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# How to move towards green jobs in family farming? The case of quinoa in Andean countries

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In the labor sphere, the new global paradigm is the creation of green jobs, which bring together aspects related to both job quality and caring for the environment. Nonetheless, this concept is still in the construction process, and has gaps and challenges in terms of quantification, particularly resulting from its multidimensional nature. More so, a diversity of theories and practices, as well as labor, sector and environmental contexts must engage together.

In this context, the present brief proposes a way of envisaging green jobs in family farming and applies this conceptualization to the case of quinoa in the Andean countries of Bolivia, Peru and Ecuador. This reflection is part of the study titled *Green Jobs and Sustainable Agricultural Technology: The Case of Quinoa Production in Andean Countries*, realized by the same authors for Fundación INESAD (Muriel *et al.*, 2025) through the sponsorship of Sur Futuro in the framework of the FutureWORKS Collective global initiative, fostered by the International Development Research Centre (IDRC) of Canada.

## A critical glance at the concept of green jobs

Green jobs include two dimensions that are equally important in their conceptualization. The first dimension assumes that green jobs must be decent, or dignified; that is, that they must satisfy the aspirations of individuals during their labor cycle, including job stability, access to industrial and social-labor protection - *e.g.* health insurance, retirement pension, protection against labor risks, unemployment insurance -with pay that allows supporting families, the freedom to form unions and organizations, and the exercising of other fundamental labor rights (ILO, 1999; Dharam, 2003; Muriel and Ferrufino, 2012; Muriel *et al.*, 2014; UN, 2015). The second dimension considers that green jobs must contribute towards preserving and regenerating the environment. Hence, their activities should allow mitigating greenhouse gas emissions, increasing efficiency in energy, water and input consumption, minimizing waste and contamination – by fostering recycling and the circular economy – protecting and restoring ecosystems and biodiversity, and contributing towards

adapting to climate change, etc. (for a literature review, see Muriel and Mansilla, 2020).

However, there are still conceptual and practical challenges and gaps for moving forward in this direction. The first of these is that green jobs are often understood without considering qualities that make them “decent” or “dignified”, despite the fact that even since the 1970s a diversity of efforts existed on the part of governments and cooperation entities for including job quality in the sustainability debate (OSE, Fundación Biodiversidad and IMEDES, 2010). For example, a diversity of studies associate green jobs with the work done by farmers to care for the environment and regenerate ecosystems, though without considering that the producers must also have satisfactory remuneration and social protection, among other labor rights.

The second challenge arises from the concept of decent or dignified jobs, which assumes an employer-employee relationship of dependency under which workers receive a salary and are

Green jobs also face conceptual and practical challenges and gaps for action.

employees or laborers of an employer or boss, who is responsible for ensuring the rights of the employees. However – and more so in underdeveloped and developing countries – many jobs are unpaid and lack this relationship of dependency. This type of work is self-employment or family labor. Thus, the concept of decent jobs has gaps and cannot be applied thoroughly to assessing the entire workforce.

The last challenge has to do with complexity in specification of the environmental component of green jobs. Some authors and entities make use of occupational groups, related mainly to the type of profession or specialization, which are affected by greening. Others categorize individuals based on the field of economic activity in which they work (e.g., see OSE, Fundación Biodiversidad and IMEDES, 2010; Bowen *et al.*, 2018). In some cases, these classifications may be interrelated; for example, forestry workers who conserve the environment tend to work in the forestry conservation sector. However, in other cases, determining this interrelationship is not possible. As an example, a security guard may work in a renewable energy company or a non-renewable energy company. Besides, the environmental part of green jobs may not be categorical – *i.e.*, 1 if it is green and 0 if it is not – but continuous instead: [0,1]. For example, the forestry



conservation sector and its workers may use transportation or equipment that employ fossil fuels.

In summary, the need to advance towards generating green jobs carries with it the challenge of offering greater clarity, coherence and structure in its concepts, and also in terms of possible forms of assessment.

### A conceptual proposal for green jobs in family farming

Agriculture plays a crucial role in environmental balance. In particular, family farming is key to food security. According to FAO (2025), family units employ 30% of the working population at the global level and produce over 80% of the world's food in terms of value. Thus, production at this scale is fundamental for enabling progress in the environmental aspect of green jobs. However, the jobs generated in this sphere are unpaid; hence the concept of decent or dignified jobs cannot be applied.

Under this context, an alternative proposal lies in having jobs that possess a certain degree of quality in the spheres of labor and caring for the environment,

considering two basic qualities. The first of these applies to possessing social-labor protection, essentially through health insurance and retirement pensions. In the case of health, some countries have inclusive systems under which such insurance – private and/or public – exist for the entire working population, either free of charge or with certain contributions. In the case of pensions, some countries also have measures that include in the contribution system workers who are not dependent on an employer. As a result, access to social-labor protection is possible for workers of small family farming units.

The second quality corresponds to labor income from farming activities, which are generally measured based on combined profit, given that it is difficult to separate labor returns as such from those arising from capital and/or land; such income must be:

- **Fair:** in the sense that these resources allow farmers and their families to cover their basic needs satisfactorily
- **Stable:** in the sense – similar to the way in which salaried job stability is sought – that farmers are able to have

resources with low levels of volatility in time. This implies not only having budget planning based on the agricultural cycles, but also risk mitigation strategies for pests and diseases, climate variability and other shocks that affect agricultural production<sup>1</sup>.

- **Sustainable:** in the sense that the buying power of labor income is conserved, and even improved, over time

One aspect worth highlighting is that the qualities proposed for agricultural labor income allow linking the activities with the adoption of sustainable agricultural technology. Such technologies are forms of production that seek to reduce negative environmental impacts in agriculture, to increase resilience in the face of climate change and climate variability, and to optimize the use of inputs and improve crop yield. All of this makes it possible for the technologies to be economically viable in the medium- and long-term with improvements in rural incomes and acceleration towards the green transition.

Sustainable agricultural technologies are at the roots of a diversity of sustainable agricultural production approaches, including agroecology, organic agriculture, conservation agriculture,

<sup>1</sup> In jobs dependent on employers, salaries are generally stable and shocks that may arise in the derived sales are taken on by the business owners.

**In family farming, green jobs should be those that minimally have social protection, and labor income that is fair, stable and sustainable.**



regenerative agriculture, and biodynamic agriculture<sup>2</sup>. These approaches allow delimiting best agricultural practices. In this way, the environmental aspect of green jobs can be assessed given the adoption or not of the mentioned types of farming practices, and based on these approaches, it is also possible to perform a subcategorization of agricultural economic activities.

## Application of the conceptual proposal of green jobs to quinoa in Andean countries

Quinoa is native to the Andean region of Bolivia, Peru and Ecuador. The case of quinoa is emblematic, for its demand has increased substantially at the global level, because of its high nutritional value. At the same time, it has historically been cultivated by small family units, although this has been changing in Peru. In addition, quinoa is produced organically, particularly in Bolivia and Ecuador. Notwithstanding, there are still a series of challenges for categorizing the work related to quinoa as green jobs.

In terms of social-labor protection, a

<sup>2</sup> Muriel et al. (2025) present a taxonomy of 15 approaches that considers the primary productive process.

survey performed by Fundación INESAD in 2023 of 297 quinoa producer families in the Southern Altiplano shows that 94% of farmers are affiliated to a health insurance system, though only 13% are part of the pension system. It is worth noting that the high rate of coverage in health responds to the fact that the Bolivian government implemented a universal health system (Sistema Único de Salud – SUS) which exists since 2019, and promoted mass registration.

Peru and Ecuador do not have data for quinoa producers, but this information can be approximated considering the employed rural population. The trend of Peru is similar to that of Bolivia, with 97% having some kind of health insurance and only 15% being affiliated to the pension system (INEI, 2023). The high rate of coverage in health is explained by the fact that the Peruvian government implemented an insurance scheme called Seguro Integral de Salud (SIS) in 2002 for entrepreneurs, microentrepreneurs and independent workers in conditions of poverty or extreme poverty. Lastly, Ecuador has a farmer social insurance (Seguro Social Campesino – SSC) which provides health and retirement benefits at the same time, though its rate of

affiliation is only 14% of the employed rural population (ILO, 2016 and IESS, 2025).

The data presented indicates that advancing towards effective access to retirement pensions is needed, and this depends on the level of accessibility provided by the governments for this niche of workers, on the payment capacity of the farmers, and on the degree acceptability of the schemes; e.g., the level of confidence in the systems.

In terms of the qualities of labor income so as to consider them fair, stable and sustainable, the first step is to identify the best agricultural practices in quinoa production, which are delimited based on sustainable agricultural technologies. Box 1 summarizes these practices, categorized under five sub-activities performed in the agricultural cycle: comprehensive soil management, seed selection and sowing, water use and comprehensive water management, pest and disease management, and harvesting.

## Box 1: Best agricultural practices in quinoa production

**Comprehensive soil management:** i) minimal or no tillage; ii) crop rotation, identifying the adequate moment in time and sequence of crops; iii) mulching, cover crops, live fences; iv) use of organic fertilizers such as manure, compost, earthworm humus, and green manure; v) integration of organic and mineral fertilizers in balanced proportions according to soil analysis; vi) reduction in the use synthetic inputs; vii) agroforestry practices; viii) use of nitrogen fixers through use of cover crops; ix) planting of forage

**Seed selection and sowing:** i) prioritization of native seeds and local varieties; ii) selection of varieties adapted to specific agro-climate conditions; iii) use of certified seeds; iv) thinning of seeds; v) regulation of sowing density based on seed characteristics; vi) sowing in furrows; vii) use of the rainy season as an indicator for sowing

**Water use and comprehensive water management:** i) efficient use of water

(techniques such as drip irrigation and rainwater harvesting); ii) irrigation systems according to crop needs and adapted to the region and to the context of access to water (rainfed or irrigation); iii) use of vegetation cover for conserving humidity

**Pest and disease management:** i) preventive pest management by means of specific rotation and biodiversity, prioritizing the ecological balance; ii) cultural, biological and etiological management of pests; iii) biological control by fostering pollinators and natural predators; iv) minimal use of synthetic pesticides; v) continuous monitoring

**Harvesting:** i) use of manual techniques, respecting natural cycles; ii) collecting by means of cutting or reaping the quinoa plants using sickles or mechanical mowers without pulling up the plants; iii) soil cover with the residue and reutilization of waste for compost



**Organic quinoa producers continue to face a series of challenges for unquestionably having green jobs.**

These farming practices have been only partially applied by quinoa farmers, for different reasons, to some degree because greater consumption at the global level led to a substantial increase in production. In the case of Bolivia, this led to an expansion of the agricultural frontier under a scheme that prioritized monoculture, reducing the presence of live fences and grazing land, leading also to a loss of organic matter in the soil, causing a decrease in yield. In Peru, crop areas expanded, to a great extent in non-Andean regions, often under conventional production, leading to an increase in yield. The agricultural practices

were however not very sustainable. In the traditional zones, the increase in production also caused a reduction in crop diversity and in vegetation cover. In Ecuador, the increase in production was significantly lower than in Bolivia and Peru, with effects on soil quality. More conventional cultivation emerged, with low levels of sustainability and a reduction in diversification.

In terms of water use and comprehensive water management, a positive aspect of quinoa is that it requires little water. Nonetheless, the reduction of live barriers and the trend towards monoculture has caused a greater loss of humidity, particularly in Bolivia, although progress is being made in rainwater collection and in irrigation with more efficient systems. Peru is the leader in this field.

As to the remaining practices, it is worth mentioning that the manner of seed selection has continued to be environmentally friendly, with pest and disease management in non-conventional agriculture. Albeit, the use of farming machinery for sowing did not prove sustainable in some cases, and this

also applies to harvesting. Greater use of machinery is the case particularly in Peru, with production of conventional quinoa.

Additionally, increased quinoa production has been accompanied by more favorable prices, particularly around 2012 and 2016, having a positive effect on labor income, leading it towards the quality of fair. However, prices fell following these years due to a rise in competition of conventional quinoa at the world level. Besides, income has been unstable not only due to price volatility, but also as a result of variability and change in climate. In the face of the latter forms of shocks, the countries of the three governments have implemented agricultural insurance for mitigating effects.

In summary, the above information shows that the jobs generated by organic production have characteristics that categorize them in an intermediate green level. There are however several challenges for the jobs to be unquestionably characterized as green jobs.



photo: INESAD

## Recommendations

The conceptualization and categorization of green jobs will likely continue to be constructed, given its complexity. It is nonetheless evident that the quality of jobs cannot be left aside, particularly in designing policies, programs and projects.

In this context, for the case of family farming it is possible to progress along these lines – and with the two qualities proposed here – from a perspective of the agricultural practices that the producers carry out. These practices imply a higher degree of granularity in the categorization of activities such as in the International Standard Industrial Classification of All Economic Activities (ISIC), generally employed in the national accounts of countries.

Finally, the application of the qualities of green jobs proposed for the case

of quinoa shows that challenges are still present. Evident is the need to implement sustainable agricultural management strategies that increase yield in balance with conservation of the environment and biodiversity, and which at the same time improve job quality. Concerning this, measures such as the following are worth considering:

- Training programs aimed at family producers on sustainable quinoa cultivation, including organic and regenerative agricultural practices. This will help farmers improve the quality of their crops and obtain certifications allowing them to access Premium markets (while improving yield and income).
- Economic and tax incentives programs for farmers who adopt sustainable quinoa production practices, which may include subsidies for organic inputs, access to low-interest loans,

and technical support. This will allow reducing production costs and increasing profitability, with the subsequent fostering of creating green jobs in family farming.

- Strengthening of quinoa producer associations for enabling cooperation in production, sales and distribution. Additionally, the strengthened associations can help with access to resources, financing and markets.

Undoubtedly these initiatives require the unwavering, firm, broad, and decided commitment of governments, as well as the effective support of cooperation entities, the private sector and organized civil society.

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