



## Resilience gaps and opportunities for the pineapple industry

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

Strengthening resilience<sup>1</sup> of pineapple value chains is increasingly important as the sector faces multiple risks, including climate change, pests and diseases, and economic downturns, among others. By building resilience, pineapple companies and associations will 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 pineapple industry.** The results were validated in a [workshop](#) with stakeholders from the pineapple and avocado industries on 6 December 2022. The complete study can be found [here](#).

### Main shocks and stressors affecting the resilience performance of the pineapple sector

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

---

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

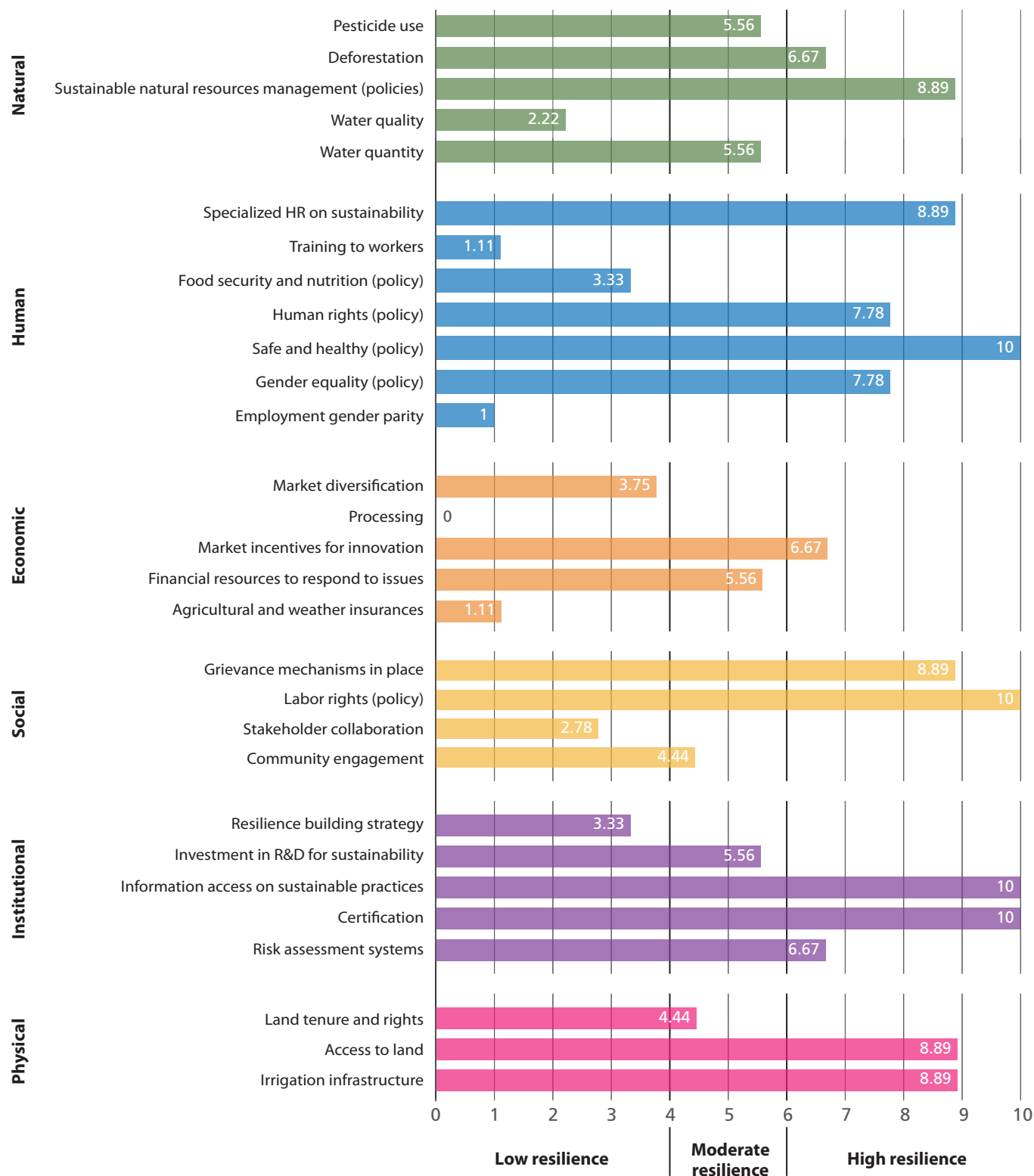
**Table 1. Main risk areas identified for the pineapple sector based on literature review and consultations**

Area	Current effects on value chains
Climate change and extreme weather events	<p>The sector has experienced <b>higher temperatures and radiation</b>, resulting in lower fruit quality and productivity, and negative impacts on workers' health. Average temperatures are projected to increase in the main pineapple producing countries. These will accelerate flowering and ripening, affect fruit quality, reduce yields and increase costs through higher demand for inputs and equipment to protect crops and workers.</p> <p><b>Water excess and waterlogging</b> heightens the presence of pathogens and deteriorates fruit production and quality at pre- and post-harvest stages. Increased average annual rainfall is projected for the Philippines and Thailand. On the other hand, <b>water deficit</b> stress affects flowering, speeds ripening, reduces soil moisture and causes water stress. Average annual precipitation is expected to diminish in Costa Rica.</p>
Environmental degradation	<p><b>Soil and land degradation</b> processes are observed and attributed to the use of inadequate agronomic practices and land use change. Increased degradation has resulted in the growing use of external inputs and labour for land preparation as well as lower yields, biodiversity loss and rising production costs.</p>
Economic factors	<p>The <b>COVID-19 outbreak</b> and lockdown measures reduced the demand from importing regions, disrupted market routes for trade of agricultural inputs, with direct impacts on costs for producers, processors and packers. Also, the ongoing <b>war in Ukraine</b> caused a reduced supply of fuel, gas and agricultural inputs, exacerbating the already growing pressure on production costs faced by the industry. Combined with the low average export value of pineapple, these factors are challenging the sector's revenues.</p>
Plant health issues and agrochemical use	<p>The recurrence of plant pathogens, enabled by higher humidity and temperatures, has resulted in the <b>increasing use of synthetic pesticides and herbicides</b>. This has in turn augmented the resistance of pests, diseases and weeds, creating a negative dependency cycle. On the other hand, more <b>stringent phytosanitary requirements</b> and agrochemical use regulations in importing markets are challenging the industry's capacity to meet the market needs in quality, price and timing.</p>
Institutional factors	<p>Trade restrictions, mostly due to COVID-19 and the war in Ukraine, have created <b>market uncertainty</b> influencing the investment strategies of the firms. <b>Limited collaboration among different stakeholders</b> has undermined investment potential, mainly in research and development (R&amp;D).</p>

## Major resilience gaps in the pineapple sector

The **livelihood resilience framework** was used to analyze the resilience performance of the pineapple 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 manage future risks. **Figure 1** highlights the indicators with low and moderate resilience levels.

**Figure 1. Resilience gaps identified in the pineapple 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 pineapple value chain are found in:

- **Economic capital:** Insufficient access to insurance and credit, low market diversification and value addition to production were noted. Also noted were the limited availability of financial resources to respond to crises.
- **Institutional capital:** Absence of resilience building strategies at the business level weakens the capacity of the sector to identify and invest in managing future risks. Low investment in research and development (R&D) is observed.
- **Human capital:** Scarce capacity development programmes for workers and limited considerations of food and security aspects as part of the business' policies. Lack of gender parity at the workplace, usually dominated by men, is also of concern in the industry.
- **Natural capital:** Issues related to water quality due to agrochemical use, low water availability and limited actions taken by companies to mitigate these problems.
- **Social capital:** Insufficient engagement with key stakeholders, including local communities and government, is lowering the capacity of the sector to anticipate and prevent future risks.
- **Physical capital:** Although all the proxy indicators performed adequately, land tenure and rights need monitoring as they could become a risk factor.

### Innovations for resilience building in the pineapple sector

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

- **High integration of operations is allowing companies to deal with sharp fluctuations in markets.** This has enabled supply chain actors to swiftly share information and respond to crises more efficiently. However, such high integration might be a major entry barrier for small pineapple growers to international markets.
- **Actions to adapt and mitigate climate change.** Pineapple companies in Costa Rica, the Dominican Republic, Malaysia and Togo are shifting to better production practices to preserve natural resources. Some examples are the use of integrated pest management, waste management and integrated soil-water management.
- **Multistakeholder collaboration for information sharing to improve production.** Collaboration with different stakeholders is required for resilience building. Some companies in Costa Rica work together with small-scale producers to monitor and share information to identify and combat potential threats in a timely manner.
- **Actions to improve social sustainability.** Some pineapple companies in Costa Rica and the Dominican Republic are working with local communities, government entities and other sectors to further the wellbeing of workers. Actions include the collaboration with other pineapple farms to improve the working conditions in the field, or post-harvest practices to create new livelihood options for local communities.
- **Reduction of waste.** Pineapple-producing countries in various regions are working to reduce agricultural waste, through generation of by-products (bromelain extraction, fiber processing, handcraft making, biofuels) with positive impacts on environmental and economic resilience, and climate change mitigation.

## Recommendations to strengthen the resilience of the pineapple sector



**Development of integrated risk management plans** to improve the sector's preparedness for future risks. Approximately 67 percent of pineapple companies interviewed 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.



**Investment in capacity development and knowledge sharing among value chain actors.** The development of skills of workers at different levels (production, packaging, transportation, etc.) can enhance the value chain's preparedness to future shocks and mitigate potential risks created by the operations. Key areas include natural resources management and occupational health and safety.



**Strengthening social capital** by increasing stakeholder engagement, including governments, research institutions, labour unions, other industries and local communities. Collaboration is needed to improve communication, share knowledge and reduce the vulnerability of most at-risk populations (e.g. small-scale producers, field workers, rural women, youth, Indigenous Peoples).



**Investment in climate-proofing infrastructure and technology** is relevant to prevent, absorb and adapt to future risks. Efficient drainage systems and solar protection methods, and the use of integrated water management practices can help the pineapple industry to be more resilient to a changing climate.



**Market diversification**, within or outside the main importing regions, is needed to increase the buffer capacity to swift market changes. Investing in value addition processes and product differentiation can support this. Some pineapple companies are using sustainable packing material and processing non-exportable pineapple to increase and/or stabilize revenues despite crises.



**Waste reduction** and management has the potential to reduce risks related to natural resource degradation, warming temperatures and pollution. This improves climate and economic resilience by creating co-benefits for companies, such as alternative income sources. Some associations are already processing waste for biomedical use, handcrafts, biofertilizers and other products.

Other recommendations to strengthen the resilience of the pineapple sector are the use of early warning systems to increase preparedness of the sector for future climate or biotic issues (e.g. pests, diseases). Research and development (R&D) on plant breeding practices can also increase the adaptive capacity of pineapple producers in a changing climate. These require the participation of other state and non-state actors due to the investment costs and time necessary to develop and implement these in the field.

New and existing resilience-sensitive investments must be risk-assessed and aligned with institutional regulations to prevent unintended negative effects. All strategies aiming to strengthen the resilience of pineapple companies and value chains must be contextualized and be developed in a participatory manner, as shocks and risks have differentiated effects on every actor.

## BUILDING RESPONSIBLE GLOBAL VALUE CHAINS FOR SUSTAINABLE TROPICAL FRUITS

The *Sustainable Tropical Fruits* series highlights important developments, technical information and good practices related to resilient, sustainable and inclusive tropical fruit value chains. For more information or to suggest future topics, please contact [Responsible-Fruits@fao.org](mailto:Responsible-Fruits@fao.org).

### GET IN TOUCH

Responsible Fruits Project

[Responsible-Fruits@fao.org](mailto:Responsible-Fruits@fao.org)  
<https://bit.ly/responsible-fruits>

Markets and Trade Division  
Economic and Social Development Stream

[www.fao.org/markets-and-trade](http://www.fao.org/markets-and-trade)

**Food and Agriculture Organization  
of the United Nations**  
Rome, Italy

Supported by:



Federal Ministry  
of Food  
and Agriculture

Required citation:

FAO. 2024. *Resilience gaps and opportunities for the pineapple industry*. Revised. Sustainable Tropical Fruits, No. 3. Rome. <https://doi.org/10.4060/cc6833en>



Some rights reserved. This work is available  
under a [CC BY-NC-SA 3.0 IGO](https://creativecommons.org/licenses/by-nc-sa/3.0/) licence