted support to sustainably intensify production. Closing yield gaps without further degrading land calls for access to appropriate

technologies and extension services, secure land tenure, and inclusive financing mechanisms. In places where accumulated land degradation is not the primary constraint, strengthening enabling environments will be key to breaking path dependencies that have led to unsustainable intensification. At the other end of the spectrum, large-scale commercial farms – though fewer in number – manage most of the world's agricultural land and have a disproportionate impact on land systems. These farms must play a leading role in achieving land degradation neutrality by complying with environmental regulations, adopting sustainable land management practices, and participating in incentive schemes that reward ecosystem stewardship.

Differentiate restoration strategies. Severely degraded areas may require transformative interventions, including land-use change or long-term fallowing, while land in agricultural production can benefit from improved management practices that enhance productivity and resilience. This calls for a nuanced policy mix that combines regulatory frameworks with incentive-based mechanisms, underpinned by robust monitoring systems and adaptive governance. Tailoring interventions to the specific needs, capacities and responsibilities of different land users is essential for equitable and effective progress.

Strengthening land governance is critical. Well-defined tenure rights – both individual and collective – are non-negotiable for sustainable land management and livelihoods. Inclusive governance structures are also essential to manage trade-offs, which are often unavoidable in land systems. Win–win scenarios are rare; thus, enabling environments must support transparent decision-making and equitable outcomes.

Scale what works. Encouragingly, sustainable land management and land restoration efforts are already underway in many parts of the world, demonstrating that solutions exist and can be scaled. These efforts show that reversing degradation is possible when the right enabling conditions are in place. However, land degradation must still be addressed within the broader context of global sustainability goals. While land is foundational to national food security and development strategies, it is also central to the global challenges of climate change and biodiversity loss. Governments and international bodies are increasingly aligning efforts; however, progress is hindered by weak implementation, limited coordination and insecure land tenure. Strengthening institutional coherence and political will is essential to translate global commitments into local action.

Investing in people, policies and practices to respond to land degradation challenges. The costs of inaction are rising, but so too is our capacity to respond. Land degradation is not an inevitable consequence of agriculture. It is the result of specific land use and management choices, policy failures and misaligned incentives. But it is also reversible. With the right mix of policies, institutions and investments, we can transform agriculture into a force for regeneration – restoring degraded lands, enhancing food security and nutrition, and securing the ecological foundations of our agrifood systems. By investing in people, policies and practices that value land, not only as a productive asset but as a cornerstone of human and planetary well-being, we can chart a path towards a more sustainable and equitable future. ■

THE STATE OF THE WORLD

2025
THE STATE OF FOOD AND AGRICULTURE

ADDRESSING LAND DEGRADATION ACROSS LANDHOLDING SCALES

Land is the foundational resource of agrifood systems, playing a crucial role in securing global food supply and achieving the Sustainable Development Goals. Yet, increasing pressures are degrading this finite and essential resource, undermining its capacity to meet growing – and often competing – demands for more efficient, productive and sustainable agriculture.

The 2025 edition of *The State of Food and Agriculture* explores the theme "Addressing land degradation across landholding scales". It examines the implications of human-induced land degradation for agricultural production, producers of all scales and vulnerable populations. The report presents new findings on how cropland degradation contributes to the yield gap worldwide against a backdrop of broader degradation processes on other land cover types and even land abandonment. Drawing on the latest data on global farm distribution, farm sizes and crop production, the report highlights how the scale at which land is managed shapes both the constraints and the opportunities for adopting sustainable land use and management practices. It also underscores the importance of policymaking that encompasses regulatory and incentive-based measures, tailored to the varied conditions and scales of land use, to avoid, reduce and reverse land degradation.

The State of Food and Agriculture 2025 (full text)

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