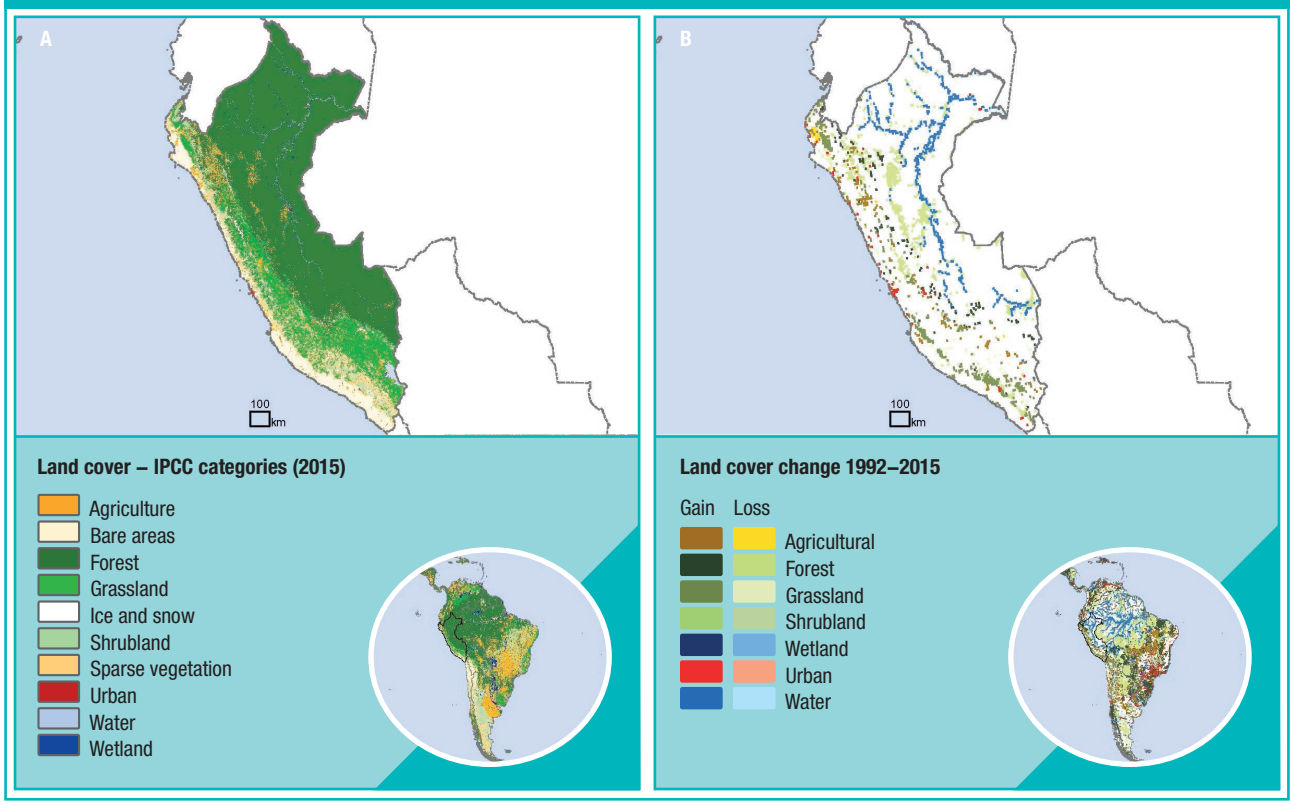
AGROBIODIVERSITY INDEX

Peru – Country profile

Context

- In Peru, agriculture occupies 19% of land area (Figure 1A), provides 28% of employment, and contributes 7% to gross domestic product. Agricultural areas are mainly located in the highlands, and patches within the Amazon.
- Peru is part of the South American Vavilov centres of plant domestication, with very high diversity for 62 plants including potatoes, beans, maize, tomatoes and *Capsicum* pepper.
- The country has one of the highest concentrations of biodiversity in the world, hosting more than 2,145 species of fish (highest in the world), 4,000 species of butterflies (highest in the world), 1,847 birds (third in the world), 624 amphibians (fourth in the world), and 523 mammals (fifth in the world).
- About 78% of young children (6–23 months) in Peru consume a minimum diet diversity. Among adults, the mortality rate attributable to inadequate diets is low compared to other countries at 107 per 100,000 population.
- Peru's agricultural biodiversity and ecosystem services are under threat due to land use change (Figure 1B), habitat loss and overexploitation. About 44% of plant and 8% of animal species in the country assessed by the International Union for Conservation of Nature (IUCN) are threatened. Deforestation has hit the Amazon forest particularly hard, with an average rate of 118,000ha forest loss per year. Clearing of land for agriculture is the major cause.[i]

FIGURE 1 – Major land use (A) and changes in major land use (B)



Source: Adapted from: A) European Space Agency 2017;[ii] B) Nowosad, et al. 2019.[iii]

Agrobiodiversity Index results

- Peru **scores** medium-high for status of agrobiodiversity (Figure 2A). The level of genetic resources for future options and agrobiodiversity in markets and consumption for healthy diets contribute most strongly to this score, while the contribution of agrobiodiversity in production is relatively lower. This indicates that agrobiodiversity is highly available in genetic resource management and in markets and consumption, but that its potential is still underused in agricultural production systems.
- The **progress** score shows that agrobiodiversity-related commitments and actions that are in place are medium-weak (Figure 2B). While many policies exist and make note of agrobiodiversity, specific strategies and targets to sustainably use and conserve it are mostly missing. Current actions to strengthen the use and conservation of agrobiodiversity are stronger in terms of genetic resource management to safeguard future options, but weaker when it comes to using agrobiodiversity sustainably in agriculture, markets and consumption to improve farmers' livelihoods and people's nutrition.
- Compared to the 10-country average scores, Peru outperforms on overall agrobiodiversity status, and scores average on commitments and actions to manage agrobiodiversity over time. This flags a risk that agrobiodiversity is taken for granted and might decline if no specific commitments or actions are put in place.

FIGURE 2 – Overview of Agrobiodiversity Index scores for Peru

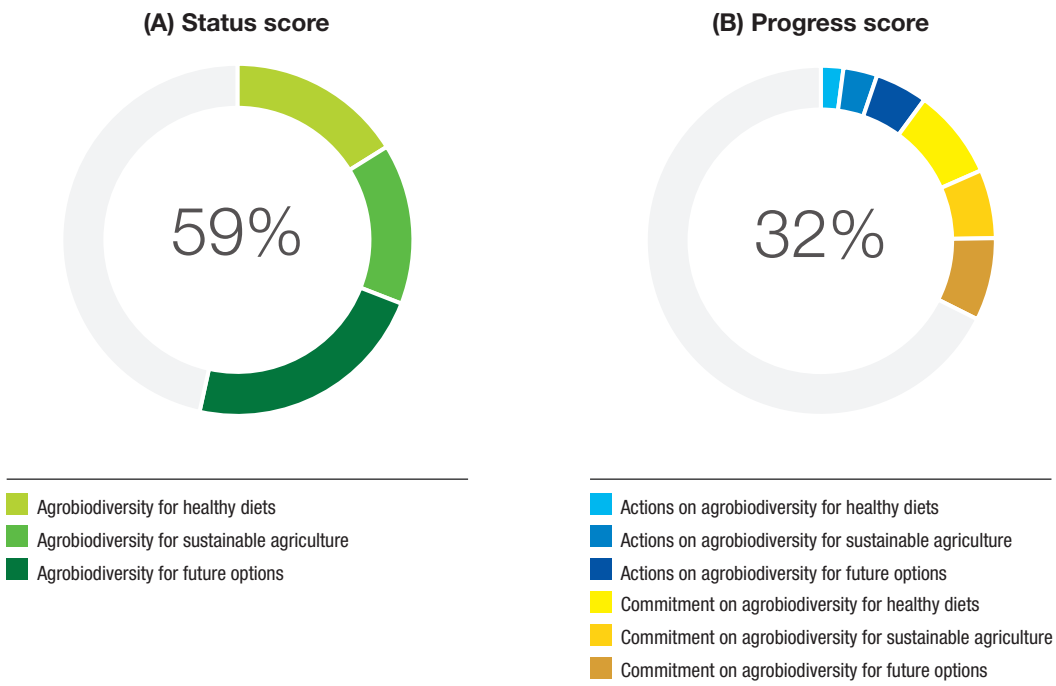


TABLE 1 – Overview of the Agrobiodiversity Indicator scores per pillar for Peru

		Pillar 1	Pillar 2	Pillar 3
		Agrobiodiversity in markets and consumption for healthy diets	**Agrobiodiversity in production for sustainable agriculture**	**Agrobiodiversity in genetic resource management for future options**
Commitment	Level of commitment to enhancing consumption and markets of agrobiodiversity for healthy diets	50		
	Level of commitment to enhancing production and maintenance of agrobiodiversity for sustainable agriculture		38	
	Level of commitment to enhancing genetic resource management of agrobiodiversity for current and future use options			46
Actions	Consumption and market management practices supporting agrobiodiversity	13		
	Production practices favouring agrobiodiversity		21	
	Production diversity-based practices		17	
	Genetic resource management practices supporting agrobiodiversity			29
Status	Species diversity	86	29	92
	Varietal diversity			96
	Functional diversity	42		
	Underutilized/local species	44		36
	Soil biodiversity		41	
	Pollinator biodiversity			
	Landscape complexity		68	

Note: All scores are scaled from 0–100. The colour scheme was changed on 1 August 2019 to reflect more accurately the scores

Leading practices

- ***In situ* conservation:** Around 67% of wild useful plants in Peru are well conserved *in situ*. The country has established agrobiodiversity hotspot areas, like the Potato Park, home to a large diversity of potatoes, to protect and conserve its agrobiodiversity *in situ*.
- **International reporting on agrobiodiversity:** Peru systematically reports on 86% of indicators to the World Information and Early Warning System (WIEWS) on Plant Genetic Resources for Food and Agriculture. Peru also contributed an in-depth country profile to the FAO *State of the World's Biodiversity for Food and Agriculture 2019*.
- **Land sharing:** About 67% of Peru's agricultural land includes more than 10% natural vegetation, suggesting that agriculture is integrated with the surrounding environment and provides habitat and habitat connectivity for biodiversity. Agroforestry is managed on 27% of agricultural land, more than double the 10-country average (10.5%). As agricultural land is expanding, it will be very important to carefully manage the interaction between agricultural and natural vegetation.

Areas for improvement

- **Explicit strategies and targets:** Commitment to managing the richness of agrobiodiversity for sustainable agriculture, healthy diets and future use options can be made explicit through the identification of dedicated strategies and targets.
- **Sustainable production practices:** The Sustainable Nitrogen Management Index (SNMI) shows that Peru performs low on sustainable nitrogen management, including nitrogen use efficiency, indicating a risk for nutrient run-off and environmental pollution. Pesticide use is also high at 5kg per ha. However, Peru has committed to banning the use of highly toxic pesticides. More careful management of pesticides and fertilizers can reduce negative effects of agriculture on biodiversity.
- **Food-based dietary guidelines:** Despite Peru's very rich culinary history, and high biodiversity for food and nutrition, locally adapted food-based dietary guidelines are not yet available. The potential of between-species and within-species diversity for healthy diets can be explored in such guidelines and in food composition tables.

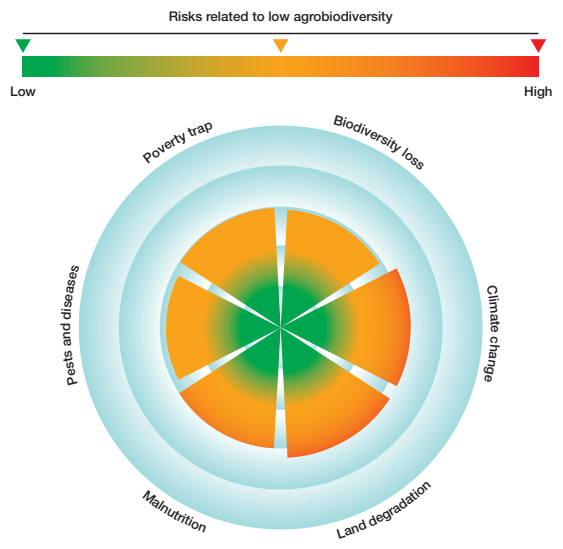
Notable findings

- **Relatively high scores across all three Agrobiodiversity Index pillars:** Peru has higher status and progress scores in agrobiodiversity for healthy diets, for sustainable agriculture and for future options compared to other countries. Other countries from the sample often perform highly in one or two of the pillars.
- **Civil society engagement:** While Peru shows a moderate commitment to achieving diversified and healthy diets, some policies stand out. Learning from the development process of the National Strategy for Food and Nutrition Security 2013–2021, the country has adopted a multisectoral approach to food security and nutrition whereby food and nutrition security programmes are co-managed by decentralized governing bodies together with civil society.
- **Useful wild plants:** while most countries score very low on the *in situ* and *ex situ* conservation of useful wild plants, in Peru 67% of useful wild plants are conserved *in situ* and 4.7% *ex situ*.
- **Markets and production:** Peru's species diversity in supply, production, export and import has gradually increased over the years but more recently it has stagnated and even declined.

Risk assessment

The country is modestly exposed to multiple risks related to low agrobiodiversity or poor actions and commitment related to its sustainable use and conservation (Figure 3). Contributing to the risk of land degradation is the relatively low species diversity per unit of land area in production systems, the critically low soil biodiversity in certain areas of the country, and the limited actions in place that support agrobiodiversity for sustainable agriculture. For example, the proportion of agricultural land under conservation agriculture or organic agriculture is close to zero. Together with the trends in land use change described in the context section, this exposes Peru to increased risks of land degradation. Contributing to the risk for losses due to climate change are the relative low species diversity in production systems and areas with low soil biodiversity.

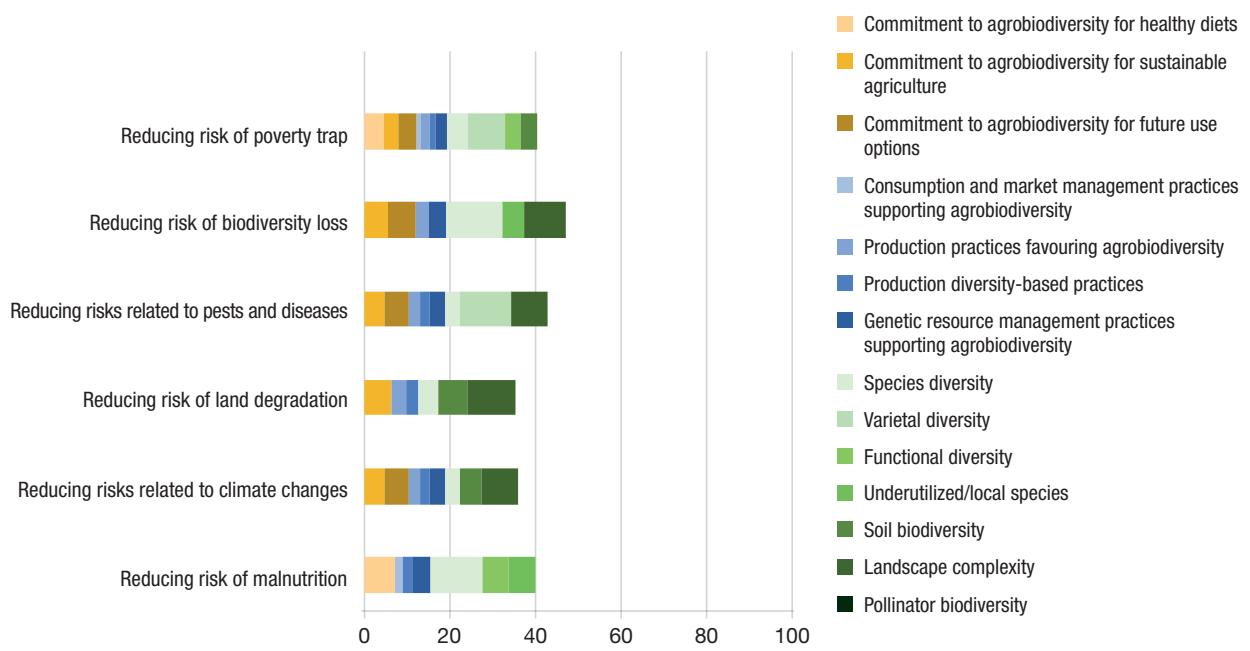
FIGURE 3 – Increased risks related to low agrobiodiversity levels in Peru



Resilience building

Reversing the risk assessment, the existing agrobiodiversity and related actions and commitments help build resilience to various risks (Figure 4). Current agrobiodiversity management in Peru contributes most significantly to managing the risks of pests and diseases, poverty trap and biodiversity loss. In particular, much of Peru's agricultural land contains a significant amount of natural or semi-natural vegetation, which plays a critical role as biodiversity habitat.

FIGURE 4 – Contributions of Agrobiodiversity Index indicators to resilience building in Peru



Note: All scores are scaled to a maximum of 100. Colours indicate relative scores of individual agrobiodiversity indicators that contribute to building resilience for that specific risk area. No data available for pollinator biodiversity.

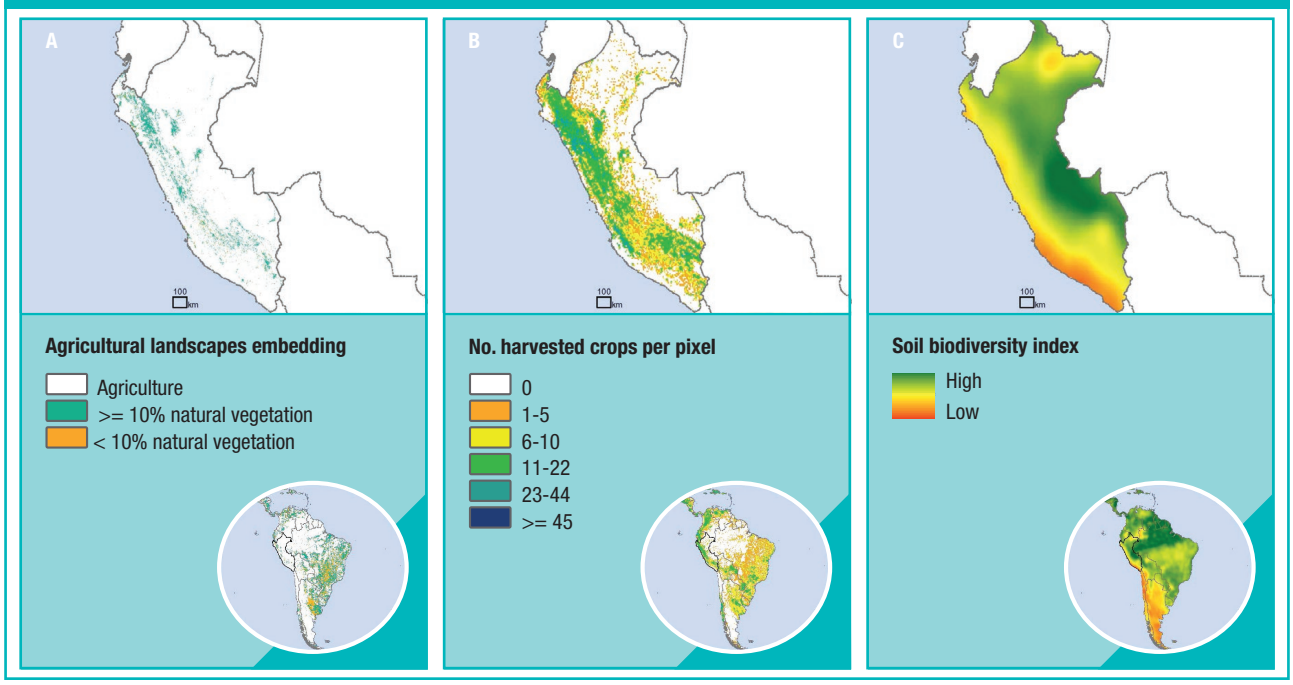
Indicator trends

Spatial trends

In Peru, 67% of agricultural land contains a minimum of 10% of natural or semi-natural vegetation (Figure 6A), suggesting that agriculture is very much interconnected with the surrounding ecosystem. Continued and improved management of this relationship between agriculture and natural vegetation is critical for agricultural and environmental sustainability in the country.

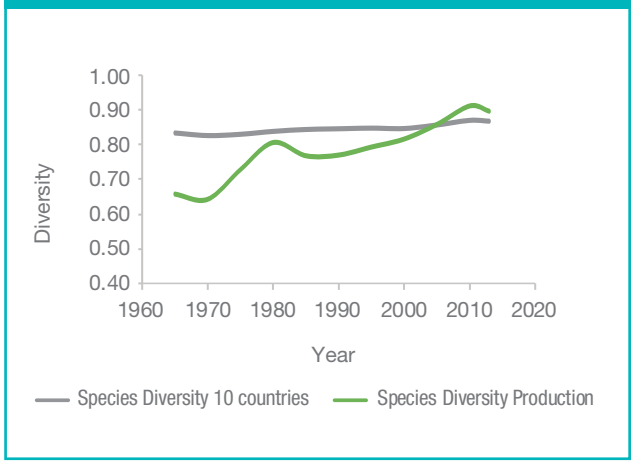
The number of crop species harvested per land unit (10x10 km) is medium-low (Figure 5B). In several regions, no more than five crops per land unit are harvested on an annual base. Overdependence on a few crops can increase risks to environmental and economic shocks. Soil biodiversity potential (Figure 5C) is particularly high in the Amazon, and critically low in the dry areas in the southwest.

FIGURE 5 – Spatial trends in agrobiodiversity indicators for sustainable agriculture, including agricultural land with > 10% natural or semi-natural vegetation (A); number of harvested crops per pixel (B), and soil biodiversity index (C)



Source: Adapted from: A) European Space Agency 2017; B) Monfreda et al. 2008;[iv] C) European Soil Data Center 2016.[v]

FIGURE 6 – Temporal trends in species diversity in production in Peru (Shannon diversity index)



Source: FAO, 2019[vi]

Temporal trends

Temporal trends in species diversity in production (Figure 6) illustrate a gradual increase in species diversity from 1965 on, reaching above-average levels in 2005. This increase, however, has leveled off and slightly declined more recently. In parallel to Peru's production diversity, species diversity in Peru's agricultural export and import has also increased over the last 50 years.

References

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