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Green Jobs and Sustainable Agricultural Technologies

The Case of Quinoa Production in the Andean Region

Sur Futuro

In Andean countries Bolivia, Perú, and Ecuador, nearly one-third of the employed population works in agriculture—an essential activity for ensuring food security and sustaining rural economies. However, the sector faces significant challenges, including low and unstable incomes, high vulnerability to climate change, and the widespread use of unsustainable practices that threaten both the future of natural resources and the livelihoods that depend on them.

That's why any strategy for building a more just, productive, and sustainable future of work in these countries must address a central question: **how can we transform rural jobs to make them more productive, green, and decent?**

Can quinoa production foster green jobs?

Quinoa production in Bolivia, Peru, and Ecuador –three of the world's leading producers– offers a compelling case to examine the ongoing transformation of agriculture. Once a crop deeply rooted in Andean culture, quinoa has gained significant international demand in recent decades, driven by growing awareness of its nutritional value and the designation of 2013 as the International Year of Quinoa. This global boom opened new markets and created income opportunities for thousands of smallholder farming families. Yet, it also brought serious challenges: soil degradation, declining yields, and a missed opportunity to secure stable, fair, and sustainable livelihoods.

Transitioning toward greener agriculture by promoting sustainable technologies and practices can boost productivity, reliability, and the quality of jobs, even within small-scale family farming. But how can we foster the adoption of these innovations in rural contexts?

To contribute to this goal, the Institute for Advanced Development Studies (INESAD) and Sur Futuro focus on four key pillars:

- A pioneering taxonomy to map sustainable agricultural technologies and practices
- An overview of how widely these practices are adopted across Bolivia, Peru, and Ecuador
- An analysis of the factors limiting adoption
- A gender-based lens to identify specific barriers faced by women farmers

What makes a job "green" in small-scale agriculture?

Defining green jobs in agriculture –particularly within family farming– is still an evolving task, with no internationally agreed-upon standard yet.

This study offers a context-specific definition rooted in the rural Andean setting, guided by two core criteria: that the activity contributes to environmental sustainability and that it provides fair, stable, and sustainable incomes for those who perform it.

While aligned with the ILO's concept of green jobs –which emphasizes the importance of decent work– this approach focuses on the level and reliability of income, adapting the definition to the realities of smallholder systems, where formal employment relationships are rare and productive activities are closely tied to household responsibilities.

The study also introduces a taxonomy of 15 sustainable agricultural practices that combine ancestral knowledge, innovation, and modern technologies. These aim to reduce environmental impact, enhance climate resilience, and improve productivity– always with a focus on protecting both the land and livelihoods that depend on it.

How widely are sustainable practices used in quinoa farming?

The adoption of sustainable practices in the quinoa sector remains limited in Bolivia, Perú, and Ecuador, though some encouraging trends are emerging. Drawing on surveys, quantitative data, and dialogue with farmers and experts, the study reveals a pattern of partial adoption, uneven progress, and shared challenges in advancing sustainability.

Progress is assessed through five key areas: soil management, seed selection, water use, pest control, and harvesting processes. While traditional methods continue to dominate, a subset of farmers –particularly those oriented toward export markets– are beginning to adopt more sustainable practices such as using organic fertilizers, minimum tillage, certified seeds, live barriers, and drip irrigation.

However, barriers persist. Access to certified seeds remains limited and conventional production continues to rely heavily on chemical pesticides. In many areas, challenges in retaining soil moisture and improving water use efficiency are still unresolved. Harvesting methods vary across countries, combining manual and mechanical techniques with differing levels of efficiency.

What's holding back the adoption of sustainable practices?

If sustainable agricultural practices improve land productivity and farmer income, why aren't they being adopted more broadly?

Based on survey data and participatory workshops with farmers, the study shows that adoption decisions are shaped by **high levels of climate, economic, and technical uncertainty**. In this context, the perceived security of familiar practices often outweighs the potential longer-term benefits of future sustainability.

The document identifies two braod categories of obstacles:

1. Producer-related barriers, including:

- Risk aversion, especially when benefits are not immediate and upfront investments are high
- Financial constraints, such as limited access to credit or high costs for export-related certifications and logistics
- Knowledge gaps, often stemming from limited formal education or insufficient access to training opportunities
- Cultural norms, which can create resistance or distrust toward innovation

2. Contextual barriers, including:

- Restricted access to credit and basic infrastructure
- Limited availability of technical assistance
- Weak market access and commercialization channels
- Fragmented or short-lived public policies

Taken together, these structural conditions undermine both the incentives and incentives to innovate – underscoring the need for a more active role by governments and other key actors in enabling a just and inclusive transition to sustainable agriculture.

Are women at a disadvantage?

Conventional approaches to measuring gender inequality often fall short in the context of small-

scale family farming, where decision-making is frequently collective and the boundaries between domestic and productive activities are blurred. But, even when these dynamics are considered, evidence shows that gender roles in farming and culture remain a barrier preventing women from accessing sustainable technologies across all three countries.

While men are typically responsible for land preparation, planting, and harvesting, women tend to manage tasks that are often seen as less valued in the market –such as seed selection, pest control, and post-harvest storage. These responsibilities are carried out alongside the majority of unpaid domestic and care work, which limits their time to learn and explore new farming practices.

Women also face greater financial and structural constraints, including limited access to land, credit, technology, connectivity, and technical training opportunities. These disadvantages, coupled with sociocultural norms that restrict their decision-making power, significantly reduce their ability to adopt sustainable technologies.

Nevertheless, there have been signs of progress. In Bolivia, for instance, legal frameworks have advanced the recognition of women's land rights, which has improved their access. But barriers persist, especially in Peru and Ecuador, where gender-sensitive policies have yet to ensure equitable access to resources and opportunities.

Bridging tradition and innovation for a just transition

Advancing toward greener and more just agricultural models is essential in countries where small-scale farming plays a vital role in rural livelihoods—such as Bolivia, Peru, and Ecuador. In the case of quinoa, this transition requires public policies that address the structural, economic, and cultural challenges identified in this study.

Our findings also highlight that promoting the adoption of sustainable technologies must go hand in hand with revitalizing traditional practices. Deeply rooted in Andean culture, these methods offer time-tested approaches to sustainability and the responsible care of natural resources. Placing them at the center of the green transformation is not only a matter of cultural recognition –it is a strategic pathway to strengthening ecosystems, increasing productivity, and improving the well-being of the thousands of farming families who depend on this crop.

Access the document here (only available in Spanish).

FutureWORKS COLLECTIVE

About FutureWORKS Collective

The FutureWORKS Collective (FWC) is a global consortium funded by Canada's International Development Research Centre (IDRC) that addresses the unique opportunities and challenges shaping labour markets in developing countries. Coordinated by JustJobs Network, FWC unites five distinguished research organisations as regional hubs to examine critical labour market issues, including the impacts of technological advancements, the proliferation of artificial intelligence, climate change, and energy transition. By fostering collaboration, generating evidence-based research, and engaging in policy advocacy, the Collective aims to bridge regional insights, amplify a unified global voice, and drive practical solutions toward a more equitable and inclusive future of work.

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