

# Climate Change in Agriculture with a Value Chain Perspective

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# Agri-Food Value Chains: A simple overview

- A value chain: the path by which a product or service is created and marketed. This path might include input suppliers, growers, transport and storage, processors, wholesalers, retailers and consumers, as well as governance and support institutions.
- This 'path involves multiple flows of value adding activities (Figure 1). The figure shows how different activities, such as production processes, logistics, information management, relationship management and returns on value can be manifested in a value chain.
- Value creation is not a simple step-by-step process where participants contribute equal value. Value contribution is also a function of how relationships are managed, how information is shared and used, and how efficiently processes are handled.

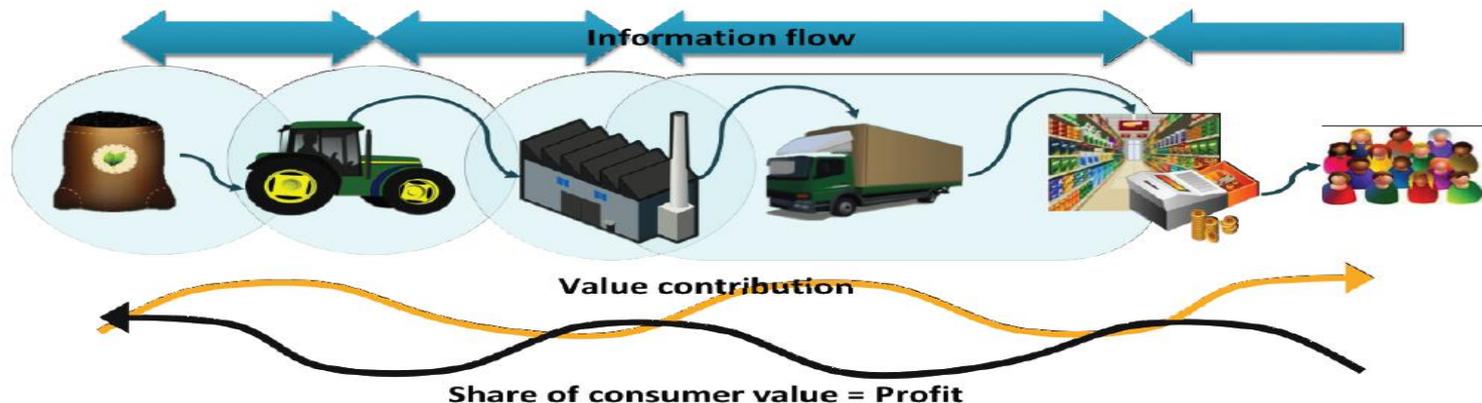


Figure 1: Schematic representation of an agri-food value chain

# Adaptation of Agri-Food Businesses within Value Chains

- Agri-food value chains:
  - are critical systems for delivering food security
  - contribute significantly to economic stability
  - add to consumer confidence.
- **The impacts of climate change are felt along the whole chain of actors that produce, handle, process and market agri-food products.**
- Whilst there is this growing level of concern about climate change impacts, there is still minimal guidance for agribusinesses in understanding the extent of their supply chain risk.
- To remain competitive and deliver value to end consumers, agri-food businesses must consider whole-of-chain approaches to climate change adaptation and mitigation.
- Agri-food businesses need to be able to **systematically identify, assess, prioritise** and **act against risks** and to **seize opportunities** that extreme weather and a changing climate might offer to their chains using a value chain approach.

# Adapted versus Non-Adapted Value Chain

An **adapted value chain** is one that is able to sustain its competitive advantage in a changing climate.

An **adapted value chain** is one where participating businesses, from farmers to retailers, are able to harness joint strategies to continue delivering value to the consumer, and as such, deliver value to the members of its chain.

A **non-adapted value chain** can only continue to exist up to a certain point where climate and weather risk and threats, both direct and indirect, are insurmountable and hence the value chain can no longer be profitable on an ongoing basis.

**Non- adapted value chains** also miss opportunities presented by a changing climate.

# Value Chain Adaptation for all actors in the agri-food value chain

- Value chain adaptation needs to consider the impact of any action on the value created and received by the chain.
- Agri-food businesses need to consider not only the adaptation benefits of a strategy, but also benefits to GHG mitigation and competitiveness.
- Businesses need to gauge the merits of an adaptation action against multiple, and potentially competing, priorities.

# Consumers as an actor in the agri-food value chain

According to recent studies, there is a lack of understanding by consumers on how climate change can impact on daily life in general.

Hence, knowledge about climate change is not enough to encourage consumers to accept an adapted product.

Therefore, for agri-food businesses, adaption to climate change is only a **risk mitigation strategy** rather than a **marketing opportunity**.

However, businesses who are constantly in touch with consumers changing sentiments may have a competitive advantage as consumer sentiments regarding adapted products may change in the future.

# A nexus approach for an adapted agri-food value chain

- Agri-food businesses have different priorities to address:
  - Competitive priorities
  - Sustainability priorities (Climate change mitigation e.g GHG mitigation)
  - Adaptation priorities
- Figure 2 illustrates how supply chain management, sustainability and adaptive capacity capabilities and attributes overlap to identify potential win-win (between two objectives) and nexus strategies (across all three).

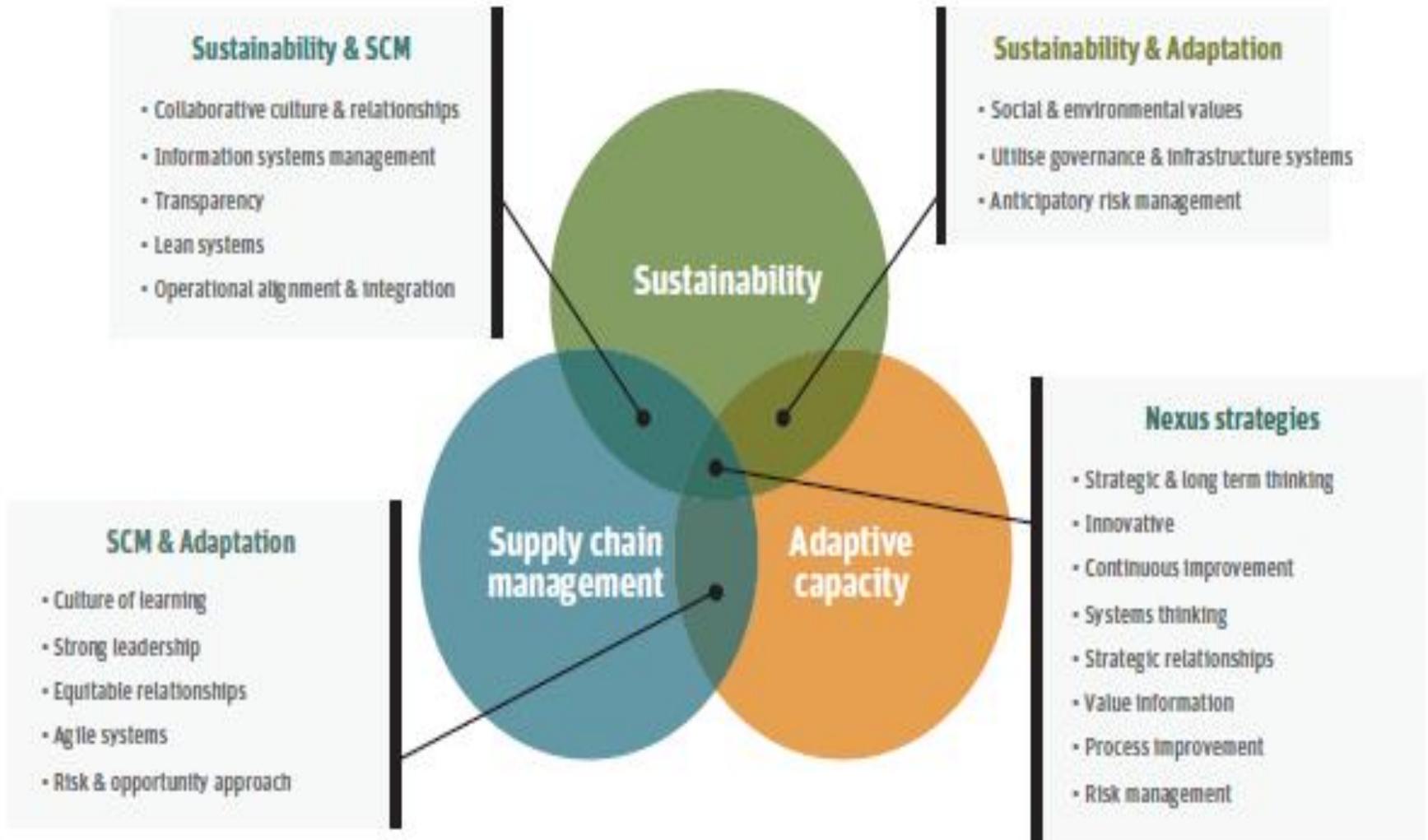


Figure 2: Supply chain management, adaptation and sustainability: Identifying nexus strategies for value chains

# Adaptive Value Chain Approaches: Australian research findings

Survey of Australian consumers on attitudes to climate change:

Five groups were revealed:

- **Sceptics (8%)**: Older males who either do not believe that climate change exists or believe that it is a natural phenomenon.
- **Abdicators (16%)**: Mostly males who believe that climate change is a natural fluctuation in the earth's temperature.
- **Undecided (31%)**: A slight female skew, this group believes that climate change is happening but is undecided on what causes it.
- **Eco-friendlies (30%)**: Slightly skewed to females, the majority believe climate change is largely being caused by humans.
- **Eco-warriors (14%)**: Predominantly females who strongly believe that human activity is causing climate change.
- These groupings have the potential to **better define consumer market segments for product categories** with consideration of environmental values, climate change belief, and adaptation.

# Adaptive Value Chain Approaches: Australian research findings (Cont'nd)

- Consumers are uncertain about how they themselves can adapt to the impacts of climate change.
- They are concerned about how climate change might impact on the affordability of food in the future, with 70% either agreeing or strongly agreeing to this concern.
- The consumers perceive the food supply chain as vulnerable, as shown in Figure 3.

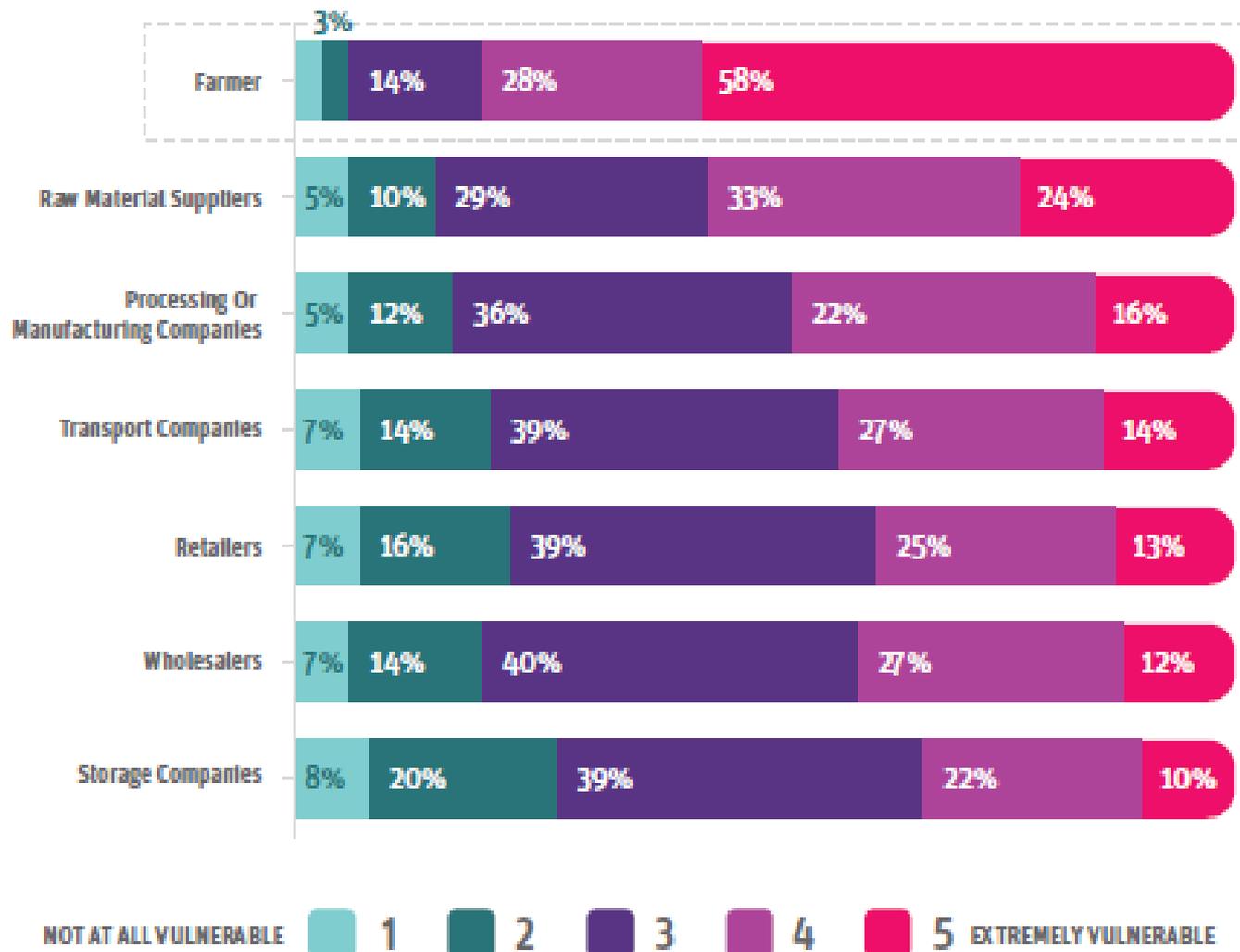


Figure 3: Perceived vulnerability of each stage of the value chain by consumers

# Adaptive Value Chain Approaches: Australian research findings (Cont'nd)

- Farmers are perceived to be the most vulnerable to the impacts of climate change (58%).
- Climate change, in itself, is not enough to encourage consumers to accept an adapted product.
- Consumers need to feel the impact of mitigation and adaptation strategies of agri-food businesses in terms of affordability and expected quality of products (**Recognisable consumer value**).
- Currently mitigation and adaptation strategies of agri-food businesses are mainly protecting the businesses against risks.
- In the future, with the continuing change in social dynamics, policy environments and climate, keeping consumer perspectives in mind can enable agri-food value chains sustainable competitiveness in a changing world.

# Case Study: The Calypso™ Value Chain

- The **Harvest Markets Pty Ltd Calypso™** mango chain produce and supply approx. 40% of one of Australia's premium mango varieties via road and rail.
- It is one of the longest value chains in the nation with fresh product travelling up to 4500 km (\*) from farm gate to market.
- The chain is largely vertically integrated with strategic alliances with service providers and marketers throughout the chain.
- The company's stringent production and marketing protocols provide process compliance benchmarks for all staff and service providers.
- **Harvest's** management of these protocols provide them with a strategic advantage over competitors, enabling them to command a premium price for their products.

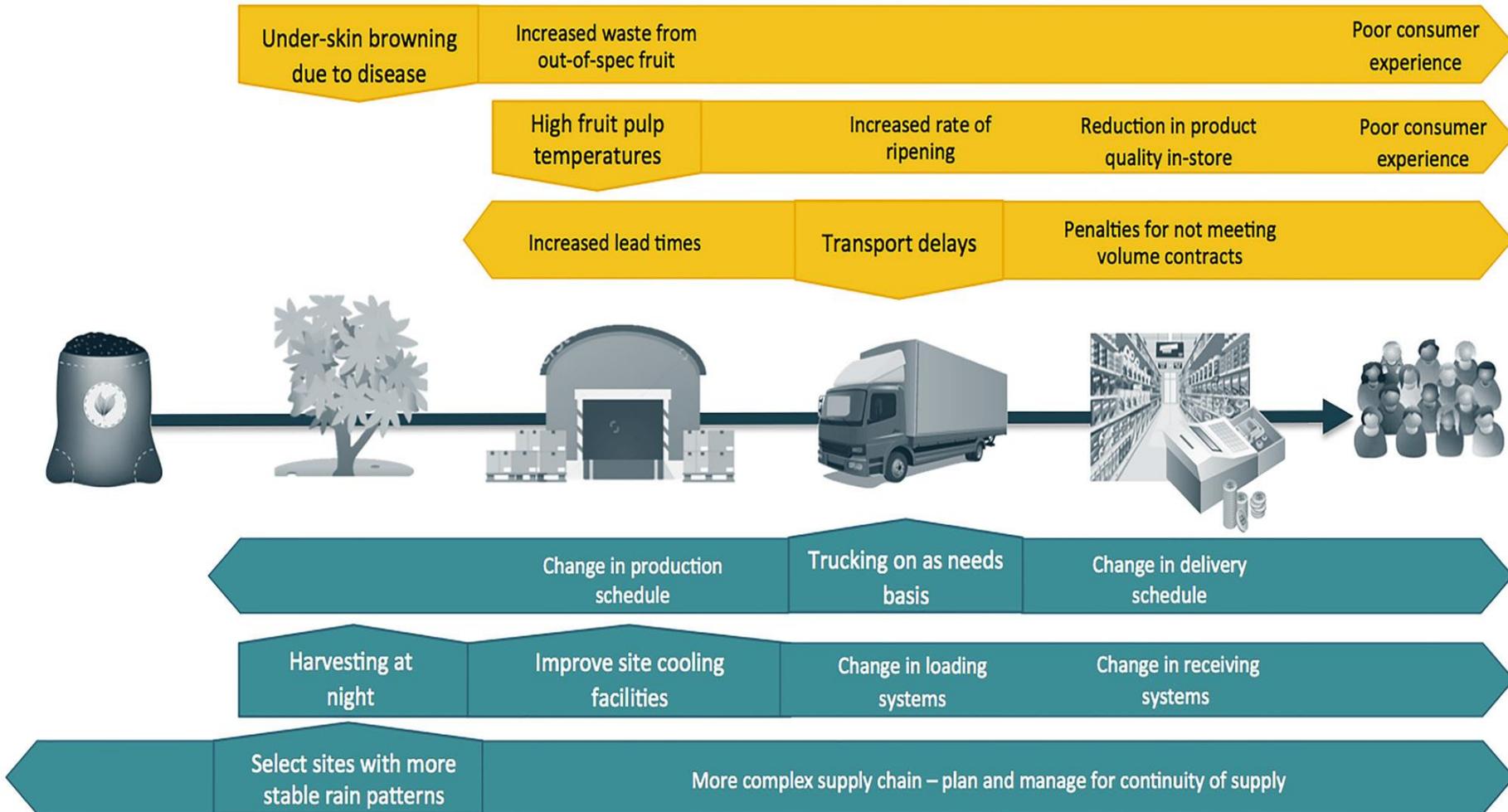
*(\*) Approx 56 times the distance Cap Malheureux-Souillac*

# Case Study: The Calypso™ Value Chain

## Impacts and adaptation along the chain

- The majority of climate and weather risks for this chain were at the **mango growing stage**, as this activity is the most exposed to the natural environment.
- However, other more indirect climate impacts were also felt across the chain (Figure 4). As a fast moving fresh product, any impact felt at the farming end is likely to translate to a deterioration in quality at the consumer end.
- This risk provides **Harvest** with a strong imperative to adapt.
- Such adaptation action, while addressing risk at one stage of the chain, could pose challenges to another if not carefully considered from a whole-of-chain perspective.

## CLIMATE CHANGE IMPACTS and flow-on effects



## ADAPTATION STRATEGIES and flow-on effects

Figure 4: Examples of how climate change impacts and adaptation along value chains can have direct, and indirect, effects on multiple stages along the chain

# Case Study: The Calypso™ Value Chain

## **Consumer perspectives of adaptation**

- Consumers have the potential to drive adaptation along the chain, especially if adaptation strategies create additional value that consumers are willing to pay for. Mangoes are considered a high-value product by consumers, driven by its seasonality and use as a special occasion fruit or dessert.
- In response to the potential impacts of climate change, most consumers are less likely to sacrifice quality over frequency of purchase, and some would even be willing to purchase mangoes off-season.

# Case Study: The Calypso™ Value Chain

## **Consumer perspectives of adaptation**

- Consumers are also likely to support adaptation in mangoes to a greater degree than other food products if it means preserving the product attributes that they most value (i.e. freshness, taste), regardless of season.
- In above case, adaptation could act as a market-competitive strategy for a fresh food chain faced by the risk from climate impacts.

# Case Study: The Calypso™ Value Chain

## **Carbon and water footprint assessment**

- Information from carbon and water footprint assessments can help a chain understand the physical, financial and reputational risks associated with climate change and the adaptation possibilities.
- A screening level assessment was designed to identify ‘hotspots’ in the carbon and water availability footprints of Calypso™ mangoes near production centres in Darwin and Katherine, delivered to markets in Sydney and Melbourne.

# Case Study: The Calypso™ Value Chain

## Carbon and water footprint assessment

- The carbon footprint of Calypso™ mangoes was assessed as Category A (<1kg CO<sub>2</sub>e per kg of product sold, Figure 5) delivered from Katherine to Sydney or Melbourne. Over half (55%) of this was determined by the **transport stage of the chain**, given the vast distance the product travels to major retail markets. However, the carbon footprint was **sensitive to the type of transport used** – road transport resulted in higher emissions compared to rail.

# Case Study: The Calypso™ Value Chain

## Carbon and water footprint assessment

- Consumptive water use was assessed as Category B (5 to 50L H<sub>2</sub>Oe per kg sold, Figure 5), with orchard irrigation accounting for 98% of this volume.

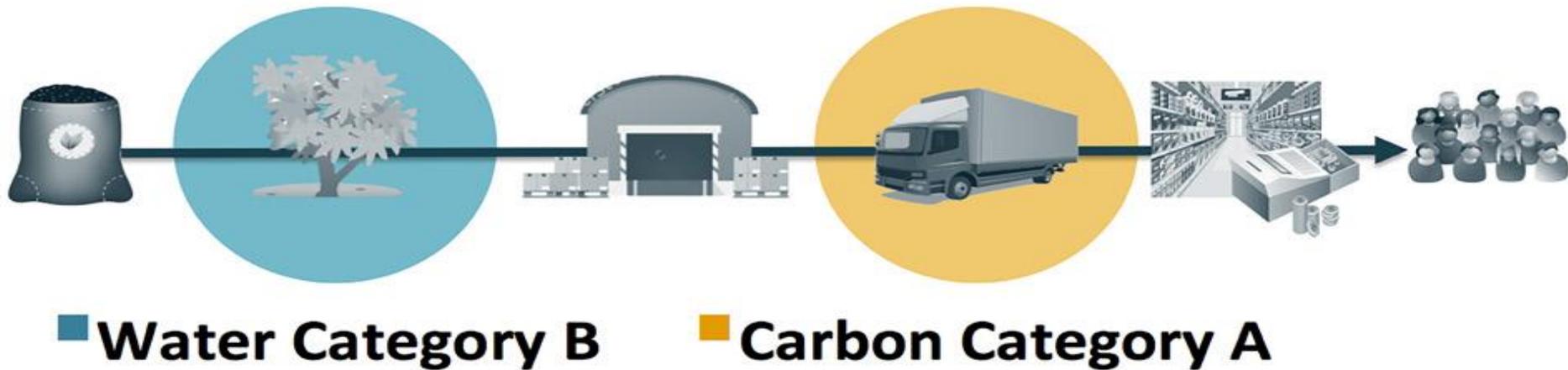


Figure 5: Carbon and water footprint hotspots for the Harvest Calypso™ value chain

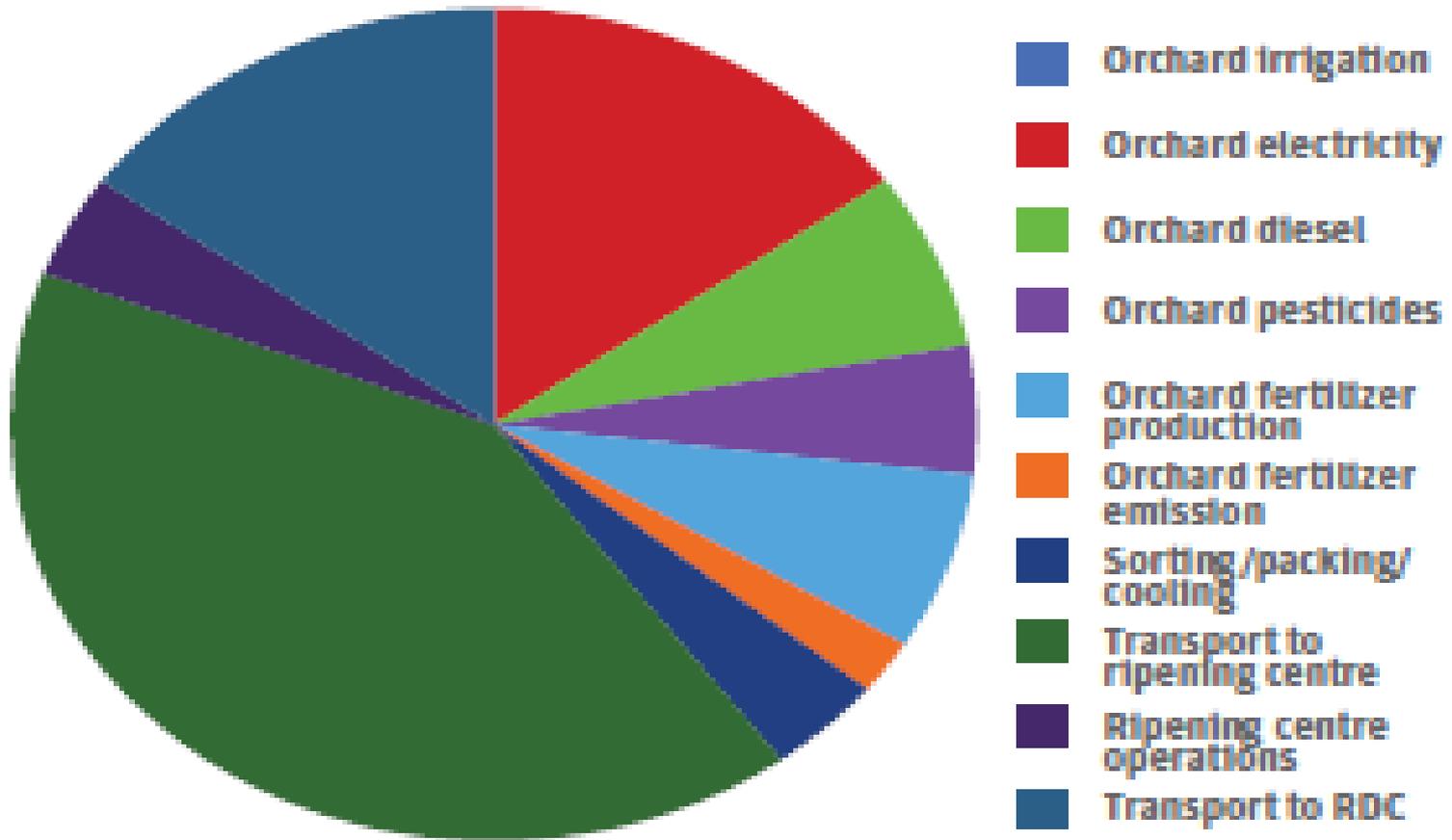


Figure 6: Profile of life cycle GHG emissions (CO<sub>2</sub>e) and water footprint for Harvest Calypso™ mangoes

# Case Study: The Calypso™ Value Chain

- The Harvest Calypso™ case study shows how opportunity for adaptation can come from multiple perspectives.
- In the case of this chain, **the farming stage faces climate risk**, while **the consumer end indicates possible support for adaptation**.
- Without a whole-of-chain perspective, there is a potential to lose line of sight of climate risks, as well as adaptation opportunities.

# Case Study: The Calypso™ Value Chain

- Thus, development of adaptation strategies based on a greater understanding of the interplay of climate impacts and adaptation strategies across the chain would lead **Harvest Markets** to be in a more competitive position.

# Conclusions on Case Study

- A holistic and systematic evaluation of the risks that climate change poses, both direct and indirect, is crucial for adaptation planning.
  - Understanding the complexity of interactions between biophysical, social and economic drivers in the context of climate change enables businesses within a value chain to have line of sight of indirect, but impactful, effects.
  - It also enables businesses, from farming all the way to retailing, to begin to understand their 'tipping points' (\*) better – where the impacts of multiple events along the value chain result to one or multiple stages of the chain unable to recover or remain competitive.
- (\*) *the point at which a series of small changes or incidents becomes significant enough to cause a larger, more important change.*

# Research questions for the Mauritian Context

- Are we taking a holistic approach to climate change adaptation and mitigation by taking a whole-of-chain perspective?
- Are we considering climate change impact on the agricultural sector only as a threat or as an opportunity to produce adapted products?
- Are we focusing our research at the farming level only and ignoring the flow-on effects across the agri-food value chain?
- Do agri-businesses adapting to or mitigating climate change factors take into consideration the needs of consumers?

# Potential objectives to promote adapted Mauritian Agri-Food Value Chains

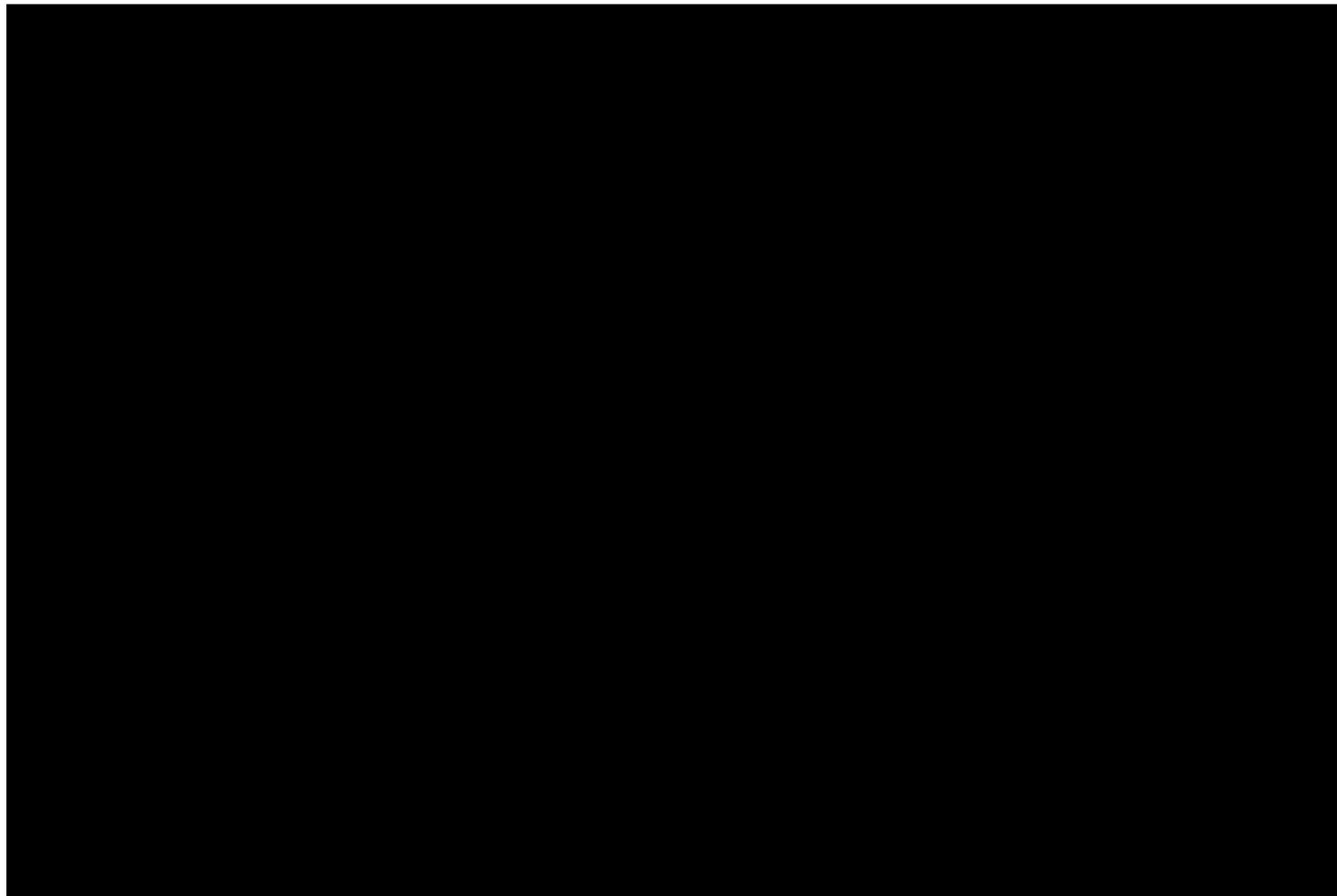
1. To increase capability of businesses to take effective adaptation action through awareness of the impacts of climate change on value chains,
2. To increase awareness of new and relevant adaptation and mitigation options available for businesses to consider within their value chains,
3. To enhance the capacity of agrifood businesses to collaboratively evaluate and adapt to the impacts of climate change.

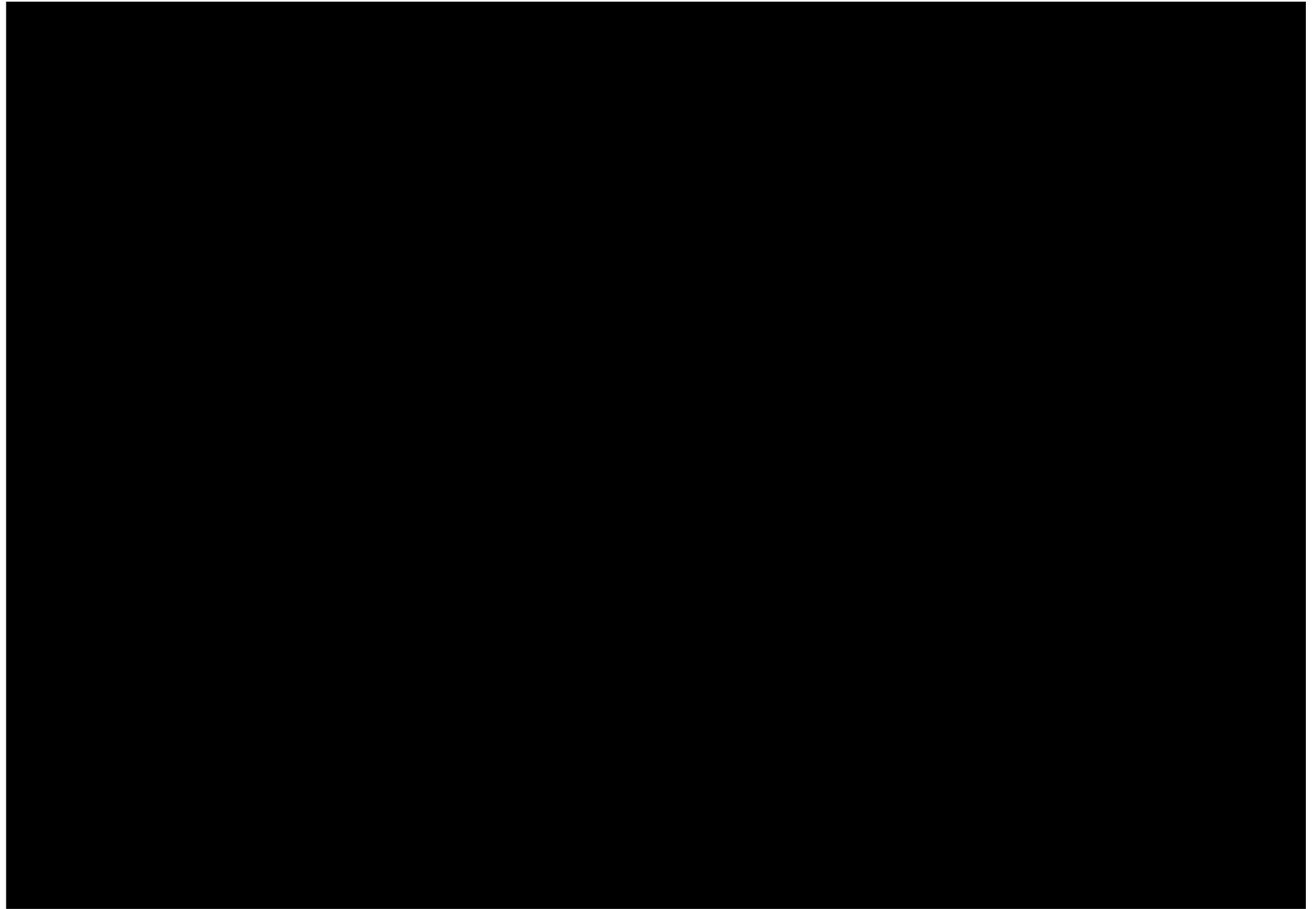
# Some Areas for Exploration for Mauritian Agri-Food Value Chains

- Further understanding the impact of extremes on value chains, and the resulting tipping points across the chain
- Tracking Mauritian consumer perspectives of adaptation over time, and comparing with international markets
- Exploring opportunities in adaptation, such as value creation strategies in product portfolios such as new product categories based on improved market segmentation

# Some Areas for Exploration for Mauritian Agri-Food Value Chains

- Exploring the dynamics of economic and market risks with climate risks across the value chain
- Quantifying value chain losses from climate change impacts, and gains from specific value chain adaptation strategies
- Exploring new ways of evaluating adaptation decisions across the value chain





THANK YOU

COMMENTS AND QUESTIONS  
ARE WELCOME