



Food and Agriculture
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BUILDING RESPONSIBLE
GLOBAL VALUE CHAINS
**FOR SUSTAINABLE
TROPICAL FRUITS**



TECHNICAL BRIEF

Resilience gaps and opportunities for the avocado industry

Main findings from the resilience assessment of avocado and pineapple value chains

Strengthening the resilience¹ of avocado value chains is increasingly important as the sector faces multi-faceted risks, including climate change, pests and diseases, and economic downturns, among others. By building resilience, avocado companies and associations can ensure the continuity of their operations and businesses. Stronger resilience will help them to prepare, adapt and respond to crises more effectively, minimizing losses and preventing the emergence of new risks.

The **Responsible Fruits project** conducted a detailed study to identify the main challenges and opportunities to strengthen the resilience of the avocado and pineapple industries. **This brief highlights the main findings for the avocado industry.** The results were validated in a **workshop** with stakeholders from the avocado and pineapple industries on 6 December 2022. The complete study can be found **[here](#)**.

¹ Please refer to the [Guidelines](#) to increase the resilience of agricultural supply chains.

Main shocks and stressors affecting the resilience performance of the avocado sector

The main shocks and stressors affecting the resilience performance of the avocado sector are linked to economic factors as well as to climate and environmental issues as explained in [Table 1](#).

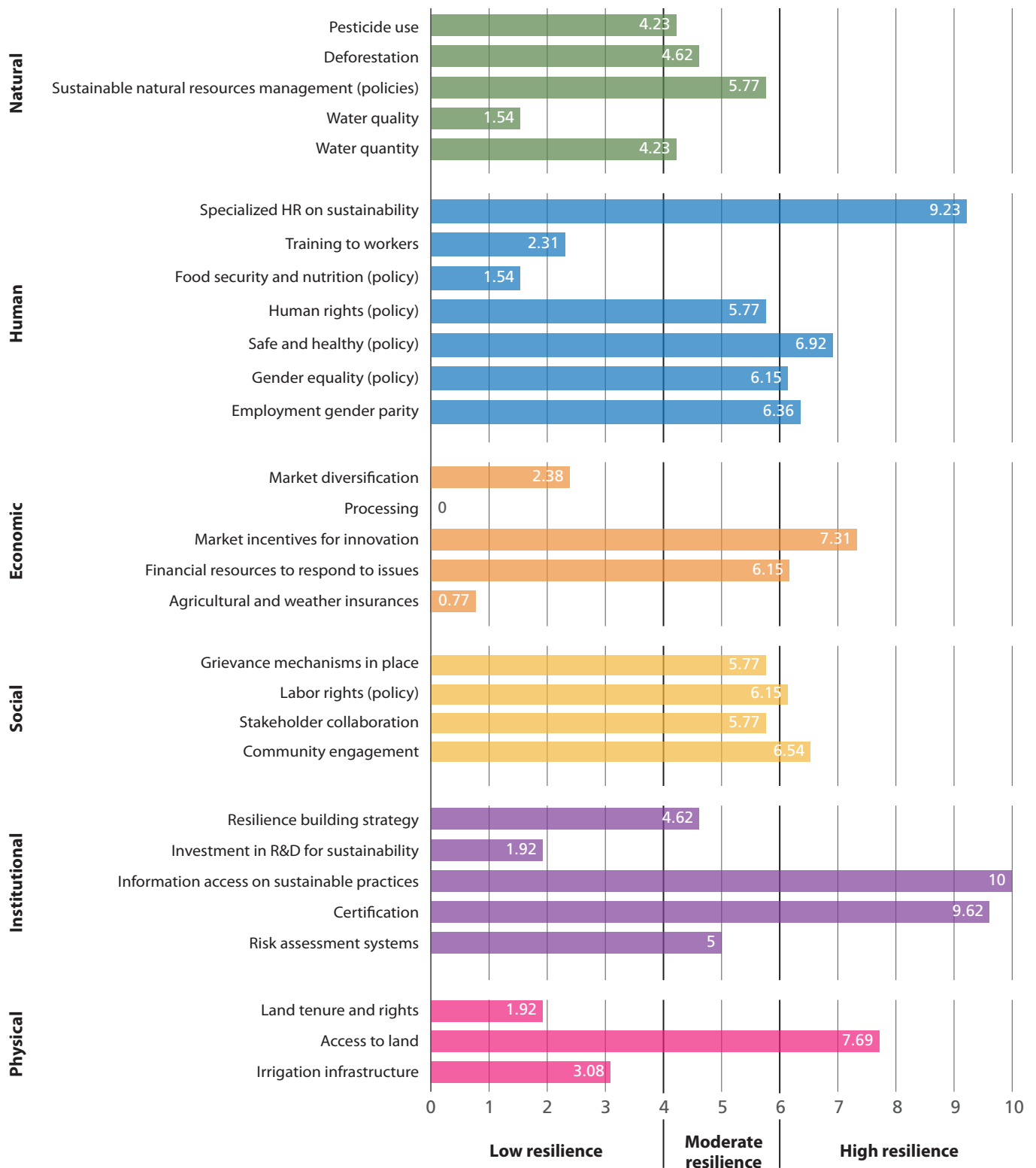
Table 1. Main risk areas identified for the avocado sector based on a literature review and consultations

Area	Current effects on value chains
Climate change and extreme weather events	<p>Higher temperatures are affecting productivity by reducing flowering, fruit setting, pollinating activity and increasing radiation. Average temperatures are expected to increase in all avocado-producing regions in the next decades. Warmer weather will contribute to more frequent hailstorms, already experienced and with damaging effects in Chile, Mexico and South Africa.</p> <p>Water deficit stress in avocado production leads to the loss of flowers, reducing fruiting. Excessive rainfall results in impaired pollination activity, flower loss, proliferation of pathogens, and reduced productivity and fruit quality. Chile, Mexico and South Africa are projected to experience lower average precipitations, while Colombia, Indonesia and Peru are expected to observe higher rainfall.</p>
Environmental degradation	Reduced soil health has decreased soil fertility and productivity, with collateral impacts on water availability and quality. Increased degradation has resulted in the increased use of external inputs, incrementing production costs. Land use change motivated by more suitable agroclimatic conditions for production and rising market demand can put further pressure on soil health and ecosystems.
Water stress	The variability in the rainy season and the slowing down of the replenishment of aquifers due to lower precipitation and water extraction for irrigation have reduced the water available for production in some regions. In some cases, water competition with other industries and domestic use has resulted in tensions and conflicts. Inefficient irrigation systems, water management and agronomic practices might intensify various risks, including aquifer depletion and pollution.
Pathogens and agrochemical use	The occurrence of plant health issues has resulted in the increasing use of agrochemicals. More stringent phytosanitary requirements and agrochemical use regulations in importing markets, combined with a changing climate might threaten consistent levels of production and export.
Institutional and political factors	According to some avocado companies, regulations on land tenure and land use among different stakeholders (e.g. avocado producers, foresters, indigenous communities) and the enforcement of such regulations are weak. Strengthened land tenure and land use regulations could prevent unregulated expansion of agriculture into forest areas.

Major resilience gaps in the avocado sector

The **livelihood resilience framework** was used to analyze the resilience performance of the avocado value chain. The framework explores how the access to and use of different types of capital (e.g. economic, natural, institutional, physical, human and social capital) can support value chain actors to develop resilience capacities to manage future risks. [Figure 1](#) highlights the indicators with low and moderate resilience levels.

Figure 1. Resilience gaps identified in the avocado value chain, by type of capital



Source: FAO. 2023. Resilience assessment of avocado and pineapple value chains. Rome. <https://doi.org/10.4060/cc5967en>.

The major gaps in the resilience capacities of the avocado value chain are found in:

- **Economic capital:** Low market diversification, limited post-harvest management and lack of agricultural and weather insurance.
- **Institutional capital:** Restricted investment in research and development (R&D) for sustainability, potentially due to low access to technologies, financial investments and duration to develop and test new technologies.
- **Human capital:** Insufficient considerations of food security and nutrition as part of business policies and low investment in capacity development of workers on sustainability issues are hindering the capacity of the value chain to prepare for and deal with shocks more efficiently and inclusively.
- **Natural capital:** Low water quality due to agrochemicals runoff and land degradation processes observed.
- **Physical capital:** Inadequate irrigation infrastructure and limited consideration of land tenure rights in business policies may indirectly promote the use of unsustainable practices to access land in view of the expansion of production and business growth (e.g. deforestation, exploitation of aquifers).

Innovations for resilience building in the avocado sector

Despite the challenges identified, **avocado companies and associations already possess valuable resilience capacities.** Some examples are:

- **The production segment is highly flexible to adapt to fluctuations in weather and markets.** Avocado companies in Colombia, Chile, Mexico, Peru and South Africa are shifting to better production practices to preserve natural resources, enhance production and access new markets. Some of these include the use of precision agriculture (e.g. fertigation systems), measures to protect pollinator populations, use of anti-frost systems, biological corridors and windbreaks, and reforestation.
- **Environmental risk monitoring** to identify and evaluate how the quality of natural resources such as water, soil and forests have been affected by avocado production. Companies in Mexico, Peru and South Africa are taking innovative approaches including the development of a water monitoring strategy or detailed soil mapping exercises to mitigate unintended effects on the ecosystems.
- **Collaboration with other stakeholders.** Some avocado producer associations and companies in Chile, Colombia, Mexico and Peru have worked hand-in-hand with local and national governments to improve the sustainability of their operations. Examples include work with phytosanitary authorities to monitor and share information about emerging pathogens; use of sustainable forest management in collaboration with communities and governments; or alliances within the wider fruit industry for more efficient production and transportation.
- **Actions towards reducing waste.** Some associations in Mexico and Viet Nam are making by-products (e.g. oil, guacamole, plant-based milk) to minimize waste and valorize agricultural residues. Companies in the United State of America and the Kingdom of the Netherlands are also innovating in their packing and marketing strategies to commercialize tier-2 category fruits and reduce fruit loss and waste.

Recommendations to strengthen the resilience of the avocado sector



Development of integrated risk management plans to improve the sector's preparedness for future risks, as around 75 percent of avocado companies did not have a risk management plan at the time of the survey. The development should go together with adequate budgeting, accountability mechanisms and capacity development for more effective anticipatory and response actions.



Use of an integrated approach to manage natural resources will contribute to the reduction of the sector's impact on landscapes and promote more resilient and sustainable operations.



Investment in climate-proofing infrastructure and technology are relevant for preparing and adapting to climate variability and extreme events. Nature-based solutions and other technologies as efficient irrigation systems can protect production systems from major risks such as water scarcity, landslides, strong winds and hailstorms. Appropriate investments can minimize damage, reduce loss and waste, and have important climate adaptation and mitigation potential.



Market diversification should be promoted to reduce the vulnerability of the sector against sudden market changes. Companies can invest in processes that add more value to production.



Investment in capacity development and knowledge sharing among value chain actors. The development of skills of value chain actors at different levels (production, packaging, transportation, etc.) can enable the preparedness of the sector to future shocks. Capacity development can also serve to mitigate potential social and environmental unintended risks created by the operations.



Strengthening engagement with governments, research institutions, labour unions, other industries and communities. More collaboration is desirable to increase knowledge-sharing and awareness among the different actors involved in the industry. This will help to increase adoption of more responsible business practices, minimize risks and improve production potential.

Other recommendations that can strengthen the resilience of the avocado sector are the use of early warning systems, and increased access to financial instruments such as weather-indexed insurances or credits. Research and development (R&D) on climate- and pathogen-resistant seeds and plants would have important implications for the resilience of the sector, promoting its long-term adaptability to climate change and other shocks.

New and existing investments must be risk assessed and aligned with institutional regulations to prevent unintended negative effects. The strategies developed to strengthen the resilience of avocado value chain actors must be contextualized and developed in a consultative manner, given the differentiated effect of shocks and risks on each value chain actor and segment.

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Responsible Fruits Project

Responsible-Fruits@fao.org

<https://bit.ly/responsible-fruits>

Markets and Trade Division - Economic and Social Development stream

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