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The Influence of Global Agricultural Production Networks on Processes of Water Governance

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The Influence of Global Agricultural Production Networks on Processes of Water Governance

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Abstract

This thesis addresses a gap in the Global Production Network (GPN) literature by investigating how globalised agricultural production influences processes of water governance. Despite increased concerns over environmental sustainability and climate change, academic inquiry informed by GPN has largely ignored the environmental dynamics that underpin globalised agricultural production. The research investigates this relationship in South Africa's Western Cape, interrogating how the export-oriented fruit industry influences processes of water governance. Water is a useful lens to study this link as it is essential for crop production but is also a basic human need, emphasising the imperative for water governance to balance competing priorities. In the Western Cape, this matters because water is scarce, crucial for economic development, and continues to be unequally distributed along racial lines due to the country's apartheid legacy. The thesis is based on an extensive documentary analysis and 76 semi-structured interviews with fruit producers, government officials, and representatives from industry associations and non-governmental organisations (NGOs), which allowed the collection of actor-specific information and structural-level data. The study reveals *how* the influence of global agricultural production networks manifests and affects the wider water governance regime, contributing to GPN theory and water governance literature.

This research shows that the Western Cape fruit industry faces a series of water risks, which are driving its deployment of multiple mitigating strategies to ensure water security for its productive activities. These strategies have direct implications for water governance as they present a dominant discourse that depoliticises water allocation – arguably the core concern of water governance. This depoliticisation is achieved by positioning the Western Cape fruit industry as (1) efficient and (2) consisting of legally compliant water users, who are (3) significant creators of employment and economic growth. Consequently, and despite the political reorientation after apartheid in 1994, the Western Cape fruit industry has maintained access to and control over water resources to produce high-value crops for global markets. The present-day political economy of South Africa enables these dynamics because of the tension between the country's neoliberal economic policy and its political project of achieving redress and equity. Therefore, investigating the relationship between water and agricultural production and trade is not only important for understanding how increased competition over fresh water will affect global production, distribution and consumption, but it also offers valuable insights into the dynamics that determine the effectiveness of water governance regimes.

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Abbreviations and Acronyms

Agri SA	Agri South Africa
Agri WK	*Agri Wes Kaap* (Agri Western Cape)
AIP	Alien Invasive Plants
ANC	African National Congress
AWS	Alliance for Water Stewardship
BDCC	Buyer-driven Commodity Chains
BGCMA	Breede-Gouritz Catchment Management Agency
BOCMA	Breede-Overberg Catchment Management Agency
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
CSIR	Council for Scientific and Industrial Research
CSR	Corporate Social Responsibility
DA	Democratic Alliance
DAFF	Department of Agriculture, Forestry and Fishery
DEA	Department of Environmental Affairs
DEADP	Western Cape Department of Environmental Affairs and Development Planning
DFPT	Deciduous Fruit Producers' Trust
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWEA	Department of Water and Environmental Affairs
DWS	Department of Water and Sanitation
ELU	Existing Lawful Uses
EU	European Union
FF	Farming for the Future
FVCT	Flower Valley Conservation Trust
GCC	Global Commodity Chain
GDP	Gross Domestic Product
GEAR	Growth, Employment, and Redistribution
GIB	Groenland Irrigation Board

GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit* (German Agency for International Cooperation)
GLOBAL G.A.P.	Global Good Agricultural Practices
GPN	Global Production Network
GVC	Global Value Chain
GWUA	Groenland Water User Association
ha	Hectare
IB	Irrigation Board
IMF	International Monetary Fund
IWRM	Integrated Water Resources Management
KBR	Kogelberg Biosphere Reserve
m3	Cubic meters
mm	Millimetres
M&S	Marks & Spencer
NEMBA	National Environmental Management: Biodiversity Act
NDP	National Development Plan
NGO	Non-Governmental Organisation
NGP	National Growth Path
NP	National Party
NPC	National Planning Commission
NWA	National Water Act No. 36 of 1998
NWRS	National Water Resources Strategy
NWPR	National Water Policy Review
PDCC	Producer-driven Commodity Chains
PLAAS	Institute for Poverty, Land, and Agrarian Studies (at the University of the Western Cape)
R	Rand (currency)
R&D	Research & Development
RDP	Reconstruction and Development Programme
RO	Regional Office
RSA	Republic of South Africa
SA	South Africa
SAAPPA	South African Apple and Pear Producer Association

SAAU	South African Agricultural Union
SASPA	South African Stone Fruit Producers Association
SCA	South African Supreme Court of Appeal
SIZA	Sustainability Initiative South Africa
SAP	Structural Adjustment Programmes
TMF	Table Mountain Fund
UK	United Kingdom
UN	United Nations
US	United States of America
VOC	*Generale Vereenigde Nederlandsche Ge-Octroyeerde Oost-Indische Compagnie* (Dutch East India Company)
V&V	Validation & Verification (of lawful water uses)
WAR	Water Allocation Reform
WCG	Western Cape Government
WCWSS	Western Cape Water Supply System
WEF	World Economic Forum
WEF Nexus	Water-Energy-Food Nexus
WIETA	Wine and Agricultural Ethical Trade Association
WISA	Water Institute of Southern Africa
WMA	Water Management Area
WRC	Water Research Commission
WSA	Water Services Act No. 108 of 1997
WUA	Water User Association
WWF	World Wide Fund for Nature
WWF SA	World Wide Fund for Nature South Africa
WWTP	Waste Water Treatment Plants
ZAR	Rand (currency)

1 Introduction: Unchartered Waters

On 6 February 2018, fruit farmers in the Elgin Valley northeast of Cape Town released 10 million cubic metres (m^3) (or 10 billion litres) of water from their private irrigation dam to help push back the date when Cape Town would run out of water, popularly referred to as 'Day Zero'. Striking images of millions of litres of water gushing out of Eikenhof Dam and into the Palmiet River made the rounds of various media outlets (Chutel 2018, Evans 2018, Vryburger 2018). It was a rare sight in the parched landscapes of the drought-stricken Cape. From the Palmiet River, the water flowed into Steenbras Dam, which connects to the Western Cape Water Supply System (WCWSS) to supply the City of Cape Town. It reportedly pushed back Day Zero from 16 April 2018 to 11 May 2018 (Evans 2018). Rains followed shortly thereafter, breaking the worst of a three-year-long drought in South Africa's southernmost Province.

Behind these headlines, some of the key dynamics and themes investigated within this thesis can be found. The farmers in the Elgin Valley produce high-value deciduous fruit for global export markets. From October 2017, it had become apparent that they would have a surplus of water in their dam (Evans 2018). October, however, is the beginning of the fruit season and is when agricultural water demands are highest. In contrast, February marks the end of the most water-intensive phase in fruit production. In fact, the fruit season wraps up around April, which further reduced agricultural water consumption and helped to push back Day Zero (Capeetc 2018). The release was therefore carefully timed to maximise producers' water security. Because of the Elgin Valley farmers' actions, the whole fruit industry capitalised on the accompanying positive imagery. A representative from Hortgro, the deciduous fruit industry association, was quoted in the news outlet News24 as saying '[i]t is a sign of goodwill and to indicate that agriculture is responsible, and we are not wasting water' (Evans 2018). This statement, and the context of its release, picks up on a myriad of issues that characterise the relationship between water and agriculture in the Western Cape. They are, as argued in this thesis, symptomatic of broader dynamics that link agricultural production, trade, and processes of water governance, making the Western Cape an ideal place and context to study the topic of this thesis.

The purpose of this thesis is to understand how the dynamics of globalised agricultural production influence processes of water governance beyond instances of acute crises by investigating the fruit industry in South Africa's Western Cape. The thesis contributes

to the literature on Global Production Networks (GPN).[1] Within this literature, there has been an increased debate on how global production networks are shaped by and interact with the natural environment on which they depend (Baglioni and Campling 2017, Bridge 2008, Irarrázaval and Bustos-Gallardo 2019, Krishnan 2017). Insufficient attention, however, has been paid to how globalised agricultural production influences processes of environmental governance and water governance more specifically. This is despite increased realisation about the importance of water as a key natural resource that enables agricultural production and trade.

The thesis also contributes to the literature on water governance. Research into water governance tends to adopt a water-centric perspective that ignores actors (and their priorities) located outside of the immediate water sector (de Loë and Patterson 2017a). This can be problematic, especially when longstanding water governance failures originate beyond the traditional boundaries of water governance systems (de Loë and Patterson 2017b). By focussing on the commercial dynamics of agricultural production, the thesis emphasises how non-environmental regimes, like those governing production and trade, play a crucial role in water governance (Newell 2008). This has the potential to shed new light on existing problems within processes of water governance. In the Western Cape – and South Africa more broadly – such new insights are urgently needed if the country is to achieve its threefold priority of conserving the natural resource base, enabling economic growth and development, while redressing past injustices. Beyond South Africa, such new perspectives are crucial considering the need for effective water governance at all scales due to the limited availability of fresh water.

In fact, just under 3% of all available water on Earth is freshwater, of which only around 0.5% is easily accessible for human consumption, while the rest is locked in ice (Vörösmarty et al. 2000, Bogardi, Fekete, and Vörösmarty 2013). Water is not only essential to life but also underpins a considerable amount of economic activity, especially in the agricultural sector (UNWWAP 2012). Concerns over the sustainability of this limited (but constant) amount of fresh water have been rising in line with climate change awareness. Fresh water has not only made it to the top of supranational institutions, such as the Organisation for European Cooperation and Development (OECD), the United Nations (UN), and its Sustainable Development Goals (SDGs) (OECD 2011, 2015,

[1] In this thesis, 'Global Production Networks' is capitalised when referring to the theoretical framework developed by the 'Manchester School' (Henderson, Dicken, and Hess 2002), whereas it is spelled 'global production networks' when referring to globalised production, distribution, and consumption and the associated value chains and networks.

UNGA 2015, UNWWAP 2012, 2016), but multi-national companies (MNCs), such as The Coca-Cola Company and The Barilla Group, have also started to take notice, and action (Addams et al. 2009, The CEO Water Mandate 2017). By listing water crises within its top three risks since 2012, the World Economic Forum's (WEF) Global Risk Report has driven much of this private sector concern (WEF 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019).

These global lead firms are worried about reputational risks, i.e. fear of being perceived as wasteful or polluting water users *vis-à-vis* concerned consumers in the Global North (Sojamo et al. 2012). They are also concerned about assuring the long-term supply of products highly dependent on water resources and sourced from different world regions, such as bottled water, soft and alcoholic drinks, cotton, flowers, and foodstuff (Hepworth 2012). This last point is especially crucial, considering that nearly 30% of the world's direct water withdrawals end up embedded in commodities to be traded globally (Chen and Chen 2013: 145). Simultaneously, because of the essential character of water to all forms of life, such agricultural water uses necessarily compete with other water needs. In certain regions, rainfall variability and/or pollution that renders fresh water unfit for purpose often exacerbate competition over water. Climate change has further aggravated pressures on the resource and the competition for it among communities, their economies, and the environment (Vörösmarty et al. 2000, 2010). Consequently, it becomes clear that global supply and value chains dealing in water-intensive agricultural commodities have a strategic interest in fresh water. While the water-related actions and initiatives of global lead firms have been studied before (Rudebeck 2017, Sojamo 2016), research has paid insufficient attention to how suppliers, i.e. producers, navigate these water-related challenges locally.

With increased awareness about questions of environmental sustainability, there is little dispute over the fact that production, distribution, and consumption, in any form, have an environmental footprint. The question is thus not *whether* global agricultural production networks impact on the natural environment, but rather, *how* they shape the processes through which we govern and manage the environment. This question, overall, represents relatively unchartered waters in terms of the academic literature and policy debates. The rest of this chapter firstly describes the research setting in Section 1.1, and then introduces the research questions guiding this thesis in Section 1.2. Finally, Section 1.3 outlines the structure of the thesis.

1.1 Research Setting: Water and Globalised Agriculture in the Western Cape

The Western Cape, its export-oriented fruit industry, and its political economy of water offer an ideal setting to study how globalised agricultural production influences processes of water governance. Fruit is a water-intensive crop that requires irrigation for commercial production. South Africa, however, is a water-scarce country. Apart from the limited availability of water resources, the Western Cape offers ideal meso-climatic conditions to grow deciduous fruit, especially apples and pears (Hortgro 2017a). In addition, it operates in opposing seasonality to European fruit growers, making it an ideal supplier of fresh fruit to British and European supermarkets during northern hemisphere winters. Characterised by a Mediterranean climate, however, the Western Cape experiences an inverse relation between winter rainfall patterns and summer production demands (Midgley, New, and Methner 2016). Fruit production in the Western Cape, therefore, relies on the mobilisation of water resources to ensure the regular availability of enough clean water to supply global markets. How, when, and in what form this mobilisation of water resources occurs, in turn, is a question of water governance.

GPN theory provides a useful framework to study the vertical commercial dynamics of globalised production but also provides a lens to investigate how they enmesh horizontally with other actors and governance regimes, such as those governing water. It facilitates a multi-scalar analysis that accounts for the interactions between lead firm supermarkets and local fruit producers, while also making space for the multiple scales inherent in processes of water governance. Because of the political, social, cultural, and economic value of water, it is argued here that GPN analysis must be grounded in a political economy perspective in order to understand how the commercial dynamics of globalised fruit production influences processes of water governance in a given place.

1.1.1 Water as the Limiting Factor in the Western Cape Fruit Industry

Water is the limiting factor for the Western Cape fruit industry. This scarcity is constructed in various ways, beyond the determinants of its physical availability (see Chapter 5). Politics and policies play a crucial role, and they invariably link to South Africa's history of conquest, dispossession, and racial discrimination. Instigated under British colonial rule, these dynamics later culminated in the apartheid regime, driven by Afrikaner nationalism (Ross 2008). Apartheid means 'separateness' in Afrikaans (Ross 2008: 123). It was a system of overt institutionalised racial segregation that justified

social, political, and economic discrimination against non-whites in South Africa and present-day Namibia from 1948 to 1994 (Feinstein 2005). Under the pretence of enabling the development of the different South African groups according to their own traditions, black South Africans were confined to the homelands, which constituted a meagre 13% of the total land area. Most of that land was unforgiving with little access to water resources, curtailing any attempts to commercialise agriculture (Marais 2011, Ross 2008). During apartheid, therefore, access to water played a crucial role in enabling the government's policies of separate development.

White South African farmers, in contrast, were given preferential access to vast stretches of fertile and well-watered land, including in the Western Cape. Farmers received access to water through riparian rights when rivers bordered their property or private water rights to groundwater sources on their land (Tempelhoff 2017). The apartheid government actively supported the commercialisation of white agriculture through deliberate and sustained policies that included subsidies, tax reliefs, soft loans, state-led cooperatives, and research and development (van Koppen et al. 2009). The mobilisation of water resources through small and large infrastructure projects played a key role in this regard (Debbané 2013, Tewari 2009). The export-oriented fruit industry investigated here developed out of these dynamics over the course of the 20th century. The formal end of apartheid was marked by the first democratic elections held in 1994, which was won by the African National Congress (ANC), and brought considerable political and legislative change with direct impacts for the Western Cape fruit industry.

Following the end of apartheid in 1994, the South African government reviewed and rewrote legislation and policy pertaining to water. The aim was to protect the country's scarce water resources while redressing past injustices and ensuring water would support economic development. This makes South Africa a useful site to investigate how the commercial dynamics of globalised production enmesh with processes of water governance. The post-apartheid legislative framework for water and its policy articulation are based on the National Water Act of 1998 (NWA) (National Water Act 1998) and the two iterations of the National Water Resources Strategy (NWRS) (DWAF 2004, DWA 2013). Previously, commercial farmers, such as the Western Cape fruit producers investigated here, had preferential access to water resources through riparian and private water rights. In addition, many farmers were organised as Irrigation Boards (IBs) to finance and manage shared irrigation infrastructure, which was often capital-intensive (Meissner 2019, Steyn et al. 2019). These were the only local water governance

structures in an otherwise heavily centralised water governance regime during the apartheid years. These privileges were now being questioned.

The NWA and the NWRS marked a significant shift in terms of access to and control over water for Western Cape fruit farmers. It abolished all water rights, including the riparian and private water rights that had benefitted these producers. In its stead, it introduced an administrative licencing system that issues time-limited water permits (e.g. 40-year licences) (Backeberg 1997). The new approach also foresaw a devolution of water governance and management functions to regional catchment-based institutions and inclusive local sub-catchment organisations. These local Water User Associations (WUAs) were to replace the farmer-dominated IBs. At the same time, the new South African constitution of 1996 made access to water for basic needs a human right, while politically the question of sanitation became very important (Constitution 1996). This led to a rollout of programmes and policies to provide water and sanitation to under-serviced households (Chenoweth et al. 2013). Coupled with population growth across the Western Cape Province, and especially in Cape Town, demand for fresh water increased considerably (Sinclair-Smith and Winter 2018). Therefore, the Western Cape fruit industry, which previously had privileged access to water, now faced not only increased regulation but also increased competition.

Following democratisation, de-regulation of the South African fruit sector in 1997 opened new markets and facilitated the supply of Western Cape fruit to the powerful UK and European supermarkets with large and consistent amounts of fruit. Previous research has revealed the commercial pressures exerted by global supermarkets on the Western Cape fruit industry (Barrientos et al. 2005, Hughes, Wrigley, and Buttle 2008, Hughes, McEwan, and Bek 2013). Western Cape fruit farmers have responded by increasing their economies of scale (Hall and Cousins 2015), aiming to grow their production by increasing the numbers of hectares under irrigation, effectively increasing their water demand. Consequently, fruit producers faced increased regulation and competition locally, while experiencing growing pressure from their participation in global value chains and production networks.

So far, water has only featured on the fringes of private governance mechanisms introduced by European and UK supermarkets within their supply chains. The main water-related concern for supermarkets is its quality and how it can compromise food safety, therefore affecting consumers in the Global North directly (Ijabadeniyi and Buys

2012). Since the mid-2000s, however, with growing awareness about the increased human pressures on natural resources, including on water, some lead firms have begun to question how global environmental change might affect their security of supply. The leading retailer Marks and Spencer's (M&S), for example, conducted a Water Risk Filter Assessment in its fresh produce supply chain, identifying fruit production in the Western Cape as a risk hot spot (WWF-SA 2014). In response to this identification, M&S funded the first stages of a water stewardship programme in 2013 as a possible way to address this risk (Dzikiti and Schachtschneider 2015, Schachtschneider 2016, WWF and M&S 2016).

Western Cape fruit producers thus face pressures horizontally, from competing water uses and climate change, and vertically, from lead firms requiring assurance of supply. These dynamics are set against the political economy backdrop of the Province and South Africa more broadly. The new South Africa has embarked on a social and political project to redress the injustices of the past and aims to provide equity in access to water resources and equity in access to the benefits of water resource use (National Water Act 1998). Despite its progressive new legislation, true reform of the water governance framework has been slow and challenging (Movik 2014, Pahl-Wostl 2019). As is shown in this thesis, this has created both opportunities and challenges for fruit producers. At the same time, it raises questions about how fruit producers' embeddedness in global agricultural production networks influences processes of water governance and how this affects other actors and their access to water resources. This is especially salient in South Africa, where water played a crucial role in the delivery of policies of separate development under colonial and apartheid rule.

GPN theory has previously been applied to the Western Cape horticultural sector and has largely focused on the social and economic dynamics of global production networks. This has included investigations into farm labour and their working conditions (Alford 2016, Alford, Barrientos, and Visser 2017, Barrientos 2013a); economic and social upgrading (Barrientos and Visser 2012, Bek et al. 2017); and ethical trade (Bek, McEwan, and Hughes 2012, Herman 2019, Hughes, McEwan, and Bek 2013). The interaction between South African horticulture and the environment, however, is largely non-existent within GPN literature. Similarly, previous research investigating the South African water governance regime (and how it plays out in the Western Cape specifically) has not sufficiently considered the commercial dynamics that arise from fruit producers' embeddedness in global production networks (e.g. van Koppen and Schreiner 2014a,

Herrfahrdt-Pähle 2014, 2010). This thesis draws upon GPN theory and complements it with concepts from water governance literature to conceptualise the influence global agricultural production networks exercise on processes of water governance, and especially *how* this influence manifests.

In doing so, this thesis addresses significant gaps in existing GPN literature. Previous GPN analysis has focused on the environment 'vertically', that is by investigating this dimension through environmental upgrading and private (environmental) standards along the chain (De Marchi, Di Maria, and Ponte 2013, Poulsen, Ponte, and Lister 2016, Goger 2013), or by focusing on how the materiality of global production networks shape firms (Baglioni and Campling 2017, Bridge 2008). However, existing GPN analysis lacks sufficient investigations into the influence of this materiality of global production networks on broader processes of environmental governance. This is largely due to the firm-centric perspective of many GPN investigations, and especially the focus on lead firms, which obscures the cultural and environmental dynamics of the economy (Hughes, McEwan, and Bek 2015). Investigating the influence of global agricultural production networks is not only important in order to understand how increased competition over fresh water will affect global production, distribution, and consumption, but it also offers valuable insights into the dynamics that determine the effectiveness of water governance regimes.

1.2 The Research Questions

The purpose of this thesis is to understand *how* global agricultural production networks influence processes of water governance. This aim is operationalised through four research questions that build on each other. These research questions have been informed by the literature reviewed in Chapter 2 and are introduced here to provide a clear overview of how the thesis addresses and operationalises its aim.

1. *How can the influence of global agricultural production networks on water governance be conceptualised using the GPN framework?*

This question addresses how GPN has investigated the environmental dimension previously and how it needs to be further developed to accommodate processes of environmental governance. It is the focus of Chapter 2.

2. *How does the historical and present-day political economy of the Western Cape influence the interactions between water and the fruit industry?*

This second question seeks to understand how the political economy of the Western Cape shapes the relationship between water and export-oriented agriculture. It addresses the importance of 'other' factors – or non-firm dynamics – that are often overlooked in GPN analyses but are crucial in relation to natural resources, their management, and governance. This is the focus of Chapter 4.

3. *What factors drive and shape the influence of global agricultural production networks on water governance, and how have these played out in the Western Cape?*

Here a move is made to understand why and how the Western Cape fruit industry influences processes of water governance in practice. It is answered in Chapter 5 and Chapter 6.

4. *What are the wider implications of the influence of global agricultural production networks for water governance in the Western Cape?*

This final question offers an opportunity to draw together the findings and discuss their implications for wider processes of water governance in the Western Cape. This is an interpretive and analytical exercise and forms the core of Chapter 7.

1.3 Thesis Structure

The thesis is divided into eight chapters. A review of the literature in Chapter 2 follows this introductory chapter. Chapter 3 outlines the research strategy. Chapter 4 discusses the historical and present-day political economy of the Western Cape, highlighting the importance of this context analysis for the presentations of the findings and discussion that follow it. The findings of the thesis are presented in Chapter 5 and Chapter 6. Chapter 7 then discusses these results and their implications in more detail. Chapter 8 is the final one and concludes the thesis. The following paragraphs briefly summarise the contents of each of these chapters, highlighting how they contribute to answering the research questions.

Chapter 2 addresses Research Question 1 by reviewing relevant literature to provide the theoretical and conceptual foundations of this thesis. The chapter is composed of two parts. The first part reviews the development of GPN theory within the academic literature, including contiguous approaches of Global Commodity Chains (GCC) and Global Value Chains (GVC). Particular attention is paid to the positioning of the environmental dimension within previous GCC/GVC/GPN research. The second part of

the chapter turns to the literature on water governance to find language and concepts that can link globalised agricultural production to processes of water governance. By doing so, it identifies and establishes key concepts from the GPN and water governance literatures that frame the remainder of the thesis, including the notion of water risks and water security strategies.

Chapter 3 outlines the research strategy adopted for this project. It is structured into four sections. The first section justifies an approach based on critical realism, which together with the research questions led to the identification of an intensive, qualitative research design as the most appropriate approach. The second section then describes the different field sites, hinting at the multiple scales relevant to negotiate both water governance and global production networks. The chapter then discusses the different data collection techniques, which included semi-structured interviews, farm visits, collecting policy documents and NGO and industry reports, as well as taking part in workshops. The third section describes the processes of analysing data, with the two dominant approaches being documentary analysis and thematic analysis. Finally, the fourth section considers positionality, ethics, limitations and challenges, especially in relation to extensive fieldwork in the Western Cape.

Chapter 4 addresses Research Question 2 and turns to the specificities of the Western Cape. It is structured into two parts. The first part shows how water governance and commercial agriculture have been interlaced since the start of European settlement, a relationship driven by political economy priorities. Apartheid further cemented this intimate connection, before it seemingly unravelled following the first democratic election. As the chapter shows, however, history and associated power structures are hard to shake, even if they have been rebranded successfully, and they continue to shape the link between water and agriculture. The second part discusses the modern-day structures and organisation of the Western Cape fruit industry, which has been influenced by both the country's history and its post-apartheid neoliberal economic policy. It provides critical contextualisation for Chapters 5, 6, and 7.

Chapter 5 investigates the first part of Research Question 3 empirically by applying the concept of water risks to the Western Cape fruit industry. Categorising water risks into physical, reputational, or regulatory and political water risks, it explains and describes in rich detail how these affect the Western Cape fruit industry and ultimately act as causal drivers for the fruit industry to deploy a series of strategies to ensure its water security.

These strategies for water security are further discussed in **Chapter 6**, which addresses the second part of Research Question 3. It structures the strategies into three categories: on-farm strategies; collaborative efforts; and influencing government. The multi-scalar character of these different strategies becomes evident immediately and is examined throughout the chapter. Ultimately, it is argued that these strategies for water security have implications for wider processes of water governance.

Chapter 7 picks up on this last point to answer Research Question 4. It draws together the insights from previous chapters to discuss the implications of water risks and water security strategies for water governance in the Western Cape. This is an interpretive and analytical exercise, which finds that the strategies deployed by the Western Cape fruit industry depoliticises the core question of water governance – the question of water allocation – in order to prevent agricultural water allocation to be challenged. This is particularly problematic in the Western Cape context because of ongoing inequities based on race.

The thesis wraps up with **Chapter 8**. This conclusion first presents the key findings from the thesis; second, it outlines the main empirical and theoretical contributions of the thesis, both to the field of GPN and the field of water governance; thirdly, it articulates insights and findings that have relevance for policy and practice; and finally, the chapter makes recommendations for future research.

2 Conceptualising the Influence of Global Production Networks on Water Governance

This chapter critically reviews the existing literature on Global Production Networks (GPN) and water governance. It focuses specifically on the interrelated notions of water risks and water security and how we can conceptualise these within the context of global production networks. By investigating the export-oriented Western Cape fruit industry and its influence on processes of water governance, the thesis locates producers both as commercial actors as well as actors of water governance and identifies this overlap as critical for assessing the implications of globalised production upon the governance of our natural environments. To this end, the present chapter addresses Research Question 1 of the thesis: *How can the influence of global production networks upon water governance be conceptualised using the GPN framework?*

The chapter progresses over two parts, with the first part reviewing the literature on GPN and the second part focussing on water governance literatures. This first part, Section 2.1, is itself structured into four sections. The first section, Section 2.1.1, retraces the origins and development of GPN in relation to contiguous approaches of Global Commodity Chains (GCC) and Global Value Chains (GVC). In Section 2.1.2 attention is turned to the different strands of GPN theory and its analytical dimension. Section 2.1.3 discusses how GPN analysis has been applied to the Western Cape horticultural industry in previous research. Finally, 2.1.4 examines existing debates about the environment in GPN and GVC research.

The second part of the chapter is also divided into four sections starting from Section 2.2. The discussion of water governance literatures commences by debating what is understood under the term ‘water governance’ in Section 2.2.1. This is followed by a discussion of the concept of water security as a desired outcome of water governance processes in Section 2.2.2. This understanding of water security leads to a discussion of water risks in Section 2.2.3, which is a useful concept to link water governance to GPN. Section 2.2.4 then reviews how firms have been addressing water risks, something that has mainly been discussed in NGO reports. Finally, Section 2.3 wraps up the whole chapter.

2.1 Of Chains and Networks: Evolution of a Framework

Agricultural production, distribution, and consumption have become increasingly globalised in the past few decades with more and more fragmented links along these value chains and production networks (Kaplinsky 2013). Phenomena like this have been possible due to an effective opening of the global economy in the past three decades, underpinned by policy shifts driven by the hegemony of neoliberal discourse and the dominance of trade liberalisation and export orientation as drivers for economic development (Bek et al. 2017). GPN is a heuristic framework that analyses these dynamics of the global economy and its impacts on territorial development. But, considerations of environmental issues linked to this global economy have, somewhat surprisingly, remained scant (Coe, Dicken, and Hess 2008). Surprisingly so, because the past decades have been marked by increased concerns about the impact economic activities have on the environment. As this chapter demonstrates, the environment has not completely been absent from GPN inquiries. Yet, investigations into the interactions between GPN and environmental governance broadly – and water governance more specifically – have been minimal. To remedy this, this first section reviews the literature on global production networks and value chains, to then ask how environmental aspects have been considered thus far.

2.1.1 From Global Commodity Chains to Global Production Networks

While the term 'commodity chains' dates back to the 1970s, it was Gary Gereffi's (1994) seminal chapter in the book *Commodity Chains and Global Capitalism* (Gereffi and Korzeniewicz 1994) that launched a new research tradition into what he called *global* commodity chains[2] (GCCs). The contribution that attracted most interest was Gereffi's proposal of a governance structure in GCCs by distinguishing between producer-driven commodity chains (PDCC) and buyer-driven commodity chains (BDCC), where the latter was becoming increasingly important in a globalising world (Gereffi 1994). A rich research tradition spawned from this initial work that has centred on this governance dimension. It has focused on how 'lead firms' control other chain actors and how they appropriate and distribute value created along the chain (Bair 2009).

The extensive work that followed from this initial contribution also brought the realisation that the dichotomy of producer-driven versus buyer-driven commodity chains did not explain chain governance in full. Gereffi, colleagues, and other researchers investigating

[2] See Bair (2009) for a detailed genealogy and review of the GCC and related frameworks.

this area reconfigured the approach under the term of global value chains (GVCs) as 'it was perceived as being the most inclusive of the full range of possible chain activities and end products' (Gereffi et al. 2001: 3). Through the metaphor of a value-added chain, the framework aims to understand the changing nature of global production and trade. Particular interests are the consequences of global outsourcing of production and services from the Global North to low-cost options in the Global South (Barrientos, Gereffi, and Pickles 2016) and the modes of governance between firms that coordinate their commercial interactions (Gereffi, Humphrey, and Sturgeon 2005, Gibbon, Bair, and Ponte 2008, Ponte and Sturgeon 2014).

Since the early 2000s, GVC has arguably become one of the dominant banners under which global production, distribution, and consumption are being studied. Its influence has reached firmly into the active policy sphere, shaping the programmes and interventions of the UN (UNCTAD 2013), the European Union (European Commission 2019), the OECD (OECD 2018), the World Economic Forum (Doherty and Verghese 2018), and many more. This has been facilitated by the effective translation of academic analysis and critique into policy language, e.g. by contrasting 'low-road' versus 'high-road' trajectories to address sustainability concerns along global value chains (Barrientos 2019).

The GPN approach emerged in the early 2000s in dialogue with, and as a critique of what it considered 'the very valuable but, in practice, more restricted, global commodity chain and global value chain formulations' (Coe, Dicken, and Hess 2008: 2). This criticism centred on the linearity of the GVC approach, which does not sufficiently take the spatial embeddedness of such chains into account, narrowly focusing on inter-firm governance and ignoring other 'non-firm' actors, as well as omitting power as an analytical lens (Henderson, Dicken, and Hess 2002). By explicitly adopting a network analogy, this initial GPN approach aimed to counter these shortcomings, i.e. by making space for different types of network configurations (rather than vertical chains) as well as for all relevant actors and relationships (rather than just firms) (Coe, Dicken, and Hess 2008, Henderson, Dicken, and Hess 2002, Hess and Yeung 2006a). The GPN approach is an explicitly relational and geographic framework in which global production networks are not only understood as supply and value chains spanning the globe but also as embedded in multi-scalar social, political, and institutional contexts, while being shaped by economic and non-economic actors (Coe, Dicken, and Hess 2008, Hess and Yeung 2006a).

Since the early GCC analyses, which mainly focused on manufacturing, the GCC/GVC/GPN literatures have broadened their scope and objects of analysis to include an increased diversity of economic actors, products, sectors, and concerns. This includes an increased focus on labour relations (Alford, Barrientos, and Visser 2017, Barrientos et al. 2005, 2011, Barrientos 2013a), investigations into, for example, the extractive industries (Bridge 2008), and different moments of value creation, such as at the retail and consumption level (Hughes, Wrigley, and Buttle 2008). Particular attention has also been paid to economic upgrading (suppliers moving into higher value activities) and social upgrading (better terms and conditions for workers) (Barrientos 2014, Barrientos, Gereffi, and Rossi 2010, Bek et al. 2017, Gereffi and Lee 2016). GCC/GVC/GPN investigations have produced invaluable analytical insight into the commercial linkages among and between firms, their shifting geographies, and often mixed consequences of this new economic architecture for suppliers, workers, and other stakeholders within global production networks. The next section delves into the GPN literature to investigate the conceptualisation of GPN thus far, and where, within that understanding, there is space for the environmental dimension.

2.1.2 Understanding the Different Strands of GPN Theory

The GPN framework draws on three interrelated dimensions – value, power, and embeddedness (Henderson, Dicken, and Hess 2002). Value, in GPN, is both understood in the Marxian sense as surplus value created through the labour process and the more orthodox understanding of economic rent (Hess and Yeung 2006b). Interest is directed towards the creation, enhancement, and capture of value. Power is key within GPN to enhance and capture value, which can take the form of corporate, institutional, or collective power (Coe, Dicken, and Hess 2008). Finally, territorial, network, and social embeddedness describe the embeddedness of economic activity (Hess 2004). While all three aspects are important to this thesis, the notion of power is especially crucial as evident from the empirical findings presented in Chapters 5 and 6 and the discussion in Chapter 7.

The first dimension – value – focuses on the three concepts of value creation, value enhancement, and value capture. Value creation refers to the conversion of labour power into actual labour via employment, skills, working conditions, and through production technology, and the possibilities of creating various forms of rent (Henderson, Dicken, and Hess 2002). Value enhancement describes technology transfers, skill improvement, and how local firms may themselves be able to generate organisational, relational and

brand rents. National institutions, such as government agencies, trade unions, employer associations play a key role in determining the possibilities for value enhancement (Hess 2018). Value capture raises the issue of where, within the global production network, the created and enhanced value is captured – and for whom (Barrientos 2019). This largely depends on government policy, as well as firm ownership, corporate governance, and the national context. It emphasises how different national forms of capitalism matter for questions of economic and social development (Henderson, Dicken, and Hess 2002). The value dimension is here understood as one of the main (but not necessarily the only) *raison d'être* of Western Cape fruit production, in the sense that the industry's aim is to create, enhance, and capture value. Water, as will be shown, is crucial to achieving this aim.

The second dimension – power – is categorised as corporate, institutional, and collective power. Corporate power describes the power of lead firms to influence other firms within the global production network (Coe 2012). Thanks to the network analogy, this eschews a zero-sum perspective of power and therefore does not ascribe a monopoly of power to lead firms. Instead, it acknowledges the asymmetrical distribution of power across the production network where lesser firms may be autonomous enough to develop and deploy their own strategies (Hess 2018). Institutional power refers to the power exercised by national and international institutions (e.g. UN agencies or Bretton Woods institutions), which can considerably influence investment and other decisions of different firms within GPNs (Henderson, Dicken, and Hess 2002). Third, collective power designates actions of collective agents that seek to influence GPN firms at specific locations, such as trade unions, employers' associations, NGOs (Henderson, Dicken, and Hess 2002). With the Western Cape fruit industry, such collective power in the form of industry associations and local water institutions, is key to understand the influence of global agricultural production networks on water governance, as shown in Chapter 6 and Chapter 7.

The final dimension – embeddedness – distinguishes between territorial, network, and social embeddedness. It describes how the institutional fabric and the social and cultural contexts of different forms of capitalism influence firms. Territorial embeddedness describes how firms absorb or become constrained by the economic activities and social dynamics of a specific place. Network embeddedness refers to how stakeholders relate with other firm and non-firm actors within the network, regardless of their country of origin (Henderson, Dicken, and Hess 2002). Finally, social embeddedness underlines the

importance of where different GPN actors come from, as their cultural and political background will influence their behaviour within the network (Hess 2004). Subdividing embeddedness like this showcases the variability of the concept and its sensitivity to context while avoiding its over-territorialisation (Hess 2004, Weller 2006). It brings forward the relational understanding of GPN and allows for dynamic 'embedded' relations rather than a static state of 'embeddedness'. We can thus understand the influence of the global fruit production network upon local water governance as embedded in uneven and shifting relations at multiple scales, which the Western Cape's history, institutions, culture, and politics shape actively.

Despite the different emphasis of GPN analysis in regard to GVC, actual research carried out under its banner often strongly resembles GCC/GVC analysis (Bair 2009). Proponents of the GPN approach itself have acknowledged that some important aspects that distinguish the GPN approach are chronically underdeveloped so that the two seem to converge into one (Coe, Dicken, and Hess 2008, Levy 2008). Others have criticised the lack of explanatory power of the GPN framework, especially in relation to the question of how globalisation processes originate and organise (Hudson 2008, Starosta 2010). In response to this critique, two of the initial key contributors to GPN have further developed the framework into, what they term, GPN 2.0 (in contrast to GPN 1.0 developed in Henderson, Dicken, and Hess 2002) (Coe and Yeung 2015, Yeung and Coe 2015).

A) GPN 2.0

This revised approach reframes GPN – and its economic development outcomes – as a dynamic theory that understands global production networks as 'an organizational arrangement comprising interconnected economic and non-economic actors coordinated by a global lead firm and producing goods or services across multiple geographic locations for worldwide markets' (Yeung and Coe 2015: 32). GPN 2.0 draws on four dimensions to increase its explanatory power of how global production networks originate and evolve. The first dimension theorises capitalist dynamics along with the four variables of cost-capability ratio, market development, financial discipline, and managing risk. The second dimension describes how these capitalist dynamics act as causal challenges that drive a series of strategies by firm and non-firm actors within global production networks. Yeung and Coe (2015) categorise these strategies into intra-firm coordination, inter-firm control, inter-firm partnership, and extra-firm bargaining. These then delimit the third and fourth dimension of GPN 2.0, which explain the value capture trajectories followed by GPN firms (and their regions) and the associated

economic development outcomes respectively (Coe and Yeung 2015). The GPN 2.0 approach highlights some major drivers and causal mechanisms within global production networks and thus advances the explanatory power of the theory in that regard (Hess 2018). The notions of strategies and risk are useful to this thesis as they resonate with the discussion on water risk and water security in Sections 2.2.2 and 2.2.3.

In other regards, the reorientation within GPN 2.0 obscures rather than explains. The more explicit focus on 'lead firms', as prominently positioned within the definition cited above, reinforces the tendency of both GVC and earlier GPN work to focus almost exclusively on these lead firms, which conceals other firm and non-firm actors and their agency (Hughes, McEwan, and Bek 2015). While GPN 1.0 showed potential (although maybe unrealised) to dissolve 'the analytical distinction between "vertical" value-adding inter-linkages and "horizontal" territorial or social relationships' (Weller 2006: 1252 emphasis in original), the refocusing of GPN 2.0 on lead firms and value capture could be a step away from achieving this goal.

In response to Coe and Yeung's (2015) publication of GPN 2.0, empirical and theoretical research has critically evaluated the theory's proposals. For example, GPN 2.0 evolved within the context of the manufacturing and service industries of East and Southeast Asia and so far has only scarcely been tested within the context of other sectors, including agriculture, where considerably different dynamics are at work (Vicol et al. 2019). Furthermore, as highlighted by McGrath (2018), the GVC/GPN literature has chronically underexplored the notion of development. In GPN 2.0, it is further restricted to '*economic* development rather than development more generally' (Coe and Yeung 2015: 167, emphasis in original). This leaves aside questions about the contested nature of development – 'in spite of the fact that the purported *raison d'être* of GPN analysis is to bring about development' (McGrath 2018: 8). Finally, while there had been movements towards marrying GPN with political economy perspectives previously (Coe, Dicken, and Hess 2008, Hudson 2008), GPN 2.0 is much less explicit about this imperative.

Grounding GPN analysis in a political economy approach, however, permits a critical analysis of the different manifestations of power within processes of globalised production and associated development outcomes (Coe, Dicken, and Hess 2008). It shows how economic organisations, e.g. firms, exist both within structural imperatives, such as capitalist modes of production, markets, etc., and the lifeworld of everyday agency and practice (Sayer 2001). This proves useful to investigate economy-environment relations (Hudson 2008), such as those arising at the intersection of water

governance and globalised production. Grounding GPN in such a political economy approach also allows for an explicit recognition and analysis of power asymmetries within global production networks, and among their firm and non-firm actors.

2.1.3 Western Cape Horticulture in GPN/GVC Literature

Investigations into South African horticulture within GPN/GVC[3] research is not new. These have included research into fruit (e.g. Alford, Barrientos, and Visser 2017), wine (e.g. Herman 2019), and flowers (e.g. Bek et al. 2017). South Africa offers interesting dynamics to study the phenomenon of GPN/GVC: the country's democratisation and subsequent deregulation of its horticulture industry coincided with the expansion of powerful European supermarkets in the late 1990s, which has embedded South African producers into global networks of production and supply. Because of the country's history of apartheid, much research has investigated how the embedding of fruit producers into global production networks interacts with this social and economic legacy. A particular focus has been on farm labour and working conditions (e.g. Barrientos et al. 2005, Du Toit 2005), economic and social upgrading (Barrientos and Visser 2012), and ethical trade (e.g. Hughes, McEwan, and Bek 2013). Much of this work revolves around the growth of different standards or codes – private and social – to regulate the social and economic implications of value chain participation. Many of these topics overlap and authors have used both the GPN and GVC theoretical frameworks, often using them interchangeably.

Research into labour relations and working conditions in South African horticulture has focused on the notion of governance, largely, but not exclusively, focusing on the impact of private and social governance mechanisms. For example, Barrientos (2008a) has shown how the commercial dynamics of global production networks drive precarious work on South African horticulture farms, despite a range of private and social standards and is facilitated by a lack of state regulatory capacity. In the fruit industry, Alford (2016) traces this concern back to a trans-scalar governance deficit for precarious workers, highlighting the need to more fully integrate national regulatory systems – besides private and social initiatives – in GPN analysis of labour relations. Unscrupulous intermediaries that coerce vulnerable workers, for example, can easily exploit this governance deficit (Barrientos 2013a). The precariousness of work on South African horticulture farms has been an important driver of the 2012/13 farm labour crisis in the Western Cape. While

[3] Such research has used both the GPN and the GVC approach and they are thus treated here as singular.

the crisis illustrated how multi-scalar labour-agency could challenge the functioning of global production networks (Alford, Barrientos, and Visser 2017), a critical reading also shows how private, public, and civil society labour governance models complement each other to uphold the hegemonic order of global production networks that generate social inequalities (Alford 2018). This underlines the need for a political reading of governance in GPN/GVC analysis, which includes the institutional and socio-political contexts of global production (Alford and Phillips 2018).

The question of labour relations and working conditions is closely related to economic and social upgrading as well as ethical trade. Research into these areas has unveiled the increasing polycentricity of export and domestic markets for South African horticulture produce, with complex implications for social and economic upgrading as well as downgrading of producers and workers (Barrientos and Visser 2012, Goger et al. 2014). Linking social upgrading to ethical trade, Bek et al. (2017) find that with the Western Cape wildflower industry, the commercial dynamics of the global production network erect barriers for true social and economic upgrading of harvesters. These authors also identify the importance of local institutions in South Africa for driving an enabling environment for upgrading and the development of ethical trade. This is evidenced by the involvement of the Flower Valley Conservation Trust (FVCT) in the flower industry, emergence of the Wine and Agricultural Ethical Trade Association (WIETA) in the wine industry, the rollout of Fairtrade (McEwan and Bek 2009), and the creation of the Sustainability Initiative South Africa (SIZA) in the fruit industry. These developments show how different South African actors (producers, retailers, NGOs, government, unions, consultancy firms) are increasingly and actively defining what ethical trade is and how it should translate into private standards (Hughes, McEwan, and Bek 2013, Hughes et al. 2014).

What we can draw from this brief, and certainly not an exhaustive summary, is that a critical reading of GPN/GVC and its implications for the different involved actors' matters. This reinforces the point made earlier about a political economy perspective that allows a political reading of power structures and agency. The review also underscores the importance of place; how the histories and geographies of places intertwine with the commercial dynamics of global production networks to create outcomes that need critical analysis. Much of this research into South African horticulture under the GPN/GVC banners has focused on the social and economic implications of value chain participation. The interaction between South African horticulture and the environment,

within GPN/GVC literatures, is scant (two exceptions leaning on the GPN/GVC framework are: Debbané 2013, Sojamo 2015 discussed below). It is important to investigate, however, as it underpins and interacts with the social and economic concerns expressed in the literatures reviewed above. This thesis contributes to closing this gap by linking the GPN framework to the literature on water governance. To do that, the next Section, 2.1.4, turns to existing debates about the environment and environmental governance in GPN/GVC literatures.

2.1.4 Debates about the Environment in GPN/GVC Literature

This thesis investigates the influence of global production networks on processes of water governance as a specific subset of environmental governance. In recent decades there has been growing concern over the impact of economic activity on the environment and the potentially disastrous consequences of this environmental change for societies and economies. While there is nothing new about concerns over environmental threats, the 'global' reach of these crises – climate change, sea-level rise, deforestation, and water scarcity – have put these fears at the top of the agenda in academic, public, and policy debates (Bakker 2012a). It is important, therefore, to consider how environmental issues have previously been investigated in relation to global production networks. Three categories of environmental considerations can be identified within GPN and GVC research. The first field investigates processes of environmental upgrading and the role of private and social (environmental) standards along the chain. The second area of investigation focuses on the materiality of global production networks. The third area of interest refers to the field of virtual water and water footprints, which investigates water usage along global value and supply chains. The following paragraphs discuss these three areas in detail.

A) Environmental Upgrading and Private (Environmental) Standards

De Marchi and colleagues (2013) introduced environmental upgrading in published GVC literature in 2013 focusing specifically on joint environmental and economic improvements.[4] Environmental upgrading refers to 'the process by which economic actors move towards a production system that avoids or reduces the environmental damage from their products, processes or managerial systems' (De Marchi, Di Maria, and Micelli 2013: 65). By adopting different green strategies along global supply and value chains, firms improve their environmental performance. Ideally, this results in new

[4] The notion of environmental upgrading did exist before that (e.g. Jeppesen and Hansen 2004) but was not put in direct relation to either the GVC or GPN frameworks.

competitive advantages for value chain actors, creating a 'business case' for better environmental performance (De Marchi, Di Maria, and Micelli 2013, Goger 2013). The attention lies on who governs environmental upgrading; usually lead firms, through mechanisms such as product design requirements or monitoring and control as well as the setting of private environmental standards (De Marchi, Di Maria, and Ponte 2013, Jeppesen and Hansen 2004). By strongly focussing on technological solutions, these investigations, however, seem to conflate environmental upgrading with efforts of supply chain greening, leaving questions of how to address wider environmental problems that arise because of or along global value chains unanswered.

Private and social standards have themselves been intensely investigated within GVC/GPN literatures. Many consumers in the Global North have become increasingly sensitive to the effects of their consumption behaviours, linking consumption to production across multiple scales. This has been articulated in investigations into commodity cultures (e.g. Cook 2004), ethical trade (Hughes 2001, 2004), and fair trade (McEwan, Hughes, and Bek 2017, Dolan 2010, Hughes et al. 2014). It has yielded much debate about inclusion and exclusion of chain actors, e.g. regarding the marginalisation of smaller producers (Henson and Humphrey 2010, Klooster 2005, Ponte 2008), and power asymmetries in gaining advantages or capturing value from subscribing to these standards (Bakker 2012a, Herman 2019). Critical investigations into private environmental standards have highlighted that while 'eco-strategies' may lead to observable environmental upgrading, the gains are most likely captured by lead firms, rather than being distributed along the chain (Overton, Murray, and Howson 2019). For example, Goger (2013) analyses how Sri Lankan suppliers of Marks & Spencer's (M&S) have constructed apparel eco-factories to comply with the retailer's sustainability agenda, Plan A. She finds, however, that this process of environmental upgrading has led to ambivalent outcomes for these suppliers, as they have little assurance they will obtain a return on investments. As a result, lead firms enjoy a (free) 'green' image thanks to these environmental upgrading strategies, while suppliers carry most of the cost, reinforcing power structures along the chain.

While these key works deepen our understanding of GVCs/GPNs, both the focus on environmental upgrading and private environmental standards is 'vertical', mainly investigating modes of inter-firm governance, e.g. how lead firms improve environmental practices throughout their value chain. They give little consideration to 'horizontal' effects of environmental upgrading, e.g. the embeddedness of these practices within specific

realities and their interactions with wider environmental concerns (see Krishnan 2017 for an exception). It also raises questions about the effectiveness of environmental upgrading in addressing or mitigating wider environmental problems that might accrue from the complexities of a specific place.

B) The Materiality of Global Production Networks

Another strand investigating environment-related aspects of global production networks has been the research into natural resources industries and their materiality as a shaping force of the phenomenon of global production networks. Since the early 2000s, the question of how matter matters has gained renewed interest in human geography. This has largely been in response to a growing unease about how the non-human worlds of animate nature and inanimate objects have been discounted as well as a desire to rematerialize human geography after the cultural turn (Bakker and Bridge 2006).

Gavin Bridge's (2008) work on the oil sector was one of the first attempts to use GPN theory outside of the manufacturing and services industry. He argued that we are living in a material world, where the economy '*is fundamentally (although not exclusively) a process of material transformation through which natural resources are converted into a vast array of commodities and by-product wastes'* (Bridge 2009: 1218 emphasis in original). The materiality of production, then, can be understood as 'the metabolism of human and natural production' (Bridge 2008: 415). In the extractive sector, there is considerable reliance on production that occurs prior to human labour, i.e. the biophysical processes producing hydrocarbon. This offers opportunities to create value by gaining and extending ownership over natural resources. This materiality of oil also considerably influences the organisation of production, which shapes the entire global production network (Bridge 2008). The water sector and the agricultural industries, obviously, differ quite strongly from the oil sector. This is because natural production is extremely heterogeneous. However, there are crucial insights from Bridge's work that can translate to other natural resources industries, such as commercial agriculture. This includes recognising the natural production not only of plants but in the context of this thesis of water: how water is mobilised, channelled, stored, applied, absorbed by the plant and then evapotranspirated to create and capture value.

An example of work that has followed Bridge's investigations into oil is Irarrázaval & Bustos-Gallardo's analysis of global salmon networks (2019). They investigate how ecological contradictions establish the territorial embeddedness and value dynamics of global salmon production networks. They find that firms' strategies interact with the

challenges experienced when commodifying nature in such a way that it shapes the spatial organisation of global production networks and affects the value creation of these resource-based industries, all to maintain or increase production for global markets. These findings feed into discussions about the appropriation of nature within capitalist production, as discussed by Baglioni & Campling (2017) within the GVC framework. Baglioni & Campling (2017) advocate for a political economy of natural resources that de-fetishize the materiality and material-intensity of capitalist production so to recognise that capitalism causes environmental problems. Firms that are part of global value chains and production networks 'strategize their relations with other firms by working through and using the environment to appropriate value, pass on risk and costs, and position themselves commercially and politically' (Havice and Campling 2017: 294). This raises key questions for environmental governance, not only about these interactions among firms within global production networks but also between firm and non-firm actors.

Two interesting notions emerge from this literature crucial for the present thesis. First, the understanding of nature 'imposing obstacles to production' (Irarrázaval and Bustos-Gallardo 2019: 3, see also Boyd, Prudham, and Schurman 2001), which can create problems – or risks – for firms during the production stage. This thesis uses the concept of water risks (see Section 2.2.3) as a fruitful way to link global (agricultural) production networks not only to their materiality at the production stage but also to their reliance on the social and political arrangements that accompany the use of water resources. Second, Havice and Campling (2017) and Irarrázaval and Bustos-Gallardo (2019) all conceptualise firms as deploying strategies in response to these 'obstacles' as to ensuring profit and appropriate value. Section 2.2.2 discusses this perspective to interrogate how actors perceive water security and how they pursue it.

Leaning on these insights, this thesis further contributes to GPN/GVC investigations into environment-economy relations by explicitly focusing on the horizontal effects of global production networks, i.e. how they influence environmental governance beyond the chain. This sets this project apart from the above-mentioned works which focus on how the appropriation and transformation of its changing natural resource base shapes the value chain itself. Little research investigates how these dynamics influence the environmental governance within which those production stages take place. The question is not whether production, distribution, and consumption have environmental impacts, but what sorts of impact and how these are distributed (Hudson 2008). Some

of these questions may be answered by focusing on how global production networks influence processes of environmental governance.

C) Virtual Water and Water Footprints

The third area of interest in this review is the field of virtual water and water footprints. Tony Allan (1998) introduced the concept of virtual water to capture the amount of water needed to produce agricultural commodities destined for global trade. It does not lean on the GVC or GPN approach but stems from the literature on hydro-politics and water and food security. It links water, food, and trade in one concept. Allan developed the concept out of his research on the water-scarce Middle East and North Africa (MENA) region and suggested that by leveraging virtual water 'serious local water shortages could be very effectively ameliorated by global economic processes' (Allan 2003a: 4). For example, considering that the production of a tonne of grain requires 10,000 m^3 of water, a water-scarce nation such as Egypt, 'saves' itself 10,000 m^3 of water by instead importing that tonne of grain from a more water abundant region elsewhere in the world. Allan theorised that water deficit economies can remedy this deficit by importing water-intensive goods with no need to enter a discourse of national food or water scarcity since virtual water is 'economically invisible and politically silent' (Allan 2003a: 8).

A spin-off that resulted from the concept of virtual water is the water footprint developed by Hoekstra and Hung (2002), which quantified virtual water. They divide it into the blue, green, and grey water footprint. The blue water footprint refers to the consumption of blue water resources, i.e. surface water and groundwater; the green water footprint denotes the consumption of green water resources (rainwater if it does not become surface runoff, e.g. absorbed by crops and plants); and the grey water footprint describes pollution and is defined as the volume of fresh water needed to assimilate a load of pollutants (Hoekstra et al. 2011). They have further developed this research strand to allow for the calculation of the water footprint of products along value chains, process steps, consumers, or a geographically delineated area (Hoekstra et al. 2011). It has been applied to a variety of products and regions, such as cut-flowers (Mekonnen, Hoekstra, and Becht 2012), cotton (Chapagain et al. 2006), rice (Chapagain and Hoekstra 2011), food aid (Jackson, Konar, and Hoekstra 2015), the UK (Yu et al. 2010), or the Netherlands (van Oel, Mekonnen, and Hoekstra 2009), to name just a few.

Both the concept of virtual water and the water footprint approach must be considered critically. The ability of virtual water transfers to benefit water-scarce economies has been questioned, because especially poor water-scarce nations may not be able to take

part in global trade (Ioris 2004). The concept also depends on 'persistently low international food prices and free access to markets' (Sojamo et al. 2012: 173), which, after the 2008 food crisis and the resulting spikes in commodity prices is not the case anymore. Furthermore, water is generally not the dominant factor in agricultural trade decisions (Wichelns 2010, 2015). Linked to that, many water-scarce countries produce comparatively water-intensive commodities, which they then export to water abundant economies (Wichelns 2004), like, for example, South African fruit exported to the UK. Moreover, if used as a prescriptive policy, virtual water transfers may undercut the domestic agricultural base and negatively impact the livelihoods dependent on it (Warner and Johnson 2007); as such, virtual water transfers are unlikely to reduce global water use inequality (Seekell, D'Odorico, and Pace 2011). Similarly, the concept of water footprints may be more misleading than helpful, as water is an extremely localised resource, and global water consumption matters little (unlike carbon) whereas it may be a concern locally. Water footprints, however, add little insight to local situations with poor water management or where excessive water use threatens the environment. These cases need to be observed on the ground and addressed by introducing sound water governance (Perry 2014).

Although neither the virtual water concept nor the water footprint uses a GPN/GVC lens, at their core they aim to understand what role water plays in global commodity chains. Suvi Sojamo (2016) is one author emerging from this virtual water tradition that has connected with the GPN/GVC concepts to investigate the largest water-using corporations as agents of water security, management and governance. Analysing global lead firms within the agri-food industry, such as Nestlé, Sojamo finds that these corporations wield considerable power over water management and governance processes, mainly by developing corporate water stewardship and contributing to an emerging global water governance regime. The legitimacy of this engagement, however, is questionable and there is a need to ensure transparency, accountability, and equal participation of other water stakeholders, such as municipalities and small-scale farmers. She highlights how these water-using corporations have become increasingly central to water management and governance, due to their need to mitigate risks but also due to a lack of public sector regulatory capacity. While Sojamo points out the need to acknowledge openly and limit the most concentrated forms of corporate power, especially around corporate water stewardship (see Section 2.2.4), she also supports their sound engagement in water via corporate water stewardship to complement public sector mandates and civil society efforts. As her research focuses on large global agri-

food lead firms, she highlights the need for more in-depth, locally grounded research. This thesis contributes towards addressing this gap in the literature.

2.2 Introducing Water Governance

To understand why global production networks matter for water governance specifically, there is a need to clarify what water governance means. Governance has become a buzzword in the social sciences and policy world. Different disciplines focus on different aspects of governance and as a result, theories of governance have evolved in a non-cumulative manner, meaning they do not necessarily build on each other, leading to confusion around the term (Gupta, Verrest, and Jaffe 2015). For example, governance is as amply used in GVC literature to describe inter-firm relations (e.g. Gereffi, Humphrey, and Sturgeon 2005), as it is used to describe the decision-making processes that affect water (e.g. Pahl-Wostl 2015). Thus, governance, without even considering the water component, is in itself complex. Clarifying how water governance is understood further matters to conceptualise how global production networks influence water governance. Here the notions of water risk and water security are used to link issues of water governance to global production networks.

2.2.1 Understanding Water Governance

Water governance is understood as 'the ways societies organise themselves to make decisions and take action regarding water' (de Loë and Patterson 2017a: 76–77). This involves multiple actors, happens at a range of scales, and takes place through a variety of mechanisms, including regulation, market tools, incentives, and formal and informal networks (de Loë and Patterson 2017a, Ingram 2011, Rogers and Hall 2003, Wiek and Larson 2012). Such an understanding frames water governance as an analytical concept rather than a normative one. An analytical understanding of water governance has three advantages. First, it allows for a nuanced understanding of practices of ruling, instead of focusing solely on the actors, thus revealing *the how* in addition to *the who* of water governance. Second, the term governance underlines the important role both the state and non-state actors can play in shaping the rules and interactions that manage water; governance thus is more than the state but not necessarily in opposition to it. Third, it reveals how water governance processes manifest across different spaces with a variety of interacting governance actors being interlinked at several scales (Gupta, Verrest, and Jaffe 2015). Such an analytical understanding of water governance thus considers firm and non-firm actors within the different water governance processes besides more traditional water governance actors.

A) Scales of Water Governance

Water is a so-called 'flow resource' that respects no administrative, geopolitical, social, or ecological boundaries and thus becomes simultaneously local and global working across multiple scales from the individual organism to the global climate. Concurrently, decisions about water are often made remotely from the site of access or allocation and are part of wider political processes (Norman, Cook, and Cohen 2015a). For this reason, water governance needs to be understood as a scale-sensitive process (Bulkeley 2005, Padt and Aarts 2014, Termeer and Dewulf 2014, Termeer, Dewulf, and van Lieshout 2010). Scales are understood as socially constructed; and next to the maybe better known geographical or spatial scale (place, landscape, region, global), there are many other 'types' of scales, such as temporal scales (days, seasons, years, decades); jurisdictional/administrative scales (towns, states or provinces, nations); institutional scales (operating rules, laws, constitutions); and networks (family, kin, society). Hence, scales may be spatial, temporal, quantitative, or analytical dimensions (Cash et al. 2006). In a similar fashion, global production networks work across multiple scales (Coe, Dicken, and Hess 2008). When considering water-intensive global production networks, such as the agricultural sector, this may bring in scales, actors, and dynamics that have not previously been considered in water governance research.

This matters as some of the most conspicuous challenges in water governance relate to the multiple spatial scales water affects, such as from the catchment to the basin to national boundaries, as well as multiple jurisdictional and institutional scales, e.g. from Water User Association (WUA) to local government to inter-governmental bodies such as the UN and their respective laws and norms. As a result, there has been increasing scholarship in recent years investigating issues of scale in relation to water governance challenges (Cohen 2011, Cohen and McCarthy 2015, Dore and Lebel 2010, Lebel, Garden, and Imamura 2005, Molle 2015, Norman, Cook, and Cohen 2015b). Most often, scalar issues in water governance are traced back to a misfit between scales of government or administration and environmentally relevant scales. This misfit creates inefficiencies, spatial externalities, and spillovers (Meadowcroft 2002, Moss and Newig 2010).

One way to address this 'misfit' is through a process of rescaling, i.e. by creating new administrative scales that map onto environmental scales. The river basin approach (and

also Integrated Water Resources Management (IWRM)[5]), the dominant paradigm in water governance, is an exemplary case of such rescaling (Cohen 2011). Its principal modus operandi is to establish a river basin organisation – an additional layer of governance – that accounts for that basin's natural flow. As such, spillovers can be internalised within one hydrological unit and upstream and downstream users can be integrated where they might have been separated by administrative boundaries previously. In South Africa, post-apartheid water policy brought such rescaling in line with IWRM (see Chapter 3 and Chapter 4). The aim was to enable participation of all affected stakeholders, especially previously disadvantaged ones. This has been difficult in the Western Cape communities dominated by commercial fruit production (see Chapter 6).

This is partly because these processes of rescaling (a) also cut across established systems of governance and (b) often lack a political dimension. The consequence of (a) is an alteration of the scope of action and power relations of involved regions, state and non-state actors, raising questions about legitimacy and equity (Brenner 2001, Moss and Newig 2010). The result of (b) is often a reification of 'natural' boundaries that implies 'neutral' planning and participation approaches (Molle 2008, Wester and Warner 2002). By drawing 'nature' into the equation, the boundaries of the basin become undisputable, '[…] as these boundaries are not a matter for political debate, but have been drawn by nature itself' (Wester and Warner 2002: 68). Boundaries of basins, however, are actively drawn, they are a matter of political choice not of nature, and therefore a clear expression of political power. Governing water is thus a political process.

B) Governing Water as a Political Process

Questions pertaining to the governance of water are often naturalised and reified, ignoring the deeply political process that governing water is (Boelens et al. 2016, Moss and Newig 2010, Sojamo 2016). Consequently, water governance is easily depicted as an instrumental, technical, and neutral policy strategy or management practice (Castro

[5] The river basin approach is basis for the concept of IWRM. IWRM is not a new concept *per se*, but the 'modern' variant is based on the Dublin Principles formulated at the International Conference on Water and the Environment in Dublin, 1992 (Biswas 2008). Many countries, including South Africa, have adopted IWRM as their leading paradigm. IWRM promotes an integrated and holistic approach to water governance and management. It emphasises the three desired E's of equity, efficiency, and environmental sustainability, while integrating all relevant stakeholders (GWP 2000). Research into IWRM, however, has shown that the concept is difficult to implement; can be interpreted in a variety of ways, making it vulnerable to stalling processes or hijacking by groups with narrow interests; and that most efforts have focused on the 'E' of efficiency – increasing efficiency of water use rather than on the 'E' of equity, e.g. the social justice aspects indispensable to human development (Biswas 2004, Ingram 2011, Mehta and Movik 2014, Molle 2008).

2007). This usually happens through two processes. First, the terms water management and water governance are often used interchangeably, when they actually mean quite different things (Pahl-Wostl 2009). Water management refers to the 'doing' by one specific actor group, such as activities of analysing and monitoring; extracting, distributing, using, and recharging water; or developing and implementing measures to keep the condition of water in a desirable state. In contrast, water governance refers to the 'steering' of those activities and *the who* and *the how* of these decisions (Kooiman et al. 2008, Pahl-Wostl 2009, Wiek and Larson 2012). Second, by identifying water governance as a complex participative democratic negotiation process that idealises the interrelations between the main actors involved – the state, the market, and civil society – as an equal tri-partite partnership, when these relationships are rarely equal nor necessarily democratic. The consequence of these two prevailing understandings of water governance is that the 'mainstream water policy literature tends to present a depoliticized understanding of governance' (Castro 2007: 105).

Understanding water governance as a deeply political process means acknowledging the different values and norms underpinning governance processes – and acknowledging who determines them. This is important because governing natural resources such as water always involves the 'norms and rules of interactions between actor groups involved in natural resource use, and the resulting power relationships between these groups' (Rist et al. 2007: 23–24). Adopting such a view of governance avoids reducing it to an apolitical, management strategy or an idealised system of shared responsibilities. It also allows identifying how different actor groups aim to obtain specific ends and the values they seek to promote. Further, it emphasises the importance of being aware of the exercise of authority and power, and therefore power asymmetries, within water governance regimes (Sojamo 2015). Water is thus often governed through different modes of governance (Driessen et al. 2012), which draw in a multitude of actors from a variety of scales that interact to create the processes that rule and manage water – a combination of governing efforts. These efforts are not necessarily aligned or coherent and might 'pull' into different directions according to the norms and values the different actors involved ascribe to water.

2.2.2 The Problem of and with Water Security

In recent years, there has been an increased focus on the notion of water security as the desired outcome of water governance processes (see Cook and Bakker 2012). The addition of 'security' after 'water' was initially feared to lead to nationalistic or militaristic

securitisation discourses (Levy 1995, Zeitoun et al. 2016). Instead, this new drive in water security research refers to a broad integrative understanding of water security combining access to and affordability of water, human needs, and ecological health (Cook and Bakker 2013). By far and away the most cited definition of water security is the one presented by Grey and Sadoff (2007: 548), where water security is the 'availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies'. Water security, thus, is a societal goal with the aim to respond to water-related vulnerabilities and risks.

Adopting a water security perspective within water governance discourses has several analytical advantages. First, it easily connects to other social, economic, and political concerns, such as commercial dynamics of globalised production (Franz, Schlitz, and Schumacher 2018, Sojamo 2016) or interrelated energy and food security issues and associated 'nexus-thinking', e.g. the Water-Energy-Food (WEF) Nexus (Bazilian et al. 2011, Leck et al. 2015, Pahl-Wostl, Bhaduri, and Bruns 2018). Second, it allows for consideration of societal and institutional dynamics and risks beyond the traditionally considered hydrological boundaries of the catchment/basin/watershed and as such makes analytical space for multi-scalar linkages of water governance processes (Bakker and Morinville 2013). These two advantages are key when considering the influence of global production networks upon water governance; dynamics that would be obscured with more traditional approaches based on hydrological boundaries, like river basins.

Adopting a water security perspective, however, also harbours some pitfalls. Inherent in many definitions of water security, such as the one cited above, is the concern of the effects of water *in*security on populations. As such, the way water insecurity is conceptualised determines how water security is then considered achievable. Problematically, however, water insecurity and its causes are often naturalised in a way reminiscent of environmental determinism (Loftus 2015). This leads to a depoliticised discussion of water insecurity equating it to scarce rainfall rather than unjust distribution. Scarcity, however, as Harvey reminds us (2001), is not inherent in nature but social and cultural in its origin. This leads us to the second pitfall which is that water security discourses tend to overlook diverse interests and politics within society (e.g. Garrick and Hall 2014). The notion of 'tolerable risk to society' (Grey et al. 2013: 4) presumes that all people have an equal say over what this would be. As pointed out by Zeitoun et al. (2016), this is of little use if one is excluded from accessing water based on income,

gender, race, religion, or other attributes. An appreciation for power asymmetries within societies is thus key when discussing water security and brings us back to understanding water governance as a deeply political process.

These considerations of power asymmetries are crucial when conducting research in unequal societies, such as South Africa. South Africa's apartheid legacy has not only shaped access to economic opportunities but also pre-determined access to water resources; dynamics that become intertwined when considering the commercial agricultural sector, such as the fruit industry (see Chapter 4). These power asymmetries become even more critical when bearing in mind the current commercial forces at work enabled by the post-apartheid neoliberal restructuring of the agricultural sector. These are the dynamics that have created the foundations for the formation and development of global agricultural production networks in the Western Cape. Access to water for commercial agricultural production consequently takes on a global dimension and a much wider set of interests. The next section introduces a typology of water risks as a way to capture water insecurity for globalised agricultural production. The aim is not to presume a unified understanding of water insecurity – and thus water security – but to approach it from an actor-group specific angle.

2.2.3 Towards a Nuanced Understanding of Water Risks

Introducing a differentiated understanding of water risks is about the question of *risk for whom.* Who defines what risks matter? This thesis is investigating the role of the export-oriented fruit industry within the context of water governance in the Western Cape. Actors within this industry will understand water risks in a way that differ from the understanding of other water stakeholders in the Province. Understanding the way the fruit industry identifies and defines water risk is a key step to conceptualise their influence upon water governance, as elaborated below.

A) Water Risks for Businesses

While risk is not a new concept within the broad field of water management and governance, traditionally it has been associated with extreme events, such as floods and droughts. In the past 15 years, there has been additional realisation how perceived water risks may cause negative consequences for businesses (Morrison and Gleick 2004, Orr, Cartwright, and Tickner 2009). Due to the familiarity of the language of risk, this has captured the attention of the private sector towards water governance like no other concept (Sojamo 2015, see for example Pegram 2010, PWC 2015). It has also been a way for NGOs to engage fruitfully with companies on water-related sustainability

concerns, as highlighted by various NGO driven initiatives in this regard, sometimes in direct partnership with (lead) firms (Ceres 2009, WWF 2013, WWF and M&S 2016). In contrast, academia has only scantly investigated water risk as a standalone concept and this thesis contributes to remedying that (exceptions being Baleta and Winter 2016, Daniel and Sojamo 2012, Orr and Cartwright 2010).

Water risks have been categorised in different manners by NGO reports (Ceres 2009, Morrison et al. 2009, Reig, Shiao, and Gassert 2013, WWF 2013), business consultancies and other private sector actors (Pegram 2010, PWC 2015, WBCSD 2010), and academia (Baleta and Winter 2016, Daniel and Sojamo 2012, Orr and Cartwright 2010). This review has identified three categories within these discourses, as shown in Table 2.1 on the next page: physical, reputational, and regulatory/political water risks. Water risks differ between economic sectors and companies and may affect different parts of a global production network differently (Hepworth and Orr 2013). Undoubtedly, water-intensive production networks will be more at risk than less water-intensive ones. In global agricultural production networks, it is the production stage that is likely to be most water-intensive and thus will face most water risks. However, there is ample scope for more research about the role of water risks in manufacturing processes, such as the high tech industry where producers of silicon chips for semiconductors rely on vast amounts of very clean water (see Morrison et al. 2009).

The categories of water risks presented in Table 2.1 represent the main categories repeated across these publications. Some authors are more detailed, for example, by differentiating a stakeholder risk from reputational risks (e.g. PWC 2015) to account for different ‘audiences’, e.g. the local community (stakeholder risk) and end-consumer markets (reputational risk). Others have introduced an ‘investment risk’ (Pegram 2010) that can accrue if water-related disclosure requirements are placed upon investors and retailers with increased awareness about water risk. For this project, less is more. The categorisation in Table 2.1 offers a broad and useful typology that can capture different audiences or additional (private or social) regulatory requirements where and as needed. When applied to a specific context, these differentiations and nuances can and should be brought forward while the overarching categories remain broad. Chapter 6 uses this broad categorisation to structure the analysis while also refining the typology to consider the Western Cape context.

Table 2.1: Different water risks in agricultural production networks

Form	Nature	Causal Effects	Examples
Physical Risk	Relates to a shortage of water (scarcity), too much water (flooding), or water that is unfit for use (pollution) as well as possible impacts of climate change on future water supply and demand.	Disruption of production; production cost may escalate; lower investor confidence.	In Dar es Salaam, Tanzania, SABMiller brewery has faced threats of saltwater intrusion into the 20 boreholes that supply its operations (Pegram 2010: 15).
Reputational Risk	Potential conflicts with the public regarding a firm's water use; affects the company's image.	Loss of (social) licence to operate; loss of customers for producers & retailers; demand for more corporate responsibility.	In McCloud, California, Nestlé had to cancel plans to bottle water after years of opposition by residents and advocacy groups concerned about the environmental impacts of the proposed bottling plant (Morrison et al. 2009: 13).
Regulatory and Political Risk	Changes in the regulatory water governance regime, usually imposed by the host country; changes in standards and norms; new political direction.	Fees and increased pricing for water supply and wastewater discharge, increased cost of operation; less inviting business environment.	In California's San Joaquin River, they have restored minimum instream flows at the expense of reduced agricultural diversion in a ruling against the Central Valley farmers at the San Joaquin Valley court (Morrison et al. 2009: 15).

(Source: compiled and adapted from Baleta and Winter 2016, Hepworth and Orr 2013, Pegram 2010, Signori and Bodino 2013, Sojamo 2015)

B) Risk in GPN 2.0

Risk has also become an important concept within GPN 2.0 and thus offers an interesting avenue to conceptualise the link between globalised agricultural production and water governance. In a globalising economy, lead firms and their suppliers face different risks at different scales every day. While all economies face risks, the 'qualitative nature and causal effects of risk play out differently in the context of global production networks such that we can term it GPN risk' (Yeung and Coe 2015: 42). Yeung and Coe (2015) propose five categories of risk: economic, product, regulatory, labour, and environmental, summarised in Table 2.2 (on the next page). This categorisation of risks is useful to distinguish the variety of uncertainties affecting global production networks, however, the conceptualisation of environmental risk lacks depth. Characterised as a hazard or disaster it invokes a 'once-off' conceptualisation of risk occurrence, negating the

possibility of a continuous (maybe underlying) environmental risk, as apparent in the categorisation of water risks in Table 2.1.

Table 2.2: Different types of risk in global production networks

Form	Nature	Causal Effects	Recent Examples
Economic Risk	Systemic shifts in markets: new technologies and innovations, changing demand, financial disruptions, exchange rate fluctuations, and so on	Loss of competitive position in cost and/or market leadership; reduction in financial returns and profitability; lower income and structural volatility to localities and regions	Decline of Canada's RIM (BlackBerry) and Finland's Nokia in smartphone devices, 2013
Product Risk	Quality, safety, branding, and efficiency considerations	Negative views of goods or services by consumers and customers; greater demand for corporate social responsibility	Toyota's quality issues with its "sticky pedals" in the United States, 2009–11
Regulatory Risk	Political, public-to-private governance, and changing standards and norms	Disruption or termination of global production, existing industrial practices and organisational arrangements	2003 European Union's regulation of genetically modified organisms (GMOs) and impact on GM crop growers (e.g., Monsanto's MON810 maize)
Labour Risk	Struggles over working conditions and employment practices	Resistance & industrial action by employees; disruptions to global production and employment prospects; and potentially greater reputational risk	Strikes in Foxconn's plants in China, maker of Apple's iPhone, due to workers demanding for better terms and working conditions, 2012–13
Environmental Risk	Natural hazards or human-made disasters	Accentuating the above four forms of risk and their causal effects	2011 Fukushima earthquake & production stoppage in automobile manufacturing due to parts shortage

(source: adapted from Yeung and Coe 2015: 41)

It is important to recognise that in reality, different risks will overlap and co-constitute themselves. This is especially true for environmental risks. For example, Gibson and Warren (2016) discuss the interconnectedness of resource scarcity and environmental regulation as a shaping force of global production networks. In their paper, the risk is thus co-constituted by the scarcity of a specific natural resource (tonewood) – an environmental risk – and the tighter regulation stemming from said scarcity – a regulatory

risk. Combined these two risks create an economic risk as they threaten supply security. This example shows how risk categories overlap and may become difficult to separate.

C) Sharing Risk?

Risk, as indicated earlier, is also a matter of definition, and they are here conceptualised from a firm perspective. As examples in Table 2.1 show, that which constitutes a water risk for a firm may create positive outcomes for other users. For example, the restored minimum instream flow for the San Joaquin River negatively impacted farmers in the Valley, however, it has enabled the environment (as a water user) to recover with the aim of restoring salmon runs, which may create commercial opportunities for other actors, potentially creating alternative (global) production networks (Morrison et al. 2009). It is thus important to discuss who defines risks and how.

One way to deal with the different perceptions of water risks has been the notion of 'shared risk' (Pegram, Orr, and Williams 2009). For water, shared risk describes how the conditions that create water risks for companies and industry (a) also drive risks for other actors within society, and (b) not only ensue from the company's own operations but often also result from wider processes within the catchment in which a company operates. Consequently, there is a shared interest among companies, governments, civil society, communities, and other actors for sustainable water management and governance. This shared interest, in turn, demands shared, collaborative action towards sustainable water management and governance (Hepworth 2012, Schulte, Orr, and Morrison 2014). As such, sharing water risk creates a case for investing into sustainable water management based on direct economic as well as social and community advantages in order to ensure long-term business viability (Schulte, Orr, and Morrison 2014).

The legitimacy of the notion of shared water risk has been challenged by highlighting the conflict between commercial uses of water that aims to prioritise profit over other societal uses of water for the public interest (Hall and Lobina 2012). This is mainly because there is no real economic incentive for companies to invest in sustainable water management and, therefore, they cannot be relied upon to do so in the long-term. Hall and Lobina (2012), therefore argue that a company's efforts in these regards could equate to greenwash strategies that create benign PR images. These arguments tie in with recent discussions about the competing agendas of corporate social responsibility (CSR) – and the question of what CSR actually does or should aim to do (Timms 2017). These are important concerns that the company and NGO literature invested in the shared risk

narrative has tried to address by highlighting the motivation of firms towards public-good outcomes in response to shared risks (e.g. The CEO Water Mandate 2017, The CEO Water Mandate and Water Integrity Network 2015, Morrison et al. 2010, Schulte, Orr, and Morrison 2014).

Equally important is that 'shared water risk' is often understood differently and harbours varying meanings depending on the water users. One cannot assume that water risks are shared equally. Nor can one assume that risks manifest in the same way for the public and the private sector, for communities and civil society, vulnerable and powerful water users (Baleta and Winter 2016, Sojamo 2016). There is a lack of understanding about the different ways public and private sectors perceive water risks. This is highly relevant as collective action, collaborative approaches, and partnerships are seen as key strategies to improve water management and governance (Ostrom 2009, Pahl-Wostl 2009). Private sector action based on water risks may have very different aims and values than traditional public sector mandates and may be pursued by different means than what is common or mainstream in the public sector. Thus, when talking about water risks, especially seemingly shared ones, it is important to understand these differences and similarities between private and public sector water security concerns, or other actors, as well as the power asymmetries between these actors (Gallagher et al. 2016).

2.2.4 Responding to Water Risks and Ensuring Water Security

Risk is a useful concept to link global production networks to water governance. This is because (a) it can accommodate the multiple scales both water and global production networks traverse; (b) it offers a common language between the two strands of literature; and (c) it allows for the conceptualisation of actor-specific mitigating strategies in response to risk. These strategies, it is argued here, can in turn exercise a considerable influence on water governance. Nature-based global production networks, such as those producing and distributing agricultural crops, heavily rely on the commodification of the environment. This is rarely a seamless process, creating risks for global production networks at different scales, requiring mitigating strategies by GPN actors (Boyd, Prudham, and Schurman 2001, Irarrázaval and Bustos-Gallardo 2019).

Strategies are also important within the GPN framework, particularly GPN 2.0. Coe and Yeung (2015) create a four-pronged typology of actor-specific strategies: intra-firm coordination; inter-firm control; inter-firm partnership; and extra-firm bargaining. Extra-firm bargaining, they argue, describes the strategies most commonly deployed by firms

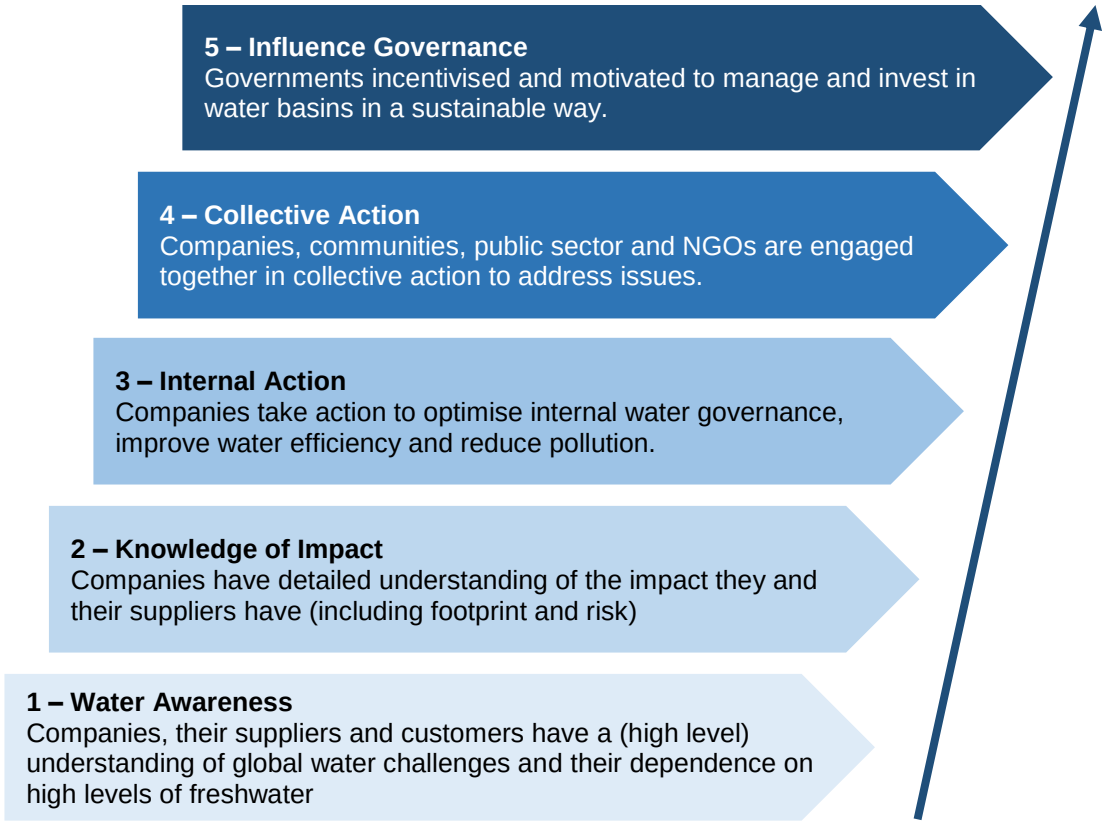
in natural resources and agri-food industries, such as the fruit industry studied here. They see it as a 'contested two-way process of *negotiation* and *accommodation* between firms and extra-firm actors in order to reach […] a mutually satisfactory outcome in relation to the creation, enhancement, and capture of value through global production networks' (Coe and Yeung 2015: 151, emphasis in original). The aim of these strategies is to achieve (1) market power, i.e. more/better access to markets; (2) proprietary rights of technological and market innovation; and (3) social and political legitimacy, e.g. through CSR programmes or by shaping public regulation. It is useful to conceptualise strategies as linked to specific objectives. Within the context of water risks, we can link this to the aim of ensuring water security. Within the water governance literature, water stewardship has become a prominent paradigm to frame the mitigating strategies of firms towards ensuring water security.

Water stewardship refers to the contributions firms make towards water management and governance within their own operations as well as beyond their company 'fence line' – or the farm gate (Hepworth and Orr 2013), i.e. the external environment, such as the basin or political context within which they operate. It is based on the above-described assumption of 'shared water risk': companies face water risks when inadequate water security due to wider (catchment) processes jeopardise their operations; simultaneously, companies generate water risk when their operations jeopardise the water security of the wider society (Hepworth 2012). Water stewardship, therefore, describes the actions companies take internally as well as externally to deal with increasing legal, financial, and political 'duty of care' obligations (Hepworth and Orr 2013: 222).

The most commonly referred to definition was formulated by the Alliance for Water Stewardship[6] (AWS 2014: 4), where water stewardship describes 'the use of water that is socially equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder inclusive process that involves site and catchment-based actions'. This definition is characterised by the three desired E's of sustainability – equity, efficiency, and environmental sustainability – with a strong focus on local participation. It emphasises the engagement in water management and governance made by private water users, such as businesses, instead of an authority, and advocates a clear

[6] The Alliance for Water Stewardship (AWS) is a multi-stakeholder NGO. Their work focuses on enhancing water stewardship capacity, and guiding and incentivising responsible water use (AWS 2010).

Figure 2.1: The WWF Water Stewardship Ladder



Source: adapted from WWF 2013:15-19

normative aim of not only creating benefits for the company but also contributing 'towards public-good outcomes' (Hepworth and Orr 2013: 222).

The World Wide Fund for Nature (WWF) is one of the key advocates of water stewardship and they foresee the operationalisation of the above definition through five steps (WWF 2013). As shown in Figure 2.1, the first three steps of this ladder refer to processes that take place within the company fence-line, or in the agricultural sector, within the farm gate. Step four and five then engage beyond the farm gate. Step four – collective action – refers to engagement with other (often local) actors concerned with water issues. Step five – influence governance – refers to a company's or sector's ability to influence formal governance processes and engage in policy dialogue. The bridge between the first three steps and the last two steps of this ladder is what, according to WWF (2013) marks the transition from water management to water stewardship. It has been plagued by a 'collective action chasm' (Morgan 2018: 24), where companies struggle to engage meaningfully with other actors on water issues, let alone strengthen water governance.

As often large and powerful actors in local areas, private sector companies have the potential to wield considerable influence upon local water management and governance processes. While it is important to note that water stewardship is distinct from the debate about the privatisation of water services provision[7], it is still imperative to evaluate approaches falling under the water stewardship banner critically. Water is an extremely complex public good. Its effective management requires constant negotiation and trade-offs between different users from private interests to collective well-being (Hepworth and Orr 2013). Many private firms are by their nature legally obliged to prioritise the needs of their shareholders, and this critically questions their neutrality when engaging in water (Newborne and Mason 2012). As such, critical scholarship on private sector engagement in water has ranged from worries related to the global rush for land and water and how this private accumulation of the means of production may result in a takeover of global resource governance and its institutions (Kay and Franco 2012, Mehta, Veldwisch, and Franco 2012); to concerns rooted in fears of ill-founded processes or misdirected efforts of private sector engagement leading to unintended consequences for social equity and the functioning of water management institutions (Hepworth and Orr 2013). In fact, much of what is proposed within the water stewardship ladder, if not implemented carefully, obscures the diverse interests and politics within society and surrounding water.

Initially, this approach was conceptualised as ‘corporate water stewardship’, targeting multi-national corporations (MNCs), such as Nestlé or The Coca Cola Company, i.e. lead firms, which then would carry out the programme along their supply and value chains (Hepworth and Orr 2013). More recent work, however, has suggested to drop the ‘corporate’ prefix and investigating how water stewardship works for not fully integrated companies (Newborne and Dalton 2016). Concurrently, WWF South Africa (WWF SA) has embarked on a water stewardship programme with some Western Cape fruit producers (Dzikiti and Schachtschneider 2015, Schachtschneider 2016), although the impetus from this did come from lead firm Marks & Spencer in the UK (WWF and M&S 2016). Chapter 6 uses an adapted version of the water stewardship ladder to structure the analysis – and offers a critical appraisal of the categories in a real-world context.

[7] The privatisation discussion refers to the legitimacy of private entities – as opposed to public institutions - to deliver water services, whereas water stewardship focuses on the role water-intensive private firms can play in either exacerbating or solving local water-related challenges (Schulte, Orr, and Morrison 2014: 21).

2.3 Chapter Conclusions

This chapter has reviewed the different elements of the analytical approach taken to guide the empirical investigation and findings within this thesis. GPN functions as an underlying theory, which is then combined with insights from water governance literature. This is characterised by adopting a political economy perspective, which also guides the analysis of findings and the discussion of implications in Chapters 5, 6, and 7.

In the first part, this chapter reviewed the development of the literature on global commodity chains, global value chains, and global production networks. It identified a gap in this literature, which has paid scant attention to the environmental dimension of globalised production, distribution, and consumption. After this review, it identified the GPN approach as most appropriate to move towards closing this gap, due to its acknowledgement of horizontal dynamics, non-firm actors, and multiple scales. The chapter then discussed GPN theory in more detail, including its different dimensions (value, power, embeddedness) and variations (GPN 1.0 and GPN 2.0), drawing out the concepts particularly useful to this project: power, risk, and strategies. After a review of the GPN/GVC literature on the Western Cape horticulture sector, it further clarified the gap in the literature. While the Western Cape horticulture sector, including fruit, has been the object of several GPN/GVC studies, environmental concerns have only featured on the margins of these.

In relation to this, the chapter then turned to existing debates about the environment in GPN/GVC literature. It found that most work has focused on either environmental upgrading and private environmental standards or the materiality of global production networks and value chains. These works have generated important insights; however, they have tended to be ‘vertical’, not taking full advantage of the analytical capacity offered by the focus on non-firm actors and horizontal dynamics in GPN. Still, two important concepts emerged from this literature. First, the notion of ‘obstacles’ inherent in the process of commodifying nature that underpins globalised agricultural production. Second, the idea that firms within global agricultural production networks deploy strategies to overcome those obstacles. These concepts informed the second half of the chapter, which focussed on water governance aspects.

In the second part, the chapter first clarified how water governance is understood within this thesis – namely as a political process involving multiple actors at multiple scales. Turning to the concept of water security, and keeping with the political reading of water governance, the chapter identified a need to acknowledge politics in society and

associated power asymmetries when defining water security. Importantly, defining water security hinges on the identification of water *insecurities* – or water risks. Seizing this notion of risk, the chapter described how it has been used both in water governance and GPN literature, establishing it as a useful concept to connect the two fields. Identifying and defining water risks in GPN then offers the possibility to conceptualise water risk mitigating strategies. Again, 'strategies' is a concept developed in GPN 2.0 approach, but it also resonates with ideas of water stewardship in the water governance literature.

Therefore, and in answering the first research question, the GPN framework does indeed provide space to conceptualise the influence of global production networks upon water governance when combined with insights from water governance literatures. This is here done conceptually and theoretically through the notions of water risk and strategies for water security. Water risks act as causal drivers for firm actors to deploy strategies that ensure their water security. These strategies, in turn, influence processes of water governance. This sequence structures the presentation of the findings in Chapter 5 and Chapter 6 and the discussion thereof in Chapter 7. Importantly, this analysis is grounded in a political economy approach that emphasises the importance of the historical and present-day political economy of water and agriculture in South Africa, as discussed in Chapter 4. Before delving into these intricacies, however, the next chapter, Chapter 3 outlines the research strategy in more detail.

3 Methodology: Unpicking the Fruit Industry

This chapter outlines the research strategy underpinning this project. It describes the methods used for collecting and analysing the presented data and the rationale behind these decisions. The aim of this thesis is to understand how global agricultural production networks influence processes of water governance. This required untangling the multi-scalar interactions between the commercial dynamics of export-oriented fruit production and the water governance regime. It is a focus on these multiple scales of interactions that guides much of this research as they are bound to influence the way globalised production impacts upon and interacts with processes of water governance.

Guided by this aim the chapter identifies a critical realist research philosophy as most appropriate. Considering this in addition to the research questions, it follows an intensive, qualitative research design. By employing a qualitative research design, we can capture the complexities and changing dynamics of global agricultural production networks as well as the intricate political economy undercurrents of water governance in the Western Cape. To capture these dynamics, the research follows a scale-sensitive approach that analytically accounts for the multiple geographical, institutional, organisational, and administrative scales involved in GPN and water governance. Simply, quantitative inquiry cannot rival the richness of data delivered by a qualitative approach.

This methodological story unfolds over five sections: Section 3.1 discusses the choice of research philosophy and the resulting intensive research design. Following this, Section 3.2 depicts the qualitative approach in more detail. First, it describes the scale-sensitive approach adopted for this project, which discusses site and participant selection and describes the study area. This is followed by an explanation of the actual data collection techniques. Section 3.3 turns to the process of data analysis, outlining the processes of thematic analysis and documentary analysis. Before the chapter ends with some concluding thoughts in Section 3.5, it discusses ethics, positionality, and other challenges in Section 3.3.2.

3.1 Research Philosophy

Research philosophy is at the root of any research project and will impact the research design and research methods. It is what links the research questions to the employed methods and goes beyond the practical requirements of research methods (Graham 2005). Research philosophies determine the relationship between ontology and epistemology, i.e. between how we conceive of reality and what we consider to be

legitimate knowledge about said reality (Clarke and Braun 2013). Although often discussed in opposition, they may be best comprehended as overlapping because elements of 'what is' may not be knowable, and knowledge may hold ideas that do not correspond to existing things (Gregory et al. 2009).

3.1.1 Ontology

Ontology asks what exists in the world, which is based on assumptions about what constitutes the world and what it is like (McDowell and Sharp 1999). Ontology may be best understood as spanning a continuum from realism to relativism. On the one hand, realism maintains that there is a 'real' world out there, which has material existence independent of our conceptions of it (Graham 2005). A realist ontology assumes a knowable world that can be understood through research for a single pre-social truth by applying appropriate research techniques (Clarke and Braun 2013). This understanding promotes a regularity view of causation in line with scientific law, where 'if A, then B', which must be observable events (Gregory et al. 2009). Relativism, on the other hand, argues that there are multiple constructed realities and none of them exist as mind-independent truth. Instead, what is true or real differs across time and context, which reflects that variety of ways knowledge is created. Reality, therefore, is constituted by human minds (Graham 2005). In that sense, variations of relativism collapse ontology into epistemology.

Between these opposing ends on the ontology continuum sits critical realism, which steers a middle ground between realist and relativist ontology. The ontology of critical realism conceives the social and natural world as existing independently of our knowledge of it, similarly to the realist understanding (Fletcher 2017). Unlike realism, critical realism rejects the notion of a 'flat' ontology based solely on observable events. Instead, it differentiates between the empirical (events we experience), the actual (events that happen irrespective of our experience of them) and the real (a deeper dimension of objects, causal structures, and generative mechanisms that produce events) (Gregory et al. 2009). Critical realism also follows the concept of causation but argues that all objects have 'causal powers'. Causal powers always release within context, and consequently, the outcomes are likely to be irregular. Therefore, it is possible for the same cause to produce different effects and for different causes to produce the same effect (Sayer 2015, Yeung 1997). Importantly, in critical realism reality is stratified in the sense that power and mechanisms operating in one stratum cannot be reduced to lower strata or collapsed into each other. This makes the approach anti-reductionist, which

highlights the importance of apparently hidden properties such as relations of power, exploitation, and control (Reed 2009).

3.1.2 Epistemology

Epistemology describes how it is possible to know the world, focussing on the nature of knowledge (Gregory et al. 2009). It is influenced by ontology as different epistemological positions distinguish between whether we think 'reality […] is *discovered* through the process of research, or whether we think reality is *created* through the process of research' (Clarke and Braun 2013: 29, emphasis in original). From this result a variety of approaches, but three distinct epistemologies stand out: the scientific paradigm or positivism, the interpretative paradigm, and finally critical approaches (McDowell and Sharp 1999). This is by no means an exhaustive categorisation of what is a complex and rich field.

First, positivism assumes a direct relationship between the world and how we perceive it. It dominates much of the natural sciences. As a wider philosophy of science it emerged in the 1820s and 1830s between a group of philosophers in Vienna but today different variations of positivism exist (McDowell and Sharp 1999). It is closely aligned with empiricism, arguing that scientific knowledge can only be achieved through direct experience, i.e. empirical testing and verification. It separates the observer, i.e. the researcher, from the practice of observation and that which is observed. Consequently, data collection happens objectively and unbiased to demonstrate reality (Clarke and Braun 2013). Some of these principles were later discredited, most notably by Karl Popper and his replacement of verification with falsification as a principle of testing hypotheses of science (Graham 2005).

Approaches that have evolved from the Vienna School are now often labelled as postpositivist. While they are usually dominated by quantitative research some qualitative enquiry does adhere to this paradigm (Clarke and Braun 2013). There has also been increased realisation that empirical evidence relates to scientific theories in complex manners, even in the natural sciences, and therefore theories cannot be abandoned based on falsification alone. Instead, scientific evidence is 'underdetermined by empirical evidence' (Graham 2005: 17). What unifies variations of positivism – and distinguishes it from other approaches – is the continued search for a singular truth. While many postpositivists now acknowledge that researchers are influenced by their contexts – and therefore they influence the research itself establishing facts that are not neutral reflections of truth – they largely argue that this subjective influence can be

controlled for or be removed within the process of knowledge production (Clarke and Braun 2013). Research under this perspective often argues that social sciences should emulate the methods and approaches of the natural sciences.

Second, one of the alternatives to positivism, are approaches based on an interpretivist epistemology. Since the 1970s, there has been a mushrooming of interpretivist approaches that largely emerged as a criticism of, and as a response to, positivism. Scholars subscribing to interpretivist paradigms argue that social sciences are not like physics, as often purported in variations of positivism, and therefore the social sciences should not follow the same scientific principles as natural sciences (Gregory et al. 2009). This is because social sciences investigate the causes and consequences of human action, which are characterised by intentionality, rationality, and reflexivity – qualities that do not apply to glaciers or rock formations, for example (Graham 2005). Linking to relative ontology, interpretivist epistemologies argue that there are many knowledges, rather than one truth, and these are context-dependent. How we know things is a product of how we come to understand them, and this varies across time and context (Clarke and Braun 2013). Because the locus is on human action and its meaning, the interpretivist paradigm often asserts the local quality of knowledge claims (McDowell and Sharp 1999). Approaches following an interpretivist epistemology predominantly derive from hermeneutics, which refers to the study of interpretation and understanding.

Hermeneutical understanding can be achieved through a variety of hermeneutical philosophies. One key approach is the hermeneutical circle, developed by German philosopher Wilhelm Dilthey (1833-1911), which describes how meaning is produced by tacking back and forth between individual parts of the text, the text as a whole, and the intellectual framework of the interpreter (Gregory et al. 2009, McDowell and Sharp 1999). Other roadmaps to achieve hermeneutical understanding have since been developed based on this understanding (e.g. by the German philosophers Martin Heidegger (1889-1976) and Hans-Georg Gadamer (1900-2002)). What unites them – and what matters for the interpretivist paradigm – is that they ‘take meaning seriously: […] they are all persuaded that human action is essentially meaningful behaviour’ (Graham 2005: 18). The hermeneutical inquiry, therefore, underlines the importance of interpretation, and associated with that, open-mindedness and reflexive sensibility (Gregory et al. 2009). A number of research strategies can be derived from this approach, including phenomenology, postmodernism, and post-structuralism, as they all focus on meaning while rejecting naturalistic explanations of human actions (Graham 2005).

Finally, critical approaches assemble Marxist, Feminist, and critical realist scholars – although there are considerable variations within those. These critical approaches adopt an epistemology that is interpretivist in the sense that it acknowledges we can only grasp the social and natural worlds through the discourses available to us (Easton 2010); but that we must 'also [be] attentive to the systematicity and often far from local power relations in which knowledge claims are made' (McDowell and Sharp 1999: 76). In critical realism, particularly, due to this interpretivist epistemology, it becomes impossible to compare the theories and conceptual frameworks scholars develop to what they aim to represent. Thus, knowledge is always fallible. However, this does not sanction relativism or state that theories are immune to empirical check; on the contrary, theories have degrees of adequacy in representing our social knowledge of the nature of objects. Our knowledge is not theory-determined but theory-laden (Sayer 2002). Or in the words of Yeung (1997: 54, emphasis in original): 'all knowledge is fallible, but not *equally* fallible'. As a result, critical realism 'implies science can make progress in explaining the world even though absolute truth is not an intelligible goal.' (Sayer 2015: 277).

The 'critical' moment of these approaches lies in the conviction that the aim of social science is not solely to search and find empirical regularities or interpret meanings but to understand what produces change (Sayer 2015, Yeung 1997). Critical realism, for example, offers a new perspective on the agency-structure dualism, arguing that agency and structure are ontologically distinct levels in line with the idea of a stratified reality. These distinct levels have different properties and causal powers. While individuals may reproduce social structures through everyday practices, critical realism argues that by bringing the 'underlying structures and their unconscious reproduction to the level of consciousness opens the way for emancipatory critique and social change' (Gregory et al. 2009: 622).

3.1.3 Why Critical Realism?

Based on the above deliberations, a critical realist research philosophy was identified as most suitable for this thesis and its research questions. Critical realism emerged based on the earlier works of philosopher Roy Bhaskar (1978, 1989) and the codifications by geographer Andrew Sayer (2000, 2002, 2015). It steers a course between positivism, which sees knowledge as based on observation and experience and a search for truth through causal explanations; and variations of interpretivism, where the truth of theories entirely depends on discourses (Graham 2005, Sayer 2015).

On the one hand, a positivist approach was rejected for this research project because of its narrow perception of causality as a fundamental matter of regularities. In this nomothetic epistemological stance, causal relationships may only be observed directly through regularities of material or social settings, which provide a basis for explanation and prediction (Easton 2010). To understand causality, we, therefore, must compare situations systematically in which these presumed causal factors are present, absent, or vary in their strength, while controlling for other explanatory factors. This requires a quantitative approach, and it often deems qualitative inquiry as not rigorous enough to be explanatory beyond exploratory formulations (Maxwell 2004). As a result, positivism rejects any notion of mental states, such as intentionality, rationality, and reflexivity, and their importance for causal explanations (Maxwell and Mittapalli 2010).

On the other hand, variations of interpretivism were not deemed appropriate as a basis for this thesis because of their hermeneutic approach that subordinates ontology to epistemology and often rejects the existence of material reality (McDowell and Sharp 1999). In such an approach, understanding and interpreting meanings is the only way we can gain knowledge about human behaviour. Consequently, although somewhat oversimplified, 'real' social problems may be trivialised (Graham 2005). For example, within the context of water, scarcity is socially and politically constructed (Ioris 2004); however, emphasising its constructive character runs the risk that we may treat it as simple imagination, even when people do experience the very 'real' consequence of lack of water. Critical realism, thus, aims to walk the line between these opposing philosophies, by arguing that we cannot reduce ontology, i.e. the nature of reality, to epistemology, i.e. our knowledge of said reality (Fletcher 2017).

3.2 A Qualitative Approach: Intensive Research Design

Adopting a critical realist research philosophy influences research design and practice. Before considering method in its practical sense, Sayer (2002) suggests a differentiation between extensive and intensive research designs. This distinction goes beyond questions of scale or 'depth versus breadth' as the questions asked in extensive and intensive research designs differ fundamentally from each other. Extensive research concerns itself with discovering common properties or general patterns of a population, while intensive research enquires about how causal powers work in one or a few cases. Consequently, the two designs employ different methods and data collection techniques.

Previously, the dominance of generalisation and empirical regularities in research has preferred extensive research designs that work across taxonomic groups (Sayer 2002).

Focusing on causation, however, means working across causal groups that are often heterogeneous to understand how phenomena are produced. Intensive research designs are better equipped to answer these types of questions and now have become much more accepted in social sciences (Sayer 2015). This does not mean that extensive and intensive research designs compete. On the contrary, their different roles have their own merits and problems, which often make them complementary. Where extensive studies seek to uncover formal relations characterised by similarity, differences, correlations, etc.; intensive studies aim to find causal, structural, and substantial relations of connection (Sayer 2002).

This thesis seeks to uncover causal explanations of how globalised agricultural production influences processes of water governance. Understanding these causal links is operationalised through the four research questions outlined in Chapter 1. They seek to understand the influences and factors driving and shaping the way export-oriented fruit production influences processes of water governance in the Western Cape. Therefore, this thesis follows an intensive research design. Other studies investigating global production networks have employed such intensive research designs previously (e.g. Alexander 2016, Howson 2019). They have shown the usefulness of intensive research designs to generate in-depth knowledge about the causal dynamics of globalised production, distribution, and consumption.

Considering the intensive nature of this research project leads us to discuss what are appropriate methods. Method in critical realism remains opaque and researchers may find themselves with little methodological guidance throughout the research process (Fletcher 2017, Yeung 1997). Some existing literature suggests inductive approaches, mainly grounded theory methods for critical realism research (Redman-MacLaren and Mills 2015, Yeung 1997). However, and following Fletcher (2017), a flexible deductive approach seems more consistent with critical realist ontology and epistemology, mainly because of its previous engagement with theory. Where grounded theory can be guided by existing theory or literature, it generally avoids engagement with these during analysis. In contrast, critical realism seeks to find ‘the best explanation of reality through engagement with existing (fallible) theories about […] reality.’ (Fletcher 2017: 186). Theories of Global Production Networks (GPN) and how they may influence water governance guided this thesis. Keeping in mind critical realist epistemology – that all knowledge is fallible – there, however, was a possibility that ultimately GPN as a theoretical framework would have been modified or rejected.

Because of the intensive nature of this research, qualitative methods are more appropriate to answer the research questions at hand. This is because quantitative methods often neglect social and cultural contexts which influence the investigated subject (Yeung 1997). For this research project, the real-world context of the topic under investigation is crucial, and quantitative methods could not have provided the richness of data needed to satisfy the line of inquiry. Furthermore, this thesis does not seek to identify regularities; it aims to understand the structures and the different causal powers that assemble the influence of global agricultural production networks on water governance – an aim that requires a qualitative inquiry. Before discussing the qualitative data collection techniques in more detail, the next section describes participant and site selection and discusses the study area in more detail.

3.2.1 Multi-scalar Fieldwork: Sites and Participants

This thesis investigates how global agricultural production networks influence processes of water governance. This aim is operationalised along four research questions (see Chapter 1) that are explored within the context of the Western Cape fruit industry using a scale-sensitive approach. Scale-sensitivity is crucial to account both for the multiple scales of water governance and those of global production networks. GPN theory has explicitly been conceptualised as multi-scalar (Henderson, Dicken, and Hess 2002, Coe, Dicken, and Hess 2008), while the question of scale is at the heart of many investigations into water governance (Bakker 2015, Daniell and Barreteau 2014, Molle 2015). The thesis thus not only investigates different geographical scales within the study area, but also institutional, administrative, political, and commercial scales.

The project studies export-oriented fruit producers operating out of the Breede Water Management Area (Breede WMA). Within the Breede WMA, two valleys – the Elgin Valley and the Ceres Valley – are further local hubs of interests, where export-oriented fruit production clusters and interacts with specific local water governance structures. The Breede WMA is managed by the Breede-Gouritz Catchment Management Agency (BGCMA), which, as the name suggests, manages also the neighbouring Gouritz WMA. While the whole of the Breede WMA is in the Western Cape Province, parts of the Gouritz WMA reach into the neighbouring Northern Cape and Eastern Cape Provinces. And although it has devolved most water governance functions to the BGCMA, some key mandates – including the power to allocate water – remain with the National Department of Water and Sanitation in Pretoria. Besides the multiple scales hailing from their embeddedness in global agricultural production networks, fruit producers are therefore

also embedded into multiple geographical, institutional, administrative, and political scales of water governance. The analysis presented in Chapters 5 and 6 teases out how these multiple scales interact and matter for the research question, underlying the need for scale-sensitive research.

A) Site and Participant Selection

This specific site and participant selection are based on a purposive selection strategy (Maxwell 2013). Selecting site and participants for qualitative research – what we traditionally call sampling – is not a straightforward process. First, sampling not only refers to interview participants but also includes settings, events, and processes, which need to be in line with the research questions (Miles and Huberman 1984 cited in Maxwell 2013: 194). Second, there is rarely a fixed pre-established sample in qualitative research, such as might be the case in statistical sampling (Flick 2002). In fact, Maxwell (2013) highlights how the term 'sampling' itself might be problematic in qualitative research. Unlike many quantitative projects, qualitative research does not necessarily seek to represent a sampled population but rather aims to understand the causal powers underlying a certain process or phenomenon. Consequently, traditional 'quantitative' sampling strategies, such as probability sampling, rarely apply to qualitative research.

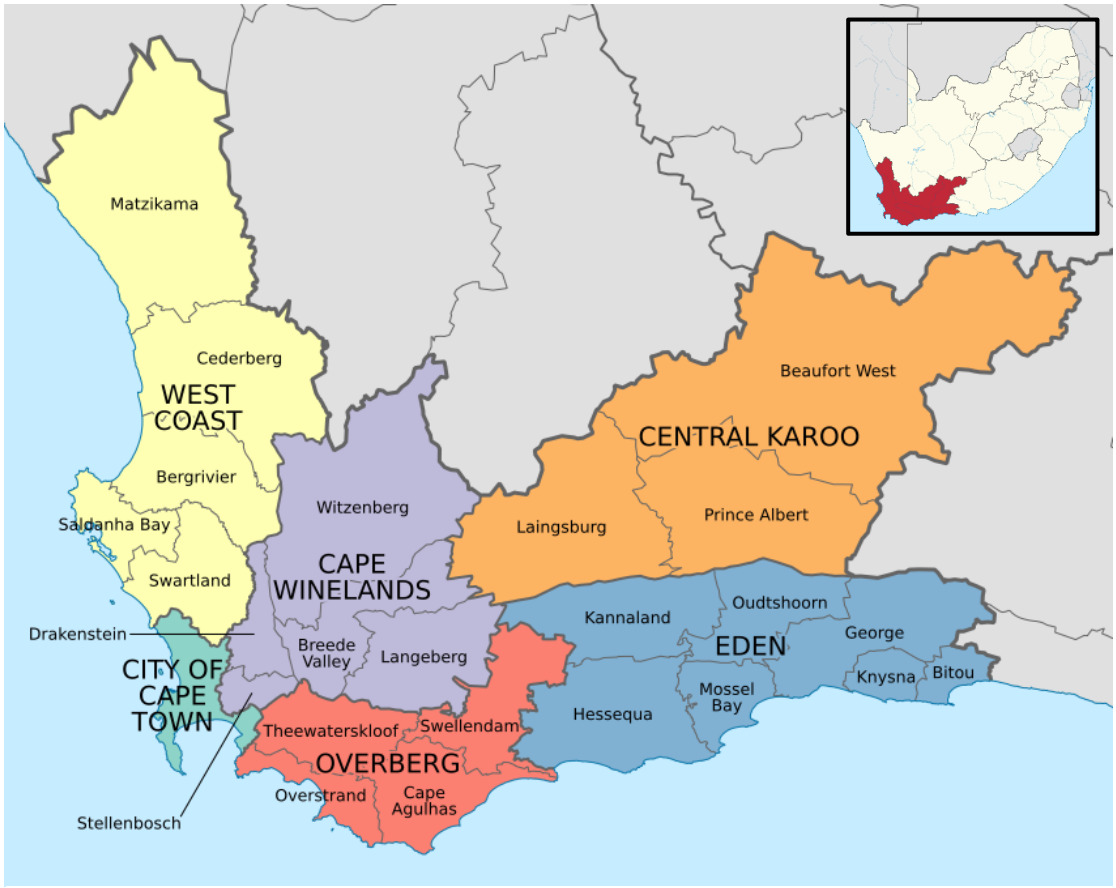
For this thesis, the export-oriented fruit industry operating within the Breede WMA in the Western Cape was selected for its purposefulness. This means that people, settings, events, and processes were selected based on their ability to provide relevant information to the research questions and aims at hand. Often, this information cannot be obtained as well through other choices. Therefore, 'selecting those times, settings, and individuals that can provide you with the information that you need to answer your research questions is the most important consideration in qualitative selection decisions' (Maxwell 2013: 195). Underlying this approach is the basic principle of theoretical sampling, which was first developed by Glaser and Strauss (1967) for grounded theory. It highlights how decisions about empirical material are not (solely) made before starting data collection, but (also) in the process of collecting and analysing data. This type of gradual selection of cases and materials has also validity in qualitative research beyond Glaser and Strauss's grounded theory. Theoretical sampling becomes a purposive and systematic way of selecting and integrating people and temporal and local settings (Flick 2002). Focusing on the Breede WMA also allows us to take full advantage of the multiple scales present in both processes of water governance and global production networks,

by enabling a scaling up and down to different geographical, organisational, administrative, and institutional scales.

B) No Country for Farming: The Geography of the Western Cape

South Africa has a poor natural resource base for farming, especially lacking in water. It is located at the most southern tip of the African continent and today covers an area of 1,219,090 km^2 (CIA 2017), which is large by European standards, equating roughly to the size of the United Kingdom, France, and Germany combined. It borders Namibia, Botswana, Zimbabwe, Mozambique, Swaziland, and environs Lesotho. Both the Atlantic Ocean and the Indian Ocean surround South Africa and meet – often tumultuously – at Cape Point. The Western Cape is the southernmost province of South Africa framed by the South Atlantic Ocean to the south-west, the Indian Ocean to the southeast, the Northern Cape to the north and the Eastern Cape to the east (see Figure 3.1). Covering an area of 129,370 km^2, the province is home to 6.29 million people (11.3% of the national population) (WCG 2016).

Figure 3.1: Map of the Western Cape, South Africa



Map by Htonl / CC BY-SA 3.0 / Wikimedia Commons

The Republic is the 30th driest country in the world, experiencing high water stresses with an average annual rainfall of 495 millimetres (mm), which translates into about 843 m^3 of water per capita per annum (WWF-SA 2016). It is, however, its irregular behaviour that is most problematic, with recurring droughts in several parts of the country, often followed by floods, especially in summer rainfall areas (Feinstein 2005). Rainfall patterns were a key climatic factor in the economic history of South Africa and especially the development and spread of farming activities by European settlers (Ross 2008). While most of the country enjoys summer rainfall, parts of the Western Cape are characterised by a Mediterranean climate and associated winter rainfall condition. Due to this characteristic the Western Cape economy – and especially farming – relies heavily on water storage facilities that harvest surplus flows and rainwater in winter, which then are made available during the hot and dry summer months (Midgley, New, and Methner 2015). Unsurprisingly then, the Western Cape has the highest registration of dams in the country (1422 out of 5226); most are small (69%) and for irrigation (88%) (DWS-DSO 2016). While the five largest dams of South Africa are located outside the Western Cape[8], the province still boasts an impressive infrastructure (44 large dams) giving testimony to South Africa's heavily engineered water sector.

Due to the high variability of rainfall and runoff, South Africa has evolved to become a world leader in water transfer schemes (van Vuuren 2012). In the Western Cape, the

Figure 3.2: Theewaterskloof Dam. October 2017

[8] The five largest dams of South Africa are the Vanderkloof Dam (Northern Cape/Free State), Sterkfontein Dam (Free State), Pongolapoort Dam (KwaZulu-Natal), Gariep Dam (Eastern Cape/Free State), and the Vaal Dam (Gauteng/Free State) (van Vuuren 2012: 2).

largest dam is Theewaterskloof Dam (482 million m^3) located on the River Sonderend and shown almost empty during the 2017 drought in Figure 3.2. Theewaterskloof Dam is the key link between the Berg and Sonderend rivers, transferring water from the latter into the former for the Greater Cape Town area (van Vuuren 2012). Other large dams are the Greater Brandvlei close to Worcester (456 million m^3); Voëlvei Dam, close to Gouda, with a capacity of 168 million m^3; the Berg River Dam with a storage capacity of 126 million m^3 is the newest dam (completed in 2007) and was the first dam to be built in South Africa under the new National Water Act, No 36 of 1998 (NWA); and the Clanwilliam Dam (123 million m^3) located on the Olifants River. All of these dams distribute at least in part irrigation water to the commercial agricultural sector in the Province (DWS 2017a, van Vuuren 2012). Theewaterskloof, Voëlvlei, and Berg River Dam together with Wemmershoek Dam (58.6 million m^3, between Paarl and Franschhoek) and Upper and Lower Steenbras Dam (above Gordon's Bay, 31.7 million m^3 and 36.1 million m^3 capacity respectively) form the 'big six' dams part of the Western Cape Water Supply System (WCWSS) that serves Cape Town, drawing in water from different catchments in the Province. The full storage capacity of Western Cape dams lies at 1,867 million m^3 (DWS 2017b).

To be filled, most dams in the Western Cape rely on runoff from the mountains. Studies by WWF South Africa (WWF-SA) (2013, 2016) showed that only 8% of South Africa's land area produces the runoff that generates 50% of the volume of water in the country's river system. The Western Cape – thanks to its mountainous geology – has several so-called water source areas: the Grootwinterhoek Mountains, the Boland Mountains, the Langberg Mountains, the Swartberg Mountains, the Kougaberg Mountains, the Outeniqua Mountains, and of course Table Mountain. Several rivers originate from those areas, including the Berg River, the Breede River, and the Olifants River. These Western Cape river systems are heavily engineered, especially in the area around Cape Town. Not many additional opportunities exist to build new dams to increase water supply, showcasing the limit of technical solutions to increased competition over fresh water.

C) The Breede Water Management Area in the Western Cape

The Breede WMA is an administrative boundary determined within the National Water Resource Strategy (NWRS) (DWAF 2004, DWA 2013), which is in turn mandated by the NWA (National Water Act 1998). The NWA, as post-apartheid water legislation, embraced the principles of Integrated Water Resources Management (IWRM) (see also Chapters 2 and 4). IWRM follows a catchment-based strategy to manage water

optimally. These Water Management Areas (WMAs) thus largely follow hydrological boundaries of different catchments. This is one of the reasons why they do not coincide with, for example, provincial boundaries (see e.g. Bourblanc and Blanchon 2014). Figure 3.3 shows the 19 initially conceptualised WMAs in South Africa, with the Breede WMA being Number 18. Each WMA was intended to be managed by a Catchment Management Agency (CMA). Implementation of these CMAs has been slow and difficult. In 2012, the number of WMAs was reduced from 19 to nine, and as a result, the Breede WMA was amalgamated with the Gouritz WMA. The main aim was to manage the Breede and Gouritz WMA within one CMA (DWA 2013). While the two WMAs now sit under the umbrella of the one Breede-Gouritz Catchment Management Agency, they are managed separately due to differing needs.

Figure 3.3: Water Management Areas as outlined in the NWRS

Source: DWAF 2004: 94

The Breede WMA satisfied three key requirements to answer the research questions successfully. Firstly, and as apparent in Figure 3.4, the Breede WMA is dominated by fruit production. Fruit production is largely export-oriented, while other crops produced in the province, such as flowers, wine, and vegetables are dominantly destined for domestic markets (although each of these has an export-component as well). Having an agricultural industry oriented towards export was crucial to fully answer the research questions. Secondly, while most of these fruit producers are export-oriented, they are predominantly ‘independent’ in the sense of not necessarily being fully integrated within multi-national companies (MNCs).

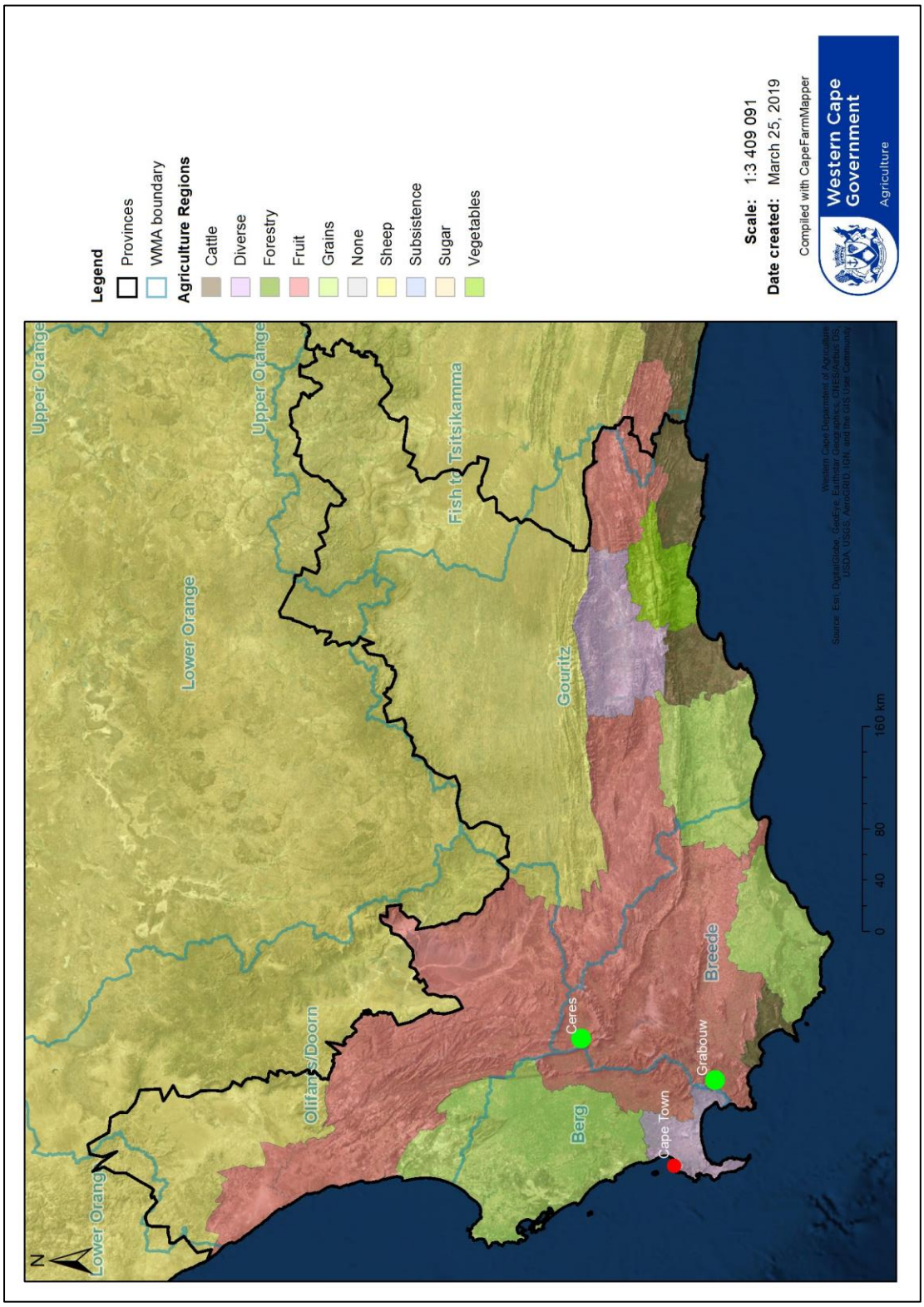


Figure 3.4: Map of the Western Cape Province showing the dominant crop grown and boundaries of WMAs. Green dots show Ceres and Grabouw, Cape Town indicated by a red dot.

Created by the author on 25/03/2019 with CapeFarmMapper. (https://gis.elsenburg.com/apps/cfm/)

This addresses a gap identified in the literature, where the GPN/GVC frameworks have been used to investigate 'lead firms' and their potential role as stewards of water while leaving other firms, often constituting a majority, on the margins of academic inquiry (Sojamo 2016). Thirdly, and finally, the Breede WMA is managed by one of the two established CMAs, meaning that the full set of formal water governance structures is in place in this area.[9] This aspect is key to answer the second half of the overarching research questions – the influence on processes of water governance.

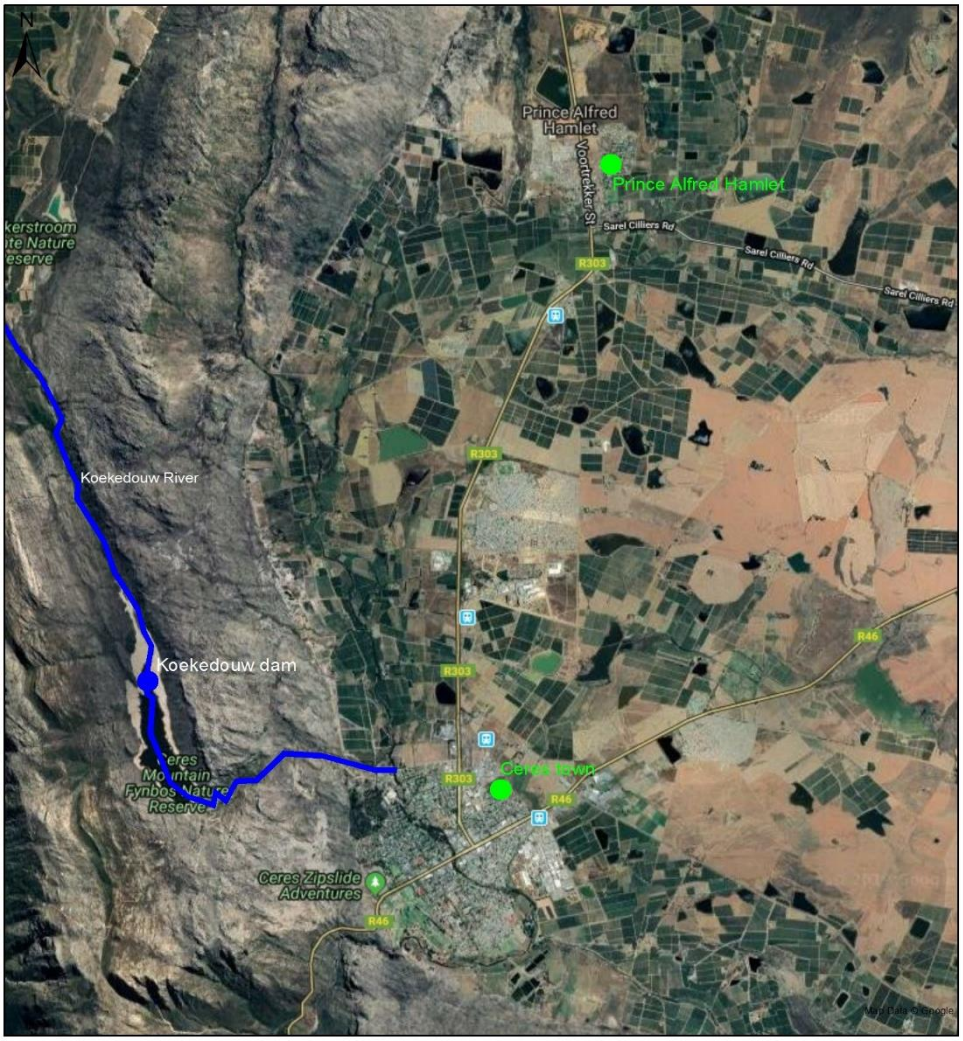
Within the Breede WMA, there are several local clusters of export fruit production. Two of these, the Ceres Valley and the Elgin Valley, were investigated in more detail (see green circles in Figure 3.4). Scaling down like this enabled more in-depth research, considering the real-world context. Both valleys are characterised by export-oriented deciduous fruit farming. Interestingly, their local water governance arrangements vary. Ceres Valley operates under a set of Irrigation Boards (IBs), while the Elgin Valley manages local water resources via a Water User Association (WUA).

[9] The only other established CMA is the Inkomati-Usuthu CMA in the north-east part of the country.

D) Ceres Valley

Ceres Valley is located within the Witzenberg Municipality in the north-western part of the Breede WMA. The main urban centre is Ceres town with Prince Alfred-Hamlet constituting a secondary urban settlement (see Figure 3.5). The valley is dominated by deciduous fruit production, mainly apples and pears (pome fruit) (Hortgro 2017b). The largest water source is Koekedouw Dam, which is fed through the Koekedouw River, which then trickles into seasonal rivers. There are a series of smaller seasonal rivers as well as smaller shared reservoirs that also supply irrigation water to the different fruit producers. Each main water source – be it a river or reservoir – is managed by an IB. The four main IBs in the Ceres Valley are the Koekedouw IB (dam), the Roikloof IB (dam), the Titus River IB (river), and the Warm Bokkeveld IB (dam).

Figure 3.5: The Ceres Valley with the towns of Ceres and Prince Alfred Hamlet (green dots), the Koekedouw Dam (blue dot) and the Koekedouw River (blue line).

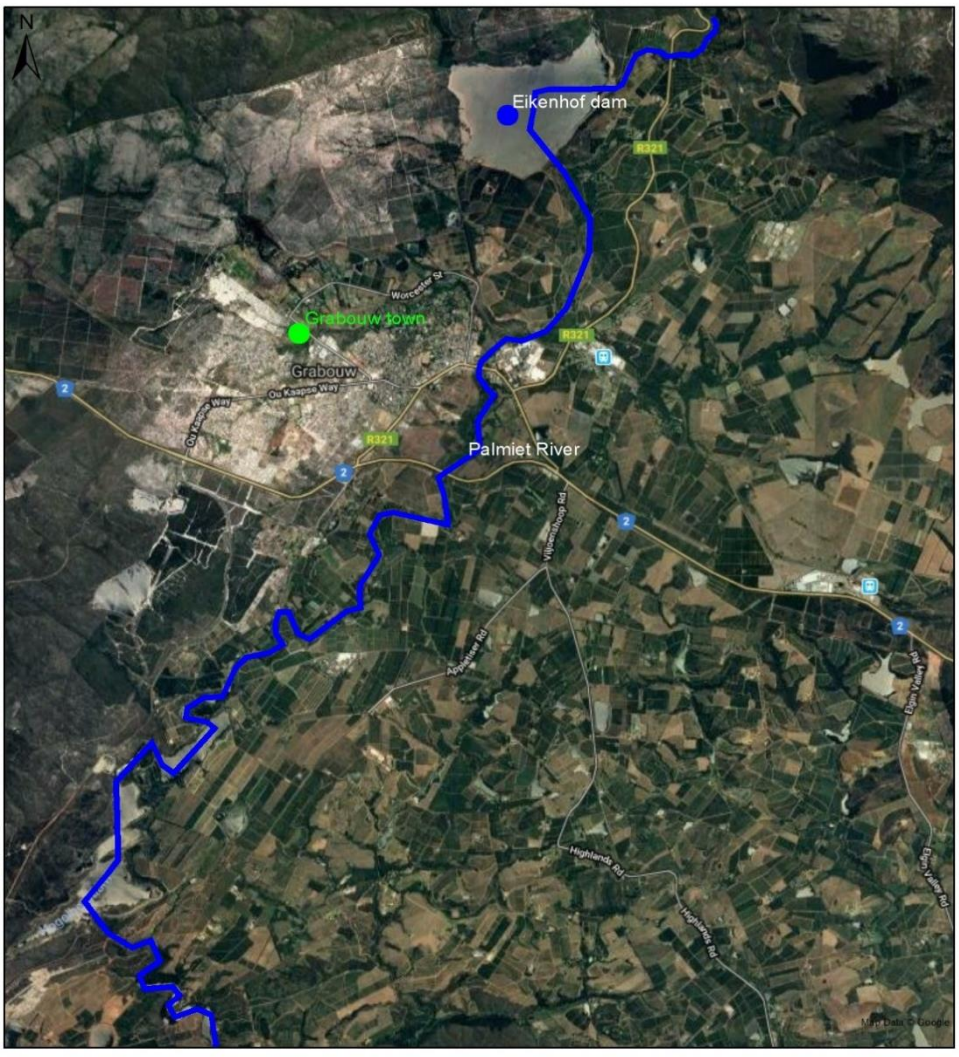


Created by the author on 26/03/2019 with CapeFarmMapper (https://gis.elsenburg.com/apps/cfm/).

E) Elgin Valley

The Elgin Valley is in the south-western part of the Breede WMA. The main urban centre in the Elgin Valley is the town of Grabouw. There are two major water sources in the Valley: the Eikenhof Dam, located at the top of the Valley, and the Palmiet River, which flows through the valley and then to the sea (see Figure 3.6). There are several other smaller dams and tributaries of the Palmiet River, which are also important. The dam, river, and other shared local water sources are managed by the Groenland Water User Association (GWUA). The Elgin Valley is also dominated by export-oriented deciduous fruit production, mostly pome fruit (apples and pears) and to a lesser extent, wine (Hortgro 2017b). Exports of fruit from this area commenced in the late 19th century and gained proper traction during the early 20th century (Hortgro 2017a).

Figure 3.6: The Elgin Valley with the town of Grabouw (green dot), Eikenhof Dam (blue dot), and Palmiet River (blue line).



Created by the author on 26/03/2019 with CapeFarmMapper (https://gis.elsenburg.com/apps/cfm/).

3.2.2 Overview of Data Collection Techniques

A variety of qualitative data collection techniques were employed to answer the research questions of this thesis. As such, this research design bases itself on the triangulation of data collected from different sources to verify the consistency of its finding as well as between-method triangulation (Denzin 1989, Yin 2014). This addresses the challenge of constructing validity and reliability for qualitative research. The varying data collection techniques employed included semi-structured interviews, farm visits, documents, and participation in workshops, as illustrated in Table 3.1. Using multiple sources of evidence and multiple methods allows for converging lines of inquiry. The intersection of different sources and methods leads to more convincing and accurate conclusions and findings (Maxwell 2013, Yin 2014).

Table 3.1: Overview of data collection methods in relation to research questions

Research Questions	Methods
1) *How can the influence of global agricultural production networks on water governance be conceptualised using the GPN framework?*	• Review of academic literature • Review of NGO, business, and consultancy reports
2) *How does the historical and present-day political economy of the Western Cape influence the interactions between water and the fruit industry?*	• Review of academic literature • Documents
3) *What factors drive and shape the influence of global agricultural production networks on water governance, and how have these played out in the Western Cape?*	• Semi-structured interviews • Farm visits • Documents • Workshops
4) *What are the wider implications of the influence of global agricultural production networks for water governance in the Western Cape?*	• Semi-structured interviews • Review of academic literature • Documents • Workshops

(Source: author's analysis)

A) Semi-structured Qualitative Interviews

Semi-structured interviews are one of the most important sources of data in qualitative research (Clarke and Braun 2013). They have extensively been used in research on global production networks (Alford 2016, Timms 2012) as well as investigations into processes of water governance (Cohen 2011, Movik 2012). Semi-structured interviews take the form of guided conversations rather than structured surveys to enable fluid dialogue. This allows for flexibility during the interview: the interviewer may pursue a line of discussion opened by the interviewee by asking new, unforeseen questions *ad hoc*, or the interviewee might answer questions pre-emptively in the process of answering another question (Flick 2002). This relatively open design encourages and enables participants to express their own viewpoint easily (Edwards and Holland 2013). For these

reasons, semi-structured interviews were deemed most useful to answer the research questions.

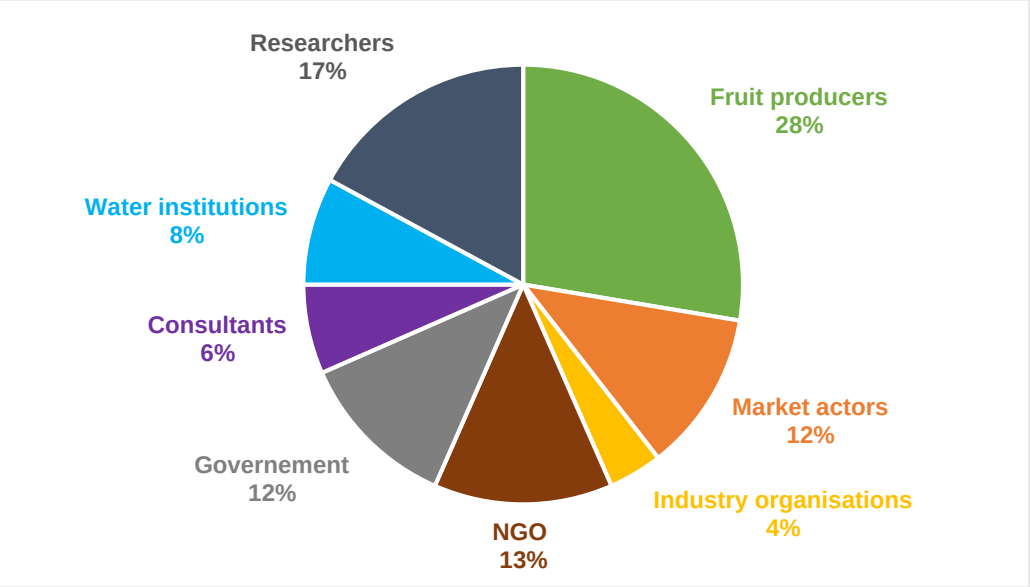
The challenge of conducting semi-structured interviews lies in having to operate on two levels. The first level consists of conducting an actual conversation with the interviewee, while the second level aims at following the study's line of inquiry (Flick 2002). This requires a high degree of sensitivity on the interviewer's part, as they need to balance between pursuing the line of inquiry and letting the interviewee talk about these and other topics in their own way. These decisions can only be taken during the interview. The researcher also needs to maintain an overview of what has already been covered during the conversation that is relevant to the research question, requiring constant mediation between the conversation and the interview guide (Flick 2002).

For this thesis, 76 semi-structured interviews were conducted at three stages of the research cycle. Table 3.2 (on page 63) offers a breakdown of the conducted interviews with a more in-depth description of participants in Appendix 2. Example interview guides may be found in Appendix 1. The first 11 qualitative semi-structured interviews were exploratory and conducted towards the end of the literature review and before fieldwork. They aimed at refining the research questions identified from the literature through discussions with academics and practitioners in the interconnected fields of sustainability, water governance, and agriculture. All exploratory interviews were conducted via Skype™, for practical reasons, as all interviewees resided in other cities or countries. Furthermore, Skype™ interviews allowed respondents to fit the interview flexibly into their busy schedule. Most Skype™ interviews were conducted using video, recreating a face-to-face interview situation as best as possible. Sometimes, however, practical reasons, such as the quality of the internet connection, prohibited the use of video technology.

The second and third set of qualitative semi-structured interviews were conducted in South Africa during two phases of fieldwork. Most of these 65 interviews were conducted face to face, either at interviewees' offices or other public premises during office hours. Some were also conducted via Skype™ if respondents resided in other parts of the country. Whenever possible, interviews were audio-recorded, always with the explicit permission of the interviewees. Participants further received an information sheet about

the research and were asked to sign a consent form in accordance with Coventry University's ethics (Coventry University 2016).

Figure 3.7: Proportional distribution of qualitative semi-structured interviews



Source: author's analysis

A range of actors were interviewed to fully answer the research questions at hand. Figure 3.7 illustrates the proportional distribution of different qualitative semi-structured interviews. Gaining access to participants for interviews and site visits, and subsequently managing these relationships, is a key design feature of qualitative research (Maxwell 2013). Four approaches were used to identify candidates for interviews. First, the lead supervisor of this thesis, Dr David Bek, is an experienced researcher in South Africa and has expert knowledge of the Western Cape as well as different horticultural supply and value chains. From his established network, he was able to recommend key-contacts who then acted as gatekeepers for further interviews. Second, some exploratory interviews were conducted with respondents working within the South African water and/or horticultural context and they also provided contact information to potential participants. Third, some respondents, especially fruit producers with illustrative websites identified via Google Maps™, were also approached by 'cold-calls' via e-mail or telephone, which was surprisingly successful. Fourth, at the end of each interview, respondents were asked whether they could recommend anyone else to talk to. From this resulted a purposive snowballing effect that resulted in the 65 field interviews.

Table 3.2: Detailed breakdown of conducted interviews

Interview category	Number of interviews	Institutional affiliation of interviewees/further information	Location in GPN
Fruit producers	21	• 7 x Elgin Valley • 5 x Ceres Valley • 9 x producers dispersed across the Breede WMA	Producer (firm-actor)
Market actors	9	• 2 x South African fruit exporters • 1 x British fruit importer • 3 x South African retailers • 2 x British retailers • 1 x Fruit processor	Network (firm-actor)
Industry organisations	3	• 1 x Hortgro • 1 x Agri Wes-Kaap (Agri WK) • 1 x Agri South Africa (Agri SA)	Network (firm-actor)
Water Institutions	6	• 3 x Groenland Water User Association (GWUA) • 1 x Ceres Valley Irrigation Boards • 2 x Breede-Gouritz Catchment Management Agency (BGCMA)	Quasi-state actors
Government representatives	9	• 1 x Local government • 4 x Provincial Government (Elsenburg, DEADP) • 4 x National Government (DWS, DAFF)	Non-firm, state-actors
NGO representatives	10	• 3 x Water NGOs • 1 x WWF International • 3 x WWF South Africa • 1 x global development NGO • 2 x small South African NGO (environment/sustainability)	Non-firm, non-state actors
Consultants	5	• 1 x Development Consultancy • 1 x Environmental Consultancy • 2 x Green Economy Consultancy • 1 x Independent Water Consultant	Non-firm, non-state actors
Researchers (water and/or agriculture and/or global agricultural trade)	13	• 7 x South African non-university research institutions • 4 x South African Universities • 2 x European Universities	Non-firm, non-state actors
TOTAL	**76**		

(Source: author's analysis)

B) Farm Visits

Some fruit producers interviewed for this research project offered to combine the interview with a visit to the farm. Farm visits allowed for casual forms of direct observation (Yin 2014) and was particularly useful to gain an in-depth understanding of on-farm water management. Five out of the 21 producers visited offered farm visits. During these farm visits, interviewees would offer a tour of the farm, showcasing their different water sources (e.g. dams, boreholes, rivers) and especially their irrigation equipment, such as micro-sprinklers or drip lines. This allowed them to explain in more detail how they manage water on the farm and the different challenges they face. It also illustrated how water security is perceived on individual farms and with what type of infrastructures it is associated.

Farm visits further offered opportunities to photograph different parts of the farms, including orchards, irrigation systems, and different water sources feeding these systems. Although photographs represent a specific perspective and cannot express the whole situation, they may prove useful to convey important characteristics to outsiders and readers (Hall 2009, Yin 2014). Photographic evidence from the different farms has been highly valuable to illustrate this thesis visually. Apart from photographs, the impressions from these farm visits were also recorded in field notes after each visit, which proved useful during later stages of analysis.

C) Documents

Document sources are often used in qualitative research and may take a variety of forms, such as letters, minutes of meetings, agendas, background papers, organisational or industry reports, and many more (Bowen 2009, Yin 2014). Documents are invaluable to corroborate and verify information obtained from other sources, such as interviews. This may be something as simple as verifying the spelling of names of people or organisations. Alternatively, their contribution might be more substantial when they corroborate or contradict evidence from another source. If document evidence is contradictory to, for example, data collected from interviews, it is likely that this specific topic needs more investigation (Yin 2014). Documents are also important to identify relevant actors and institutions that can be approached for interviews or to collect more documents.

When using documents, it is important to be aware that documents do not contain unmitigated truths. On the contrary, every document was created for a specific purpose with a specific audience in mind, independent of the research agenda. The researcher

then becomes an observer of the communication between other actors (Yin 2014). Furthermore, documents are likely to be aligned with specific purposes and procedures implying a specific agenda or a 'biased selectivity' (Bowen 2009: 32), i.e. institutional documents may have an underlying political agenda while corporate reports may depict accounts overly positive. Thus, it is important to keep the original purpose and audience of the document in mind as well as the context within which it was produced.

For this project, a range of documents were collected and reviewed at different stages of the research. This includes official policy documents, laws, regulations, and reports, all from different levels of government and related to either South African water resources management and governance or the agricultural sector; NGO reports on water and agriculture in South Africa, much from the WWF South Africa (WWF SA), which is based in Cape Town; and finally industry reports, mainly from Hortgro, the deciduous fruit industry association, and Agri South Africa (Agri SA) and Agri Wes-Kaap (Agri WK), the national respectively provincial industry association for commercial agriculture. Some of these documents served as background information to contextualise this research, while other documents were more systematically included in the data analysis. Much research employing GPN research has used documents as data (e.g. Krauss 2015, Mwangi 2018) Section 3.3 discusses the process of documentary analysis in more detail.

D) Workshops

Four different workshops were attended during the period of data collection. Three of the four workshops took place in South Africa and one at Coventry University in the UK. Table 3.3 (on the next page) categorises the different workshops into two main themes. Two workshops revolved around the topic of water and drought. The Western Cape went through a crippling drought between 2015 and 2018, and fieldwork took place amid that in 2017. The other two workshops revolved around the topic of markets and sustainability requirements within agricultural supply- and value-chains. All four workshops were multi-stakeholder events that included participation from a range of actors. Attending workshops on the topic of one's research offers the opportunity for casual forms of direct observation (Yin 2014). This facilitated insights into both the water sector and the fruit industry outside the face-to-face interview situations otherwise pursued for data collection. Such an approach has been used in previous research on global production networks (e.g. Krauss 2015, Mwangi 2018) and water governance (Rudebeck 2017, Sojamo 2016).

The Water Sustainability Symposium gathered researchers, government officials, and the private sector around questions of water sustainability in South Africa. The workshop highlighted an emphasis on efficiency and technological solutions to address water problems. This helped to contextualise the way the fruit industry addresses water challenges within a broader technocratic water sector in South Africa. The second workshop within this theme, the Water Conservation Workshop, took place in October 2017 after another dry winter escalated the drought situation. The workshop explicitly focused on the challenges faced by commercial horticulture operating in a water-scarce context. A range of fruit producers attended in addition to representatives from NGOs, the provincial government, and other actors from the agricultural private sector. The workshop showed that producers were managing water on farms efficiently and with support from technology. It also highlighted that faced by increasing water scarcity, this approach is insufficient. More fundamental questions regarding water use need to be asked – and the workshop underlined that this conversation is only slowly starting.

Table 3.3: List of different workshops attended during data collection

Theme	Workshops
Water and Drought	• **Water Sustainability Symposium** organised by the Water Institute of South Africa (WISA), Somerset West, May 2017 • **Water Conservation Workshop** organised by WWF SA, Robertson, October 2017
Market and Sustainability	• **SIZA Enviro standard-testing workshop** organised by WWF SA, Paarl, May 2017 • **Woolworths Seminar** organised by Dr David Bek, Coventry University, July 2017

(Source: author's analysis)

The second set of workshops focused on (export) markets and sustainability. The first of these – the SIZA Enviro standard-testing workshop – was organised by the agricultural lead at WWF SA. SIZA is the abbreviation for the South African Sustainability Initiative. Initially conceptualised as a South African social standard to assure retailers and consumers about fair labour practices, it has since evolved to encompass ethical trade and environmental compliance (SIZA 2017). WWF SA lead the development of the environmental arm of SIZA. The workshop attended in May 2017 tested the environmental standard with fruit producers and also attracted representatives from buyers and exporters. The second workshop in this category was held at Coventry University and organised by Dr David Bek. It was led by a representative from the South African retailer Woolworths and a representative from the firm EnviroScientific with whom

Woolworths developed Farming for the Future (FF). FF is a continuous improvement programme that evaluates suppliers on a yearly basis according to a set of sustainability criteria. EnviroScientific undertakes this evaluation. Both of these workshops were useful to contextualise water concerns within broader sustainability issues of South African fruit supply- and value-chains. Water is most relevant in terms of quality and related food safety concerns, however, the move towards continuous improvement highlights how water quantity is increasingly recognised as a threat to the assurance of supply.

3.3 Data Analysis

Analysis of the collected data was completed through documentary analysis and thematic analysis, as elaborated below. The thematic analysis was used to analyse the interview data. It was based on a process of coding, recoding, and categorising each data item to identify themes. This process was considerably aided by thematic mapping exercises. The documentary analysis aimed to understand the production and purpose of collected documents, while also analysing its contents. Documents here are understood as 'social facts', that need critical examination. Impressions from farm visits and workshops, which had been recorded in physical notebooks, supported both the thematic and the documentary analysis.

3.3.1 Analysing Interview Data through Thematic Analysis

Analysis of the interview data followed a thematic analysis approach as proposed by Braun and Clarke (2006). Qualitative approaches are very diverse, and the main benefit of thematic analysis is its flexibility. This flexibility means that the approach is both compatible with essentialist and constructionist paradigms within social sciences, including critical realism (Clarke and Braun 2013). This does not mean that 'anything goes' as thematic analysis still needs to follow a theoretically and methodologically sound approach. Therefore, a thematic analysis is 'a method for identifying, analysing and reporting patterns (themes) within data' (Braun and Clarke 2006: 79) and as such organises and describes the collected data in rich detail.

It is important to highlight that qualitative data analysis, such as thematic analysis, is an active process where themes are developed by the researcher who – in relation to their research questions – selects what is of interest and reports on this to their reader. Themes do not 'reside' in the data, waiting to be discovered, or 'emerge' after we have looked hard enough (Ely et al. 1997: 208). Such a conception would negate the active role of the researcher in ascribing meaning and interpretation and, therefore, ignore the critical realist epistemology. What then counts as a theme? As this is an intensive

research project following an explicitly qualitative approach, the goal is not to generalise and quantify. In that sense, themes are 'conceptualised as meaningful entities that are constructed from codes that unify disparate data and capture the essence of some degree of recurrent meaning across a data-set' (Braun and Clarke 2016: 740). This goes beyond a superficial description of what participants have said and involves interpretive work to bring out what is meaningful about the data, explore relationships and connections between ideas, and offers insights into the data (Connelly and Peltzer 2016).

Table 3.4: The six different phases of thematic analysis

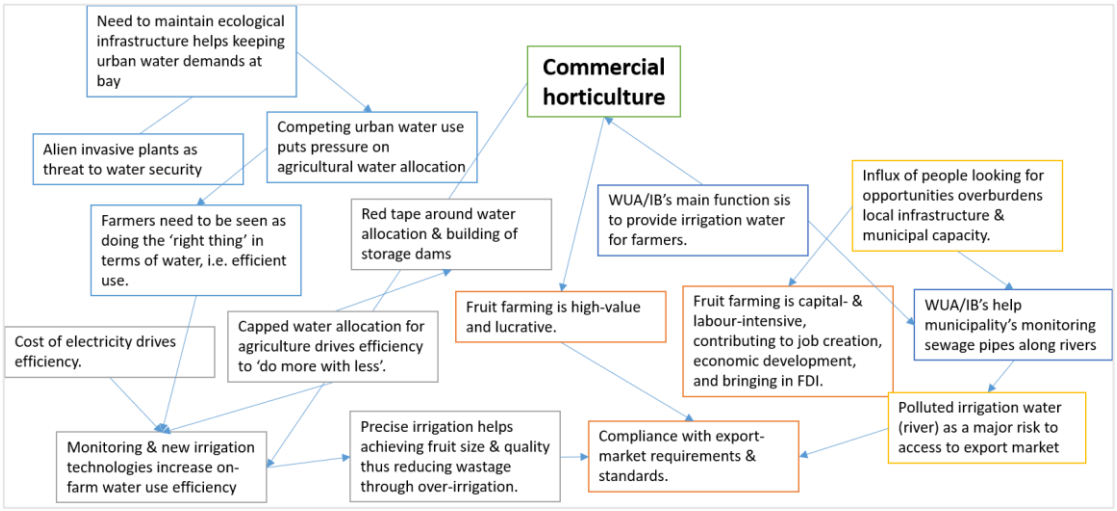
Some materials have been removed from this thesis due to Third Party Copyright. Pages where material has been removed are clearly marked in the electronic version. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

(Source: Braun and Clarke 2006: 87)

Table 3.4 shows the different phases of thematic analysis as proposed by Braun and Clarke (2006). They are listed here as distinct steps; however, the process of thematic analysis is a recursive one that requires moving back and forth not only between the different phases outlined in Table 3.4 but also between the entire data set, the coded extracts, and the analysis being produced. This includes the writing of the final report, which in Table 3.4 is shown as the final step when writing is a key part of the analysis itself. While writing is the way we articulate ideas and findings, 'it is also a tool whereby we come to these understandings' (Colyar 2009: 422).

For this project, an initial set of codes was deduced from the literature as well as preliminary impressions from the interviews. After familiarisation with the data, the whole dataset was then coded with the set of codes while also allowing for the development of new codes. Once the entire data set was coded, these codes were reviewed, some were merged, and others split. This was a key step to work towards identifying potential themes. Identifying themes was considerably aided by 'mapping' exercises where the different potential themes were mapped (first with pen and paper and then on PowerPoint) in relation to each other. This was useful in the process of reviewing, refining, and finally defining the themes. Figure 3.8 represents an initial thematic map, representing five colour-coded sets of codes. These are not necessarily themes, yet, as they are still largely underdeveloped and have no central organising concept (Clarke and Braun 2013). This is also evident from the fact that they cannot be captured in a few words but need a relatively cumbersome description to convey their purpose.

Figure 3.8: Initial thematic map with underdeveloped themes

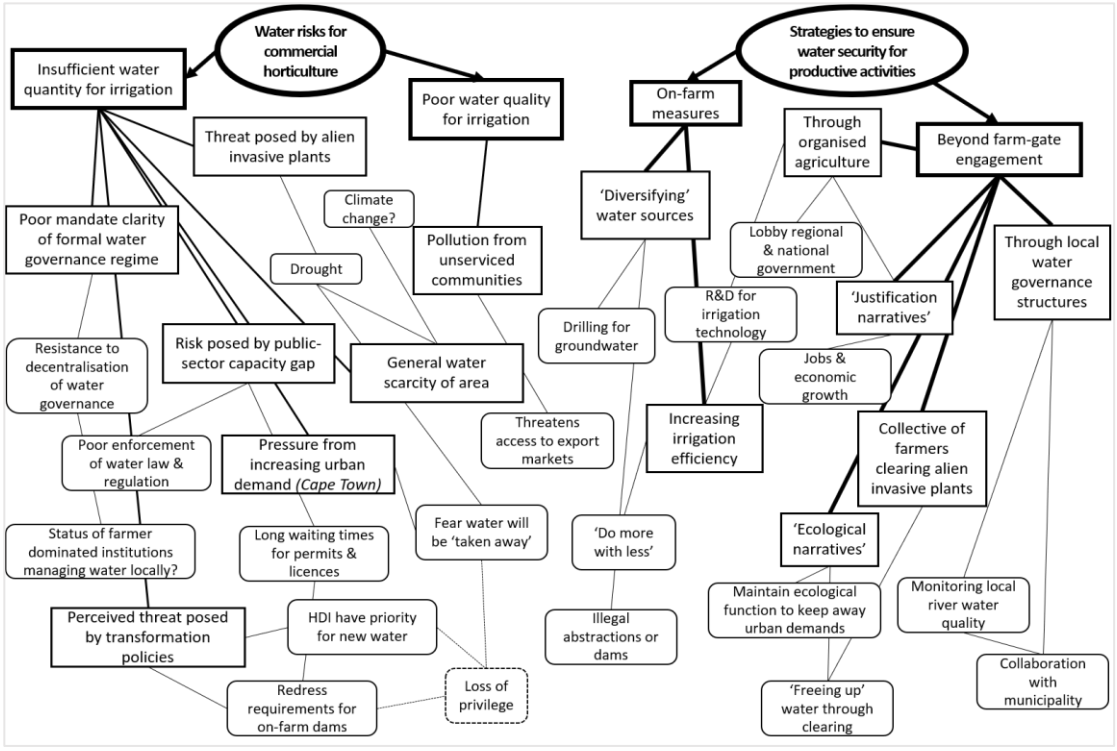


(Source: author's analysis)

This set of related codes was then reviewed against the coded data and the entire data set, which led to the identification/confirmation of two central themes: (1) water risks and (2) strategies to ensure water security for productive activities. These two overarching themes are shown in a more developed thematic map in Figure 3.9. The thematic map in Figure 3.9 also shows how there are several sub-themes forming below these over-arching themes. Still, the thematic map lacks clarity and is somewhat 'messy', which points towards the richness of the data. After further reviewing and refining of the candidate themes, a final thematic map was produced, as illustrated in Figure 3.10. While the two overarching themes remain the same ((1) water risks and (2) strategies for water

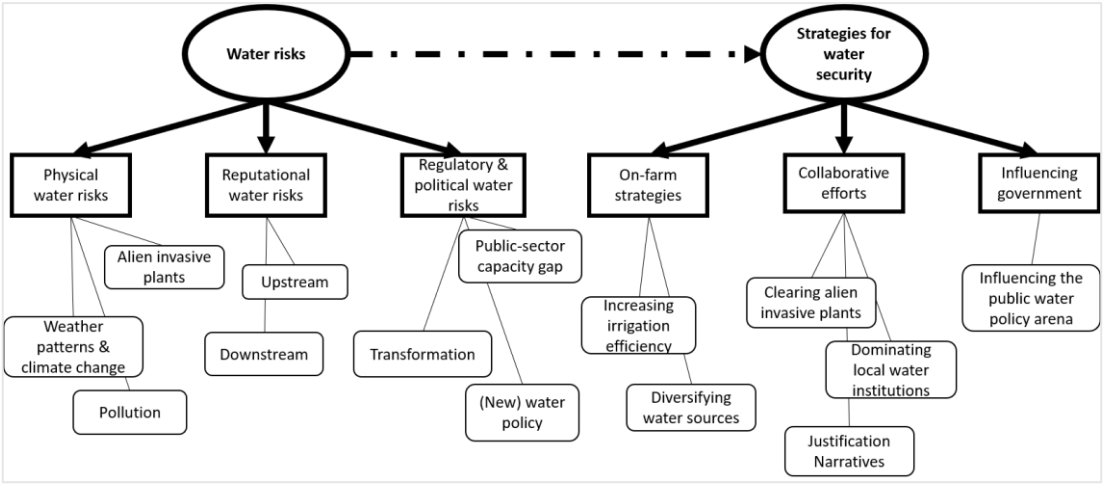
security), the sub-themes have been considerably refined because of the analytical process. The sub-themes are also more precisely defined. This final thematic map then served to structure the two findings chapters, Chapter 5 and Chapter 6.

Figure 3.9: Developed thematic map with two overarching themes and several sub-themes



(Source: author's analysis)

Figure 3.10: Final thematic map with two overarching themes, each with three sub-themes characterised by one to three aspects



Source: author's analysis

3.3.2 Documentary Analysis

Documentary analysis is an important tool of qualitative inquiry (Bowen 2009). Documents are a prominent feature in modern societies that serve as records or evidence of events and facts (Wolff 2004). They constitute 'social facts', which have been produced, shared, read, and used, usually with a specific audience in mind. Hence, documents, even official ones, cannot be considered as transparent representations or firm evidence of what they aim to convey (Atkinson and Coffey 2011) and therefore should not be reduced to 'information containers' (Wolff 2004: 400). Recognising documents as constructed does not mean that they should be ignored as data. The approach to documents needs to take into account their purpose and their embeddedness in a specific organisational setting as well as the cultural values attached to them (Atkinson and Coffey 2011).

The purpose of the main documentary analysis conducted for this project was to understand the South African water governance structures for water resources management as foreseen in law and policy. While some policy and legislative documents had been examined before interviewing participants, the need for a more systematic approach – specifically to (quite literally) untangle the formal water governance regime – became apparent while conducting interviews with respondents in South Africa. This was because multiplicities of water governance structures were being mentioned in interviews and many respondents were not sure themselves how they related to each other. Therefore, only official documents produced by the Department of Water Affairs were analysed. Hence, the criteria for including documents in the analysis was whether the document has direct implications for water policy and/or water law and thus formal water governance structures in South Africa. Seven major water policy and legislative documents were identified each introducing important changes to formal water governance structures. They are listed and briefly described in Table 3.5.

Documentary analysis is an iterative process, involving 'skimming (superficial examination), reading (thorough examination), and interpretation' (Bowen 2009: 32). Each document was first superficially scanned and then read in more detail. Then, two sets of questions were brought to the documents. The first set asks questions *about* the document, to understand the context of the publication as well as agendas or biases that may be contained within them. This is important because documents are just one representation of reality at a certain point in time. They are not 'necessarily precise, accurate or complete recordings of events that have occurred' (Bowen 2009: 33).

Table 3.5: Seven main water governance documents analysed

Document Name and Description	Source
The Water Act No 54 of 1956 The 'old' Water Act was implemented eight years after the National Party came to power and aimed to serve the benefits of the ruling white minority. The Water Act was in place for nearly 40 years and still shapes current features of water governance, as discussed in Chapter 4.	(Water Act 1956)
White Paper on National Water Policy The White Paper was produced based on a two-year inclusive and participative consultation process after the 1994 elections. It served as a major input to the NWA. This is fed into the discussion in Chapter 4, with the NWA and the NWRS.	(DWAF 1997)
The National Water Act No 36 of 1998 (NWA) The National Water Act (NWA) clarifies and formalises the propositions set out in the White Paper. It is the legal basis for water resources management and an active piece of legislation, although consultations to revise the Act are currently underway. This is discussed in Chapter 4, with the White Paper and the NWRS.	(National Water Act 1998)
National Water Resources Strategy (NWRS) The formulation of the NWRS is mandated by the NWA. The first edition was published in 2004. The Department of Water Affairs and Forestry (DWAF) authored the document, with Ms Buyelwa Sonjica as Minister, who was appointed by President Thabo Mbeki. The NWRS is a policy document that outlines how the ground rules set out in the NWA are to be operationalised. It informs the discussion in Chapter 4 together with the White Paper and the NWA.	(DWAF 2004)
National Water Resources Strategy 2 (NWRS2) The NWA mandates the revision of the NWRS every five years. Its second edition was published in 2013. Jacob Zuma, now President, had shifted the water mandate to the new Department of Water and Environmental Affairs with Ms Bomo Edith Edna Molewa as Minister. The NWRS2 is strongly influenced by the National Development Plan (NDP) that had been finalised in 2012 (NPC 2012). As there have been no new revisions of the NWRS since 2013, this is still an active policy document and informs Chapter 7.	(DWA 2013)
National Water Policy Review (NWPR) The NWPR was published in 2014, after President Zuma's re-election in May 2014 brought on another shift of the water mandate to the new Department of Water and Sanitation. Mrs Nomvula Mokonyane took up the role of Minister, and subsequently became embroiled in a series of controversies, including irregular expenditures and maladministration. This is not a policy document but a series of propositions that are part of the discussion in Chapter 5 and 6.	(DWS 2014)
Business Case for the Establishment of a Single Catchment Management Agency This document was published in November 2017, shortly after fieldwork ended. The proposal has been gazetted (government notice) and was out for comments until February 2018. In February 2018, however, new President Cyril Ramaphosa appointed Mr Gugile Nkwinti as new Minister of Water and Sanitation and since then there has been little news regarding future developments around this proposition. Its contents are also part of the discussion in Chapter 6.	(DWS 2017c)

(Source: author's analysis)

The second set asks questions *of* the document, which are what O'Leary (2014) refers to as the 'interview technique' in documentary analysis where researchers treat documents as respondents by asking them questions and highlighting answers within the text. The following *about*- and *of*-questions were used on all documents identified in Table 3.5.

About-Questions

- Who authored the document?
- When was it published?
- Who is the intended audience?
- What is the economic and political context of the publication?
- What are the outcomes of the document?

Of-Questions

- What are recurring overarching themes?
- What principles of water governance are proposed, mentioned, or assumed?
- What water governance mechanisms are foreseen, mentioned, or assumed?
- What type of links to other actors and institutions are made explicit, mentioned, or assumed?
- How does the document portray commercial agriculture and/or what is said about the commercial agricultural sector?

The *about*-questions were answered through information contained within the documents, consultation of academic literature on the topic, and research on the political economy of South Africa during the publication dates. The *of*-questions were answered by carefully reading the documents and then highlighting the information needed. The documentary analysis allowed for a careful mapping of the formal water governance structures in the Western Cape that pays attention to political economy context and history. These mappings are presented in Chapter 4.

3.4 Positionality, Ethics, and Other Challenges

Any research project needs to consider ethics and matters of positionality. This is especially the case when research involves people, as much qualitative research does. Positionality is important to evaluate the interactions between researcher and research participants. Ethical considerations also matter when conducting research with participants, as they are important for establishing trust in the relationship between

researcher and research participants. The following paragraphs discuss the positionality of the author and ethics during the research process as well as challenges and limitations to the research strategy.

3.4.1 Positionality

By entering research sites, be it interviews, workshops, farm visits, or other situations, researchers will – as human beings – influence their surroundings and therefore the production of data (Yin 2016). In face-to-face interviews, the issue of positionality becomes particularly acute because interviewees may respond differently depending on how they perceive the person asking questions (Denscombe 2014). For this project, a constant critical reflection on how the interactions between researcher and research participants influenced fieldwork was necessary. This was done by keeping a research journal, where the author reflected on the interview interaction at the end of each interview. It must be acknowledged, however, that such reflexivity can never be complete, and there always remains an 'unknowability' of both the researcher's and individual participant's position (Gillian 1997).

Overall, the profile of the South African fruit industry is elite and heavily gendered, dominated by white middle-aged and senior men, mostly of Afrikaner origin.[10] This has, in part, historical reasons, tying into the policies of colonial and apartheid governments, as well as perceptions regarding gender roles in South African society. Because of this history, many actors interviewed occupy dual roles, i.e. they were interviewed in their capacity as representatives of government departments, water institutions, or industry; but they also own farms themselves. Consequently, when asked about issues regarding water and agriculture, they often spoke from such a combined perspective. Many actors within the fruit industry, especially producers, have been educated abroad, dominantly in the UK, or at South Africa's best universities. All producers interviewed were white and out of the 21, one was a woman. Representatives from industry associations or export and marketing agencies were also exclusively white and dominantly male. In contrast, representatives from NGOs tended to be predominantly white women. Finally, representatives from the provincial and national government working on water or agricultural issues were more equally split along the gender divide but still tended to be

[10] Throughout this thesis reference is made to the black, coloured, and white people of South Africa to explain how the different racial groups' social construction throughout history influences the present South African society (Feinstein 2005). Although these terms originate from apartheid-era race classification, for many South Africans, they are expressions of identity, including the otherwise-contested term coloured (McEwan, Hughes, and Bek 2017).

white, with one black, one coloured, and one Indian representative. While this list of gender and races might seem crude, it is important within the South African context and matters to understand the author's positionality within it.

Being foreign, young, female, and white has influenced the way participants responded during interviews. This led to a mix of insider/outsider perception – where the author's race and degree of education constructed her as part of a white elite; while her age and femaleness positioned her as an outsider. Similar positionalities have been identified by other foreign, white, and female academics in their late twenties conducting research in South Africa (e.g. Howson 2019). Water and agriculture are delicate and highly political topics in South Africa. The dualistic agricultural sector is still largely divided along racial lines, with white men firmly on the side of capital-intensive, high-tech, 'productive', commercial agriculture. Coming from a white European background has facilitated gaining access to these actors. Being foreign, young, and female also has had advantages, as it seemed to make the author and her questions less threatening. On a positive note, this made it easier for respondents to speak openly and freely. On a more challenging note, it made some respondents test the author's expertise, before opening up. As pointed out by Denscombe, *'[o]ur sex, our age, our ethnic origin, our accent, even our occupational status, all are aspects of our 'self' which, for practical purposes, cannot be changed'* (2014: 190, emphasis in original). While one cannot change themselves, certain measures can be put in place to mitigate these factors.

Being aware of this 'interviewer effect' (Denscombe 2014: 190) is the first step. Within this research, several strategies helped to either minimise the author's impact or satisfy 'testing' from interviewees. First, it was important to know the research topic well, to be able to give a short and concise summary of the research aims and objectives in a comprehensible way of meaning to the respondents. This communicated expertise and professionalism. It was also crucial to have the necessary technical and scientific knowledge regarding on-farm water management (e.g. how different irrigation technologies work). Second, each respondent, their company, or institution was briefly researched online before entering the interview, this again showcased professionalism and time invested in the interview. Third, dressing appropriately was important, as it is within any professional context. Dress codes had to be adapted depending on the interview locations. This meant wearing business attire for interviews at government offices or industry associations but wearing more practical clothing – especially shoes – when visiting farms. Finally, as water and agriculture are sensitive and political topics in

South Africa, remaining neutral was important to conduct interviews successfully. Many white farmers often feel they need to justify their privilege, and by remaining neutral, cordial, and receptive to their words, interviewees shared their perspectives more easily.

3.4.2 Ethics

This research was conducted in line with ethical guidelines of Coventry University (Coventry University 2016). Given the political nature of water allocation in South Africa, these principles were strictly adhered to, especially along the lines of confidentiality, anonymity, and transparency. Many actors within the fruit industry were concerned with their image towards the outside world and questioned whether this research had a wider political agenda. For this reason, it was important to outline the purpose of the research from the outset. Usually, participants were approached via e-mail, which would contain a brief blurb about the research as well as a participant information sheet. During the meeting and before the interview, the interviewer would briefly recap the participant information sheet before presenting participants with an informed consent form. This was useful to establish credentials and dissipate fears about a hidden political agenda. All participants were given the choice of signing the consent form and proceeding with the interview or withdrawing from the process at any stage. Confidentiality and anonymity were assured by ensuring the collected information would only be used for this research and not sharing information about participants with any third parties. Interviewees were also asked to consent to the audio recording of the conversations. This only went ahead if participants were happy with it to proceed. Recordings of interviews, as well as consent forms, are kept on two password-protected external hard drives as well as a cloud-based server provided by Coventry University (also password protected). A copy of the participant information sheet and the consent form can be found in Appendix 3 and Appendix 4. Certificates of ethical approval are on page i and in Appendix 5.

3.4.3 Challenges and Limitations

Initially, language had been anticipated as a potential challenge. This is because many farmers in the Western Cape are of Afrikaner origin and it was not clear whether they would be comfortable enough to conduct detailed interviews in English. For this purpose, a research assistant fluent in Afrikaans often accompanied farmer interviews. Language turned out to be a non-issue. As outlined above, many farmers were educated abroad or at South Africa's best universities, speaking English fluently, even when Afrikaans was their native language. Similarly, interviewees working for NGOs or different levels of

governments were all fluent in English. Nonetheless, being accompanied by a research assistant on occasion proved useful to discuss impressions after the interview

Furthermore, fieldwork for this study was conducted during a period of drought in 2017, which was feared to be a challenge. Because of the drought, however, water was on everybody's mind in the Western Cape. The drought most likely increased responsiveness to interview inquiries and presented a good conversation starter. The length and intensity of the drought also revealed dynamics that otherwise would have remained hidden. This includes, for example, 'uglier' practices, such as water theft. It also brought concerns about the assurance of supply for export markets to the forefront, expressed by market actors and producers. While this urgency influenced responses from interviewees to a certain degree, the analysis in Chapter 5, 6, and 7 shows how this is an amplification of existing dynamics rather than something 'new'. This amplification, however, highlights the timely nature of this research.

The aim of this thesis was to understand how the export-oriented Western Cape fruit industry influences processes of water governance. To achieve this aim, the direct respondents of the thesis were mainly owners and managers of said farms. Similarly, when engaging with respondents outside the fruit industry, e.g. levels of government and NGOs, discussions largely revolved around their interactions with the fruit industry or processes of water governance. By doing so, the thesis was able to untangle the narratives and perspectives of the fruit industry in relation to water. This was done purposefully and helped to focus the thesis on a specific aim. In also meant, however, that the voices and perspectives of other water stakeholders could not have been included directly. This includes historically disadvantaged communities in both rural and urban areas. This is, however, a necessary area of further research (see also Section 8.4), for which this thesis offers a fruitful stepping stone.

3.5 Chapter Conclusion

The chapter has reviewed the research strategy underpinning this thesis. It has discussed the research philosophy that influenced the research approach and choice of methods. Highlighting the need for a scale-sensitive approach, processes of site and participant selection were reviewed before introducing the geography of the study area. This was followed by a discussion of the data collection techniques – semi-structured interviews, farm visits, documents, and workshops. After this, the approach to data analysis was outlined, which included a documentary analysis of collected documents and a thematic analysis of the interview data. It also showed how data analysis was

considerably aided by thematic mapping. In its final section, the chapter turned to matters of positionality, ethics, and other challenges, which are key issues to consider and reflect upon in qualitative research.

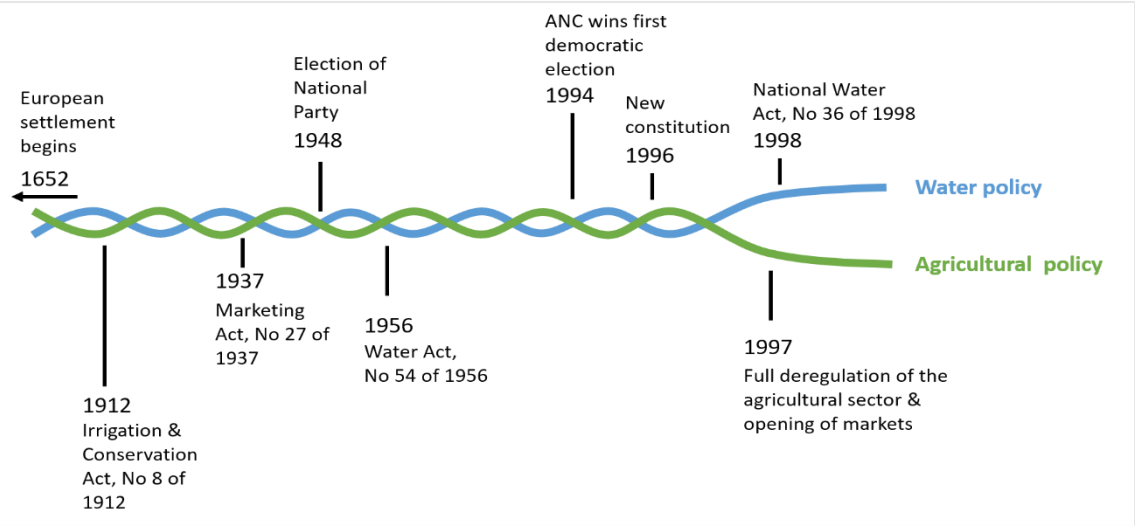
The approach presented here allowed for the generation of large amounts of primary and secondary data to address the research questions at hand. While this qualitative approach does not allow for generalisable findings in the way quantitative data does, it does provide in-depth insights into diverse dimensions and tensions that the research sought to explore. The findings chapters, Chapter 5 and Chapter 6, aim to showcase how the data obtained here has provided a rich and nuanced understanding of how globalised agricultural production networks influence processes of water governance within the Western Cape – and what we can learn from this example that might have more far-reaching applications. Before delving into the findings, however, Chapter 4 reviews the historical and present-day political economy of water and agriculture in the Western Cape. It argues that this is key to not only contextualise but also understand the dynamics through which global agricultural production networks influence water governance in the Western Cape.

4 Water and Agriculture: A Political Economy of the Western Cape

In the Western Cape, commercial agriculture has historically played an important role within the context of water management and governance. These interactions are deeply embedded in the country's history of colonialism, racial segregation, and discrimination. To comprehend the present-day influence of the export-oriented Western Cape fruit industry on processes of water governance, these historical intertwined dynamics are crucial. Before the country's transition to democracy, controlling access to water played a significant role in the government's policy of separate development (Funke et al. 2007, Tempelhoff 2017). Commercial agriculture, a profession reserved exclusively for the white farmer, enjoyed privileged rights to water because of the colonial appropriation of fertile, well-watered land. In contrast, black South Africans were confined to the arid homelands, where land was unyielding and water was scarce (Bernstein 2013, Feinstein 2005, Tempelhoff 2017). Access to water, therefore, was racially determined and conferred in preference for the development of white commercial farmers.

It was only after the demise of the apartheid regime in the early 1990s and the subsequent rewriting of legislation and policy that water and agriculture started to be considered separately (see Figure 4.1). Despite a seemingly progressive approach to formal water governance in the new South Africa, relics of the past remain and true transformation is an ongoing, long, and challenging process (van Koppen and Schreiner

Figure 4.1: Intertwined water and agricultural policy during colonial and apartheid rule that separates after democratisation



(Source: author's analysis)

2014a). History, here, is a powerful shaping force that still influences the present-day political economy of water and agriculture in the Western Cape. Hence, this chapter investigates Research Question 2: *How does the historical and present-day political economy of the Western Cape influence the interactions between water and agriculture?*

The aim of this chapter is to unravel the historical dynamics that influence present-day interactions between commercial agriculture and water governance. The chapter draws on secondary academic literature, which mainly informs sections on colonial and apartheid-era water governance and agricultural development. The chapter also analyses post-apartheid developments in water governance. To achieve this, the six major policy and legislative documents post-1994 were reviewed as well as the main apartheid-era water legislation, as outlined in Chapter 3. They are, in chronological order, the Water Act (Water Act 1956), the White Paper on National Water Policy (DWAF 1997), which resulted in the new National Water Act (National Water Act 1998) that mandated the National Water Resources Strategy (DWAF 2004), or NWRS for short. This was followed by a second edition of the NWRS – the NWRS2 (DWA 2013) and the National Water Policy Review (DWS 2014). The newest document is the Business Case for the Establishment of a Single Catchment Management Agency (DWS 2017c). These developments in water governance are analysed against the backdrop of post-apartheid agricultural and economic policy to showcase the interaction between the two.

This analysis is facilitated by adopting a political economy perspective. As introduced in Chapter 2, a political economy perspective allows for the analysis of nature-based GPNs, such as the Western Cape fruit industry, and their interaction with environmental governance regimes. This chapter thus commences by reviewing, in relatively broad brushes, the intertwined development of water and agriculture during colonial times and then apartheid (Section 4.1). In Section 4.2, the chapter turns to the reforms that the transition to democracy brought post-1994 and how this has influenced the link between commercial agriculture and water governance, asking whether it has indeed led to a separation of water resource policy from agricultural policy. The chapter then ends with some concluding thoughts in Section 4.2.1.

4.1 Water and Agriculture in the Western Cape's History

The history of water rights in South Africa coincides largely with the history of the ruling class. It is this context of conquest and colonisation that has fundamentally shaped the way water is governed in the Western Cape today. The evolution of commercial agriculture, largely driven by white European settlers, played a significant role within this

context. Therefore, this section will not delve into the pre-colonial area and the ways water was managed within the different African communities before European settlement (see Tewari 2009 for a review including precolonial times). It starts with the arrival of the Dutch in 1652 at the Cape of Good Hope and intertwines the evolution of water governance regimes and agricultural development with the political economy of modern South Africa.

4.1.1 Development of Water and Agriculture during Colonial Rule

Colonialism arrived in present-day South Africa via the establishment of a refreshment station for the Dutch East India Company (VOC[11]) in 1652. At the time, there was no ambition to establish the colony as an independent territory. Consequently, the colonial settlement grew at a relatively slow pace with only scarce interactions with African communities except for the notable dispossession of the Khoisan people of the Cape (Feinstein 2005). The Company – as a representative of the state – imposed a *dominus fluminis* approach to water rights. The *dominus fluminis* concept gave the VOC full control over all running water, which was considered a public commodity. Individuals (read Dutch settlers) were able to get temporary – and revocable – entitlements to water only if this use did not interfere with the Company's water needs (Tewari 2009). During the early years of colonial settlement, access to water resources was thus controlled by the VOC – equivalent of the government – in a permit system aimed at Europeans and largely excluding any African population.

The production of fruit in the Western Cape also started in these early days. Jan van Riebeeck is said to have planted medlar and quince pips upon his arrival at the Cape of Good Hope in 1652. Over these early years of colonial settlements, the Dutch would experiment with apple trees, citrus, and wine grapes (Hortgro 2017a). The main purpose of these productive activities was to feed the colonial settlers, as well as producing additional food to refill passing ships (Feinstein 2005). As the colony remained relatively small and spatially concentrated initially, horticultural production progressed slowly.

In 1806, the British permanently occupied the Cape Peninsula, ousting the Dutch from the colony. In terms of water governance, the British introduced a series of changes, mainly removing restrictive policies that had limited the spread and entrepreneurship of colonial settlers – including limitations on irrigation for agricultural production.

[11] The full name of Dutch East India Company was *Generale Vereenigde Nederlandsche Ge-Octroyeerde Oost-Indische Compagnie* or VOC for short. It effectively administrated the Cape colony on behalf of the Dutch empire (Feinstein 2005: 22).

Consequently, economic activity and population growth picked up speed. This change in rule also led to a wave of movement of white settlers to the interior of the country from 1835 onwards, as Boers – the farmers descending from the first Dutch settlers – aimed to establish their own territory outside the reach of the British Empire. By the end of the 1850s, these shifting boundaries between the Boers and the British led to the effective division of colonial South Africa into two Boer dominated independent states: the South African Republic (or Transvaal) and the Orange Free State; and two British colonies: the Cape Colony and the Natal Colony (Feinstein 2005). While the Boer republics continued to operate under the *dominus fluminis* approach, the state power to control water resources in the British colonies crumbled (including in the Cape), giving way to a more liberal approach that allowed for individual rights to water tied to land tenure (Tewari 2009). Consequently, the Western Cape has a legacy of both Dutch and British water governance mechanisms, which still shape reality on the ground today.

After Britain won the Anglo-Boer War in 1902, it annexed the two Boer Republics. Shortly thereafter, in 1910, the Union of South Africa was proclaimed, consisting of four provinces: the Cape of Good Hope, Natal, Transvaal, and the Orange Free State (Ross 2008), as illustrated in Figure 4.2.

Figure 4.2: Map of the Union of South Africa (1910-1976)

(Map by Htonl / CC BY-SA 3.0 / Wikimedia Commons)

In 1912, the Irrigation and Conservation Act, No. 8 of 1912 came into force and codified the laws pertaining to water across the Union. The 1912 Act was a compromise based on earlier codifications of British customs in the Cape but also taking into account the very different realities of the much drier Northern provinces (Tewari 2009). In a predominantly farming society recovering from war, it meant to appease and enable development. Its main objective was to ensure the availability of sufficient water for the agricultural sector through conservation (storage) of the resource (Tempelhoff 2017). In many ways, this can be understood as the beginning of the 'hydraulic mission' (cf. Allan 2003b) in South Africa, which saw heavy investments in water storage and water transfer infrastructure to satisfy supply-oriented policies for a modernist development approach (Swatuk 2010).

With this new piece of legislation, water was effectively divided into public and private water. Public water described most surface water, mainly streams and rivers, and riparian users were given rights to that water. The normal flow of such a river or stream was subject to apportionment, most often between different irrigation farmers, whereas surplus flow, e.g. during heavy rains, could be used without limits. Private water described water that 'rose on one's land' (Tewari 2009: 699), e.g. a spring. Under the 1912 Act, water law was considered a statutory system. Consequently, so-called water courts – first established at the end of the 19th century – were needed to settle disputes between different riparian users, most often due to competing upstream and downstream irrigation practices of European farmers (Tewari 2009, Uys 2008). The distinction between public and private water is important because it effectively remained in place until the end of apartheid.

It is important to note that both access to private and public water was tied to land ownership as water had to either originate on one's land or one's land had to border a public river or stream to gain riparian right. Unsurprisingly, the colonial government granted a majority of title deeds (~ 90% of the territory) to the white minority (Tewari 2009, van Koppen et al. 2009). The European settler's desire to appropriate the land for themselves coupled with their need for labour in the agricultural and mining industry led to an effective strategy of conquest and dispossession culminating in the Natives' Land Act No. 27 of 1913. The Act made it illegal for the African population to acquire or rent land outside of allocated reserves. Reserves initially constituted only 8% of the territory, which was later increased to a meagre 13% in 1936 through the Natives Trust and Land Act, No. 18 of 1936. The notorious Act was to be the first cornerstone of the legal

framework underpinning apartheid (Feinstein 2005). Consequently, the British colonial government effectively restricted the African's population access to water and thus limiting subsistence agriculture while curtailing any significant development of commercial agriculture.

In the Western Cape, access to irrigation water for European settlers had enabled further development of the fruit industry. This was in part fuelled by demands for fresh fruit from England and in 1892, the first 14 trays of dessert peaches were exported from the Western Cape and sold at London's Covent Garden Market in the UK (Hortgro 2017a). This jumpstarted the export-oriented deciduous fruit industry, which grew steadily from then on. Much of this was made possible by increasing support mechanisms from first the colonial and then the apartheid government. Economic and political pressures led to the formulation of a series of state policies which supported the development of white commercial farming and sustained the sector through the collapse of the world farm prices in the inter-war years (Kirsten, Edwards, and Vink 2007, van Koppen et al. 2009). These included drought relief grants, export subsidies, interest subsidies (e.g. for irrigation infrastructure), railway rates rebates, and other support mechanisms, culminating in the Marketing Act of 1937. The Act effectively protected farmers from foreign competition and let them increase prices for consumers by creating marketing boards through which commodities had to be channelled (Feinstein 2005).

Therefore, the years after the formation of the Union and up to the election of the National Party (NP) in 1948 were characterised by the creation of a basic institutional framework to enforce a dualistic agrarian structure (Christiansen and van den Brink 1994, Hall 2004, van Koppen et al. 2009). It played (white) large-scale commercial farmers with capital and technology at their fingertips on vast stretches of land against (black) small-scale subsistence farmers with little to no government support confined to the arid reserves. These dynamics and structures would shape the agricultural economy until the end of apartheid brought widespread deregulation. The government, thus, put in place a series of economic and financial mechanisms and infrastructure projects – including irrigation schemes – to support and develop white commercial farmers.

4.1.2 Apartheid and its Implications for Water and Agriculture

After 1910, rapid industrial development across the Union led to increased demand for water and water infrastructure from other sectors than farming, such as growing urban centres and manufacturing, but mainly the mining industry (Tempelhoff 2017, Tewari 2009, van Koppen et al. 2009). When, in 1948, the NP won the election under the slogan

of 'apartheid', policies of segregation were systematically intensified based on notions of Afrikaner nationalism (Marais 2011, Ross 2008). The apartheid government had a clear desire to 'shape South Africa into a powerful state' (Tempelhoff 2017: 192). The booming gold-mining industry was crucial to achieving this vision. The new, intense water demands from the mining sector and the drive for the industrial development needed to be satisfied (Tempelhoff 2017). To do so, the NP embarked on a new direction in water legislation and policy that seemed to decrease the previous prioritisation of agricultural water use.

The Water Act, No. 54 of 1956 replaced the 1912 Act and aimed to consolidate the different needs of the growing economy, including mining, manufacturing, urban centres and their commercial development. This was the first time that the agricultural sector was put on the figurative backburner: much of the NP's support base were poor white Afrikaans farmers in the former Boer strongholds; providing them and the broader agricultural sector with support to develop water storage facilities and irrigation schemes had been a key political strategy (Hall and Cousins 2015). But also successful, commercial farming communities had profited from these policies. Case in point, the influential wealthy farmers in the Cape were not pleased with the increased regulatory discourse on irrigation farming. The promise of industrial development, however, seemed to appease protests and in reality, the new Act hardly affected subsidies to irrigation farming communities (Tempelhoff 2017, van Koppen et al. 2009). The 1956 Water Act would shape the formal water governance structures of South Africa until the end of apartheid – and beyond – and it is thus informative to look at it in more detail.

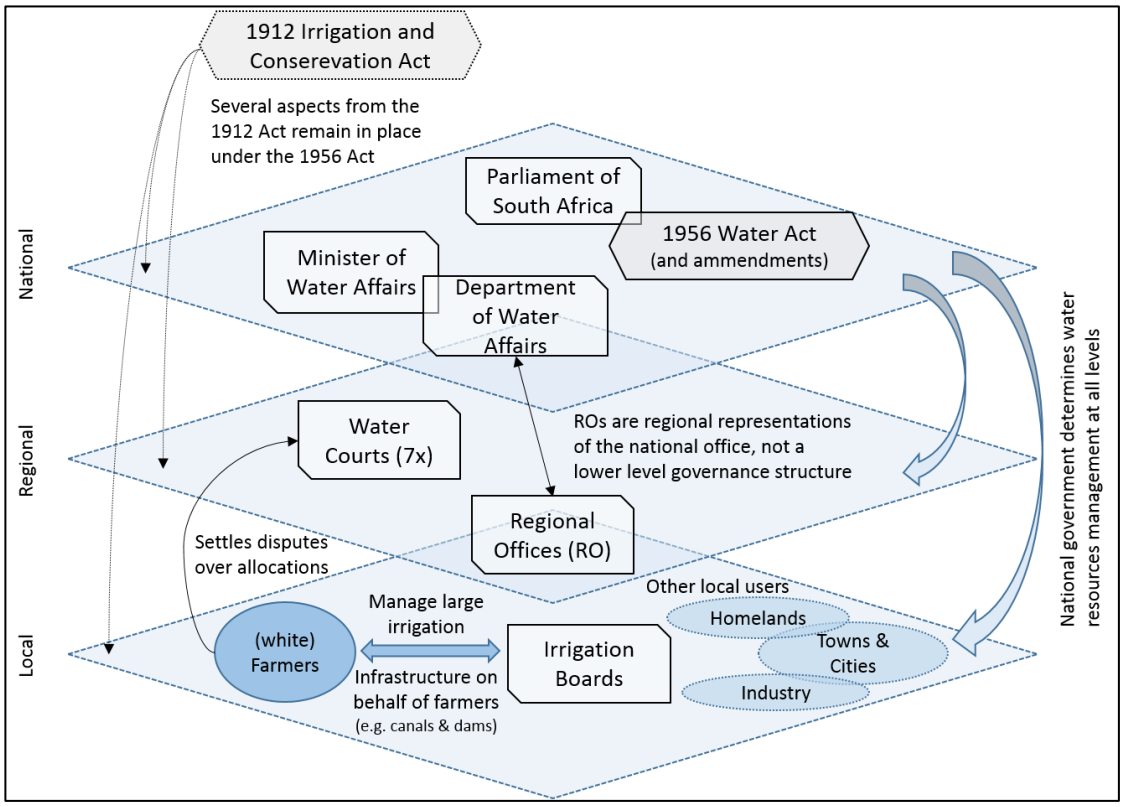
A) The Water Act, No. 54 of 1956

At its core, the 1956 Water Act aimed to serve the benefits of the ruling minority. The state took over responsibilities to supply and manage large volumes of water to users beyond the agricultural sector. This led to a vast expansion of water infrastructure and schemes, propelling South Africa's hydraulic mission forwards. For example, many of the Western Cape's large dams were built under the Water Act of 1956 (see van Vuuren 2012 for a historical review of South Africa's large dams). Water was still divided into public and private water, and the government oversaw both by administering them through a water permit system, effectively reintroducing aspects of the *dominus fluminis* principle. This principle, however, was qualified in two ways important to this research project. First, the government gained the ability to define Water Control Areas. Often these would be declared in the homelands or other areas mainly populated by black

people. It became an effective tool to control their access to water (van Koppen and Schreiner 2014a). Secondly, private water rights, such as groundwater, for the white commercial farmers remained uncontested, as did riparian rights (Tempelhoff 2017, Tewari 2009). Although the overall direction of water policy changed from a focus on irrigation and water storage for agriculture to focus increasingly on other economic sectors, this did not mean that farming lost any of its privileges.

Figure 4.3 illustrates the layering of water governance as foreseen in the 1956 Water Act. Water governance largely focused on a mandate of storing and delivering water. Most water governance mechanisms were heavily centralised, with powers principally vested in the Minister and the Department of Water Affairs. Consequently, the national level determined water resources management at all lower levels (Mackay 2003). Due to the country's vastness, regional representations of the Department were established – these Regional Offices (ROs) still operate today. Locally, the 1956 Act made provision for Irrigation Boards (IBs). They were formed when farmers pooled their resources to apply for loans in order to build and manage irrigation infrastructure (Water Act 1956). Other institutions with water mandates included the Water Courts. Seven Water Courts

Figure 4.3: Apartheid-era water governance structures with a focus on (white) commercial agriculture



(Source: author's analysis)

were established to cover different parts of South Africa, (Transvaal, Orange Free State, Natal, Cape, Eastern District, Northern Cape, and South-West Africa (modern-day Namibia)) and litigate disputes between different water users (Water Act 1956). Thus, the 1956 Water Act established strong top-down water governance structures that consolidated over almost 40 years of apartheid rule.

Due to the limited natural endowments of the Western Cape, the horticulture sector initially grew at a relatively slow pace. However, by the mid-1960s commercial agriculture registered significant improvements in its resource use. The main reason behind this advancement was an increase in the area under irrigation thanks to the mobilisation of water resources through large infrastructure projects (Swatuk 2010). This was coupled with higher yielding varieties, intensive use of chemical controls for pests and weeds and artificial fertilisers, as well as improved soil management, more efficient planting and harvesting, and the spread of mechanisation (Feinstein 2005). This trend continued into the 1970s and was further aided by a steady increase in average farm size (+40% from about 770 hectares (ha) in 1948 to 1,990 ha in 1974) due to the decline in the number of farming units (Feinstein 2005: 194). By the mid-1970s, an overall economic downturn hit the South African economy, largely due to enforced isolationism, and the agricultural sector was no exception to it. Commercial agricultural had profited for more than half a century from heavy government interventions, protectionism, and a distorted agricultural policy environment subordinated to apartheid policy. By the 1980s these support mechanisms became fiscally untenable and gradual deregulation ensued (Hall and Cousins 2015). As such, the 1980s were characterised by a move to opening the agricultural sector, discussed in more detail in the following Section 4.2.2.

This first section has shown how water governance and agricultural development have been closely intertwined in South African history. In the Western Cape, fruit production has been prominent since the late 19th century. Owing to the Western Cape's winter rainfall condition, commercial production of fruit for export has been reliant on irrigation, which required the mobilisation of water resources through infrastructure projects. At the same time, farmers across South Africa were some of the National Party's key constituents and ensuring their support through policies that facilitated and enabled farming was a political priority. Consequently, fruit producers in the Western Cape profited from these support mechanisms in developing and growing their farming businesses.

4.2 Ending Apartheid – Separating Water and Agriculture?

Apartheid formally ended in 1994, when the ANC won the first democratic election. It was a negotiated end: a political settlement between the National Party and the ANC and its allies, which had commenced in 1990 with the release of Nelson Mandela from prison. It was followed by the repeal of the four cornerstones underpinning the legal framework of apartheid (the Population Registration Act of 1950, The Group Areas Act, the Natives Land Act (now Black Land Act) and the Separate Amenities Act) in June 1991 by then President FW de Klerk (Feinstein 2005, Ross 2008). Negotiations of the democratic transition began later that year. While these negotiations included policy directions, the hard work came after 1994, when all laws needed to be systemically rewritten, including those pertaining to water and agriculture.

For the first time, at least theoretically, water resources management was not subservient to the agricultural sector. These changes in the water legislation and policy are discussed here in detail in Section 4.2.1. While the formal water governance regime was being reworked, agricultural policy went through its own radical change. Markedly, the full reopening of markets was accompanied by the deregulation of the agricultural sector, including the fruit industry, which led to a proliferation of global agricultural production networks, as discussed in Section 4.2.2. The deregulation of the fruit industry followed South Africa's subscription to an orthodox macroeconomic policy characterised by neoliberal market restructuring that included trade liberalisation and export-orientation as a model of development. This neoliberal paradigm ended up creeping into the new water governance framework to ensure continued access to water for export-oriented fruit production. In a way, therefore, water policy remains subsumed to agricultural policy. These developments are important contextual information that support the analysis presented in Chapter 5, Chapter 6, and Chapter 7.

4.2.1 A New Hope? Post-apartheid Water Governance

The cornerstone of the legislative water reform was the 1997 White Paper on Water Policy (DWAF 1997), spearheaded by Professor Kader Asmal, the first Minister of the newly created Department for Water Affairs and Forestry (DWAF)[12], after a two-year consultation process (De Coning 2006). The White Paper introduced important principles

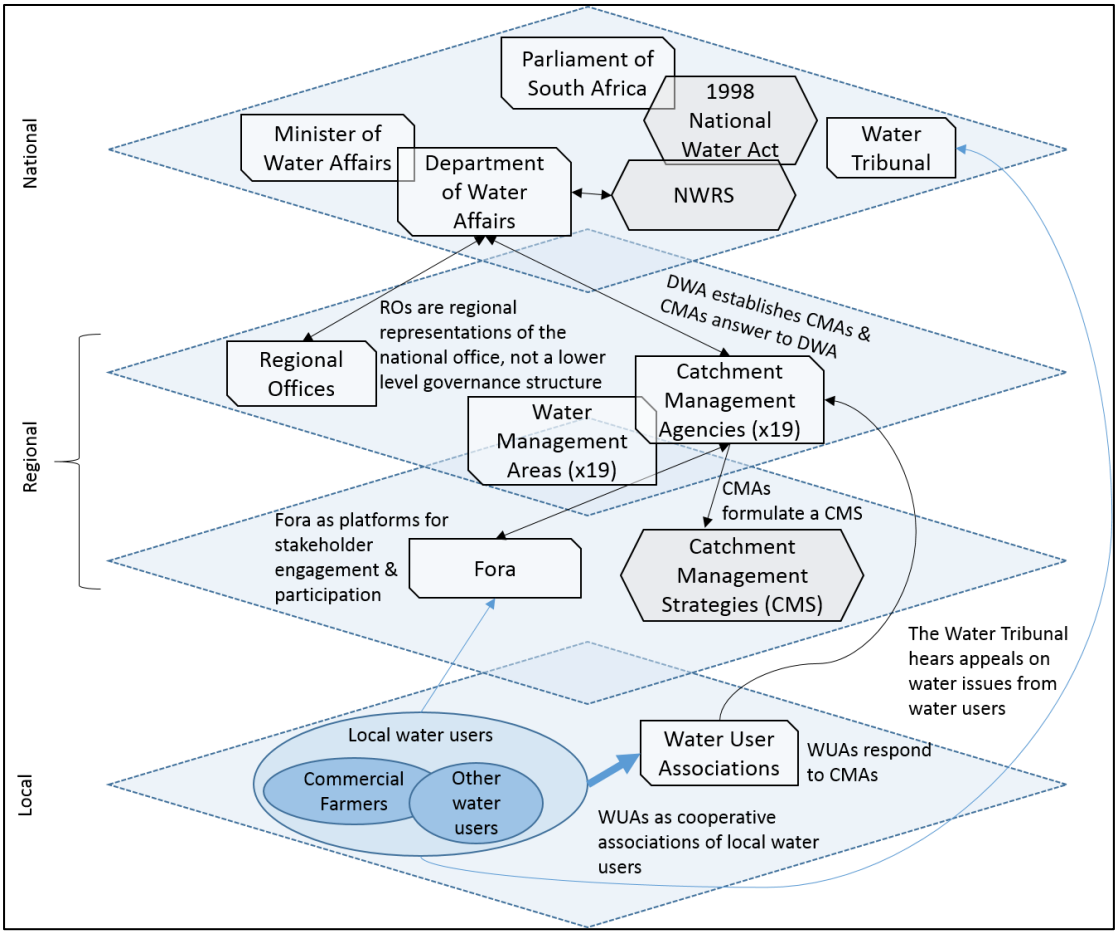
[12] The Department has undergone several restructuring processes post-apartheid. It was Department of Water Affairs and Forestry (DAFF) from 1994-2004, Department of Water and Environmental Affairs (DWAE) from 2004-2009, and Department of Water and Sanitation (DWS) since 2009. It is aimed here to consistently use the term adequate to a specific period. When in doubt, or overlapping time periods, the term Department of Water Affairs or Water Affairs is used.

that would later be reflected in law. This included a focus on equity and redress, as well as sustainability. Especially the provision of water services and sanitation had become a political priority. The lack of these infrastructures for the black majority population viscerally embodied the effects of the segregationist rule. Partly because of the urgency to address the sanitation situation, the White Paper distinguished between water services provision and water resources management. This separation was translated into law with the Water Services Act No. 108 of 1997 (WSA) and the National Water Act No. 36 of 1998 (NWA). The WSA is competence of local government and oversees water distribution for domestic, business, and industrial uses. The NWA is a national competence and governs the country's water resources – rivers, streams, groundwater, and dams (Goldin 2010). Water use by commercial agriculture is thus governed by the NWA. The NWA introduced a series of new principles for water resources management that directly impact water use by commercial farmers, such as Western Cape fruit producers.

The most far-reaching change for Western Cape fruit producers was the abolishment of private water rights and riparian rights (National Water Act 1998). Under the apartheid regime, fruit farmers were able to use water from adjoining rivers or groundwater with very little regulation. The NWA, however, introduced administrative water permits for everybody. This could have potentially led to important curtailment of fruit producers' access to water for irrigation purposes. This potential has, however, so far not been realised. This is largely due to the caveat of 'Existing Lawful Uses' (ELU). ELU acknowledges water uses that were lawful under the 1956 Water Act as lawful under the NWA. The caveat was introduced to minimise disruption to economic growth and development – very much in line with the country's new orthodox macroeconomic policy (discussed in Section 4.2.2). It is determined based on the two years prior to the promulgation of the National Water Act. ELU does not equate to a water licence; it was supposed to be a transitional mechanism and users with such authorisation are still required to apply for a proper licence in the future when required to do so by the responsible authority (van Koppen and Schreiner 2014a). The reality, however, is that 21 years after the promulgation of the NWA, many commercial fruit producers still have access to water resources based on ELU. This is part of the analysis presented in Chapters 5 and 6 and the implications are further discussed in Chapter 7.

The only water rights that remained in the NWA were those pertaining to the Reserve. The Reserve refers to both the quantity and quality of water needed to cover basic human needs as well as to protect aquatic ecosystems for sustainable development (National Water Act 1998). The Reserve thus has a human right and an environmental component. All other water uses are subjected to an administrative allocation and authorisation process.[13] The right to access enough water for basic human needs is also enshrined in the Constitution (Constitution 1996). As such, water for basic human needs has the highest priority of allocation in South Africa. The concept of the Reserve was ground-breaking and innovative when initially published and has contributed to the national and international acclaim for the National Water Act No. 36 of 1998 (Schreiner 2013).

Figure 4.4: Ideal water governance regime as foreseen in the National Water Act No. 36 of 1998 and the National Water Resources Strategy



(Source: author's analysis)

[13] The need for licences for all water uses is somewhat qualified in the Act to lighten the administrative burden of water licencing where water uses are relatively small so they may fall under schedule 1 use or a general authorisation (National Water Act 1998).

The NWA also completely shifted the layering of water governance structures, as shown in Figure 4.4 on the previous page. There is a clear effort to break up the previously highly centralised structures. This is aided by subscribing to the principle of subsidiarity and making provision for decentralisation of water management functions, where and when appropriate, to lower levels of decision-making. The main purpose of this policy is to enable participation of all concerned water stakeholders in water governance; especially historically disadvantaged groups, which had largely been excluded from decision-making processes around water (DWAF 2004). In the NWA, the principle of subsidiarity is linked to the principles of Integrated Water Resources Management (IWRM) (see Chapter 2).

Figure 4.5: South African Water Management Areas pre-2012 and post-2012

On the left, initially defined 19 WMAs (source: DWAF 2004:94). On the right, amalgamated nine WMAs after 2012 (source: DWA 2013:65).

This idea of subsidiarity is further developed in the first edition of the National Water Resources Strategy (NWRS) (DWAF 2004). It defines 19 Water Management Areas (WMAs) (see Figure 4.5) that largely follow hydrological boundaries and are to be managed by Catchment Management Agencies (CMAs) through locally adapted Catchment Management Strategies (CMS). The local level innovation of post-apartheid water policy came in the form of Water User Associations (WUAs). WUAs are co-operative mechanisms that coordinate water-related activities between different water users – large-scale, small-scale, commercial and subsistence farmers; municipalities; industries; and households. This is not unlike the idea of IBs that were established under the previous 1956 Water Act to co-ordinate irrigation infrastructure and management

within farming communities, but much more inclusive. The Act planned for existing IBs to be converted to WUAs within six months of its promulgation.[14]

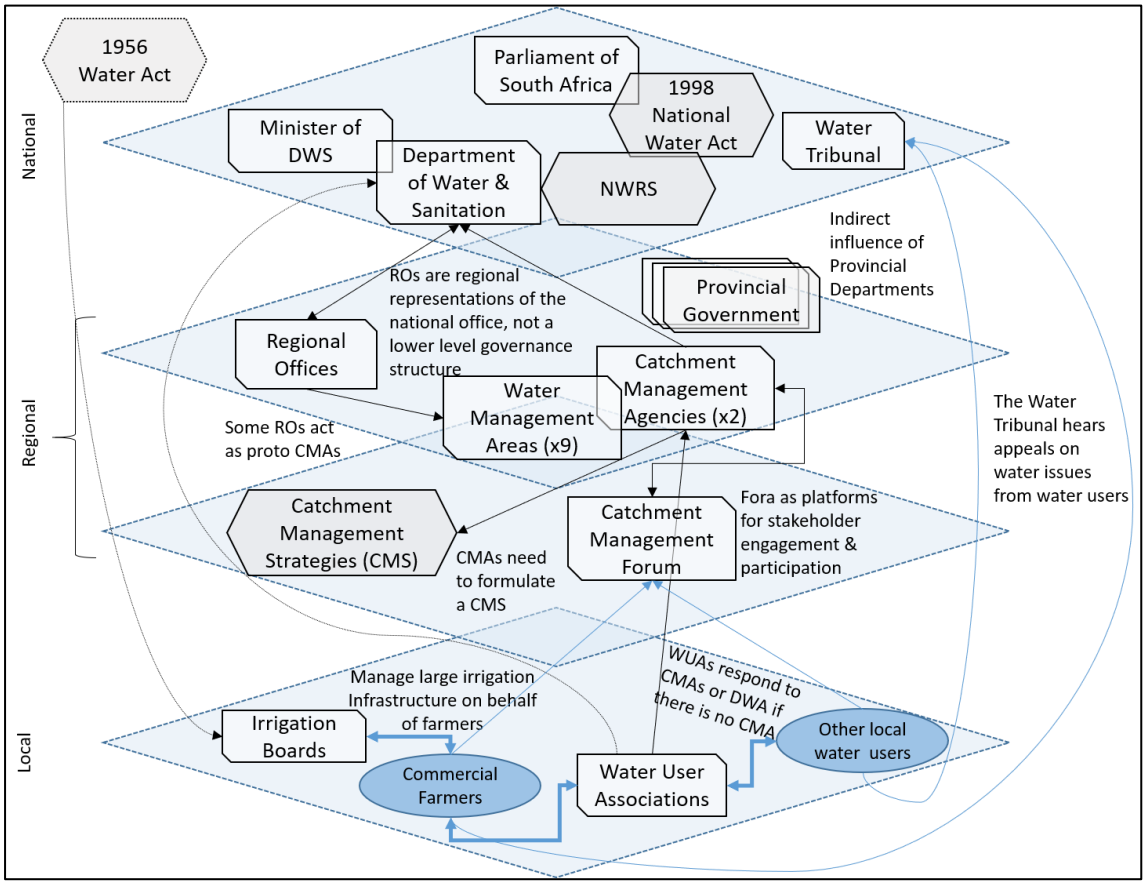
In 2013, only two out of 19 planned CMAs had been established (Inkomati CMA in Mpumalanga and Breede-Overberg CMA in the Western Cape). The slow implementation was ascribed to financial constraints and a lack of human resources and capacity to staff 19 CMAs. While this might have contributed, there also was internal resistance from the staff of the Department of Water and Sanitation who expressed concerns not only about cost and capacity but also about the appropriateness of delegating functions to CMAs and their existence overall (see Schreiner 2013, van Koppen and Schreiner 2014b). This stalemate over the fate of CMAs was only broken when the Minister, in March 2012, announced the consolidation of the 19 Water Management Areas into nine (DWA 2013). Figure 4.5, on the previous page, shows first the 19 planned WMAs (left) and then the consolidated nine WMAs (right). Similarly, and as it stands today, not all IBs have been converted to WUAs. The process of converting IBs was halted towards the end of the first decade of the 21st century, largely due to a lack of true transformation towards equity (DWA 2014). The more intricate dynamics behind this are discussed in Chapter 5, but it does relate to a reticence towards decentralisation. In fact, in November 2017, DWS proposed to establish a single Water Resources Management Agency to centralise decision-making, while devolving only management functions (DWS 2017c). Shortly thereafter, Cyril Ramaphosa became President, ousting Jacob Zuma, and replacing the Minister of DWS in February 2018, which might lead to a change in direction.

What is important for this research project is that the incomplete implementation of the NWA has led to a multiplicity of water governance structures, as shown in Figure 4.6 on the next page. At the national level, all foreseen institutions are implemented and operational. Although there are other levels of water governance, most decision-making is still centralised at this level. At the regional level, the institutions foreseen in the NWA are not fully implemented or operational. For example, only two out of nine CMAs have been established to date, with a question mark currently hanging over the implementation of further CMAs. In the absence of CMAs, Regional Offices (ROs), as direct representations of DWS, have been executing their functions. ROs are inventions

[14] Other institutional innovations of post-apartheid water law and policy include the national Water Tribunal, which replaces the regional Water Courts, and fora (later termed Catchment Management Forum (CMFs)) as platforms for stakeholder engagement to establish CMAs (National Water Act 1998, DWAF 2004).

of the 1956 Water Act. The initial idea was that they would disappear once CMAs were fully established but there has been much resistance to this from within DWS (Schreiner 2013). Also, while some CMAs are established, many do not have control over all functions initially foreseen, above all the power to allocate water. At the local level, IBs that hail from the apartheid era are still operational in some areas where they serve only farmers. In other areas, WUAs manage local water resources, either as converted IBs or newly formed institutions; and they are supposed to serve both farmers and other water users. Chapter 6 discusses the role of IBs and WUAs within the context of communities dominated by export-oriented fruit production.

Figure 4.6: Multiplicity of water governance structures in present-day South Africa, influenced by both apartheid and democratic water legislation and policy



(Source: author's analysis)

There is thus a multiplicity of water governance structures at play, resulting in a complex water governance architecture. This complexity needs to be navigated, and as argued in the remainder of this thesis, the commercial fruit industry of the Western Cape has become particularly adept at doing so to ensure its water security for productive activities.

4.2.2 Post-1994: Proliferation of Global Fruit Production Networks

While complete deregulation of the agricultural sector was not finalised until 1997 when the Marketing of Agricultural Products Act took effect, efforts to open the agricultural sector had commenced during the late 1980s. The many government support services provided to agriculture had become fiscally untenable, and with a general economic downturn affecting the apartheid project, slow moves were made to open up parts of the economy (Hall and Cousins 2015). Bernstein (2013) argues that commercial agriculture effectively repositioned itself during this time of creeping deregulation by rebranding and reorganising many state agricultural institutions into modern private entities (Bernstein 2013). This ensured the continuation of support to strengthen (white) commercial agriculture post-apartheid.

While many commercial agricultural sectors faced considerable financial challenges in the 1980s, the export-oriented horticulture industry fared comparatively well, generally registering the strongest growth rate of total factor productivity (Feinstein 2005). This was most likely due to two reasons. First, the inherent labour-intensity of this sub-sector prevented it from replacing labour by capital as was seen in the grain industry, for example. Second, the horticulture industry benefitted greatly from the devaluations of Rand in the 1980s, especially when international sanctions led to a reduction of the number of horticultural exports, and their value increased with the concurrent depreciation of the Rand (Christiansen and van den Brink 1994). And although public assistance to commercial farmers as known in the previous decades had been downscaled, state support continued through – most notably – 'drought relief' programmes from 1983 and culminated in 1992 with a government handout of 3.2 billion Rand (R) (Bernstein 2004, van Koppen et al. 2009) – just before the end of apartheid.

A) GEAR – Growth, Employment and Redistribution

Full deregulation of the agricultural industry came in 1997 when the Marketing of Agricultural Products Act took effect. It opened new markets while inviting in global competition. This new agricultural policy led to a proliferation of global fruit production networks, which resulted in an unprecedented change across the Western Cape fruit industry and the wider agricultural sector (Du Toit 2008, Kirsten, Edwards, and Vink 2007, Mather and Greenberg 2003, Mather and Adelzadeh 1998). The new state policy towards agriculture is located within the broader dynamics of the Growth, Employment and Redistribution (GEAR) strategy, the post-apartheid macro-economic plan

championed by the ANC, which included neoliberal market restructuring with a focus on trade liberalisation and export-orientation as a model of development.

In 1996, the otherwise left-leaning ANC introduced GEAR as its new macro-economic policy, replacing the previous more social-democratic Reconstruction and Development Programme (RDP) (Marais 2001). The ANC had inherited a bedridden economy from the apartheid state, and to promulgate economic growth it relatively quickly unrooted itself from its socialist ideologies, aligning its economic policy to neoliberal orthodoxy. GEAR became not only South Africa's new growth strategy, but also considerably shaped its broader development path. Critical research into the negotiated transition of South Africa shows how GEAR was drafted in a rush, presented as non-negotiable, and then swiftly implemented with the main purpose of boosting private investor confidence (Bond 2000, Marais 2001). The basic principles of GEAR focused on fiscal austerity and limiting tax revenue as a share of GDP to 25% (later increased to 26.5%) while GEAR's growth projections depended entirely on private investments (Adelzadeh 1996). Under the headline of 'enhanced competitiveness', it restructured trade and industrial policy according to an export-led strategy, leading to a disconnect between political discourse and economic strategy (Bek, Binns, and Nel 2004).

GEAR did not, however, include any specific measures 'to ensure the private sector met its assigned duty of productive investment' (Marais 2011: 114). Consequently, there were no direct causal links between the proposed measures in GEAR and the achievement of growth and employment targets. This latter point was crucial – tackling unemployment was (and remains) a key political agenda point. Between 1994 and 2000, over half a million non-agricultural jobs were lost in addition to the loss of roughly 200,000 farm jobs where farmers mechanised and retrenched workers ahead of stricter labour regulation (Alford 2016). Even at the peak of GDP growth of 5% between 2005 and 2007, unemployment levels were only reduced marginally (Marais 2011). The growth of the South African economy, therefore, was largely a jobless one. The jobs that were created, e.g. through public works programmes, were predominantly insecure and low-paid, effectively creating a class of working poor (Marais 2011). As a consequence, the 'structural foundations of a society in which injustice and inequality had been horrendously fused' (Marais 2011: 78) remained unaddressed.

B) Contemporary Global Fruit Production Networks

Following deregulation, the fruit industry went through a process of concentration and centralisation by expanding through internal accumulation and buying out competitors.

As a result, the number of white commercial farms dropped from roughly 60'000 units in 1996 to 35'000 units in 2014 (Hall and Cousins 2015: 3). This was the outcome of a process of 'natural selection' by new global market forces that produced winners and losers. When the marketing boards were removed after democratisation and protectionism fell away, some more marginalised commercial farmers were not able to remain competitive. Other, more 'elite' farmers, often already having a certain global orientation through exports, capitalised on these new market forces and became winners (Hall and Cousins 2015, Mather and Greenberg 2003). Many of these 'elite' farms are located in the Western Cape, which has had a history of export-orientation.

Figure 4.7: Rise in production volume (t) and export volume (t) of deciduous fruit (apples, pears, apricots, peaches, and plums) from 1990 to 2017

(Source: compiled from the Abstract of Agricultural Statistics 2018 by the Department of Agriculture, Forestry and Fisheries (DAFF))

One of the most significant impacts of full integration into the global markets for the fruit industry was the increase in production and exports. Figure 4.7 illustrates the increase in production and export volume of deciduous fruit[15] produced from South Africa.[16] It shows the increase of production and export volumes over five-year instalments, except for the last bar, which describes the latest available data. As such, the latest bar is much

[15] This includes apples, pears, apricots, peaches, and plums.
[16] The Abstract of Agricultural Statistics (DAFF 2018) does not differentiate export data by Province, consequently is what not possible to get the specific export data from the Western Cape only.

closer, time-wise, to the previous five-year instalment and it may appear to present a stagnation or slump. In reality, production has continued to increase over that year (plus 43,383 t), while exports, however, have indeed slightly decreased (minus 2,175 t) (DAFF 2018). This could be an early sign of the 2015-2018 drought, however, full impacts will only become evident for the 2017/18 and 2018/19 harvests, for which data is not yet published. Overall, there has been an increase in production of plus 751,894 t (+ 79%) between 1990 and 2017, while exports have increased by 388,392 t (+117%) in that same period. In sum, Figure 4.7 shows that deciduous fruit is a prominent export sector that has considerably grown since the early 1990s.

Considering the Western Cape in more detail from secondary data shows that agriculture is a key sector in the Province. Agriculture in the Western Cape contributes 23.3% to the national Agriculture, Forestry, and Fisheries sector, over 4% of the Gross Domestic Product (GDP), and 45% of agricultural exports in 2015. It is dominated by horticultural production, which makes up 52% of the annual agricultural production value of the Province (Midgley, New, and Methner 2015: 112). In 2015, roughly 150,000 people worked in the agricultural sector of the Western Cape, which amounts to 20% of the total national employment opportunities within that sector and 8.2% of the regional workforce (Midgley, New, and Methner 2015: 101). Employment creation is a key political priority of GEAR and the National Development Plan (NDP)[17]. In fact, the NDP singles out irrigated agriculture as one of the important sectors to boost employment. It proposes to increase the area under irrigation by more than 50% to create jobs in the labour-intensive, and high-value horticultural industry (NPC 2012).

Much of the deciduous fruit produced in the Western Cape is exported to international markets. South Africa is one of the top four *pome fruit* (apples and pears) producers in the Southern Hemisphere alongside Chile, New Zealand, and Argentina. Together these four countries contribute to 22.3% of world apples and 30% of world pear exports. The Western Cape exports roughly 37% to 45% of its apple production and circa 48% of its pear production. *Stone fruit* is another export commodity originating from the Western Cape. In fact, 90% of all South African apricots, nectarines, peaches, plums, and prunes

[17] The NDP was published by the National Planning Commission (NPC) in 2012, after a three-year research and consultation process. It lays out a roadmap to eliminate poverty and inequality in South Africa by 2030 (NPC 2012). It is part of the New Growth Path (NGP) promoted by Jacob Zuma.

are grown in the Western Cape (Midgley, New, and Methner 2015). Figure 4.8 shows the concentration of deciduous fruit and grape production in the Western Cape Province.

Figure 4.8: Main deciduous fruit and grape growing areas in South Africa

(Source: Hortgro 2017: 1)

Initially, the growth in fruit exports from the Western Cape (and South Africa more generally) was due to increased demand for fresh fruit in Western Europe – the primary export destination at the time. Changing global consumption patterns have raised the demand for fresh fruit and vegetable by 100% between 2000 and 2007 (FAO 2006), which coincided with South African fruit's renewed integration into global markets. Consequently, the UK and continental Europe became the primary destination for Western Cape fruit exports. Since around 2007, other economies, such as other African countries, Asia, and the Middle East have become increasingly important buyers for the Western Cape fruit industry (Tregurtha, Vink, and Kirsten 2010, Barrientos and Visser 2012). Albeit Europe and the UK remain important, export markets are, therefore, becoming increasingly polycentric.

The rapid expansion of commercial fruit production in South Africa coincided with wider shifts of global production, characterised by the increased complexity of networks of production, distribution, and consumption. For the South African fruit industry, this meant a further move away from producing for national and regional markets and the associated arms-length wholesale traders towards a sharp increase in production for export via

increasingly integrated global production networks. Similarly to dynamics in the agri-food sector of other developing countries, the South African fruit production networks have been characterised by 'buyer-driven' production networks (Gereffi 1994). This is largely due to the expansion and consolidation of powerful supermarket lead-firms (Barrientos 2008b). Deregulation of the South African fruit industry in the late 1990s coincided with this rise of supermarkets from the UK and mainland Europe, who remain important buyers today, despite the increased polycentricity of export markets.

Supermarket lead-firms have been able to control and direct production of South African fruit, without direct ownership of the production process – a key characteristic of such buyer-driven production networks (Humphrey and Schmitz 2001). This has been achieved by focusing on value-added consumer-oriented activities, which allows lead firms to extract economic rents from a weaker supply base (Barrientos 2013b). Through just-in-time buying practices, cost of demand instability as well as other risks and uncertainty are passed down from the supermarket buyer to the producer. This pressure is often exacerbated by the imposition of a vast array of private standards to govern the safety, quality, and aesthetics of the fruit, as well as agricultural processes, and social and environmental sustainability practices (Dolan and Humphrey 2000, Bain, Ransom, and Higgins 2013). The Western Cape fruit industry is thus a truly globalised one, fully embedded in global agricultural production networks.

4.3 Chapter Conclusion

This chapter has considered the political economy of water and agriculture of the Western Cape. It has done this by showing how water and agriculture have been tightly interlaced over the Western Cape's complicated history. This intertwining characterises much of the colonial and apartheid era, where water was actively mobilised to serve the ruling minority, who dominated the fruit industry. After democratisation water policy has largely been decoupled from agriculture, however, challenges remain to break completely with past structures. This is in part due to the importance of the fruit industry for the Western Cape economy, which in turn is heavily reliant on water for irrigation.

The first half of the chapter has reviewed South Africa's colonial trajectory, which originated from the Cape Colony. It has shown how gaining access to and control over water resources has been key to develop the colonial settlement. The commercial fruit industry developed in the Western Cape out of this dynamic in the late 19th century. After the formation of the Union of South Africa, racialised access to land – and thus water – was cemented into law with the introduction of the Natives' Land Act No. 27 of 1913.

Today, many fruit farmers in the Western Cape proudly point towards generations of farm ownership within their families. It is important to remember that they acquired land within this context of colonisation and dispossession.

The exploitative dynamics underpinning these developments were further reinforced during apartheid. In fact, the apartheid government supported the development of white commercial agriculture through deliberate and sustained subsidies, tax reliefs, soft loans, and research and development. This created a comprehensive organisational and infrastructural support structure for commercial agriculture, which is still being leveraged today as discussed in Chapter 6 and Chapter 7. At the same time, black South Africans were confined to the homelands, where poor soils and little water had curtailed developments to commercialise agriculture. The ensuing dualistic agricultural sector still characterises much of South Africa today.

After apartheid in 1994, hopes were high to achieve an equitable society, including through processes of land and water reform. The National Water Act No. 36 of 1998 has garnered international acclaim for its emphasis on sustainability through the Reserve. It has, however, also enshrined inequities by acknowledging water uses granted under the previous apartheid-era Water Act as lawful through the ELU-mechanism. The reason behind this was a fear of otherwise disrupting the economic pillar, especially lucrative export-oriented horticultural production. This thinking is in line with GEAR, the orthodox macroeconomic policy championed by the ANC in 1996. It represented a rightward shift for the otherwise left-leaning ANC. Contrary to the promises of its proponents, it led to slow and jobless growth that did not bring the redistributive justice it advertised.

This was accompanied by deregulation of the agricultural sector, including the fruit industry, who so far had operated through a single-channel marketing board. It led to a considerable increase in production and exports, associated with the lifting of sanctions and full integration into global markets. Despite on-farm job losses, the horticultural industry remains comparatively labour intensive. Consequently, it is often singled out for its employment creation potential, including by the NDP which emphasises the link between irrigated hectares and number of jobs. Concurrently, after a process of concentration and centralisation, the fruit industry has settled into lucrative global production networks. This constitutes a considerable motivation to increase the area under production, which in turn requires more water. These themes are picked up through presentation of the findings in chapters 5 and 6, as well as in the discussion of these in Chapter 7.

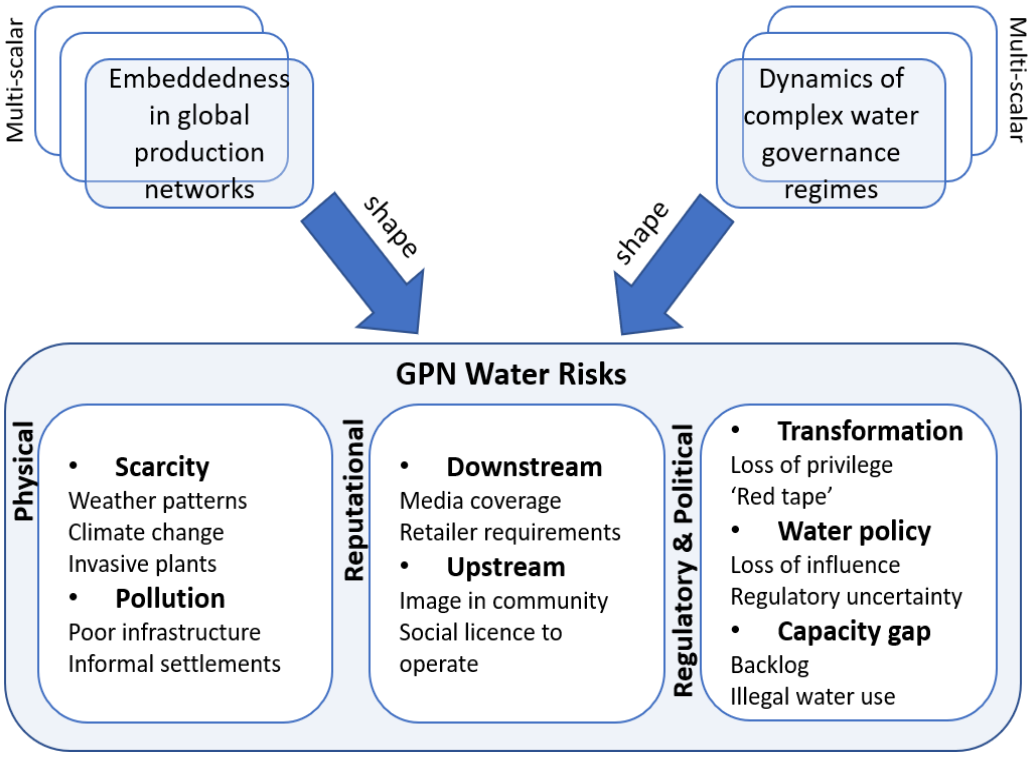
5 Troubled Waters: Water Risks for the Western Cape Fruit Industry

This chapter discusses the different water risks faced by the Western Cape fruit industry. High-value export-oriented deciduous fruit cannot be produced without precise irrigation. Therefore, the Western Cape fruit industry is reliant on access to (1) enough water (2) of acceptable quality (3) on a regular basis. Production and supply to global markets may be threatened if any of these three requirements are not fulfilled. How these threats come to be can usefully be captured through the concept of water risk, as introduced in Chapter 2. Absence of water is often equated to a lack of rainfall, however, what is shown here is that such scarcity is not inherent in 'nature' and can be produced and constructed by policies, governments, firms, and their interactions (see for example Bakker 2000). While these scarcities will affect various actors differently, this chapter investigates how the fruit industry specifically identifies and defines water risks and how it is affected by them. As such this chapter is the first step in answering Research Question 3: *What factors drive and shape the influence of global agricultural production networks on water governance, and how have these played out in the Western Cape?*

The chapter is based on primary and secondary data. As described in Chapter 3, the primary data was collected in the form of 76 semi-structured interviews during fieldwork across the study area in the Western Cape and Pretoria. Interview participants included producers; industry organisations; representatives from different levels of government, NGOs, research institutions, and consultancies (see details in Appendix 2). By interviewing these various stakeholders both actor-specific information and more structural-level data could be collected. Secondary data became useful to understand the regulatory and policy environment surrounding water and agriculture, which is particularly key for the understanding of regulatory and political water risks. The chapter follows the broad categorisation of water risks identified from the literature and untangles how (1) physical risk, (2) reputational risk, and (3) regulatory and political risk manifest in the study area. By drawing on both primary and secondary data, it offers a rich and detailed description of the dynamics of each of the three water risk categories.

Identifying and defining water risks for the Western Cape fruit industry is a key step to understand how these economic actors influence local water governance. The political economy perspective allows drawing in both the historical and current political and commercial forces at work in the Western Cape, emphasising the contextual nature of water risks. It is also important to remember that the water risks described and analysed here are identified and defined as such for the commercial fruit industry specifically and are therefore actor-specific. Other actors within the study area might not define these dynamics as risks or if they do, experience them very differently. A key argument brought forward here is that water risks form based both on the fruit industry's embeddedness in global production networks and its integration into the complex water governance dynamics of the Western Cape and broader South Africa – both of which are inherently multi-scalar. Figure 5.1 aims to illustrate this relationship and functions as the beginning of a conceptual framework that is informed by the literature reviewed previously and refined through the empirical investigation and analysis presented in this and the next two chapters, Chapter 6 and Chapter 7.

Figure 5.1: Conceptualising the influence of global agricultural production networks on processes of water governance: how water risks form and manifest



(Source: author's analysis)

As will be shown, all water risks threaten the industry's regular access to the needed quantity and quality of water to produce export fruit. Crucially, when these risks actualise, they become an economic risk, translating into costs or loss of market share. Following the broad water risk categorisation discussed in Chapter 2, Section 5.1 starts the chapter by discussing physical water risks. Physical water risks describe 'traditional' understandings of scarcity, e.g. arising from lack of rainfall and runoff. In the Western Cape, this includes the winter rainfall condition, water lost to alien invasive plants, the effects of climate change on water availability, but also concerns regarding water quality due to pollution from informal settlements and failing infrastructure. Both water quantity *and* quality influence the formation of reputational water risks, as debated in Section 5.2. The amount of water allocated to commercial agriculture is a contentious issue in post-apartheid South Africa characterised by increasing urbanisation and population growth. Concerns over water quality also affect the industry's image, where media reports about irrigation with polluted water can have a detrimental impact on market access. All these dynamics are compounded by regulatory and political water risks (Section 5.3) experienced by the fruit industry. Unstable water policy and a public-sector capacity gap have led to weak governance in the South African water sector, while transformation requirements are often perceived as an additional burden for the still mostly white commercial fruit farmers. The chapter is then wrapped up with some concluding remarks in Section 5.4, which also sets the scene for the following chapter, Chapter 6.

5.1 Nature Matters: Physical Water Risks

Physical water risks refer to a shortage of water (scarcity), too much water (flooding), or water that is unfit for purpose (pollution). These risks can majorly affect global agricultural production networks as they have the potential to disrupt production, and consequently, threaten the supply of the desired product to global markets. Fieldwork for this research project was conducted during a period of drought (2015-2018) and as such many respondents focused on issues of scarcity rather than flooding. The unwanted abundance of water brought on by floods may, however, be just as disruptive to commercial fruit production as a lack thereof (Midgley, New, and Methner 2016). Pollution also poses a physical risk as water may get so dirty that it is unfit for purpose, even if there is enough in terms of quantity. Water quantity and quality can thus be categorised as physical water risk and the dynamics behind them will be explored in more detail within this first section.

5.1.1 Managing Weather Patterns and Preparing for Climate Change

South Africa is a water-scarce country – the 30th driest in the world – with an average annual rainfall of 495 mm (WWF-SA 2016). The Western Cape itself has a very heterogeneous climate that spans a semi-arid summer rainfall regime in the north-east Karoo, to perennial rainfall areas in the southern coastal areas, and mostly winter rainfall in the south-west and western parts of the province. Mean annual rainfall also varies strongly, ranging from around 150 mm to over 1 500 mm (Midgley, New, and Methner 2015). Much of the province where fruit is produced commercially for export falls into a Mediterranean climate characterised by winter rainfall.

A) Managing Weather Patterns: Dealing with the Winter Rainfall Condition

As a consequence of the winter rainfall condition in the fruit-producing areas, farming enterprises rely heavily on water storage facilities that harvest surplus flows and rainwater in winter, which then are made available during the hot and dry summer months (Midgley, New, and Methner 2015). A representative of the provincial Department of Agriculture illustrated how the winter rainfall condition affects water availability on fruit farms:

> So, we get the water in six months of the year, when we don't need it, store it to use it in the summer months. So, there is a technical competency to manage that water compared to other parts of the country where they get summer rainfall. (Government interview R45)

The statement underlines several issues about managing the winter rainfall condition of the Western Cape in relation to commercial fruit production for exports. The main irrigation period for fruit in the Western Cape is between October and March, depending on cultivars. This is the most water-intensive phase for fruit production as trees need to be irrigated at regular intervals. Since there is little to no rainfall, irrigation needs to be administered from water storage:

> [W]e are a winter rainfall area, which is different from farming apples in the UK for instance, and we get limited summer rainfall, so we have to store everything we use. You can't rely on any summer rainfall for irrigation. (Producer interview R62)

Depending on cultivars, the harvest may start as early as November or be as late as May. After harvest, trees require less water as they go dormant; however, some post-harvest irrigation is needed to ensure the tree's productivity for the following season (producer interview R9, market interview R61). Consequently, there is an inverse relationship between when water is readily available and when it is needed. Western

Cape fruit growers thus need to manage the most water-intensive phase of production during the time when least water is available.

To ensure water availability during the spring and summer, farmers rely on water storage facilities – dams – to store the water they need for irrigation. Some farmers have private dams on their own farms. Others are part of a collective of farmers that owns the local infrastructure, where each farmer has an allocation depending on the investment contributed to the construction and maintenance of the dam. Other regions are serviced by government schemes. These are usually very large reservoirs that service different areas and farmers have specific allocations to some water (researcher interview R72). Many of the farmers that access water from a local or regional dam will also have smaller storage facilities on their land in order to store their allocation on site (SmartAgri 2015).

This winter rainfall condition poses a risk in two ways. First, it can become problematic when winter rainfalls are below average, as happened during the 2015-2018 drought. Farmers are left to manage a fraction of their usual water allocation over the forthcoming summer months. Second, the need for infrastructure such as dams is costly to build and to maintain, and as discussed in Section 5.3, it can be difficult for farmers to build on-farm storage. Water remains the limiting factor for fruit production in the Western Cape. As explained by one producer (R37), 'we have got more arable land available than we have water'. Lack of rainfall can seriously disrupt production. This disruption is aggravated if no or insufficient water storage is available.

B) Preparing for Climate Change?

Physical water risks are exacerbated by the threat of climate change. The Western Cape is one of South Africa's regions most at risk from the effects of climate change (Midgley, New, and Methner 2016). While trends show overall warming of South Africa with an increase of >0.02°C/year of surface air temperatures between 1980-2016, there are greater rates of warming in the Western Cape (Jury 2019). This warming trend in the Western Cape is further evidenced by a combination of increased mean annual temperatures, higher maximum and minimum temperatures, more hot days and more heatwaves, and fewer cold days and frost days. Projected future changes in the temperature range from +1.5°C to +3°C for the period 2040-2060. While there are no detectable trends of changes in mean annual rainfall, there is a trend of reduction in mean annual rain days. Projected changes in rainfall indicate some degree of reduced rainfall for the 2040-2060 period (MacKellar, New, and Jack 2014, Midgley, New, and Methner 2016).

A warming of the climate (with or without decreased rainfall) may have significant impacts on the province's water resources. Higher mean annual temperatures can lead to increased evaporation and decrease the water balance while also increasing demand for water. This matters as a hotter climate and increased water stress have direct impacts on the production of fruit destined for global markets. If evaporation rises, farmers need to irrigate their fruit trees more, which in turn increases their demand for water in an already water constrained environment. As explained by one producer 'in theory, if it's getting hotter, then we've got to put more water down' (producer interview R7). Producers are worried, especially considering the 2015-2018 drought during which these interviews were conducted, saying that:

> We are also quite aware of the possible impact of climate change and global warming. You know these cycles of drought can become more intense. (Producer interview R37)
>
> This [the drought] is to me climate change, and this is reality now facing us. It was forecast that this area would get drier and it is happening. So, we got to manage within that going forward. (Producer interview R62)

Demand for irrigation water is projected to increase by around 10% until the middle of the century to maintain current production levels (+20% to maintain production levels until the end of the century) (SmartAgri 2015). Combined with population growth and increasing urbanisation, this will lead to growing competition over water allocations, which feeds into the reputational risks discussed in Section 5.2.

The increased temperatures may also render certain crops unsuitable for the region in the near future (researcher interview R25). Crop selection and suitability is a worry only a few deciduous fruit producers are actively engaging with, as it could signify a complete shift in GPN network embeddedness. One producer in the Elgin Valley region did voice this concern:

> [O]bviously [a] change in the environment is going to affect our trees' performance and that could be concerning, I mean, are we going to be farming bananas in 15 years' time? (Producer interview R7)

Apple production in the study area is the crop most threatened by a warming climate. Apples are also the main fruit produced in the Elgin Valley. Apple-trees are chill-dependent and therefore reliant on cold winters. Even with moderate warming, which is likely, apple production may no longer be commercially viable in the Elgin Valley before the mid-century (SmartAgri 2015). This could lead to a complete shift of the Western Cape fruit industry.

A further worry brought on by climate change related to water is extreme events. While the Western Cape is already prone to extreme water events, such as droughts, floods, and hail storms, there are concerns that these might increase in frequency and severity (Midgley, New, and Methner 2016). A representative of the Western Cape Department of Agriculture underlined how more stressed water resources, combined with more severe events, such as increased droughts and floods, not only pose individual risks to farm businesses but may require a complete overhaul of water resources management in the Province:

> And then on top of that, we have climate change, which will seriously impact our Province and we've seen that in the last couple of years already, the impacts of that. So that will further stress […] water availability. Not necessarily have less water, but more severe events. More floods and droughts. So, the whole management of the water resources will have to be relooked at again. (Government interview R3)

The largest risk from climate change for fruit producers is the uncertainty it brings. Farmers are used to dealing with adverse weather. However, climate change may bring shifts in weather patterns, temperatures, and extreme events beyond the current experience. As such the available response options can be inadequate and inappropriate. A fruit producer in the Ceres areas brings this point home by saying:

> […] our biggest challenge is the uncertainty with the last two years of very low rainfall, this is the most worrying part for us. Is it going to come next year again [the drought], or is it going to come again in 10, 20 or 30 years... so I think that everybody will change their strategy about their water and how to farm with it and what you're going to do with it. (Producer interview R56)

The statement highlights the risks posed by the uncertainty of climate change. Most farmers consider the 2015-2018 drought an extreme event and not the new norm. At the same time, there is appreciation and a realisation that gradually summers have become hotter, springs drier, and winters not as cool. As one producer (R63) put it, 'climate change is more like the frog in the boiling water'. If a frog is put into boiling water, it will jump out, aware of the danger. However, if it is put into tepid water which is then brought to a boil slowly, the frog will remain unaware of the danger until it is too late, and it is cooked to death. This is a useful metaphor describing the gradual worsening of the climate situation and the associated inaction. As a result, the impacts of climate change on the availability of water for fruit production in the Western Cape becomes a causal driver for firm strategies (discussed in Chapter 6).

5.1.2 Infested Waters: Risk Posed by Alien Invasive Plants

A further element that impacts on the quantity of physically available water for fruit producers embedded in global production networks are alien invasive plants (AIPs). AIPs create risks by directly impairing fruit producers' water security because of their water intensity compared to native vegetation and creating other business risks. AIPs occupy roughly 1.5 million condensed hectares (ha) of South Africa[18] (Le Maitre et al. 2016) and may contribute to around 6.7% reduced river flows across the county (Le Maitre et al. 2002). In a country with limited water resources, this is highly problematic, as pointed out by a researcher from CSIR[19]:

> These invasives are sucking up maybe about 7% or so of South Africa's surface waters. So, it's a very important water link and implication, particularly because we're so water constrained. (Researcher interview R73)

While AIPs are a concern throughout South Africa, they are concentrated in the southwestern, southern, and eastern coastal belts and their nearby interiors, which includes much of the Western Cape Province (Van Wilgen et al. 2012). In the Western Cape, the native fynbos vegetation in mountain catchment areas has particularly been invaded by pines and wattles[20] (Le Maitre et al. 2002). In the Breede catchment, home to the study area analysed within this thesis, AIPs contribute to an estimated 6.11% flow reduction (river and groundwater) (Le Maitre et al. 2016). Much of the spread of AIPs is located on private land, including commercial fruit growers' land (van Rensburg, van Wilgen, and Richardson 2018). AIPs are thus a direct concern for commercial fruit producers embedded in global production networks.

The risk posed by AIPs for commercial fruit growers embedded in global production networks manifests itself in several ways. First, the reduction of water flows (river and groundwater) can have very concrete impacts on water availability on the farm. One grower highlighted, for example, how 'as soon as the Eucalyptus trees were taken out, an underground water stream developed, and a fountain came out' (producer interview R50). More commonly though AIPs affect sub-catchment or catchment level water

[18] See Le Maître et al. (2002) and van Rensburg et al. (2018) for a detailed explanation of the rise of AIPs in South Africa.
[19] CSIR stands for Council for Scientific and Industrial Research. CSIR is a research and development organisation established through an Act of Parliament in 1945. Its executive authority is the Minister of Science and Technology. The CSIR undertakes directed, multidisciplinary research and technological innovation, including on water. More information on: www.csir.co.za
[20] The main invasive alien plants in South Africa are Australian Acacias, Pines, Eucalypti, and Hakea (see McConnachie et al. 2012, Le Maitre et al. 2016).

availability, such as the flows of local rivers or the runoff from mountain areas (Le Maitre et al. 2016).

Other risks associated with AIPs is the fire hazard they pose. The Mediterranean climate and the fynbos shrublands in the study area are part of a fire-prone ecosystem. Regular fires remove above-ground biomass and create the necessary conditions for reproduction and coexistence in the native plant communities (Van Wilgen et al. 2010). However, AIPs are also adapted to fire, meaning their seeds spread through fires, aiding their reproduction. In areas where native fynbos has been invaded by alien plants, fires can trigger further spread. In these instances, the fuel load and therefore intensity and severity of fires are greatly increased (Le Maitre et al. 2002). These fires are more difficult to control and pose an increased hazard for humans, infrastructure, and crops, such as fruit orchards, as explained by a grower in the Elgin Valley:

> It is also important from a fire perspective, as the alien vegetation has a much higher fire risk. It burns far hotter and far more intensely and it is harder to control. (Producer interview R55)

The increased severity of the fire may also damage the soil in a way that can result in soil erosion and water repellency. This, in turn, may lead to increased surface water run-off and increase the risk of severe flooding (Le Maitre et al. 2002). Both fire and floods have the potential to be a major disruptor at the production stage of the fruit value chain.

Furthermore, AIPs harbour a regulatory risk. They are regulated under the National Environmental Management Biodiversity Act No 10 of 2004 (NEMBA). In 2014, NEMBA was amended to compel all South Africans, including private landowners, to contribute to the control of alien invasive species to mitigate their threat to biodiversity and water availability[21]. While difficult to enforce, theoretically, NEMBA can be used to demand legally of private landowners to control all listed AIPs on their land (Bennett and van Sittert 2019). Because enforcement of NEMBA had been relatively poor in the past, many commercial farmers interviewed were unaware of their legal responsibility or did not see it as a priority (NGO interview R11). However, there was an awareness that enforcement might be increased in the near future and, for example, in the Elgin Valley, the Water User Association (WUA) has been playing a significant role in informing farmers, as illustrated by the following quote:

[21] Since 1995, the South African government has been running a large-scale programme to eradicate AIPs named 'Working for Water' (WfW). As the focus of this thesis is on commercial fruit farmers, WfW is not discussed in detail here. Please see Bek et al. (2017) and van Wilgen et al. (2016) for reviews of the WfW programme.

> What I also think is maybe not everybody is that aware of the importance of clearing the aliens on their farm with this new NEMBA Act. So, at every meeting [of the WUA] we try and tell them. [..] We tell the farmers 'That is it, you are going to get it'. The green people is [sic!] coming here and they see. (Water institution interview R30)

The 'green people' in this quote refers to the Green Scorpions, the 'enforcement' arm of the Department of Environmental Affairs. If there is non-compliance with the legal requirement to control AIPs, landowners might face a fine and be compelled to invest significantly in alien invasive plant control in the future. This has a considerable cost.

The high cost of alien clearing stems from the need for recurrent clearing to control the spread of AIPs because of their rich seed banks. Clearing can be done through mechanical, biological, or chemical control, depending on the variety. After an initial through clearing, at least two follow-up clearings are needed in six months intervals, followed by ongoing control of the area (McConnachie et al. 2012). Hence, there are considerable financial implications for the farming business (NGO interview R53).

> So, we have an annual budget, in fact, last year we've spent half a million Rands on alien clearing [£28,617][22], which means we don't take it lightly. Our normal budget is about ZAR250,000 [£14,308][23]. Which is a lot of money to spend on anything that does not really generate a proper return. (Producer interview R5)

The explanation also emphasises one of the main barriers to successful enrolment of private landowners in the clearing of AIPs, as (next to cost) there is a challenge of unlocking value from the resulting biomass (Stafford, Von Maltitz, and Watson 2018, van Rensburg, van Wilgen, and Richardson 2017), as pointed out by a freshwater specialist:

> One of the […] residual issues that we're really battling to deal with is this whole thing about trying to find ways to generate values from chopped down alien trees. (NGO interview R11)

Some farmers 'chip it and turn it into mulch' (producer interview R14), which helps reduce evaporation from the soil and reduces the water demand of orchards, however it still demands 'quite a lot of money and energy' (producer interview R14).

Consequently, some fruit growers do not necessarily see the water benefits that clearing of AIPs brings, saying that 'no, I think that whole thing about clearing trees for the run-off. I haven't seen that huge of a success' (producer interview R62). While others highlight the shared nature of the risk posed by AIPs:

[22] 1 ZAR = 0.0572342 GBP (source: www.xe.com, accessed 11/07/2019)
[23] 1 ZAR = 0.0572342 GBP (source: www.xe.com, accessed 11/07/2019)

> And the benefits at the end of the day it's almost for people downstreams from you, because I don't save myself much water. But obviously, if we do it right from the top, we should get more water into the river. At least it is good for the environment. (Producer interview R63)

Because the seeds of AIPs can be dispersed across long distances, especially through fires, there is a shared interest among commercial fruit farmers and other local actors to control the problem (McConnachie et al. 2012). Otherwise, individual efforts become futile rapidly. As such, AIPs may be understood as a shared risk (see Chapter 2) that triggers specific strategies as discussed in Chapter 6. Such a reduction of water quantity, be it due to weather patterns, climate change, or alien invasive plant infestation, has consequences for the quality of water as discussed in the next section. The age-old approach of 'dilution as a solution to pollution' becomes impossible when water quantities decrease, elevating the problem throughout global production networks.

5.1.3 Unfit for Purpose: Risk from Inadequate Water Quality

Water quality risks are a concern throughout the global fruit production network because irrigation water is one of the sources of pre-harvest microbiological contamination of fresh produce (Ijabadeniyi and Buys 2012). If microbiological contamination occurs and is not detected before the produce reaches the end consumer, it can lead to an outbreak of foodborne illnesses, such as those caused by Escherichia coli (E.coli) or Salmonella (Van Pelt et al. 2018). Due to the global reach of fresh produce production networks, such as those governing fruit, outbreaks are rarely confined to the country of origin. For example, in June 2011, Germany and France reported two linked E. coli outbreaks that were traced back to contaminated fenugreek seeds imported from Egypt. The outbreak ended up affecting 14 EU countries plus the US and Canada (EFSA 2011, WHO 2011). Water quality risks are therefore closely linked to food safety assurances and have global importance. Because water quality concerns link to the physical property of water, they can be considered a physical risk; however, because of the sensitive nature of food safety, an actualised water quality risk can also be construed as a reputational water risk (see Section 5.2).

For commercial fruit growers embedded in global production networks complying with food safety and other standards is key to gaining and maintaining access to lucrative export markets. In fact, 'food safety is non-negotiable', as underlined by a fresh produce buyer for a large retailer (market interview R41). Another representative of a different retailer further explained:

> Our farmers because of the exchange rate of the Rand are [sic!] very lucrative to export, so export is very big business to them, it's profitable. But with that comes a number of challenges. You need to produce a crop or a raw material that are [sic!] at a higher standard. The UK and the European Union are very finicky with their standards. (Market interview R32)

GLOBAL G.A.P.[24] is the minimum certification that all producers must adhere to in South Africa if they want to export. Conforming to water quality standards is considered a 'major must' within GLOBAL G.A.P. Not complying with a 'major must' results in non-conformity with the GLOBAL G.A.P. certification rules (GLOBAL G.A.P 2018, 2017a). Therefore, for export fruit farmers, 'one of the biggest threats that you can have […] is when your water becomes so dirty that you cannot export anymore' (researcher interview R51). As such, not conforming to food safety standards set by GLOBAL G.A.P. and lead retailers by using poor quality water, possibly contaminated, could curtail a farmers' access to these market. In fact, there is a risk that if lead firms find 'any problems with your fruit, it gets sent back to you at your cost' (water institution interview R15). Poor water quality can, therefore, turn into a considerable financial risk for fruit producers. This highlights the power relations along the vertical value chain from lead firms, who set standards, to producers, who need to comply. It also showcases how in terms of water, standards and certification are first and foremost in place to assure food safety.

Western Cape fruit growers source irrigation water from large reservoirs, private on-farm dams, groundwater, and/or sometimes municipal supplies. As such, most irrigation water is bulk water and untreated (Ijabadeniyi and Buys 2012). Different forms of surface water, largely rivers, are most at risk of contamination from surrounding or upstream activities than groundwater or reservoirs located above settlements or other human activity (Duvenage and Korsten 2017). In the study area, respondents were mainly worried about two sources of contamination: informal settlements and failing municipal Waste Water Treatment Plants (WWTP).

Informal settlements are a concern because they are unserviced by the municipality and have little to no sanitation infrastructure and limited drainage systems. As a consequence, stormwater, greywater, blackwater, and solid waste can mix in a toxic cocktail that drains into rivers (Fell 2017). A representative of the municipality that encompasses the town of Grabouw in the Elgin Valley summarised the connection between informal settlements and other issues, such as the commercial farmers:

[24] G.A.P. stands for Good Agricultural Practices.

> Sometimes people just go into those areas and […] they put up their informal shacks there and […] then the river becomes a problem and then everything else becomes a problem. (Government interview R6)

Similarly, failing municipal Waste Water Treatment Plants (WWTPs) become a concern when pipes burst and sewage either spills directly into rivers or is swept into the river by stormwater (water institution interview R64). Municipalities in South Africa often lack capacity, are chronically understaffed, and cash-strapped. These features, in combination with ageing infrastructure and rapid population growth, can quickly lead to failing WWTPs (WWF-SA 2016). Water quality risks are thus also connected to a public-sector capacity gap, a concern that feeds into regulatory and political water risk, discussed in Section 5.3.

While it is easy to point towards informal settlements as the source of water quality risks, in some cases these are intimately linked to a growth of the fruit industry, driven by increased demand from global markets and enabled by the mobilisation of additional water resources. Figure 5.2 on the next page depicts this relationship in the context of the Ceres Valley. The Koekedouw dam in Ceres suffered structural damage during an earthquake in 1969 and only held 0.4 million m^3 water, limiting agricultural development. In 1998, the dam was fixed, and the dam wall raised, now holding 17 million m^3. The increased availability of water led to an expansion of deciduous fruit production (Schachtschneider 2016). This, in turn, stimulated the labour market and surrounding urban areas, such as Prince Alfred Hamlet, experienced rapid population growth. One representative of an NGO working in the area explained, how the fixing of the dam attracted labour, which in turn affected water quality:

> That enabled them to grow a lot more fruit and that drew in a lot more labour. The labour was seasonal […] [and] came with their families and so informal settlements developed around the town. And those informal settlements are upstream from [the farmers'] water intake. And then all the sanitation, rubbish and problems came down from there and are flowing into their water which then has to go onto very high valued crops for the international market. (NGO interview R35)

The Witzenberg municipality holds the responsibility to provide water and sanitation services to these growing towns. The speed of the urban growth, however, has rapidly overburdened local capacity and infrastructure. Consequently, greywater, blackwater, and solid waste form unserviced or poorly serviced communities, often drained by stormwater, flows back into the catchment, creating the much-feared water quality risks for fruit production supplying global markets as outlined above. Another NGO interviewee concurred with the above statement:

> [I]t's a vicious cycle because the farmers are obviously…Well, farm labour often stays in town, the municipality is responsible for it and their pressures are so large, typically in South Africa, on the municipalities that they cannot meet the sudden influx of growth that comes with the growing agricultural sector. (NGO interview R31)

Increased agricultural production will invariably require more labour, especially in the comparatively labour-intensive horticulture sector. More labour, however, requires the provision of sanitation and water services, as this can otherwise become problematic for export-oriented fruit production (producer interview R18, NGO interview R60). In turn, a water-quality-scare induced market loss could potentially affect the well-being of urban dwellers if the loss in market share translates into a loss of jobs (Schachtschneider 2016).

Figure 5.2: The link between growth and water quality in the Ceres Valley

(Source: Schachtschneider 2016: 1)

Poor water quality is a typical example of shared water risk. It is hard to see how polluted water can be anything but a risk for both humans and the environment. The way the fruit industry identifies and defines water quality risk, however, is very specific to its needs. The above example of the Koekedouw dam in Ceres further shows how the fruit industry is not only exposed to water quality risks but also plays a part in driving the dynamics behind its formation (NGO interviews R31 and R35). Increased production in the Ceres Valley, and the Western Cape more broadly, is largely driven by the demand for fruit from global markets. This links the dynamics of the global economy to the formation of local water quality risks. This formation of water quality risks works in interaction with regulatory and political water risks, such as the public-sector capacity gap that plagues the South African water sector (see Section 5.3). The way these undercurrents work together to create water risks also begs the question of who is responsible to ensure good water quality. For global fruit production networks, water quality concerns can also easily translate into reputational water risks, as discussed in the next section.

5.2 Image Matters: Reputational Water Risks

Reputational water risks refer to the real or perceived (negative) social and ecological impacts of water use and discharges of companies. This can affect the brand value and market share of individual firms. With the rise of social media and the 24-hour news cycle, scrutiny of companies and their decisions has particularly increased (Orr and Cartwright 2010). Recurring examples are the damning media reports on Kenya's cut-flower industry and its impacts on Lake Naivasha, often appearing around Valentine's or Mother's Day (e.g. Smithers 2011, Stewart 2009, Vidal 2006). Such reputational water risks do not necessarily need to be accompanied by legal proceedings or real material environmental impacts to have long-lasting financial implications for companies (Hepworth and Orr 2013). In the study area, reputational water risks manifest in two specific ways for fruit producers. The first manifestation can be characterised as a 'downstream' reputational risk that links to the perception buyers and retailers have of the Western Cape fruit industry. The second display is located 'upstream' and refers to the negative perception of fruit producers and their water use by the surrounding communities, which can threaten producers' licence to operate. The next sections discuss these upstream and downstream reputational water risks in more detail.

5.2.1 Downstream Reputational Water Risks

Poor water quality can quickly turn into a reputational water risk for fruit producers if irrigation water is contaminated. While poor water quality is technically a physical water

risk, social media and the 24-hour news cycle can convert it into a reputational water risk by reporting on it. Due to the link of water quality to food safety, lead firms, such as retailers, are very sensitive to such media reports. In the case of the Western Cape fruit industry, lead firms located in the Global North, such as UK supermarkets, carry the brand name and thus ultimately the association with contaminated water (Sojamo et al. 2012). Consequently, lead firms can lose consumer confidence and therefore market share if a water quality risk is turned into a reputational risk. For producers, the translation of water quality issues into a reputational water risk, is serious, as explained by an NGO representative working on freshwater issues, because it can translate into an inability to export:

> [I]f they really have problems and things they didn't want Marks & Spencer's to necessarily know about it, to not have their export permit withdrawn. (NGO interview R31)

An illustrative example of this is the Elgin Valley in the study area. On 6 June 2014, the South African news outlet news24 reported on high levels of pollution in the Palmiet River and its tributaries, which flow through the Elgin Valley (see Figure 5.3 on the next page). The newspaper article points out these waterways are 'a main water source for the fruit industry' (news24 2014). While river water quality in the Palmiet river is questionable at times and may contain E. coli (RHP 2011), most farmers receive their irrigation water through closed pipelines from a shared reservoir called Eikenhof Dam. Eikenhof Dam is located above the town where there is very little chance of contamination of that water from human settlement and activities. A representative of the local WUA clarified this and explained how the media reports affected the area nonetheless:

> It was totally misreported in the newspaper. And we nearly lost very big export orders. This is all below the Eikenhof Dam [the E. coli contamination]. And so yes, it can affect about 8 or 10 farmers out of 160. The other 150 farmers get water pumped out of the Eikenhof Dam, which is pristine. But you know what newspapers write, interpretation goes, and you know we are now very strict on reporting on that…the point is valid, because there are big farmers down there. But this polluted water does NOT go into our dam and therefore pollutes all the water we use. It only pollutes 5% of the water that we are using. (Water institution interview R64)

The explanation highlights how a reputational water risk can take on a life of its own, not necessarily relying on real material environmental impacts. Although the water in the Palmiet River may be polluted, most farmers were not affected by this as they do not use river water for irrigation. This nuance, however, matters little in the face of rapidly spreading media reports. As interviewee R64 points out, the Elgin Valley fruit producers almost lost a large export order. Similarly, another WUA representative in the Elgin Valley

Figure 5.3: Screenshot of a newspaper reporting on E. coli contaminated water in the Elgin Valley

(Source: news24 2014)

also recalled the 2014 incident and compared it with the Chilean grape scare from 1989[25], saying 'that's how serious it is. Just imagine, if they wouldn't take any fruit from here anymore, the implications are horrific' (water institution interview R15). The interviewee here also refers to the fear that export markets could refuse produce from the whole of the Western Cape based on isolated cases (whether true or misreported). Microbiological contamination of irrigation water is, therefore, a constant water risk to commercial fruit growers embedded in global production networks that needs perpetual

[25] Two grapes from Chile tainted with cyanide were found by the Food and Drug Administration (FDA) in a shipment that arrived in Philadelphia after apparently a threat was made to the US Embassy in Santiago de Chile. Following the alleged find, the FDA warned people not to eat Chilean fruit. As a consequence, thousands of farm workers in Chile lost their jobs and producers and exporters lost around $300 million and the Chilean government had to step in to offset losses (Anderson and van Atta 1990, Hilts 1989).

management. Downstream reputational water risks can have long-lasting economic impacts characterised by loss of market share and financial costs.

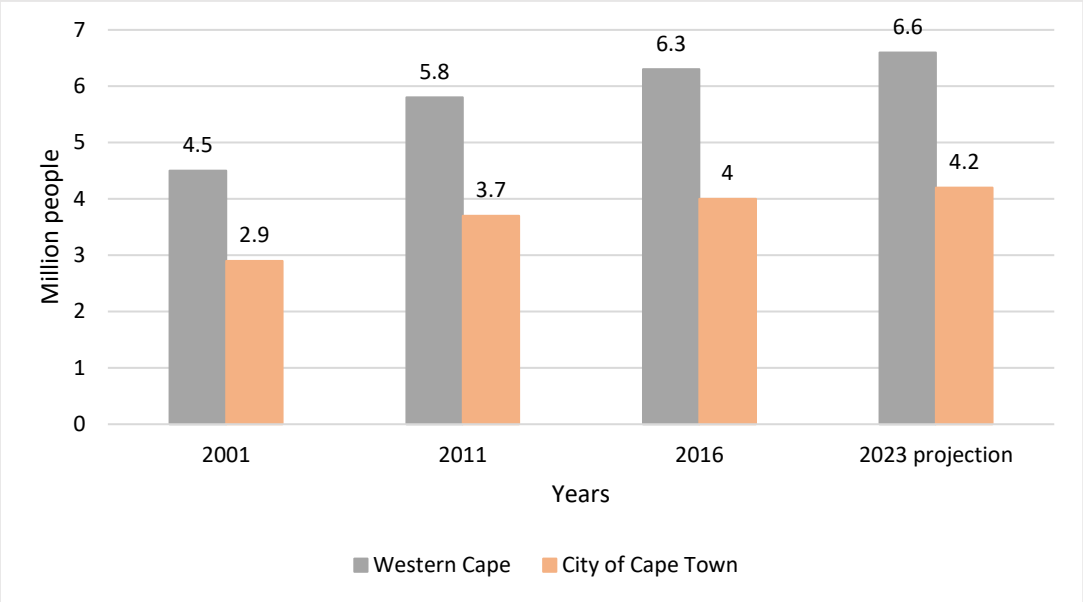
5.2.2 Upstream Reputational Water Risks

Upstream reputational water risks refer to concerns about the image surrounding communities have of fruit producers' water use. In the study area, on average 68% of available water is used for irrigated agriculture, making it by far the largest water user (Midgley, New, and Methner 2016). While this percentage is in line with global averages, in situations of water stress, like a drought, competition over water resources flares and having the lion-share of water can become a reputational risk for the fruit industry. From the fruit industry's perspective, the worst-case outcome of such reputational risk is increased regulation. Upstream reputational water risks for fruit producers are based on competition over water resources. These concerns must be understood against the political economy backdrop of the Western Cape, mainly population growth and urbanisation, as summarised by a representative of the fruit industry:

> [T]he challenge for agriculture is within the potential 60% of urbanisation of people as well as a lot of migration of people from parts of other provinces because there is economic stability here. It's going to be a much bigger challenge for agriculture to keep a hold on the allocation that they've got. (Industry interview R8)

Over the past 20 years, the Western Cape Province has grown rapidly in population from 4.5 million in 2001 to 6.3 million in 2016, a trend that is projected to continue (WCG 2017a). Within the Province, the City of Cape Town has registered a particular growth of almost 40% between 2001 and 2016 (see Figure 5.4 on the next page) (Stats SA 2001, 2011, 2018, WCG 2017a). Cape Town is the second-largest metropolitan area in the country and population growth is coupled to increased service delivery, improved access to water, economic growth, and improved standards of living, all of which are expected to contribute to increases in water consumption (Sinclair-Smith and Winter 2018). At present, water provision for the City of Cape Town is reliant on surface water, as described in Chapter 3, mostly from large reservoirs shared with other growing urban hubs such as Stellenbosch and Paarl, as well as agricultural communities outside the city boundaries (Sinclair-Smith and Winter 2018, Ziervogel, Shale, and Du 2010). As the 2015-2018 drought has shown, this water supply is close to being insufficient for both commercial agricultural production and growing urban centres across the Province. Fruit producers are very aware of the conflictual situation that emerges from this situation:

Figure 5.4: Population growth in the Western Cape Province and the City of Cape Town 2001-2016 and projection to 2023



(Source: compiled from Stats SA 2001, 2011, 2018, Western Cape Government 2017)

> So, in the context of more and more people flocking to the cities, the problem isn't going to get easier for agriculture, it's going to get worse. As I say water is at a very critical path. Without water, we can't have a business, and without water, people can't survive. (Producer interview R5)

> The difficult one is [that the] population is growing, so they need more water, but at the same time you can't take water from agriculture, you need water for food production. (Producer interview R56)

Under South African water policy, during periods of drought when water use needs to be restricted, agricultural water demands have the lowest assurance of supply after human consumption, the ecological reserve, energy production, and industrial production. Or simply put, 'people get preference over plants, of course' (industry interview R73), while agriculture is usually the first water user to be curtailed (Baleta and Pegram 2014).

Competition for water resources is not only an issue during periods of drought. In the Western Cape, water resources within most catchments have been over-allocated, creating a water deficit (Baleta and Pegram 2014, Boccaletti, Stuchtey, and van Olst 2010). A representative of the Provincial Department of Agriculture explained it best:

> If you look at our province […] and if you look at the mean annual runoff, that's how much water is available, and much of that has already been allocated […]. Basically, the Breede still got a small amount of water available, but the other three is [sic!] already over-allocated. So, that will in effect mean you will always have a shortage of water from time to time [and] the shortage will become more regular. Because we're actually utilising more water than we have available. (Government interview R3)

Although the study focuses on the Breede Water Management Area (Breede WMA), where water is not over-allocated (yet), as outlined in Figure 5.5, there are ample water deficits in neighbouring catchments. This can increase pressure on the Breede as catchments are connected through Inter-Basin Transfers (ITBs). As described in Chapter 3, the Breede catchments hosts Theewaterskloof Dam, the largest dam in the Western Cape Province, which also feeds into the Western Cape Water Supply System that supports the city of Cape Town. The Palmiet Catchment in the Elgin Valley is also an option for a water transfer scheme towards Cape Town. Now only used intermittently, there are fears that pressure on the Palmiet River could intensify with population growth and climate change (Baleta 2015), as pointed out by a representative of the local WUA:

> [W]e're in the Palmiet, we supply water to Cape Town. Our problem, our aspect so far is, that we have enough water for us but we're part of a catchment to supply Cape Town, that then becomes a priority [when they lack water]. (Water institution interview R15)

This is not unfounded as population growth is predicted to continue, which, in combination with plausible climate change scenarios, will worsen existing water deficits in the near future (Baleta and Pegram 2014, Boccaletti, Stuchtey, and van Olst 2010). In

Figure 5.5: Gap between existing water supply and projected water demand in 2030 in South Africa's Water Management Areas (WMA)

(Source: Boccaletti et al. 2014: 4)

such a future, the largest water users, including the fruit industry, will come under increased scrutiny.

With increased water deficit and heightened competition over available water resources on the horizon, it becomes key for the fruit industry to maintain a good reputation as a responsible water user. One respondent articulated this by saying that 'we've got to be seen to do the right thing' (water institution interview R15). Another fruit grower explained in more detail how he is concerned about the sector being viewed as the 'enemy', especially during times of water stress:

> What I am concerned about is that we get seen as the enemy. But it is a fact, agriculture uses the most water in the world, but it's needed for that. So, what we have to communicate is that we are being sensible and responsible in how we manage our water. (Producer interview R62)

Historical undercurrents of the apartheid legacy play into this concern about being viewed as the 'enemy'. By adopting a political economy perspective these can be uncovered. In the Western Cape specifically, most commercial fruit farmers are white and of Afrikaner descent. Unlike in apartheid South Africa, this actor group is not a policy priority anymore in terms of water allocation. Consequently, the relationship between the ANC government and the commercial agricultural sector has been somewhat strained and trust has been slow and difficult to establish (NGO interview R11). The Western Cape is also the only Province in South Africa to be ruled by the opposition party, the centre-right Democratic Alliance (DA). This has, over the past few years, led to tensions with the national ANC-led government, as pointed out by different interviewees:

> And in the Western Cape, unfortunately, it causes conflict that it's different political parties that rules the Western Cape versus the national office that is run by the government. And it does cause friction sometimes. (Government interview R39)

> On the other side, we've got another problem, is that this is a DA province, it's not an ANC province. (Industry interview R8)

Upstream reputational water risks are thus closely linked to regulatory and political risk. In terms of water, fruit producers already face considerable political water risk as they are not a privileged actor group anymore. Portraying a positive image is thus key in preventing a translation of this into increased regulation of their water use. This is especially crucial in light of climate change and population growth increasing competition over water. The next section, Section 5.3, discusses in more detail how these political and regulatory water risks play out for the fruit industry.

5.3 Politics Matters: Regulatory and Political Water Risks

Under apartheid, the Department of Water Affairs[26] had a very technical orientation and was run by engineers that focused on supply management. The mandate centred on the construction of dams, inter-basin transfers, and development of irrigation schemes (government interview R66). With democracy, the Department went through a radical change. It received the added function of providing water services and sanitation, a key political agenda point of the democratic movement. This increased the Department's mandate significantly. The focus also shifted away from supply management towards increased demand management (Swatuk 2010). This shift in orientation has meant that commercial agriculture, including the fruit industry, have been removed from a position of priority and privilege from the Department's mandate. These changes have brought on significant regulatory and political water risks for the commercial fruit industry. Three interconnected aspects drive these risks. For ease of discussion, they are here divided into three categories: (1) the risks associated with transformation requirements, which (2) are embedded in the broader changes in water policy, and (3) are generally aggravated by a public-sector capacity gap in the water sector.

5.3.1 Transformation Policy: Losing Privilege

Under apartheid, water law and policy aimed to serve the benefits of the ruling minority. Many fruit farms in the study area were established under this system of privilege. As put by one producer (R23), 'in the old South Africa […] we had a bit of a nanny state when it came to farming. Everything was taken care of'. This included subsidies and technical support from the government to develop irrigation schemes and gaining access to water resources, giving producers a high degree of security in their water allocation. When South Africa transitioned to democracy, much of this support was withdrawn. For example, mobilisation of additional water for agriculture has been stopped. One representative from the Department of Water and Sanitation explained that 'the policy is that we will not give more water, countrywide, for agriculture, we just don't have it', emphasising that 'there is the allocation for agriculture, we will honour that', however, because of the already heavily engineered hydrology, 'any further augmentation that we have to do is going to be extremely expensive' and therefore the water would not be affordable for farmers without heavy subsidies (government interview R27).

[26] As outlined in footnote 12, the Department of Water and Sanitation has undergone several restructuring processes since democratisation. These have been accompanied by name changes. Many interviewees just refer to it as Water Affairs or the Department, which is reflected in some of the quotes.

As will be shown in Chapter 6, this does not mean that the industry is flailing without support. The change in political direction, however, has brought on a more inclusive approach to water governance, which has many fruit producers worried about the security of their water allocation. As interviewee R23 from above went on to say, many fruit producers feel that now 'we are on our own', receiving much less support and 'certainly no sympathy from the government'. The change in political direction in South Africa, accompanied by a new regulatory framework for water thus poses regulatory and political water risk for many fruit producers.

One particular concern for the fruit industry are the regulatory and political requirements that need to be fulfilled with this new water governance regime. This not only includes increased administrative processes, stricter environmental assessments but also transformation requirements. This is often perceived as a 'horrendous legal mania that goes on a farm' (industry interview R8). One area that is particularly affected by this is the construction of on-farm storage dams. On-farm storage dams are an 'easy' way to increase water security on the farm. The post-apartheid water governance framework, however, has introduced strict environmental and transformation requirements to new dam constructions, which aims to ensure environmental sustainability and redress of past injustices. Consequently, building a new private dam is a lengthy, bureaucratic, and expensive process that can easily span 10 to 15 years, as explained by one producer who recently finalised such a process:

> [W]ell, we've just built a dam. […]. I think we've started the process about ten years ago, it's quite a process to get permission to build a dam, as it takes quite a while to get the paperwork sorted. We've gone through all the processes and the environmental studies and everything else. And a third of the capacity goes to black empowerment. (Producer interview R14)

Black empowerment refers to the transformation component that now must accompany new on-farm dam constructions. While producer R14 was proud his new dam contributed to black empowerment, for many other commercial fruit farmers in the Western Cape who are white South Africans, these transformation policies are often understood as 'red tape' (market interview R47). It is perceived as negatively affecting their water security and as posing a risk to their business. A deciduous fruit farmer described this:

> It's the logical thing to do [building a dam] and ok, it's costly but it will probably be beneficial to us in the long run […]. But the red tape that's put in place that relates to things, like your black shareholdings. We're a family business, I'm white, and I'm not going to let the black shareholders ruin this family business, so that's sort of one of their criteria for sort of saying 'You can put in a bigger dam but you need a black shareholding.' And it's kinda… 'What now?' (Producer interview R7)

This is symptomatic of the adversarial relationship between the private and the public sector. Much of this can be traced back to the (perceived) loss of privilege experienced with the advent of democracy. Consequently, commercial fruit farms often 'are nervous to engage with the public sector around issues around water because of the transformation policy' (consultancy interview R24). This is particularly frustrating for the industry around the construction of on-farm water storage because private dams are a key strategy to 'be more self-sufficient' (industry interview R8) and remove themselves from the hydro-political line of fire. This links to larger dynamics within the country and points towards the lack of trust between the government and the commercial agricultural sector (government interview R38). It is compounded by fears of not only water but also land reform, and that South Africa might 'end up in a Zimbabwe situation with our economy' (industry interview R43).

5.3.2 New Water Policy: Losing Influence

After transition to democracy in 1994, South Africa embarked on a process of water reform with the aim to ensure 'equity in access to water services and equity in the access to water resources, as well as equity in the access to the benefits of water resource use', such as those gained through productive water uses (DWA 2013: 12). The way forward was paved by the National Water Act of 1998 (NWA), often praised as a highly progressive piece of water legislation (Schreiner 2013). Cornerstones of this new water legislation are (a) an administrative system of water licences (instead of private and riparian water rights) and (b) subscribing to the principle of subsidiarity, which devolves the decision-making processes around water to the lowest appropriate level, enabling local participation in water decision-making. For various reasons, the implementation of the new NWA has been slow. Slow progress in water reform has been a source of frustration not only for the government and previously disadvantaged communities, but the accompanying uncertainty also constitutes a political and regulatory risk for fruit producers.

The principle of subsidiarity foresees that decisions about water should be made at the lowest appropriate level. The aim of this approach was to enable participation of all concerned stakeholders in decisions about local water resources, especially individuals that were previously excluded from such processes. For this purpose, the new water law of South Africa foresees the establishments of Catchment Management Agencies (CMAs) at the regional level and WUAs at the local level. (WUAs are also foreseen to absorb existing farmer-dominated Irrigation Boards (IBs)). As outlined in Chapter 4,

these have been slow processes. To date, only two out of nine CMAs are functioning, while over a hundred IBs are still in operation. There is also an ongoing debate about the functions to be delegated to CMAs, especially whether they should have the power to authorise water use (Schreiner 2013). While these are national policy processes, they do affect commercial fruit growers in the Western Cape directly.

The Breede WMA, home of the study area, is one of two WMAs in South Africa to have an established CMA (The Breede Gouritz Catchment Management Agency or BGCMA[27]). While the CMA is fully functional, there are debates about the organisation's mandate. This is because the main decision-making processes – the power to allocate water – have not been fully delegated to the CMA. As one respondent put it, CMAs 'were new institutions that have just never really fulfilled their mandate and become fully functional' (NGO interview R11). This is particularly acute in the study area, where it seems that at a certain point powers to allocate water were indeed delegated to the BGCMA but shortly thereafter withdrawn again. A representative of the provincial Department of Agriculture explained this and how it led to confusion:

> Then they said now the CMA, as part of the delegation, they can issue the water licence. They started doing it. And then all of a sudden all of these delegations were drawn back and I don't know whether there is internal turmoil within the Department [of Water and Sanitation] or whatever the reason is, but it's creating a lot of problems for us. And I don't know when it will change again or if, because we don't know what the reason for that is. (Government interview R3)

Consequently, many producers are not certain how to apply for a water licence or other permits and will have to test different avenues before the process is complete. This lack of clarity can lead to significant delays in obtaining water licences and hamper the development of production and potentially set the growth of a business back several years.

Feeding into these concerns has been the publication of a series of policy positions in the National Water Policy Review (NWPR) in 2014 (DWS 2014). Two of the policy positions presented there have a potentially large and very direct impact on water use in the commercial fruit industry. They include the introduction of the 'Use-it or Lose-it' principle and the disestablishment of WUAs and IBs. The 'Use-it or Lose-it' principle suggests that authorised water uses – including Existing Lawful Uses – that is not used

[27] Initially, 19 CMAs were planned for the 19 WMAs. The Breede WMAa was the second WMA to receive a CMA, the so-called Breede-Overberg CMA, or BOCMA. In 2012, DWS changed its policy and reduced the number of CMAs to be established from 19 to 9. Consequently, BOCMA was amalgamated with the neighbouring Gouritz WMA and is now the Breede-Gouritz CMA for the Breede and Gouritz WMAs.

for a certain period should be ‘returned’ to the public trustee, i.e. the Department, from which it then can be reallocated to other users. A representative of the provincial government expressed his views on the policy proposition:

> Another one was that 'use-it or lose-it principle' they had. If you have an allocation on your farm and you don't use it, we're going to take it away from you. I said, but you can't do it! It's, apart from unconstitutional, it's unpractical. (Government interview R3)

The ‘Use-it or Lose-it’ principle could pose a serious regulatory water risk for fruit producers. The question of it being unconstitutional, as per the quote above, refers to the fact that expropriation of property without compensation is unconstitutional in South Africa (Constitution 1996). While water is not a property anymore, a water licence is still granted with a specified duration (National Water Act 1998). The question of practicality raised in the same quote refers to the fact that many fruit farms may not use their full water allocation during every season. This is because of varying rains, i.e. if it rains more, farmers need to irrigate less often. The principle could also become a perverse incentive to over-irrigate or simply waste the water to ensure retention of said allocation in the future.

The document also proposes the disestablishment of WUAs and IBs, mainly because they have been perceived to lack meaningful transformation towards equity (DWA 2014). In its stead, DWS foresees that functions will be reverted to either itself, or delegated to its respective Regional Offices, CMAs, or Regional Water Utilities. The proposal, which hinges on the question of transformation, has become a highly contentious issue travelling along racial lines. It expresses the animosity between the ANC government and the (white) commercial agricultural sector, as voiced by a representative of DWS:

> Again, it's to get at white farmers, because the Water User Association were developed out of Irrigation Boards, the Irrigation Boards were developed by groups of farmers getting together to look after their interests in a geographical area. And now the Minister just feels they haven't transformed, they're still too white, get rid of them. So, who is going to manage those areas? […] When it's white people, just wipe it off the table. (Government interview R27)

DWS, however, already lacks human and financial resources, which would make it difficult for them to take on additional functions, such as local water resource management. This proposition has also sparked widespread concern among commercial fruit producers (industry interview R43). Many are organised as IBs or WUAs and exercise control over irrigation infrastructure and local water resources management. Decentralised water governance and management is a key component of how fruit

producers access – and control – water resources for irrigation (see Chapter 6). While the NWPR is neither a legislative document nor an active policy, it does inform and influence ongoing reviews of the National Water Resources Strategy and the National Water Act.

Another policy proposition published by DWS in November 2017 further reconfigures the decentralised water governance and management system. The Business Case for the Establishment of a Single Catchment Management Agency (DWS 2017c) abandons the idea of establishing nine CMAs. Instead, DWS proposes to create a single organisation to manage all water resources in South Africa. The new single CMA[28] is intended to be a central executive body with geographically decentralised catchment-based units based on the existing nine Water Management Areas. It proposes that the single CMA should be enlarged from the current Inkomati-Usuthu CMA in Mpumalanga (the first CMA created in South Africa in 2004). The other established CMA, the Breede-Gouritz CMA in the Western Cape, would have to be disestablished with executive functions moving to the single CMA while operational activities would be transferred to the new decentralised water management area unit.

The proposition was published in November 2017, after the end of data collection. It was, therefore, impossible to ask respondents directly about it. However, rumours of the proposition had been circulating already, creating unease amongst representatives of the fruit industry:

> Thinking of DWS and the back structures of the governance of water, so it's really a concern for us. Because worldwide it is actually the option to have the water governance level at the lowest level of organisation. Because you can engage the industrial sector, you can engage the municipalities and the farmers as well. It's the best way of water management. (Industry interview R43)

Agri SA, the main industry organisation for commercial agriculture, also condemned the proposal, as evidenced in their annual report (Agri SA 2018a). The fruit industry in the Western Cape, and especially in the Breede WMA, exercises considerable influence in the Breede-Gouritz CMA, which is an important strategy to ensure the industry's water security (discussed in Chapter 6). The move thus poses considerable regulatory and political water risk to the fruit industry by potentially curtailing their sphere of influence.

[28] The single CMA would probably be renamed as *National Water Resources Management Agency*, or NWRM for short, however, this is just a suggestion of the authors of the Business Case so far and not confirmed yet.

The above proposal of the single CMA expresses the culmination of a two-decade-long debate within South Africa about the neo-liberalisation of government. The left-oriented groupings in government have long been concerned about increasing transfers of functions and government employees to parastatal organisations and agencies, such as the Catchment Management Agencies. One interviewed producer analysed the situations as follows:

> For some reason somewhere along the line some Minister of Water decided that they didn't like the decentralised view, be it in the Western Cape or somewhere else, it's that fundamental clash now between centralising everything and having it decentralised. (Producer interview R63)

The dragging out of this debate in the mid-2000 with the decision to consolidate the 19 CMAs into nine strongly revolved around the question of delegating power to authorise water use (Schreiner 2013). In contrast, CMAs would enable stronger public engagement and local participation – a cornerstone of the South African constitution – and thus be more directly accountable to water users within their respective catchments. The enormous diversity of South Africa also makes centralised water management difficult. This has become evident during the recent drought (2015-2018), where centralised decision-making processes have hampered quick relief responses, and considering 'how serious the situation is […] there needs to be real consideration to devolve that a little bit' (government interview R54). In the Western Cape, these dynamics seem to be further exacerbated by the fact that the province is ruled by the opposition party, DA, rather than the otherwise dominant ANC (government interviews R39 and R54).

5.3.3 Empty desks: Public-sector Capacity Gap

South Africa suffers from a public-sector capacity gap due to a lack of human and financial resources. This is particularly acute in the water sector. After apartheid, in addition to water resources management duties, the Department of Water Affairs was tasked with providing water services and sanitation. Coupled to the switch from supply-oriented to demand-oriented water resources management, it considerably enhanced the mandate of the Department, while state spending stagnated. This is linked to the implementation of GEAR (see Chapter 4), which limited public spending (Marais 2011). Consequently, the public sector has struggled to be effective not only in the years of transition but well into the democratic period. Two interviewees emphasised this issue, saying that:

> [I]t really boils down to inadequate finance and human resources for these institutions. That is kind of a central theme in the underperformance of water resources management. (NGO interview R68).
>
> So, there's lots of good laws and then not much going on on the ground. (Consultancy interview R46)

The most serious consequence for commercial fruit producers is the lack of clarity and backlog in the process of issuing water licences and permits for the construction of on-farm storage (researcher interview R36), as explained by two producers:

> The frustrating part was more the administrative side of things. We applied for a licence, it was apparently issued a year later, but we only got the licence physically a year after that, once we asked what was going on. […] the process […] is long and it's not user-friendly […], you need to follow-up repeatedly and you get different answers where things are and a year later you find out actually it was issued a year ago. (Producer Interview R28)
>
> […] it took me three years to get my water registered properly, and I've got a very simple registration. I've got the guy's personal email and two years of to and fro' and we managed to sort out my registration. (Producer interview R63)

While most commercial farmers use water for irrigation through the Existing Lawful Uses mechanism (ELU, discussed in Chapter 4), this needs to be verified and validated by the government to be turned into a licence. Before this process is complete, farmers cannot be certain of their final water allocation. The Verification and Validation (V&V) process in the Breede was only completed around 2014 (BGCMA 2016).

The backlog is aggravated by the lack of mandate clarity between the different levels of government discussed above (see also Chapter 4). Applications from all over South Africa are currently handled by the national Department of Water and Sanitation (DWS). Consequently, if a fruit producer in the Western Cape plans to apply for a licence or extend an existing one, they must go through a heavily bureaucratic process. This means first applying to the local IB or WUA, which then recommends the application to the CMA, who has to refer it to the Regional Office of DWS, and they then finally send it to DWS in Pretoria (government interview R3). The long-waiting times and delays in obtaining water licences are a regulatory water risk that can have serious financial implications if productive activities are stalled due to bureaucracy.

Other water sources, such as boreholes to access groundwater and on-farm water storage dams also need registration permits. For export-oriented producers, this backlog can become acutely problematic when they are asked to provide proof of water licences and permits during audits for standards that grant them access to overseas markets. One Western Cape fruit producer explained this:

> Yes, because for the audits, they always ask me about the registration of the dams. All the boreholes, everything is registered that we got, but the dams we can't...you get to a certain point and from thereon you can't go further. We've been struggling with that for a very long time. (Producer Interview R59)

The farm receives a lower rating within the audit due to their inability to provide documentation for the dam in question.

This lack of public-sector capacity further translates into a poor regulatory capacity. One Ceres Valley producer pointed out that while there had been enormous efforts to complete the V&V process, since then 'nothing happens' (producer interview R63). Nothing meaning no inspections and no enforcement of water usage according to water licences. In some cases, this has led to rogue water use by producers, as described by one respondent:

> You want to dig a borehole, you need to get permission, but if there's nobody in that office, or nobody answers the phone, or responds to the fax, you eventually say, I can do what I like. So, you put the borehole down, which allows you to convert more virgin land to agriculture and there's another law that says that you need a permit to do that, but again, there's nobody in the office. A tremendous amount of stuff happened, I'll call it illegally because I think, the government had a duty to have someone in the office, but the farmer had a duty to go so far. (Market interview R67)

Therefore, already stretched water resources are being pressured. In Ceres Valley, there is real trepidation about how this unchecked use has affected the overall sustainability of water sources in the area (producer interviews R13 and R63). A Ceres Valley fruit grower highlighted how 'it is a constraint to growth, the availability, but also the competition for the limited availability of water' (producer interview R23). Much of this water use is driven by the desire to expand production for lucrative export markets, however, by doing so, producers are creating additional water risks for themselves.

5.4 Chapter Conclusion

The purpose of this chapter was to answer the first part of Research Question 3. It has identified the discussed water risks as drivers of the influence of global agricultural production networks on processes of water governance. The chapter identifies and defines these water risks from the specific perspective of the fruit industry while embedding them within the wider dynamics of the Western Cape and South Africa in general. Importantly, water risks not only stem from the natural environment but are also created and constructed by politics, regulation, markets, and interactions with other stakeholders. The chapter has therefore categorised the different water risks as either physical, reputational, or regulatory and political.

In three different sections, the chapter has described how these physical, reputational, and regulatory and political water risks manifest for the Western Cape fruit industry. Physical water risks refer to what might traditionally be understood as water risks in the Western Cape, namely a lack of water due to weather, climate, or pollution. Reputational water risks can manifest downstream with retailers or upstream with the surrounding community. Finally, regulatory and political water risks refer to the loss of influence and legal privileges many producers experienced after the end of apartheid as well as a perceived uncertainty in terms of the new water policy.

Water risks are, therefore, actor-specific and context-specific. That is, they manifest as they do for the fruit industry because of the specific political economy of water and agriculture in the Western Cape. Importantly, the findings have also shown that water risks are not necessarily inherent in nature but produced by policies and interactions. The different water risks also manifest relationally, e.g. physical water risks may arise in relation to regulatory and political water risks and are thus often reciprocally constructed. Finally, most water risks are exogenous; they largely originate beyond the individual farm-gate. Water risks can, therefore, be theorised as being actor- and context-specific, produced and reciprocally constructed, while largely originating beyond the farm-gate. The discussion in Chapter 7 further delves into this theorisation.

In the end, all the above water risks may lead to the one dreaded outcome: insufficient water of acceptable quality available on a regular basis. This, in turn, can undermine the commercial viability of each and every fruit farm investigated for this project. Producing fruit, however, is good business. Individual fruit producers and the fruit industry as a collective thus have an interest in mitigating these risks. Chapter 6 discusses the strategies they deploy to secure access to and control over water resources. The different water risks analysed here can thus be understood as causal drivers of firm- and industry-specific strategies. Understanding these different water risks and the dynamics that produce them is thus key to untangling the different strategies in the next chapter.

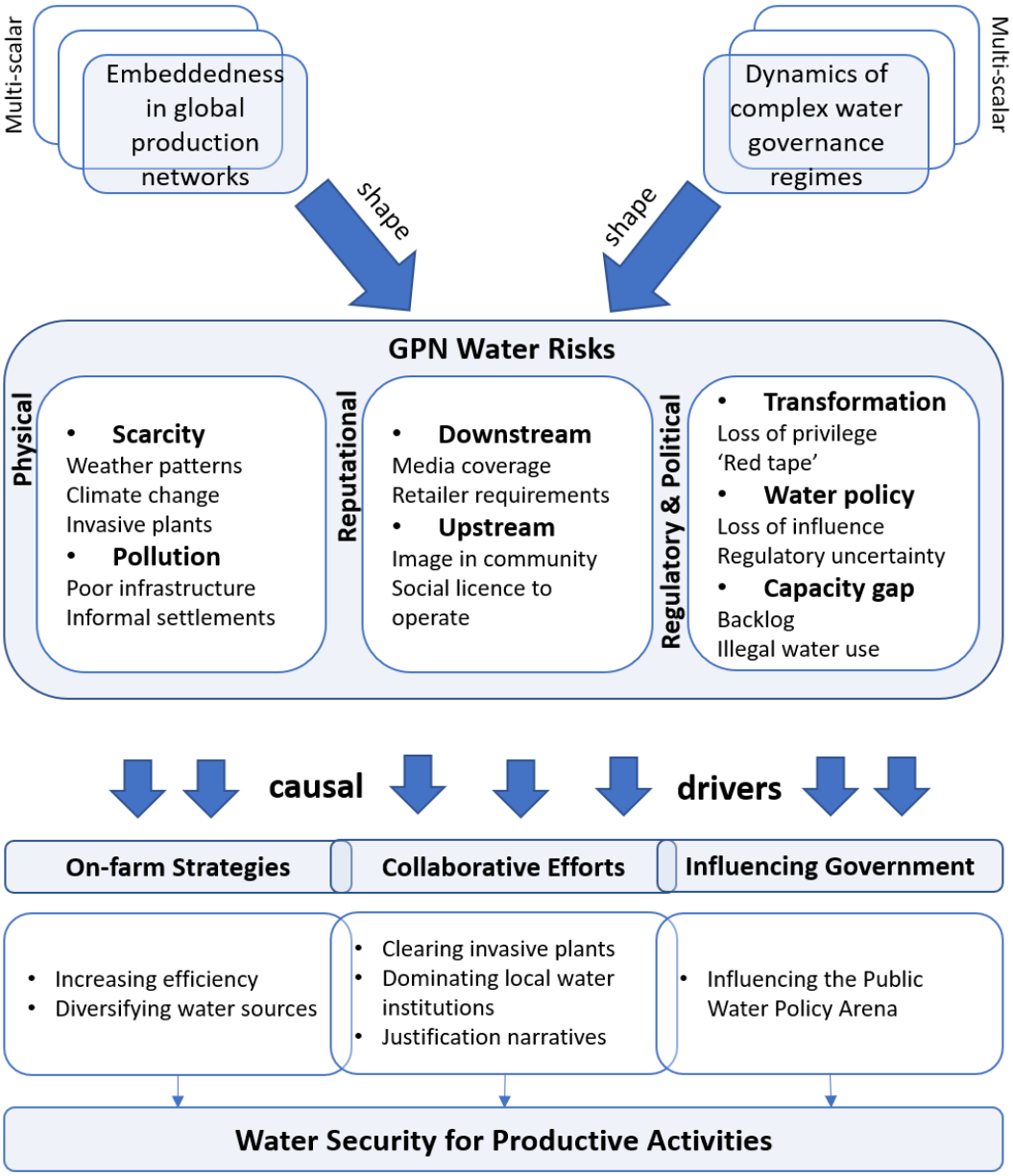
6 Securing Water: Strategies to Ensure Access to and Control Over Water Resources

This chapter discusses the strategies the commercial fruit industry in the Western Cape deploys to mitigate water risks. Water is the limiting factor to further agricultural growth in the Western Cape. This is due to the water risks outlined in the previous chapter, Chapter 5, including the competition between different water users, the winter rainfall condition, as well as the accompanying regulatory landscape. As highlighted by a respondent 'the fruit industry is very dependent on water, it can't grow, it can't work without it, certainly not commercially' (water institution interview R15). The very commercial viability of fruit farming is thus dependent on water, highlighting the materiality of agricultural production networks (see Baglioni and Campling 2017). The chapter is the second step in answering Research Question 3: *What factors drive and shape the influence of global agricultural production networks on water governance, and how have these played out in the Western Cape?*

The findings presented here are based on primary and secondary data collected during fieldwork in South Africa over the course of 2017. The bulk of primary data was collected via semi-structured interviews with fruit producers, industry associations, exporters/importers, representatives from NGOs, different levels of governments, and researchers with expertise in the field of water and agriculture. Based on these exchanges, the presented strategies for water risk mitigation were identified. Through the process of thematic analysis, as outlined in Chapter 3, the different strategies were mapped out and then grouped into themes. These insights were supported through additional primary data collected through casual forms of observation when visiting farms or participating in workshops. Secondary data was also used to support and elaborate on the findings, including reports from industry associations and water institutions.

Based on this data and following the discussion outlined in Chapter 2, the identified water risks mitigating strategies are broadly categorised into three groups: (1) on-farm strategies, (2) collaborative efforts, often with local actors, and (3) by influencing government. An important insight is that these different strategies do not necessarily follow the 'ladder steps', as proposed within the Water Stewardship paradigm (WWF 2013) (see also Chapter 2), instead they complement each other and might be driven by different actors or actor groups at different scales. This is where the GPN approach shows its strength when combined with an analytical focus on water governance

Figure 6.1: Conceptualising the influence of global agricultural production networks on processes of water governance: how water security strategies form and manifest



(Source: author's analysis)

processes. It includes firm and non-firm actors and brings in scales and actors that are often overlooked in water governance but that are important to key sites of water governance and management. While the identified strategies are separated here into these three categories for analytical purposes, some of them overlap and drive each other. The three categories are thus better visualised as overlapping strands of strategies, rather than a progressive ladder, as shown in Figure 6.1. Figure 6.1 also

continues the conceptualisation started in Chapter 5 and shows water risks as causal drivers for the deployment of these strategies that aim to ensure water security for productive activities of fruit producers.

As will be shown, the purpose of these water risk mitigating strategies is to ensure water security for productive activities, i.e. the production of fruit for export markets within the study area. As such, the deployed strategies are strongly influenced by producers' embeddedness in the global fruit production network, while also requiring negotiation of the complex dynamics of the water governance regimes at hand. In order to analyse these strategies further, and following the categorisation above, the chapter starts out by discussing the on-farm strategies (Section 6.1), specifically the notion of increasing efficiency on the farm as well as the diversification of water sources. Section 6.2 then analyses the collaboration with other actors, including other farmers but also local governments, NGOs, and water governance institutions. The third section, Section 6.3, delves into the strategies that influence government and the public water policy arena. A summary and some final comments in Section 6.4 close the chapter.

6.1 On-farm Strategies for Water Security

On-farm strategies refer to the actions producers take directly within the farm-gate to ensure water security for their productive activities. These can be understood as the most straight-forward strategies for producers as they are not directly dependent on other stakeholders and can usually be fully controlled by producers themselves. On-farm strategies fall within the first three steps proposed by the water stewardship ladder: water awareness, knowledge of impact, and internal action (WWF 2013). They are grouped here under one umbrella for analytical purposes as they designate activities within the farmer's purview. They manifest in two ways in the study area. First, many fruit producers aim to increase their irrigation efficiency by improving on-farm water management and water use. In GPN terms, this can be understood as a process of environmental upgrading. Second, most producers try to diversify their irrigation water sources, i.e. accessing groundwater as well as rivers and having the infrastructure to store water on the farm.

6.1.1 Doing More with Less: Increasing Efficiency

What to do when water is limited but key to grow and develop a business? Increasing efficiency of individual fruit farms is one way to manage this concern. One buyer for a retailer explained:

> In the last 5 years, there has been an increase in the production of fruit because of good profits. But water is the limiting resource for expansion. Better technology has somewhat helped and lots of farmers are adopting higher efficiency technology and do scheduling. (Market interview R41)

Efficiency, as it relates to water in the agricultural context, can refer to a range of things.[29] Respondents in this study mainly focused on the notion of irrigation efficiency (plant application efficiency) and related conveyance efficiency (efficiency of water transport) (see Brouwer, Prins, and Heibloem 1989), which are often expressed in percentages (e.g. 70% irrigation efficiency). The aim of increasing efficiency is to reduce water loss that occurs during the transport of water from the reservoir to the plant, e.g. through leaks in pipes or evaporation in open canals, or during the application of water to the plant, e.g. through runoff, evaporation, or wind drift (Evans and Sadler 2008). When these water losses are reduced, less water needs to be transported and then applied to a plant for it to be fully irrigated. At the scale of the orchard, this can result in considerable water savings for individual producers. This saved water can be used to irrigate additional hectares of fruit trees. In this way, producers are effectively 'doing more with less', i.e. producing more (exportable) fruit with less water (per hectare, the same amount of water in total for the whole farm) (researcher interview R25). A producer in Robertson explained this approach:

> The ideal is […] to maintain our tonnage of fruit per hectare or increase [it] with the same amount of water. Not to use more water, to get more [fruit] but to use the same or less by using specialised programmes or improving our […] irrigation systems. […] If we can use less water for the same amount of fruit, we are winning, so that is one of our biggest goals. (Producer interview R9)

Figure 6.2: Drip lines visible on an orchard in Robertson (R9) and micro-jets under pome fruit trees on a farm in Ceres (R56).

[29] See Evans & Sadler (2008) for a full discussion of efficiency and water use in agriculture.

As highlighted by the quote, improvements in irrigation and conveyance efficiency are achieved via specialised technology. These high-tech irrigation systems are usually composed of water application technology and a monitoring system. In the study area, producers either use short-range micro-jet irrigation systems or drip irrigation systems on their farms to distribute and apply water (see Figure 6.2 on previous page). Both distribute water through a network of pipes. Micro-jets are fitted with small sprinklers to wet the ground while drip lines distribute water drop by drop from the pipes to the ground under the tree. The main difference between micro-jets and drip irrigation, in terms of efficiency, is a reduction of water loss due to evaporation with the latter. Although drip irrigation systems can be up to 30% more efficient than micro-jets (Evans and Sadler 2008), most farmers in the study area prefer micro-jet irrigation systems. In drip irrigation systems the water drips drop by drop onto the ground from the pipe and might not water the whole root area, which in turn can negatively affect yield and quality of the fruit produced (producer interview R55). While this can be circumvented by introducing a second or even a third dripper line, micro-jets do have the added benefit of creating a little micro-climate around the tree that helps to prevent sunburn on the tree during hot and dry summer days (producer interview R13). In the end, both systems are precise and lend themselves to automation and tight control of water application to the plant.

Both drip irrigation and micro-sprinklers are used in conjunction with other measures to ensure optimum irrigation, as explained by this producer located in the Ceres Valley:

> We try to irrigate as far as possible at night. And I use both a neutron probe and these […] constant loggers […]. And we make physical holes every week. (Producer Interview R63)

Irrigating at night, as highlighted by this farmer, helps to reduce evaporation from the field and this increases the irrigation efficiency as more water can be used by the plant (Evans and Sadler 2008). Neutron probes and/or continuous water loggers are used to measure soil moisture in combination with the regular digging of a physical hole close to the tree. This information usually feeds into a computerised system that informs irrigation scheduling and administers the irrigation water (producer interview R4). Computerised systems are therefore an important support tool for scientific irrigation scheduling and considerably reduce human error, i.e. by opening and closing valves automatically or sending out alerts when pipes block or burst (producer interviews R4, R14, and R42). This creates a very high-tech irrigation system on individual farms.

Drip irrigation, micro-sprinklers, neutron probes, continuous water loggers, and computerised systems mean that irrigation in fruit orchards is expensive and highly

capital-intensive. Fruit trees are a perennial crop and have long lifespans (25-35 years or even more (producer interview R23)) and as such decisions regarding irrigation infrastructure have long-lasting consequences. A deciduous fruit grower in Ceres Valley explained that therefore, 'you can't cheaply change it a few years down the line' (producer interview R23). Respondents explained that they had made considerable investments into their irrigation system throughout the past, most often incrementally as orchards were replanted, as there is scope for innovation and upgrading to new irrigation and monitoring equipment during that phase.

> We also installed a very sophisticated irrigation control equipment with a budget of about four million Rands [£228,936][30] to revamp all the water infrastructure. (Producer interview R5)

> We've changed, we've done it over a few years. It's also a question of cost and affordability. And what we've done is installed in all new orchards rather than old orchards, so every new orchard that's planted, we install the new system. (Producer interview R14)

Despite the cost of these systems, all producers interviewed for this research project functioned on automated and computerised drip or micro-irrigation coupled with some sort of soil moisture measurement. Constantly measuring how much water is used where within the orchard, these systems lend themselves to tight control, monitoring, and (re)evaluation of water application. The recent 2015-2018 drought has further pushed such developments, as echoed by a producer who said that they were 'stepping up, just in terms of the level of detail of [irrigation water] management' (producer interview R28). While the financial cost of such capital-intensive irrigation systems can be exclusionary, the farmers that can afford it consider it an investment because it permits producers to mitigate a range of water risks. Water risks often lie outside of the immediate control of fruit producers themselves but can have a direct impact on the growth of the business, its viability, and its prosperity. Thus, managing, controlling, and increasing irrigation efficiency on the farm is one of the things that is within the immediate purview of farmers.

Increased efficiency also reduces electricity costs. In South Africa, 'the price of electricity has gone up in the last 10 years by 400%' (producer interview R23). This is a serious concern for farmers, as water needs to be pumped[31] across the farm with electricity through pipes to irrigate the different orchards. One farmer simply highlighted that 'it is expensive to irrigate if you don't need to' (producer interview R42), while another

[30] 1 ZAR = 0.0572342 GBP (source: www.xe.com, accessed 11/07/2019)
[31] The alternative to pumping water across the farm is a gravity-fed system, which is only possible in certain topographies and unlikely to work on whole farms.

emphasised that ‘we pay to move the water’ (producer interview R4). Irrigating precisely thus minimises electricity cost. Similarly, irrigating at night is not only beneficial in terms of reduced evaporation but electricity is also cheaper during night times (producer interview R14). Investing in high-tech irrigation systems – in the long run –helps to reduce the cost of water as an input, the implications of which are discussed in Chapter 7.

High-tech irrigation systems are also key to manage fruit size and quality so that they fit the often very specific requirements of export markets. Both over-irrigation or under-irrigation of orchards can damage the tree, which will result in lower quality fruit of the wrong size. One producer emphasised that ‘if you irrigate inadequately you get a smaller fruit size. Your yields are impacted’ (producer interview R5); while another one explained that ‘the irrigation plays a direct role in the quality that you want to keep up for a crop’ (producer interview R28). While both under- and over-irrigation can affect the crop negatively, in the past, there has been a tendency to over-irrigate, especially during dry months as a sort of risk mitigating strategy (producer interview R55). Consequently, farmers used too much water and did not achieve the ideal fruit size and quality or yield. Nowadays, technology allows farmers to irrigate more accurately to achieve the highest yield, and the best fruit size and quality as demanded by lucrative export markets, as an Elgin Valley farmer explained:

> In apple farming, using too much water is as big a problem as using too little water. […] Having the correct amount of water in an orchard makes an enormous contribution towards your yields, your quality and longevity of the water, too. (Producer interview R55)

Increasingly, retailers and associated private governance mechanisms, such as Global G.A.P. are also requiring more information about water usage on farms. This is in addition to water quality tests, which have so far dominated downstream reputational water risks. Several retailers and other private and social standards now want to know how orchards are irrigated (i.e. through what type of irrigation technology), how much water is used to do that, and what the different water sources are, as outlined by the below quotes from a producer and a British import agent:

> There's definite guidelines, it varies from supermarket, it varies from accreditation or standards, […]. They want to know how do we deal with [water], how do we manage it, how do we measure it, what control measures do we have in place, and they also want to know what do we plan for the future. (Producer interview R4)

> Look, all of [the retailers] are moving towards sustainability standards and they would ask are they measuring the water? What [irrigation] methods are they

> using? So, all the retailers take an interest in the fact that water isn't wasted. (Market interview R57)

High-tech irrigation systems are an easy way to keep these records and provide them for audits or otherwise when required. High-tech irrigation systems thus provide several key support services for farmers: (a) the ability to irrigate close to optimum in terms of plant water requirements; (b) achieve the fruit size and fruit quality required by export markets – (a) and (b) thus enable farmers to produce more fruit that fits market requirements; and (c) allow to record water usage over time to provide the information to markets; and while (d) irrigation and monitoring technology is itself expensive, it does allow producers to reduce their cost per hectare by using less water and electricity.

6.1.2 Diversifying Water Sources

Typically, farmers in the study area will rely on a range of water sources for their productive activities. If one water source fails, for whatever reason, other options are still available. These options will include a combination of the following: direct river water abstractions; direct groundwater extraction via boreholes; access to scheme water from a local or regional reservoir, often shared among different producers or, if particularly large, with other types of users (industry, urban); and on-farm dams, which can collect run-off if located so, harvest rainwater, or store allocated scheme water (producer interview R23). Having access to several water sources is a key water risk mitigating strategy to deal with direct physical water risks, water quality concerns, as well as regulatory and political risks.

Western Cape fruit producers experience direct physical water risks in two main ways. First, by means of the Province's Mediterranean climate, which creates an inverse relationship between winter rainfall patterns and production demands during the summer growing period. Consequently, during the height of the fruit production season, from October to March it practically does not rain yet trees are most water demanding then. Second, through extreme events, such as droughts and floods. Fieldwork for this thesis was conducted in 2017 during a prolonged period of drought and many respondents thus emphasised the lack of water rather than too much water as would be the case during floods. Mitigating direct physical water risks by diversifying water sources is a straightforward strategy and many producers have a setup where they draw on multiple water sources. An excellent example of the diversity of water sources that producers draw upon is highlighted by this fruit grower in Ceres Valley:

> Winter rainfall we collect, we've got dams all over the farm […] and we have to fill them from run-off, fill them up in winter and then they have to last us through summer. Then we've got some underground water. So, we've got some boreholes, probably 10 to 15 of them. […]. And then we are also listed with the Koukedouw irrigation scheme for summer water. So those are our three sources. (Producer interview R23)

This explanation shows how the producer collects winter rainfall from runoff in his on-farm storage dams, which then can be used for irrigation during summer months. It highlights the importance of on-farm dams for the water security of fruit producers as they become a direct water source for irrigation. Water from dams is complemented by the use of groundwater via boreholes. Some farms, like R23, are fortunate to have substantial groundwater yields. In other areas, this might not be the case, or it might vary in quality and quantity and thus be an unreliable source. During summer months, producer R23 also has access to scheme water from a local reservoir. Scheme water is usually divided into a winter and summer allocation. Because local reservoirs might overflow in winter, it is good to distribute water to the different farms then and individual farmers can store it on their own farms (winter allocation). Summer allocation refers to water that is captured in winter and stored in the shared reservoir and distributed during summer months to individual farmers. Producer R23 from the above quote has access to such water. Some producers only have a summer allocation, while others have both a summer and winter allocation (producer interview R13). This depends on how much water a grower can store on their farm, on the farmer's share in the local reservoir, i.e. how much capital they invested in the dam when it was built (producer interview R5), and their water allocation.

Having access to more than one water source is also an important strategy to mitigate water quality risks. In the Elgin Valley, for example, the main river used for irrigation runs through the village, past the Waste Water Treatment Plant (WWTP), and through informal settlements. Consequently, it is easily polluted. In contrast, Eikenhof Dam, the local reservoir where the scheme's water is stored, is located higher up in the mountains and there is no human activity on the land surrounding it. Therefore, there is no source of pollution from human activity and the water flowing into the dam is pristine mountain water. From the dam the water is distributed through closed pipes to individual farmers, so that there is little risk of contamination during that transport either, as these two producers explained during interviews:

> The Eikenhof dam is above the town, and so the Eikenhof dam doesn't have a problem of pollution and that services the most area of the production. (Producer interview R14)

> Water quality is a problem. Definitely – not from the GWUA[32] [Eikenhof Dam], because they source their water before anybody, informal settlements and whatever. (Producer interview R4)

In case of spillage from the WWTP into the river, producers who have access to both scheme water and river water for irrigation can, therefore, manage such pollution of the river by drawing on the scheme water until the pollution is diluted. Other producers, who do not have access to the scheme water above town might need to wait before they can irrigate with river water, or they would try to dilute any pollution themselves by mixing river water with groundwater if they do have boreholes. This, however, would again presume access to more than one water source.

Access to groundwater and borehole pumping also need a special mention within this section. As fieldwork for this research was conducted during a period of drought, many interviewees echoed the importance of having access to multiple water sources as a key strategy to mitigate direct physical water risks from lack of rainfall. Boreholes were termed as 'Plan B' (producer interview R10) or 'insurance policy' (producer interview R5). Several producers sunk extra boreholes during this drought to make up for the failure of other water sources in the short-term. Some have drilled boreholes as an emergency measure and have not registered them. Producer R13, for example, said that ‘I drilled two [boreholes] last year that nobody knows of’. This ‘extra’ water has enabled growers to continue their productive activities with less disruption from the drought (market interview R57).

While such an increased, and especially largely uncontrolled, use of groundwater is unsustainable in its own right, it is also largely illegal, as explained by a representative of DWS:

> The farmers, if they have boreholes, they will start using that water. But it also depends on the allocation that they have. So, they basically have a problem because they only have x-amount of allocation and so there is a lot of stealing of water. (Government interview R39)

Having access to different water sources, such as boreholes, does not mean that farmers can use these sources without limit (consultancy interview R33). Producers have water allocations that state the volumetric amount of water they may use from different sources. The water licences will state how much volume of water a farmer may withdraw from a surface water source such as a river, how much they may withdraw from a borehole, and how much they may store on the farm (DWS 2016). Therefore, when one source fails,

[32] GWUA stands for Groenland Water User Association.

e.g. river flows diminish due to drought conditions, then this does not mean that the producer can simply pump more water from their borehole. The licence accompanying the borehole has a specified pumping limit. As discussed above, this is not respected during desperate times, such as droughts. Punctuated crises, however, are not the only time producers circumvent the law to ensure their water security.

Next to boreholes, producers view on-farm water storage dams as an ideal solution to ensure their water security for productive activities. An on-farm storage dam means they can collect water during winter and store it on their farm, becoming independent of socio-political dynamics beyond their farm-gate. Due to the regulatory and political risks discussed in Chapter 5, it is, however, from a producer's perspective, a long, difficult, bureaucratic, and potentially frustrating process to build a new dam on their farm. Next to the bureaucracy, the transformation requirements for new on-farm dams is a concern for some farmers. To circumvent these regulatory and political water risks, some producers side-step the administrative and legal processes required to build on-farm dams. One government representative described how some producers 'built dams, which no one knows about' (government interview R34). Another producer explained how the transformation requirement has stopped him from building an additional dam so far, but that there is potential to bypass this by expanding his existing dams little by little:

> It would be nice, at some stage, to expand the dams. Another thing they say is that […] every time you rehabilitate your dams they get slightly bigger, but no one notices, no one's really looking. (Producer interview R7)

As this quote also indicates, the public-sector capacity gap to enforce water legislation and policy plays into producers' favour in this regard. There are not enough personnel to verify compliance of individual farmers. Another producer in the Ceres Valley summarised the problem when he said that in his area:

> The main challenge […] is that the Department of Water Affairs hasn't pushed through and implemented the Water Law of 1998. As a result, people have expanded beyond the sustainable yield of our area, illegally, but nobody is stopping them. (Producer interview R63)

Fruit farmers in the study area 'have been doing very well' (market interview R74); it is lucrative and therefore there is a desire to expand production, driven by demands from global markets. Limited access to water for fruit producers constrains the growth and development potential of their businesses and thus their ability to participate in these lucrative global markets. Many commercial farmers in the Western Cape are white South Africans who are not necessarily given priority when considering new water allocations

or permits for on-farm storage dams or boreholes. Regulatory and political risk thus compound the direct physical water risk they already experience. At the same time the public-sector capacity gap – also a regulatory and political water risk – enables producers to circumvent this situation as they are keenly aware of the poor implementation of water legislation and regulation.

6.2 Collaborative Efforts to Ensure Water Security

Collaborative strategies describe the actions fruit producers undertake together with other actors beyond their farm gate. They fall into the 'collective action' category of the water stewardship ladder (fourth step). What is shown in this section is that the 'collective action chasm' (Morgan 2018: 24) is in part constructed by the relatively narrow definition of water stewardship. If the discussion is broadened somewhat, it becomes apparent that producers collaborate with a range of actors on water issues. They might, however, not necessarily produce the 'public-good outcome' advocated by water stewardship. Instead, their main purpose is to ensure the water security of the fruit industry so that its participation in global markets remains guaranteed. These collaborative efforts may take different forms and have farmers collaborate among themselves as well as engage with governmental and non-governmental stakeholders at the local and regional scale. This section discusses three such collaborative efforts: first, collaboration around the clearing of alien invasive plants; followed by an untangling of how fruit producers dominate local water institutions; and finally, an understanding of what is here termed Justification Narratives.

6.2.1 Clearing Alien Invasive Plants

The spread of alien invasive plants is an example of shared water risk in the study area. Seeds of alien invasive plants (AIPs) can easily spread across properties and infest areas wherever they land. Alien invasive species are much more water-intensive than the native fynbos vegetation, resulting in dramatically reduced water budgets. The repeated clearing of infested areas is the only way through which the further spread of AIPs can be contained and reduced – and through which the negative impact on water resources can be mitigated. Many producers tackle AIPs on their land by themselves by regularly clearing infestations. The scale of the problem and the shared nature of this water risk has also resulted in collaborative efforts among farmers as well as between farmers and other stakeholders (see Figure 6.3 for an illustration of recently cleared land).

Collaborative efforts to tackle AIPs can take various forms and include engagement with local and provincial government, especially the Western Cape Department for Agriculture; NGOs, such as WWF South Africa (WWF SA); among farmers through different fora, such as fire associations or private conservancies; and through water institutions, such as Water User Associations (WUAs) and the Breede Gouritz Catchment Management Agency (BGCMA). Not all, but many of these engagements are farmer-driven because farmers are acutely aware of the importance of collaborating with their neighbours and other actors on alien clearing. Otherwise, there is a risk that 'just because one neighbour doesn't clean means that all the seeds come across into their farm and then they end up clearing aliens forever and a half' (NGO interview R31).

Figure 6.3: Alien invasive plants recently cleared through chemical control on farm R22.

In their most basic form, collaborative strategies happen locally and rather informally among farmers, for example through the provision of labour for clearing of AIPs. For example, after the picking season, producers may keep on seasonal labour for a couple of weeks in order to complete clearing activities, as illustrated by the following explanation:

> Take a look in the Palmiet River now, just now the community had some spare labour around after the picking season […] and a number of farmers put some labour in there just cleaning up the river. (Water institution interview R15)

While many producers may keep on labour for clearing activities on their own farm (producer interview R7), in the above example, different farms provided the labour to clear the shared river in the Elgin Valley.

Other collaborative strategies are more formalised and aim to access external funding to lighten the financial burden of clearing activities for producers. Because AIPs need to be cleared on a regular basis, costs for these activities need to be factored in every year,

as such, this water risk can turn into a considerable financial risk for fruit producers. Gaining access to external funding becomes a key strategy to mitigate this financial risk. Consequently, both in the Elgin and Ceres Valley, farmers have started to organise themselves formally by creating formal conservation areas on unused farmland.

In the Elgin Valley, for example, producers whose land borders the Groenlandberg Nature Reserve have founded a conservancy which focuses on clearing the river that flows through that area and their land, as explained by one of the farmers involved:

> On this mountain, we've got the Groenlandberg Conservancy. […] And that's a collaboration of all the landowners on the mountain. It has been a project now for a few years, clearing the Jakkals River […]. (Producer interview R14)

The Groenlandberg Conservancy thus draws in all the landowners on the mountain to clear the waterways of the Jakkals River to ensure a healthy flow of water. Being organised as a conservancy allows the farmers to access funding for these activities from the Table Mountain Fund[33] (TMF) (producer interview R62). The TMF has been funding the integrated restoration of the Jakkals River ecosystem since September 2016 and is expected to continue its financial support at least until November 2019 (TMF 2018).

Similarly, in the Ceres Valley, neighbouring farmers have pooled their resources to tackle AIPs together. These farmers also border mountain ranges that have some tourism potential with walking trails and they decided to declare part of their lands as a conservation area with CapeNature[34], the provincial conservation body. One of the four farmers involved in this project gave details about the motivations behind the initiative:

> The reason that we did [establish a conservation area] is […] mainly to protect our catchment area. And we are hoping to get funding and help from CapeNature in fighting the battle against the alien vegetation. (Producer interview R23)

Finally, a third group of farmers, also in the Ceres Valley, have entered into a collaboration with LandCare, an arm of the provincial Department of Agriculture. While these farmers did not declare a conservation area, they are organised through their Irrigation Board (IB) and have approached LandCare through that forum. In this case,

[33] The TMF is a capital Conservation Trust Fund that develops and funds projects to protect and restore the native fynbos in the Cape. The TMF was kick-started in 1993 by WWF South Africa and later expanded by a significant investment from the World Bank. For more details, visit www.thetablemountainfund.org.za/.

[34] CapeNature is a public institution with the statutory responsibility for biodiversity conservation in the Western Cape. It is governed by the Western Cape Nature Conservation Board Act 15 of 1998. For more information, visit www.capenature.co.za.

LandCare brings in large machinery and teams to clear an area that affects the producers within the IB, while the farmers each provide a contributing lump sum and diesel for the machinery. That way, a much larger area has been cleared more strategically than if farmers worked individually (producer interview R63).

WWF SA is another important facilitator of collaborative efforts around the clearing of AIPs in the Ceres Valley. Interestingly, WWF SA's involvement in the clearing of AIPs has come through their water stewardship project initiated with funding from the UK retailer Marks & Spencer (M&S) and later continued with support from the South African retailer Woolworths and the German International Cooperation Agency GIZ[35] (Dzikiti and Schachtschneider 2015, Schachtschneider 2016, WWF-SA 2014). Stone fruit production in Ceres Valley was identified as a water risk hotspot within M&S's fruit supply chain and a water stewardship exercise, facilitated by WWF SA, was initiated. A key component of this exercise was driving collective action around the clearing of AIPs, which received additional support from LandCare and CapeNature. A WWF representative explained how all these actors came together:

> We've got some funding from Woolworths [...] and […] from the Western Cape Government to do a lot of the clearing, for a year. And that is becoming a very collective action process where the alien clearing is happening at a municipal scale and nature conservation scale, the Department of Agriculture has got their fingers in the pie, the Catchment Management Agency gives funds to it. The farmers partially do some of their own stuff. The Water Users Association presses on. So, there is many different players and they are all playing in the same sandbox, basically. (NGO interview R31)

In this instance, supply chain water risks prompted a lead firm to investigate the water situation at the production scale via an NGO, which in turn sparked a water stewardship project that included investments in the clearing of AIPs.

Thus, both in the Elgin and Ceres Valley, collaborations among farmers are tied in with cooperation with other local actors, such as NGOs and provincial authorities to get expertise regarding the management of AIPs and access funding to complete costly clearing activities. The clearing of alien invasive species, therefore, rallies a series of actors around a highly relevant water issue. This collective action, to use the water stewardship term, has direct relevance for water governance in the Western Cape. As a freshwater specialist described 'how all these various institutions […] feed in and drive, or not drive, something [has] an impact [on water governance]' (NGO interview R31)

[35] GIZ stands for *Deutsche Gesellschaft für Internationale Zusammenarbeit*.

because it determines *who* is involved in these water governance processes and *how* these interactions are structured.

Figure 6.4: Average amount [m^3] of water lost to alien invasive plants every year in South Africa

(Source: WWF SA 2016: 12)

The drive behind the clearing of AIPs is multi-faceted because AIPs pose several risks. They constitute a considerable fire risk, burning far hotter and quicker than native vegetation. They also pose a threat to the Western Cape's rich biodiversity, especially the indigenous fynbos, which is one of the reasons collaborations with conservation bodies (e.g. CapeNature and TMF) are successful. In the end, however, there is a very clear water dimension to the clearing of AIPs, especially the coordinated and strategic clearing in catchment areas. This is because AIPs are so water-intensive, clearing whole catchment areas 'means a lot more water ends up in your dam' (water institution interview R64). Many producers are motivated to clear AIPs to make additional water available which can then be used, for example, to satisfy increasing urban demands. Figure 6.4 illustrates the average amount of water lost to alien invasive plants and what it could be used for instead. In the Elgin Valley, producers are particularly aware of this as the pressure from urban water demands in the form of Cape Town is felt acutely, as outlined by a representative of the local Water User Association:

> We don't know if Cape Town is coming to us and say we want some of your water. So, if we've got the money to clear rivers and stuff like that, there is more water that can go to Cape Town. (Water institution interview R30)

This shows how the clearing of AIPs is not only a strategy to mitigate direct physical water risk but also a way to manage competition over water arising from the growing urban centre of the City of Cape Town – and the associated potential for increased regulation. The prevailing narrative is that if farmers put in efforts to clear alien invasive plants, more water becomes available for other uses while existing allocations to farmers remain untouched and protected. The importance of narratives in ensuring access and control over water resources is discussed in more detail in Section 6.2.3.

6.2.2 Dominating Local Water Institutions

In areas where export-oriented farming clusters, commercial agriculture dominates local water institutions, including, in the study area, the BGCMA, and local WUAs and IBs. Especially at the level of WUAs and IBs, this means that farmers coordinate and collaborate actively on water issues. They are often 'longstanding farmers with lots of experience [that] have privileged knowledge' (researcher interview R25). While these local levels of water governance cannot, formally, make decisions about water allocation, i.e. who gets how much water, they remain a key forum for decision-making processes around irrigation water and shared irrigation infrastructure. This is thus a key example of 'collective action' as described within the water stewardship paradigm. Yet, the formation of many of these local water governance structures can be traced back to the country's apartheid legacy. More specifically, the policy to confer preferential access to land and water to the white minority, resulting in the initial clustering of commercial farming in the study area. Historically, these local water governance structures served white farmers' interests first and foremost. Post-apartheid this, it is argued here, has been reinforced by embedding producers in global markets, creating additional drivers for WUAs and IBs to ensure sectorial water security in the study area.

In both the Elgin Valley and Ceres Valley, local water governance structures came into existence through the establishment of IBs during apartheid. IBs were formed when farmers pooled their resources to apply for loans in order to build and manage shared irrigation infrastructure, such as a local dam (Water Act 1956). White farmers were important constituents to the apartheid government and received beneficial conditions to take out such loans (government interview R3). Thus, initially, local water institutions had the specific aim to provide white commercial farmers with irrigation water. In contrast, WUAs are a distinct innovation that was legislated post-apartheid under the NWA.

Similarly to IBs, WUAs operate in a restricted localised area. Unlike IBs, they were conceived as a co-operative mechanism to coordinate water-related activities between different water users. Therefore, and ideally, these associations represent all the water users present in an area: municipalities, small-scale farmers, large-scale farmers, industries, and others considered water stakeholders; and become participatory vehicles of local water resources management (National Water Act 1998, DWA 2013). This represents a considerable shift within legislation and the reality of farmers as well as other water users, as explained by a representative from the BGCMA:

> Previously it used to be farmers, all right, but with the Water User Associations we have been wanting to include other sectors as well, and also to bring in our equity and gender in terms of the management responsibilities. (Water institution interview R29)

With the introduction of the WUA-concept, IBs were expected to transform to WUAs after the promulgation of the NWA in 1998. In reality, however, many IBs never did transform to WUAs; and the ones that did remain heavily dominated by commercial farmers (government interview R45). This is particularly well illustrated when comparing the two local scales: Ceres Valley and Elgin Valley.

Ceres Valley continues to operate under a set of IBs: the Koekedouw IB, the Roikloof IB, the Titus River IB, and the Warm Bokkeveld IB, which all manage different water sources. Apart from the Koukedouw dam, which is a public-private partnership between the farmers and the Municipality, the other dams (Roikloof and Warm Bokkeveld) are government-owned reservoirs, while Titus IB manages a seasonal river. Converting into a WUA would most likely merge these four IBs, which would ‘be more complicated than it is now’ (water institution interview R19). Currently, the NWA does make provision for areas to continue local water governance structures ‘as is’ and not transform, although the policy desire, at least initially, clearly was that all IBs would eventually transform to WUAs (DWAF 1998, 2004, DWA 2013).

Another critical reason for IBs not to transform to WUAs lies in the inherently different definition of the two institutions. While IBs serve a relatively narrow scope of managing irrigation water from rivers or reservoirs, WUAs have a much broader and inclusive conception. Due to the structural make of the commercial fruit industry in Ceres, fruit producers are unlikely to fulfil these requirements, as deciphered by a representative of the Water Research Commission:

> So, the different users had to be represented and the different races, and so on. And that's very often where Irrigation Boards had problems. If let's say, 80% of

> the water is used for farming, then they say 'well, why should I have a board which has other interests, which then can make my life difficult?' (Researcher interview R20)

Therefore, by remaining organised as a set of IBs, the producers in Ceres Valley retain access and control over those water resources without having to enter into dialogue with other water users.

Transforming to a WUA, however, does not necessarily mean giving up control over water resources, as shown by the Elgin Valley case study. In 2005, the Elgin Valley transitioned from an Irrigation Board (the old Groenland Irrigation Board or GIB) to the Groenland Water User Association (GWUA). During this process, the GWUA absorbed four small neighbouring IBs under its management (GWUA 2009), effectively increasing its territory and therefore control over water resources. Due to its origins in a set of Irrigation Boards, the GWUA in the Elgin Valley remains dominated by commercial farmers, including in the appointment of its leadership positions. The main purpose of the WUA also remains the provision of water to farmers (water institution interview R30).

In the Elgin Valley as well as the Koukedouw Dam in the Ceres Valley these dynamics are directly linked to the water infrastructure. This is here explored through the example of Eikenhof Dam in the Elgin Valley. Eikenhof Dam is the reservoir that stores scheme water in the Elgin Valley (see Figure 3.6 in Chapter 3) and it is privately owned by producers, as explained by a representative from the local WUA:

> We‘ve got a private water scheme, which is the Eikenhof Dam and that belongs to the farmers. […] So, we’ve got producers that bought into that a long time ago, we built the dam in 1977. (water institution interview R30)

It is this reservoir that drove the formation of the initial GIB in 1977 to pool financial resources among farmers, apply for a loan, and build Eikenhof Dam. Because of these past investments, they now own Eikenhof Dam and the associated infrastructures, such as pipes. During apartheid, shares of the water from the dam were then conferred to producers based on their share of investment (government interview R3). Due to the ‘Existing Lawful Uses’ (ELU) mechanism, many of these allocations remain unchanged, complicating post-apartheid water reform. This dynamic is not unique to the Elgin Valley, in different areas across South Africa, farmers have built irrigation infrastructure during the apartheid era that they now own. While they do not own the water anymore, as this is determined through an administrative allocation system, the reality of it remains largely unchanged. This is in part reinforced by the fact that the fruit industry is the largest water user in the Elgin Valley as well as the main economic actor.

Dominating local water institutions also means that producers can leverage these to mitigate water quality risks, for example. Microbiological pollution from failing sewage infrastructure and unserviced communities poses a major water risk to fruit production networks with potentially far-reaching impacts all the way through to the retailer as they link directly to food safety concerns. If fruit growers in the study area do not comply with the stringent standards imposed by export markets, produce may be sent back and further market access may be put on hold. Therefore, ensuring clean water for irrigation is key for export-oriented fruit growers. Water pollution, however, usually happens beyond the farm-gate and involves activities and stakeholders over which producers have little control. One way to deal with these concerns has been to channel efforts through local water institutions, as evidenced in the Elgin Valley.

In Grabouw, the main town in the Elgin Valley, the municipality has been struggling to provide sanitation services to a growing population. Sewerage infrastructure is overburdened while other communities remain unserviced. Documentation detailing the formation of the GWUA from 2008 highlights the risk of 'of e-coli pollution due to sewerage [sic!] spills from Wastewater Treatment Works' (GWUA 2008: 6). While preventing sewage spilling into rivers and servicing communities is the mandate of the municipality, they lack human and financial resources to do so. As a consequence and because 'the quality of water is of utmost importance to the export industry, the GWUA has taken the responsibility for the monitoring thereof' (GWUA 2014a: 1), as stated in their 2014 annual report[36]. They do this by driving along the river and checking up on sewerage pipes and other possible sources of pollution along the river as well as independently testing water quality samples, as outlined by a GWUA representative (water institution Interview R30).

Monitoring the water quality of the river is thus a direct strategy to ensure the sectoral water security of commercial fruit farmers relying on river water for irrigation of crops destined for export markets. What is more, dealing with potential pollution from spilt sewage requires collaboration with the municipality who manages the Waste Water Treatment Plant (WWTP) in Grabouw. Another representative of the GWUA highlighted how this relationship has positively evolved over the last couple of years as the Municipality's reaction time to spillages has become much shorter by saying that:

[36] Both documents cited here can be downloaded from the GWUA's website: www.groenlandwater.co.za

> Because the worst thing that can happen is, something clogs [the sewerage pipe] on Friday night, and Saturday morning the whole thing is overflowing. In the past, I am talking quite a year or two ago, we get a reaction from the Municipality 'oh we will send our guys around on Monday morning'. Well oh, between Saturday morning and Monday morning millions, and I mean millions of litres of pure sewage were just running down the road – boom! So now they […] get there immediately when we see anything overflowing. (Water institution interview R64)

In the Elgin Valley, the GWUA provides farmers with a platform to engage local government on these issues. Similarly, the municipality has one point of contact to communicate with farmers regarding any water quality related issues (government interview R6). These dynamics thus not only show how commercial fruit producers leverage their power within local water governance structures to mitigate water quality risks but also how these are intimately linked to the public-sector capacity gap associated with regulatory and political risks.

The influence of commercial farmers reaches beyond their restricted local areas into the Breede-Gouritz Catchment Management Agency (BGCMA) (researcher interview R76). As outlined in Chapter 3, both the Elgin Valley and the Ceres Valley fall under BGCMA's auspices, one of only two established CMAs in the country. Like the Elgin Valley and the Ceres Valley, large parts of the area controlled by the BGCMA, the Breede and the Gouritz Water Management Areas, are rural and dominated by farming communities, especially commercial farming (although not exclusively export-oriented). In an interview with a representative of the BGCMA, they outlined the importance, and dominance, of commercial farmers to their institution:

> In our area, 70% of our water use is going to irrigation, commercial agriculture, so they are the biggest role player in our area, also the biggest contributor to our catchment management charges, our budget. So, we try to look after them. […] and when you move over to […] the CMA board, out of the total of 12 members there is about 4 directly linked to commercial agriculture. (Water institution interview R29)

By being the largest water user in the Breede and Gouritz WMAs, commercial farmers are also the main funder of the BGCMA itself. They further take influence by occupying no less than one-third of the BGCMA's governing board. One government representative emphasised that 'where they [commercial farmers] definitely do have a role to play is in your Catchment Management Agencies' (government interview R27). Another researcher interviewed on the same topic explained much less diplomatically, that the CMAs were almost 'too decentralised so that the old whites could hide from central government' (researcher interviews R75). While decisions about water allocation are currently made at the national level at DWS, it is foreseen to devolve this power to the

CMAs in line with the principle of subsidiarity. If this is to happen, commercial farmers as an actor-group could wield considerable influence over water allocation decisions. As things stand right now (2019), it is unlikely, however, that these powers will be delegated soon. More broadly, the way the fruit industry has managed to dominate these different local water institutions shows how much collective power the industry wields.

6.2.3 Justification Narratives

Different stakeholders within the study area have deployed – what is here termed – Justification Narratives regarding agricultural water use. These narratives are considered within the context of collaborative efforts as they are established in dialogue with other actors and often deployed by a series of stakeholders, including producers, government representatives, market actors, and NGOs. The quotes supporting this concept highlight the breadth of respondents deploying these Justification Narratives. It is argued here that they are carefully crafted to exert maximum influence by using 'heavy-weight' arguments to justify agricultural water use. These narratives have an economic and an ecological dimension and are used to justify agricultural water use in response to competition over water linked to reputational risks as well as regulatory and political water risks.

A) The Economic Justification Narrative

The Economic Justification Narrative intertwines the allocation of water to commercial agriculture with the sector's ability to provide employment. Unemployment is a key political concern in South Africa. The official national unemployment rate lies at 26.7% (19.7% in the Western Cape) (BFAP 2018). Irrigated agriculture, specifically horticulture, has been identified by the National Development Plan (NPC 2012) as a key industry with employment creation potential. The document states unequivocally that '[e]xpanding commercial agriculture has the potential to create 250 000 direct jobs and a further 130 000 indirect jobs' (NPC 2012: 222). In 2017, 216,000 people worked within the primary agricultural sector of the Western Cape alone, while many more are employed through the backwards and forwards linkages produced by the sector, e.g. the agri-processing industry alone employs another 250,000 people (WCG 2017b). It is the irrigation component within the Western Cape horticulture industry that makes it labour intensive, needing many people on relatively few hectares, compared to other types of agriculture that tend to be more extensive (researcher interview R44).

This link between labour- and water-intensity is the locus of the Economic Justification Narrative. The narrative is straight forward: 'If you cut the use of water, we will have lower production, we will have less food, less employment' (water institution interview R64). It

ties the question of farmers' livelihoods who 'without water […] can't produce' to the livelihoods of the workforce dependent on this employment, because otherwise 'what are these people going to do' (consultancy interview R26). Especially in rural regions, the fruit industry may be the only employer for low- or unskilled workers (government interview R27). There are not many alternatives for waged labour in these rural areas and farm owners are often the only ones providing services and some social security (Lemke and Jansen van Rensburg 2014). One fresh produce buyer for a retailer explained:

> Agriculture is […] a large employer and driver of the economy, so if you take away agricultural water, you're going to destroy jobs. (Market interview R41)

The Economic Justification Narrative then becomes useful to veer the focus away from water use to job creation and this is much more difficult to criticise. This shift in focus allows the fruit industry to mitigate two different water risks – reputational risk and regulatory and political risk, which become inextricably linked through this strategy.

Reputational risk arises from competition over water due to pressure by increasing urban demand for water. In the Western Cape, irrigated agriculture is the largest water user. When water needs by other users increase, agricultural water use is often the first to be examined critically, which then poses a reputational risk to producers. Being able to project an overall positive image of the industry by focusing on its employment creation potential helps to mitigate those interrelated risks. An Elgin Valley producer (R55), for example, insisted that it was 'irrelevant' to look at what 'your water use per hectare is', instead, in the South African context, one should be paying attention to the 'water use per number of jobs' created. The discourse plays into the political priority of job creation in South Africa and positions the water-intensive horticultural sector as key in alleviating the nation's unemployment crisis.

This thinking becomes important in relation to regulatory and political water risks – the threat of water reform further restricting water allocations to agriculture or worse, removing existing ones. Many fruit producers in the study area employ the Economic Justification Narrative (e.g. producer interviews R50, R55) in relation to regulatory and political risk. A producer from the Elgin Valley, for example, expressed his frustration with the cap on agricultural water allocation, linking it directly to employment creation:

> I mean how many jobs we create here, and how many people are looking for jobs, and there is enough water in this catchment. So that's a challenge for us as far as far as expansion goes as an agri-business. (Producer interview R62)

Water allocation to agriculture has been capped at current levels, meaning that little to no new water will be allocated to existing farmers. This constitutes a considerable regulatory and political risk for farmers as it can be perceived as a limitation to the growth of fruit businesses, including job creation, and especially so in the relatively water abundant Elgin Valley. Similarly, another respondent highlighted how 'Cape Town is shooting itself in the foot' if they were to divert water from agriculture to urban needs, 'because of all the jobs' (water institution interview R15). Deploying the Economic Justification Narrative is a strategic way of influencing policy discussions about water reform and allocation.

During the recent drought of 2015-2018, the Economic Justification Narrative proved key to influencing processes of water governance directly, as explored in more detail in Section 6.3. Farmers, like other users, were subject to heavy water restrictions. Farmers had to employ drastic measures to reduce their water requirements and keep their fruit trees alive. Fruit trees can be irrevocably damaged if not managed properly during droughts so that they need to be replaced with new trees. New trees, however, need several years before they are fully productive. Consequently, a farm that is producing less, will need less labour. One producer highlighted how it would be a disaster 'socio-economically […] if there is no crop because all the seasonal workers won't have a job and income' (producer interview R42). In the context of drought, reduced water allocation to commercial agriculture has 'knock-on effects on the community' (government interview R3), especially those in precarious employment, while also affecting the general performance of the sector (BFAP 2018, WCG 2017b, 2017c).

The Economic Justification Narrative is a powerful tool in the study area. This is not to say that the impacts of reduced water allocations to commercial agriculture are not exactly as described by respondents. Rather, the narrative is used to project a uniform discourse that makes questioning existing water allocations difficult. There is very little interrogation of this narrative across the interviews conducted and documents reviewed. In the South African context, such a hegemonic discourse becomes problematic when one considers that most commercial farmers were able to legalise their water allocations from apartheid days through the administrative ELU mechanism. It obfuscates the continued inequity in the access to water resources as well as inequity in the access to the benefits of water resource use and does little in terms of questioning the origin of these inequities.

B) Elgin Valley: Ecological Justification Narrative

Because the Elgin Valley is located within the water harvesting area of Cape Town, farmers there are particularly concerned about their water security and competition over water resources from the City. In 1998, UNESCO declared its first biosphere reserve in South Africa, the Kogelberg Biosphere Reserve (KBR). The KBR is located within the Elgin Valley, just south of Grabouw and the main production area (see Figure 6.5 on the next page). Actors in that region have deployed an Ecological Justification Narrative to ensure their water security. This is in addition to the Economic Justification Narrative that is dominant throughout the Western Cape. As such, this section focuses solely on the Elgin Valley, although similar narratives may well be deployed across the Province.

The KBR is home to an exceptional biosphere. At its heart lies the Cape Floral Kingdom: the smallest, but by far the richest of the world's floral kingdoms, with 9,087 different plant species of which 6,218 are endemic (KBRC 2018). It is also quite water-rich as the Palmiet River and its tributaries flow through the area. A key driver for the implementation of the KBR was to prevent the construction of a reservoir that would have dammed up the lower reaches of the Palmiet – and flooded parts of the present-day KBR – in order to supply Cape Town with water (water institution interview R15), as proposed by the Department of Water Affairs in 1991 (Pool-Stanvliet 2014).

Establishing the Biosphere Reserve allied a range of actors with different motivations. One main concern was the conservation of the rich biodiversity and the rare fynbos in the area as the dam would have flooded 800 hectares at the heart of the Cape Floral Kingdom. Another concern, more relevant to this research project and voiced by the Elgin Valley farmers, was the need to retain control over local water resources. The Palmiet River flows through the farming areas and provides irrigation water to the producers in that area. The dam would have critically interfered with this water supply (Hyman 2006). The Biosphere status of Kogelberg now demands management of the local water resources according to certain sustainability principles, including respect of a minimum ecological flow (the Reserve) to maintain the ecosystem. A representative of the local WUA explained how this added focus on water was a blessing for the region:

> The whole focus on water […] meant then that water use had to be done in terms of biosphere reserve principles, which is sustainable development, which means you don't want to take more water out than what the river needs. (Water institution interview R15)

Figure 6.5: Map of the Unesco Kogelberg Biosphere Reserve (KBR).

Source: www.kbrc.org.za [accessed 15 June 2017]

The Elgin Valley does supply Cape Town with water, especially in winter, when it rains abundantly in the region. During summer, water is sometimes supplied on an *ad hoc* basis when Cape Town is in need. This is then more complicated as the ecological flow needs to be maintained and rains are scarce (water institution interview R30).

This establishes the Ecological Justification Narrative that is deployed around the KBR and the need for a minimum flow for the river to maintain the sensitive ecosystem. In line with this, producers in the Elgin Valley consider the KBR as protection against growing urban demand from Cape Town. For example, one fruit producer explained how the 'very sensitive eco-system […] helps us to keep Cape Town at bay' (producer interview R4), while another emphasised that the 'excess water is needed to maintain the eco-system' (producer interview R55). In addition to the Economic Justification Narrative, the Ecological Justification Narrative has proven to be instrumental in the Elgin Valley. It has functioned as a tool to maintain distance between the relatively water-abundant Elgin Valley and the growing urban demands of Cape Town.

6.3 Influencing Government

Arguably all strategies discussed so far influence water governance in one way or another. Within the water stewardship paradigm, influencing governance refers to engagement in the public water policy arena to mitigate water risks. Ideally, this engagement should be aligned with public interests and accompanied by transparent and accountable processes in line with principles of good governance. As WWF (2013: 18) writes, '[s]tewardship is about guiding and supporting government policy, not supplanting it, and certainly not thwarting or undermining its implementation'. Politics in society, however, may hamper such a positive implementation. This section thus aims to understand how the commercial fruit industry in the Western Cape influences formal water governance processes, i.e. influences government, especially the public water policy arena. It will show how the fruit industry benefits from considerable collective power, which it has been able to leverage to ensure its water security.

6.3.1 Influencing the Public Water Policy Arena

As one of its key constituents, white commercial farmers enjoyed wide-ranging support from the apartheid government. Water legislation and regulation was designed in such a way to ensure producers' water security (Mackay 2003). When South Africa transitioned to democracy in 1994, white commercial agriculture moved from 'historically advantaged to newly disadvantaged minority' (Goldin 2010: 202) – or so it may appear from their perspective. The government, suddenly, was not a reliable partner anymore in terms of

water security. While democracy meant losing considerable privileges around water, most notably the abolition of private and riparian water rights (as discussed in Chapter 4), it did not render commercial agriculture powerless or leave them without influence within the public water policy arena. This is due to one of the key features of commercial agriculture (and very much true for fruit production specifically), namely the collective power that stems from its organised nature.

There are several bodies that are part of the 'organised'-component of commercial agriculture in South Africa. For the Western Cape fruit industry, two of these are particularly important to maintain the sector's water security. First, the South African Agricultural Union (SAAU), which, in 1999, rebranded itself as the colour-blind Agri SA (Bernstein 2013), and its provincial arm Agri Wes-Kaap (WK). Second, Hortgro, which is a rebranding from the Deciduous Fruit Producers' Trust (DFPT), an organisation formed after deregulation of the fruit industry to establish a comprehensive service structure for the fruit industry (Hortgro 2017). As put by a respondent, 'the industry has a long history of […] strong organisation and structures' (industry interview R70) and these organisational structures are being leveraged to influence water governance and mitigate regulatory and political water risks for fruit producers in the Western Cape.

Agri SA and its provincial arm, Agri WK, are particularly powerful, and interesting, in this regard. Today, Agri SA is a federation of agricultural industry organisations that conducts policy assistance and lobbying for commercial agriculture (Agri SA 2018b). Or as put by a respondent, 'anything on the policy side that will affect agriculture, we do that' (industry interview R8). Agri SA and Agri WK are funded by a levy on irrigation hectares. Each farmer pays three Rand [£0.2][37] per irrigation hectare, of which one Rand is attributed to the provincial arm, here Agri WK, and two Rand go towards Agri SA (industry interview R8). While Agri SA and Agri WK constantly engage in agricultural concerns and how they relate to water, this section exemplifies this by means of selecting three distinct instances in the time since 1994.

The first instance refers to the elaboration of the National Water Act of 1998. Drafting of this piece of legislation was preceded by a two-year consultation process, including those with vested interests. As such, Agri SA (then SAAU) was a key actor at the table during that time. Agri SA and others linked to commercial agricultural vehemently opposed the abolition of riparian water rights and the implementation of limited-duration water licences

[37] 1 ZAR = 0.0572342 GBP (source: www.xe.com, accessed 11/07/2019)

(Backeberg 1997, Muller 2018). There was a considerable concern that these 'insecure' water licences could lead to a devaluation of farming properties, reduced investment in irrigation infrastructure, and more generally lead to a covert expropriation of riparian water rights without compensation (Backeberg 1997). These fears proved in vain as Existing Lawful Uses (ELU) were recognised within the NWA (National Water Act 1998). The ELU-provision recognises water uses that were lawful under previous legislation (the 1956 Water Act) as lawful under the NWA until such a time that they shall be converted into a water licence. A researcher interviewed highlighted that this was 'how white farmers made sure existing water allocations remained in place' (researcher interview R75). Therefore, while commercial farmers' water rights might have been diluted from apartheid, the new law still serves their interests (Muller 2018). Agri SA, as the organised voice of commercial agriculture, is now one of the actors calling for the full implementation of the NWA.

Second, and as an example of Agri SA putting its weight behind the NWA is a court case from the late 2000s. The court case brought a commercial farming business, Groede Wellington Broede (Pty) Ltd, against the Department of Water and Environmental Affairs in 2012. The farm on the banks of the Berg River in the Western Cape had applied for the transfer of a water licence, which had been rejected by the Department based on the need for equity and redress in terms of the NWA 1998, a decision upheld by the Water Tribunal. Agri SA got involved and brought the case to the South African Supreme Court of Appeal (SCA), disputing that the Department could refuse the application for water transfers based on the need for equity, as equity could not be taken as the highest priority criteria based on Article 27 of the NWA (Möller and Opperman 2011, van Koppen and Schreiner 2014a). Agri SA won the case, showing how the organisation has the resources to contest decisions and policies and the ability to 'play the institutional game of water' (Förster, Downsborough, and Chomba 2017: 530).[38]

Third, the recent 2015-2018 drought in the Western Cape coupled to the unstable water policy has spurred Agri SA to launch a specialised Water Desk (AgriSA 2018), as highlighted in Figure 6.6. Previously, water issues had been handled under the 'natural

[38] Shortly after this court case, the Department of Water and Environmental Affairs published the second edition of the National Water Resource Strategy (NWRS2), clarifying the priorities of water allocation (DWA 2013): (1) the Reserve for basic human needs and ecological flow; (2) international obligations; (3) poverty eradication and redressing past inequities; (4) strategically important water uses, including power generation and inter-basin transfers; and (5) water for general economic purposes, which includes commercial agriculture, putting the assurance of supply for it at the very bottom of the list.

Figure 6.6: Agri SA's press release for the launch of its water desk

(Source: www.agrisa.co.za/projects [accessed 13 August 2018])

resources' programme. The creation of a specialised Water Desk speaks towards the concerns of Agri SA in relation to commercial agriculture's water security. The focus of the Water Desk is to make 'South Africa's Water Law Work'. This is telling within the context of current revisions of the NWA (Dini 2018). The press release makes clear that Agri SA supports catchment area management through WUAs and CMAs. Previous publications on water policy positions by the DWS have suggested the abolishment of WUAs as a level of water governance (DWS 2014). Similarly, a recent Business Case publication, also by DWS, proposes the establishment of one single CMA, instead of the legislated nine (DWS 2017c). In areas where commercial agriculture clusters, such as the fruit-producing areas in the Western Cape, commercial agriculture exercises considerable power over water questions within these devolved institutions. The abolishment of WUAs and/or CMAs in the Western Cape could result in a considerable power loss. There is also fear that, because DWS lacks capacity and resources, current local arrangements over water management could collapse without being replaced by other effective structures. A representative of the provincial Department of Agriculture exclaimed that:

> It's impossible! They can't do it! They don't have the knowledge, they don't have the people, they don't have the money to do it. (Government interview R3)

The press release also highlights a series of key areas Agri SA's Water Desk aims to focus on. The first three foci mentioned are: validation and verification, compulsory licencing, and definition of existing lawful water uses. All three of these processes refer to questions of water allocation, a deeply political and historically charged question. These questions are negotiated at the national level and are a key concern during the currently ongoing revisions of the NWA – and Agri SA is making sure that they have a seat at the table. A representative of Agri WK explained this process:

> The process is that the DWS will come out with a new draft [for the National Water Act], and then it will go out for comments, and we're in that phase with the comments, it's a lot of workshops. We're working on it. So, we'll give it for instance to all our water experts, the irrigation boards and those guys will look at it. (Industry interview R8)

The current water policy environment is perceived as highly unstable by the commercial agricultural sector. Water has risen to the top of Agri SA's agenda and they are deploying their resources to ensure the best interests of their constituents.

Fourth, and related to the Water Desk, is how the support provided by these organisational structures played out during the recent 2015-2018 drought in the Western Cape. Agri SA's provincial organisation, Agri WK, took the lead in this instance. Already in 2015, early signs of a possible drought had become apparent. 2013 and 2014 had been very wet years with copious amounts of rain but 2015 brought below-average winter rainfall. While some restrictions were implemented relatively quickly, the Province and the National Government had previously delayed projects to augment the provincial water supply (Muller 2017). With less rain, the reliance on stored water increased, both from the agricultural side and urban side, especially the City of Cape Town. These early restrictions quickly proved to be insufficient. In response, and because agriculture is given least assurance of supply, the government aimed to restrict agricultural water use completely in early 2017. And this is where Agri WK intervened. A representative of the organisation explained:

> And then when [the drought] really started serious, they just wanted to cut our water off. And we said 'No, you can't cut our water off, bottom line, we've warned you, this is what you've got. We are prepared to look at a 10, 20, 30, or even 40% reduction. But you're not going to cut us off because you've done nothing to prepare'. Cape Town woke up too late to put in water restrictions. If we've done this in 2015 already, we would have been able to manage it much better than we were able now. (Industry interview R8)

The main reason Agri WK intervened so strongly was that the proposed total restrictions came in the middle of the fruit season. Such a complete restriction would have damaged or even destroyed many fruit trees and hampered successful participation in the global fruit production network. Consequently, and as summarised by one interviewee, organised agriculture had 'clearly sufficient voice to say "don't be unreasonable, don't expect us to just kill the crop"' (researcher interview R40), and instead demand the introduction of gradual restrictions. Within this context, the Economic Justification Narrative previously discussed was heavily deployed to prevent a complete water cut.

Another important organisation providing services, support, and policy advocacy for the fruit industry is Hortgro. Hortgro is a specialised governing body of the deciduous fruit industry and itself composed by two organisations: The South African Stone Fruit Producers Association (SASPA) – or Hortgro Stone; and the South African Apple and Pear Producer Association (SAAPPA) – or Hortgro Pome. Hortgro is funded by a statutory levy from commercial stone and pome producers. A producer that sits on Hortgro's Science Advisory Board explained the levies:

> So, we pay a statutory levy on every carton and every kilo of juice fruit produced and every kilo of fruit packed. […] That then goes into a levy fund administered by Hortgro. (Producer interview R62)

All farmers producing fruit commercially are thus part of Hortgro and can benefit from the services the organisation provides. Hortgro offers a range of support servcies to deciduous fruit producers in the form of research and development (R&D), market information, and production support (Hortgro 2018). For water issues, a key branch within Hortgro is Hortgro Science, which conducts R&D for its members, with a specific focus also on irrigation and orchard management (producer interviews R4, R62). In recent years, water has risen to the top of the agenda within Hortgro, with a specific focus on mitigating direct physical water risks as 'the major risks to the orchard of the future in South Africa is climate and water' (industry interview R70). Hortgro invests considerable resources into R&D with different programmes with permanent working groups. The organisation also partners with other research institutions, such as the University of Stellenbosch or the Water Research Commission to undertake larger or more expensive projects, such as those investigating high-tech irrigation systems (industry interview R70).

During the recent 2015-2018 drought, Hortgro played a key role in providing information to producers about on-farm strategies to save water, irrigate efficiently, and manage water in a way that does not damage the tree and current and future crops. A Hortgro

Science representative elaborated on how in this drought situation, they went beyond their mandate:

> Although we are only really mandated for R&D, obviously, you know, growers also look to us, 'oh good grief, it's dry what should we do?' So, we send out some fresh notes, which is basically just newsletters that tell growers what they can do. (Industry interview R70)

Critically, Hortgro also organised an irrigation seminar in Stellenbosch in August 2017 – during the height of the drought – to instruct farmers on how to deal with the drought. The seminar focused on three interrelated issues: a) farm planning and design, b) irrigation scheduling and measuring, and c) drought management (Duvenhage, Bonthuys, and Mouton 2017).[39] The Hortgro representative interviewed for this project underlined his surprise at the high attendance number to this seminar and then saying that '350 growers showing up for an irrigation seminar just indicates the need of it' (industry interview R70). The research and development support provided by Hortgro Science is critical for the successful production of fruit in the Western Cape, especially under difficult circumstances. Fruit production is highly capital-intensive and receiving training and sharing knowledge is key.

6.4 Chapter Conclusion

This chapter has outlined the different strategies the fruit industry deploys to mitigate the range of water risks discussed in Chapter 5. In doing so, it answered the second part of Research Question 3. The thesis argues that these strategies shape how global agricultural production networks influence processes of water governance. The strategies discussed range from on-farm solutions, through to collaborative efforts, to influencing government, involving multiple scales. This categorisation is loosely based on the five-step ladder proposed within the water stewardship paradigm (see WWF 2013, and Morgan 2018). Unlike the water stewardship ladder, these strategies are seen here as overlapping strands that all work towards ensuring water security for the export-oriented fruit industry. Overlapping strands were found to be more appropriate because these strategies do not necessarily follow each other progressively, rather they are deployed at the same time at different scales, by the same or by different actors.

In three sections, the chapter discussed on-farm strategies, collaborative efforts, and influencing government in more detail. On-farm strategies happen fully within the

[39] Individual presentations delivered at the workshop can be viewed on Hortgro's YouTube channel: www.youtube.come → search: Hortgro.

individual farmer's purview and focus on increasing efficiency and diversifying water sources. Collaborative efforts designated strategies that producers engage in with other, often local, actors to ensure their water security. This includes the clearing of alien invasive plants, dominating local water institutions, and the deployment of justification narratives. Finally, while all these strategies influence water governance at some level, the fruit industry in the study area also deploys specific strategies to influence the public water policy arena in their favour. This is facilitated and largely driven by the highly organised character of the commercial agricultural sector, characterised by high degrees of collective power. Importantly, fruit producers' participation in lucrative export markets for deciduous fruit is limited by water in the Western Cape, and it is the desire to enhance this participation that underpins and shapes the different strategies.

This chapter has thus shown that the commercial fruit industry deploys a series of strategies at different scales to ensure their water security. It has described these strategies in rich detail, teasing out the commercial dynamics as well as the political economy influences that inform them. Using an adapted version of the water stewardship categorisation has been informative because it showed how fruit producers do engage with other actors regarding water management and governance challenges. However, while water stewardship promotes 'public-good outcomes' of such engagements, the strategies analysed here show that they first and foremost serve fruit producers interests. Some of them, like alien clearing or managing water quality within shared rivers, might have secondary benefits for other actors, but that is not their primary goal. Chapter 7 will now discuss what the implications of these water risks and their associated mitigating strategies are for water governance in the study area and how this matters for understanding GPN.

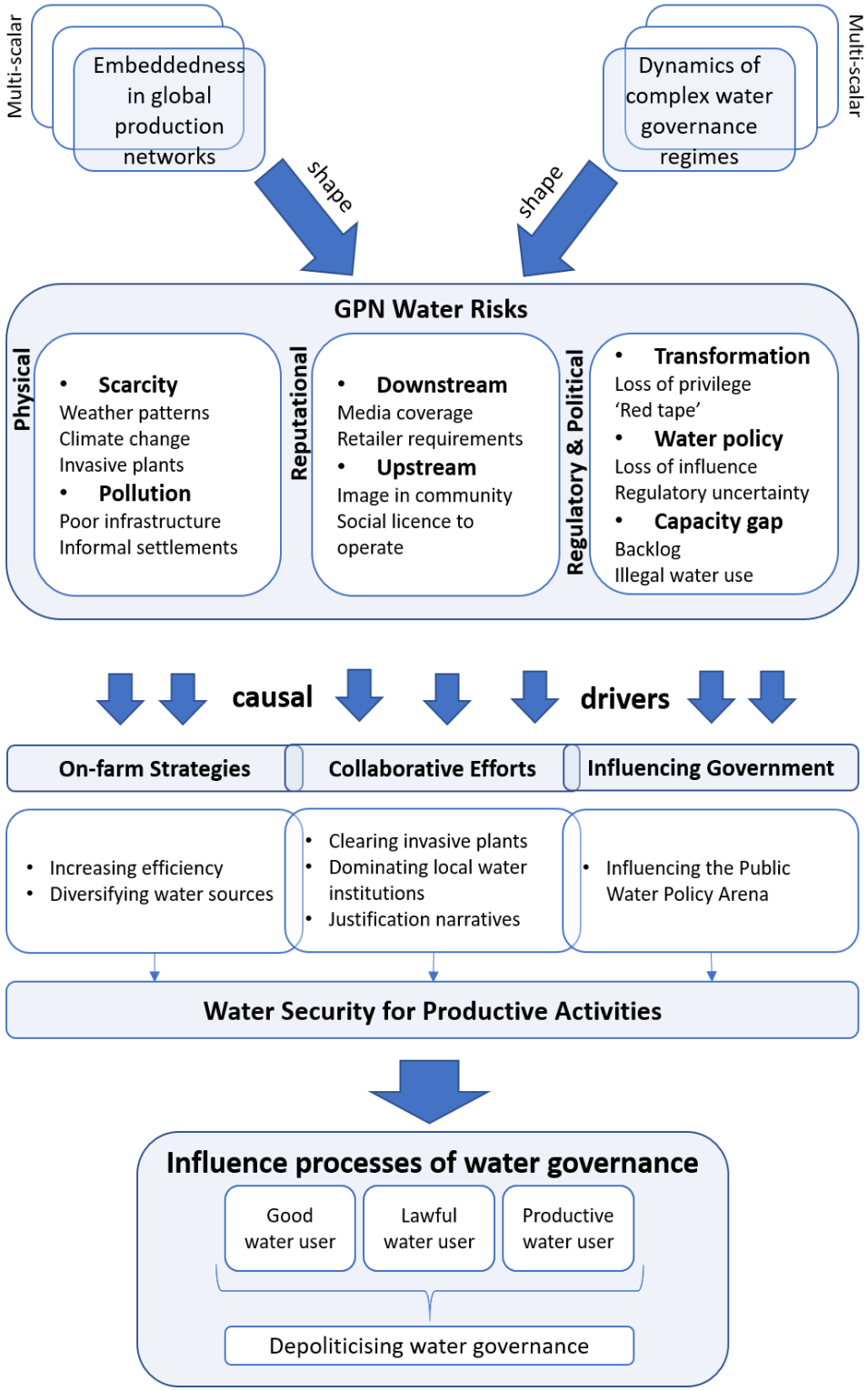
7 Discussion: Influencing Water Governance

This thesis has drawn upon existing GPN and water governance literature to conceptualise the influence of global agricultural production networks on processes of water governance. It has done so through the concept of water risks and an understanding of strategies directed at ensuring water security for productive activities. This conceptualisation has been developed over several chapters: theoretical foundations were laid in Chapter 2, underpinned by an in-depth context analysis in Chapter 4, followed by an analysis of, first, water risks in Chapter 5, and, second, strategies for water security in Chapter 6. As the thesis progressed, the analysis has highlighted the importance of both fruit producers' embeddedness in global agricultural production networks and their interaction with complex dynamics of water governance,. The purpose of this discussion chapter is to reflect analytically on the implications the presented water risks and associated water security strategies have for processes of water governance. Therefore, this chapter seeks to address the final research question, Research Question 4, of this thesis: *what are the wider implications of the influence of global agricultural production networks for water governance in the Western Cape?*

Answering this question leads to the final analytical building block to complete the conceptual framework developed over the last two chapters. This is illustrated in Figure 7.1 (next page), where we can first see a recap of previous analytical work: water risks are formed both by fruit producers' embeddedness in global agricultural production networks and through their interactions with the complex dynamics of water governance regimes; these physical, reputational, and regulatory and political water risks then act as causal drivers for the fruit industry to deploy a series of strategies to ensure water security for its productive activities – these can take place on the farm, collaboratively with other (local) actors, or can directly aim to influence the public water policy arena. These strategies, it is argued in this chapter, have wider implications for processes of water governance, which is visualised in the latest addition to the framework.

The chapter unfolds as follows: Section 7.1 first returns to the concept of water risk and aims to theorise it more thoroughly, as so far it has been used as simple categories. It theorises water risk as actor-specific, context-specific, produced, reciprocally constructed, and largely originating beyond the individual farm-gate. This theorisation has implications for the possibilities of water security, and thus water governance. The second part of the chapter, Section 7.2, turns to the water governance implications of the water security strategies discussed in the previous chapter (Chapter 6).

Figure 7.1: Conceptualising the influence of global agricultural production networks on processes of water governance: implications for water governance



(Source: author's analysis)

This chapter debates these strategies and argues that they result in three shifts in narrative that largely depoliticise water governance. In the Western Cape context, where access to water is characterised by ongoing power asymmetries and inequalities, this is problematic. Section 7.3 then deliberates how the process of depoliticisation has been facilitated by the wider political economy of South Africa, especially the country's neoliberal economic policy, which favours economically productive water uses. This is wrapped up in a summary in Section 7.4, which also sets the scene for the final concluding chapter, Chapter 8.

7.1 Theorising Water Risks

In academic literature, water risks have been poorly theorised so far. Instead, they have largely served as categories to capture different characteristics, which is useful, as shown within this research project. Here, water risks have been categorised into physical, reputational, and regulatory and political water risks. While these categories are relatively broad, Chapter 5 has refined these for the actors and context under investigation. Physical water risks stem from the specific weather patterns of the Western Cape, the negative impact of alien invasive plants, and pollution and related water quality concerns, all of which are exacerbated by climate change. Reputational water risks can manifest downstream with lead firms when producers are associated with polluted water use, or upstream when local communities perceive fruit producers' water use negatively. Regulatory and political water risks can arise from the transformation requirements within the post-apartheid water policy as well as more generally a public-sector capacity gap. This is thus a useful categorisation to capture a range of characteristics of water risks.

The categorisation is based on previous research into water risks (Baleta 2015, Baleta and Winter 2016), which is largely based on NGO literature (e.g. Pegram 2010, Reig, Shiao, and Gassert 2013) and may be one of the reasons the concept has remained under-theorised. One of the contributions of this thesis is to offer a more rigorous theorisation of water risks based on previous literature and the empirical findings of the research. The main argument is that the water risks presented here can be understood as GPN water risks specifically. This is because they largely form due to actors' embeddedness in global production networks. From this premise, a series of characterisations for GPN water risks emerge: they are actor- and context-specific, they are produced, reciprocally constructed, and often exogenous. The following paragraphs aim to describe this theorisation in more detail and outline its implications for water governance.

7.1.1 GPN Water Risks

GPN water risks are the first step to understanding the influence of global agricultural production networks on processes of water governance. It is, therefore, necessary to theorise them in more detail. Based on previous academic literature on water risk, drawing on NGO reports, as well as GPN 2.0 literature, the following sections theorise GPN water risks as actor-specific, context-specific, produced, reciprocally constructed, and largely originating beyond the farm-gate. Each of these characteristics is now discussed within this section, drawing on examples from the empirical evidence presented earlier, as well as on previous literature.

A) Actor- and Context-specific GPN Water Risks

GPN water risks are actor- and context-specific. The GPN water risks identified within this project are water risks for the Western Cape fruit producers embedded in global production networks. Other stakeholders within the Western Cape will most likely not define some described water risks as 'risk' (Franz, Schlitz, and Schumacher 2018). For example, agricultural enterprises that do not export are unlikely to face the same downstream reputational risks because they are not subject to the same export market requirements. Even when risks are shared among different water users, they are not necessarily shared equally (Baleta and Winter 2016). Pollution of shared rivers is a good example. Pollution poses a risk to all water users; however, it will affect their social and economic reality very differently depending on whether they are subsistence or commercial farmers, have small-scale or large-scale operations. For this study, the described water risks are specific to the export-oriented fruit industry in the Western Cape.

While water risks have been theorised as GPN water risks specifically, context still does matter. This is because global production networks are 'grounded' in specific locations (Coe, Dicken, and Hess 2008), an aspect that can be drawn out by applying a political economy perspective to GPN analysis (Hudson 2008, Alford 2018). As such, the identified GPN water risks manifest as they do due to the very specific Western Cape context. For example, the historical legacy of apartheid plays an important role, especially considering the privileged position of many fruit producers under this regime. The present-day political economy of the region is equally important; including the rapidly growing urban centre of Cape Town, the need to create employment, the different political leadership governing the Province versus the national government, the likelihood of the Western Cape being disproportionately affected by climate change, and

the economic importance of the export-oriented agricultural industries. All these political economy factors determine how water risks form and actualise for global fruit production networks which originate in the Western Cape. Similar industries in other world-regions might experience comparable GPN water risks but they will actualise quite differently depending on their context. This shows the value of keeping the categories of physical, reputational, and regulatory and political water risks relatively broad when investigating global (agricultural) production networks. By applying the categories to a specific context (and actor-category), they can then be refined and adapted to account for historical and present-day political economy context.

B) Produced and Reciprocally Constructed GPN Water Risks

GPN water risks can all lead to the same outcome: not having access to enough clean water for productive activities to supply global markets. GPN water risks thus produce scarcity for individual farmers. Importantly, only physical water risks from weather/climate and alien invasive plants are 'nature-made'. This highlights how water risks are not inherent in nature, but they are produced and constructed depending on specific actors and context. This produced character arises from economic activity, policies, private and public institutions; their interactions, aims, and values. Other research into 'nature-based' GPNs/GVCs does not explicitly acknowledge this constructed character of environmental risk. For example, Irarrázaval & Bustos-Gallardo's (2019) understand nature as 'imposing obstacles to production', creating 'ecological contradictions' that hamper its commodification at the production stage. This seems to give nature itself agency – which is not disputed here – however, in the context of water, such assumptions could easily lead to a naturalised and depoliticised discourse where water scarcity is equated to a lack of rainfall (Ioris 2004). Understanding GPN water risks as constructed and produced acknowledges the power to define these water risks. This is important when considering the possibilities for water security, as discussed in Section 7.2. Water scarcity, as well as water governance, already tend to be naturalised and reduced to technical or managerial processes rather than the political questions they are (Bakker 2000, Boelens and Seemann 2014, Castro 2007, Ioris 2004), and it is, therefore, important to be explicit about this characteristic.

GPN water risks furthermore tend to be reciprocally constructed, meaning that they produce or reinforce each other. For example, water pollution incidents – a physical water risk – are often caused or reinforced by the public-sector capacity gap, negatively impacting producers' water security and may lead to downstream reputational water

risks, threatening their business viability. Similarly, Western Cape weather patterns make producers reliant on water storage facilities, a reliance that is expected to increase with climate change. The post-apartheid regulatory landscape, however, makes the construction of on-farm storage facilities complicated for the dominantly white producers. Regulatory and political water risks thus reinforce physical water risks. The understanding of water risks as actor-specific, context-specific, produced, and reciprocally constructed fits with the relational understanding within the GPN framework (Henderson, Dicken, and Hess 2002). It allows for a defining and redefining of GPN water risks depending on the actor and perspective adopted within the GPN analysis and positions them in dynamic relation to other firm and non-firm actors.

C) Exogenous GPN Water Risks

What is further important to note is that water risks for the Western Cape fruit industry largely originate beyond the individual farm-gate. As theorised by Yeung and Coe (2015: 42), 'risk is generally produced beyond the control or confines of individual actors'. This does not mean that individuals cannot also contribute to creating GPN water risks – they can, for example, if they overuse groundwater through illegal abstractions as has been happening in Ceres Valley. In that case, individuals generate GPN water risks. For another producer, this is, however, still an exogenous origin, as it is the fact that neighbouring producers (also) overuse groundwater that creates a physical water risk for the individual.

Due to the exogenous origin of risks, Yeung and Coe (2015) further deduce from that that actors confront a common environment collectively, similarly to the notion of shared water risk (see Pegram, Orr, and Williams 2009). As previously discussed, water risks may be shared among actors, and while they might be shared among fruit producers relatively equally, they are not necessarily shared equally among firm and non-firm actors (Baleta and Winter 2016). What is more important within the context of this research project and an aspect on which the GPN approach remains relatively silent, is the fact that because risks are largely exogenously produced, the strategies to mitigate them will most likely have wider implications as well, as discussed in Section 7.2. This ties these water risk mitigating strategies to a range of non-firm actors, underlining the importance of an explicit network analogy when considering how globalised production interacts with other regimes, such as those governing the environment.

7.1.2 The Implications of GPN Water Risks for Water Governance

The above considerations are important to capture the implications of global agricultural production networks on processes of water governance. This is because water security, as the desired outcome of water governance processes, is largely defined in terms of water *in*security, i.e. tolerable water-related risks to society (e.g. Grey and Sadoff 2007). From this follows that the way water risks are defined, determines the possibilities for water security. It seems to assume a uniform understanding of both water risks and water security. As the empirical findings of this thesis have shown (Chapter 5), and the theorisation above has underlined, water risks need to be understood in relation to specific actors or actor-categories. The *who* is important. This is because there are power asymmetries in society, and water security for some may come at the expense of water security for others (Zeitoun et al. 2016). Thus, water risks for Western Cape fruit producers will result in very specific strategies to ensure water security that do not necessarily increase the water security of other actors.

The GPN water risks identified within this thesis are very specific to the Western Cape fruit industry. This water risk framing is strongly influenced by fruit producers' embeddedness in global agricultural production networks, and consequently, it is argued here, has direct implications for the understanding of water security in the Western Cape. Fruit producers are large and powerful water users that can dictate water risk framings. This power needs to be taken into account, and therefore a more plural notion of 'divergent water securities' as suggested by Boelens and Seeman (2014: 3) may be more useful, as it acknowledges the 'intrinsically relational, political, and multi-scale relationship of access and control that takes shape in the contexts of unequal power relations'. This understanding of divergent water securities is useful for this research project to capture the specific water security interests of the fruit industry, largely driven by global commercial interests, and to emphasise, again, the political character of water governance processes.

To summarise, GPN water risks are actor- and context-specific, they are produced and reciprocally constructed, and they originate beyond the control of individual actors. For this thesis, water risks were investigated for the fruit industry of the Western Cape, shaped by the region's historical and present-day political economy. All water risks pose a threat to the continued and seamless production of export fruit. Lack of reliable access to enough clean water for fruit production can turn into business risks, e.g. leading to financial cost or loss of market share. Consequently, the specific water risk framing

presented here can be understood as driven by fruit producers' embeddedness in global markets. In other words, it is in large parts because of fruit producers' export-orientation that water risks are identified and defined as presented within this thesis. These risk framings and perceptions subsequently act as 'causal drivers' (Coe and Yeung 2015) within the global fruit production network to deploy strategies to ensure the fruit industry's water security. Section 7.2 discusses these strategies in more depth.

7.2 The Implications of Strategies for Water Governance

GPN water risks act as causal drivers (Coe and Yeung 2015) for the Western Cape fruit industry to deploy a series of strategies to ensure water security for its productive activities. These water risk mitigating strategies take place at different scales and can involve a variety of actors. Chapter 6 has outlined these strategies in three overlapping categories. The first category of strategies describes activities within the farm gate that are fully within the single fruit producer's purview. The second set of strategies describes collaborative efforts, e.g. among producers, with the local and provincial government, as well as non-governmental organisations and institutions. The third category describes efforts to influence formal water governance structures to support the industry's water security, i.e. directly influencing the public water policy arena and its accompanying regulatory framework. Importantly, these strategies overlap and complement each other dynamically to establish a dominant discourse on water risks and water security that has tangible implications for water governance in the Western Cape.

The dominant discourse that is established by these water risk mitigating strategies positions the Western Cape fruit industry as efficient – and thus good – water users that are making the law work and are key to providing employment and supporting economic growth. As a result, the discussion is shifted away from questions of water allocation – arguably the core issue of water governance. The following sections separate this dominant discourse into three shifts that work together to depoliticise water governance, especially questions of water allocation. These shifts position the fruit industry as 'good water users', 'lawful water users', and 'productive water users'. The way these shifts in narrative arose, i.e. influenced by commercial dynamics, shows how global agricultural production networks influence processes of water governance.

7.2.1 First Shift: Good Water Users

The first shift construes fruit producers as 'good' water users based on their highly efficient irrigation practices and involvement in the clearing of alien invasive plants (AIPs). Although in terms of water security, these practices are largely self-serving, they

also portray the industry as 'doing the right thing' in terms of water usage and environmental stewardship. This perspective is enabled by a wider scarcity discourse (Woodhouse and Muller 2017). Water resources management in South Africa follows a river basin approach, which considers water as bounded and thus finite resource. This emphasises its scarcity, which in turn 'enables the application of classical economic models of markets as mechanisms to achieve efficient allocation of water to more productive users' (Peters and Woodhouse 2019: 6). The effect is a shift away from questions of water governance to practical issues of water management. This obscures the process by which water is allocated to certain groups (and not to others) as well as the reasoning behind it.

A) Efficient Water Use as Good Water Use

The key on-farm strategy for fruit producers in the Western Cape is to increase irrigation efficiency (see Chapter 6). Increasing irrigation efficiency through high-tech irrigation systems has several benefits at the farm-level. It saves pumping costs, i.e. electricity; permits the precise application of fertilisers and other chemicals, reducing input costs; allows for increased irrigated area as water application per hectare is reduced; increased yields; this all usually leads to an increased value of production, especially for higher-value crops, like fruit trees (Perry and Steduto 2017). Increasing irrigation efficiency has the added benefit of being fully within the farmer's control, requiring little to no interaction with other water stakeholders and the relatively messy hydro-political landscape of the Western Cape. Irrigation efficiency is also commonly positively connotated – efficient water use, in the public mind, equates to good water use. Thus, by investing in high-tech irrigation systems, fruit producers also manage to portray a positive image to other water stakeholders and the wider community.

Irrigation efficiency is equally important to increase yields and obtain ideal fruit size and quality. With more precise irrigation, yields per orchard can be increased, therefore intensifying production (Perry and Steduto 2017). High-tech irrigation systems also facilitate control over fruit size and fruit quality, two key requirements to export successfully towards premium markets. Self-service fresh fruit shelves in supermarkets across Europe 'reinforce the need for instant, appealing produce' (Dolan and Humphrey 2000: 153). In the study area, fruit that does not visually conform is usually processed to lower value fruit juice or canned as consumers in destination countries are unlikely to buy such fruit (de Hooge, van Dulm, and van Trijp 2018, Göbel et al. 2015). Because export markets are more lucrative than fruit juice or canned fruit markets, high-tech

irrigation technology to achieve fruit size and quality becomes a function to access those markets successfully. It demonstrates how global production networks directly influence on-farm water management.

In a similar fashion, standards and certification imposed by export markets also favour high-tech irrigation systems. Global G.A.P is the minimum requirement for fruit producers to export abroad and is often the basis of many supermarket specific standards as well. For example, the Tesco NURTURE certification can be obtained as an add-on module to the latest (2017) GLOBALG.A.P. IFA Version 5 audit process (GLOBAL G.A.P 2017b). GLOBALG.A.P. IFA Version 5 has several requirements regarding water use and management that are facilitated by high-tech irrigation systems. This includes a focus on technical equipment to manage, monitor, and forecast irrigation requirements in water-scarce settings. While the main focus of standards and certification remains on water quality concerns regarding food safety, there is an increasing awareness about water quantity concerns and how they might affect the long-term assurance of supply to global markets (WWF and M&S 2016).

B) The Paradox of Irrigation Efficiency

There are direct implications for water governance resulting from increased irrigation efficiency at the farm level. Saving water at the farm scale through more efficient irrigation systems does not necessarily translate into increased water availability at the catchment or basin scale, as often presumed. This ‘paradox of irrigation efficiency’ (Grafton et al. 2018) is constituted of two components. First, less efficient irrigation systems have ecological benefits, as water ‘losses’, such as runoff, are frequently recovered or reused at the catchment scale respectively contribute to subsurface recharge, and thus become available to other users (Ward and Pulido-Velazquez 2008). Second, any water savings made at the farm-scale tend to be reinvested within the production site, e.g. by expanding the area under irrigation. Because little to no water can be recovered or reused elsewhere, highly efficient irrigation systems actually increase local water consumption, at the expense of water availability elsewhere (Perry and Steduto 2017).

An additional worrying effect of highly efficient irrigation systems is that water becomes a more valuable input. This is due to the combined effects of farmers being able to irrigate larger areas, obtain higher yields, and making pumping more affordable. Simply put, high-tech irrigation permits individual farmers to produce more with less. These combined effects increase the incentive to access more water as the ‘impact of “more

efficient" irrigation is to increase *current* consumption, and to increase *demand* for water' (Perry and Steduto 2017: 35, emphases in original). In the study area, this is also evidenced by the second on-farm strategy 'diversifying water sources' (discussed in Chapter 6). Water has become so valuable for fruit production in the Western Cape that some producers do not shy away from accessing additional water sources illegally. While this rogue behaviour is facilitated by the public-sector capacity gap plaguing the South African water sector, it also directly undermines any of its effectiveness by bypassing the law.

C) Environmental Upgrading and Rendering Technical

Acknowledging the direct implications of improved irrigation efficiency on water governance as partly driven by producers' embeddedness in GPN also provides us with a more nuanced conceptualisation of environmental upgrading. Traditionally, a linear understanding of environmental upgrading has been proposed, where it describes 'the process by which economic actors move towards a production system that avoids or reduces the environmental damage from their products, processes or managerial systems' (De Marchi, Di Maria, and Micelli 2013: 65). This includes, for example, lower consumption of natural resources, such as water, during production processes. Investments into high-tech irrigation systems to increase irrigation efficiency and reduce the 'drop per crop' can thus be conceptualised as environmental upgrading.

Recent in-depth research into environmental upgrading in the Kenyan horticulture industry by Krishnan (2017), however, has challenged this linear understanding, instead finding that environmental upgrading is a dynamic process that is conditional on economic and social upgrading. She further argues that in contrast to economic and social upgrading, environmental downgrading can never be beneficial. As discussed above, this is not necessarily true within the context of water and high-tech irrigation systems. A reality that Krishnan (2017: 333) acknowledges by saying that '[p]erforming "excess" environmental upgrades may be long-term environmental downgrades'. Within this study, this is in part due to the type of agriculture investigated: large-scale, high-tech, capital-intensive farming operations, fully embedded in global production networks rather than maybe the more mid-sized agricultural companies only partially embedded in GPNs investigated by Krishnan. It also relates to the specificities of water as a flow resource, where negative impacts may be easily externalised from the production site and felt by downstream users. In that sense, and considering that the natural environment is a porous system, this raises the more general question of whom environmental upgrading

benefits? While most farmers investigated within this study are concerned with environmental sustainability, as evidenced by their involvement in biodiversity conservation, for example, this is largely self-reflexive in the sense that it also serves a specific purpose, i.e. increasing their water security (see below).

The broader focus on high-tech irrigation efficiency can have an effect akin to what Tania Li (2007, 2016) terms 'rendering technical' in her research on rural development in Indonesia. This concept can be adapted to the present research project where the process of 'rendering technical' articulates processes of water governance in technically defined terms, such as efficiency achieved through high-tech irrigation, side-lining the core question of water governance – who gets how much water and why? This encapsulates the first shift in narrative. The question of water allocation is obscured by the argument that water is used efficiently, largely depoliticising existing water allocations. The consequence, however, of '[v]iewing governance in technical or formulaic terms is running the risk of overlooking context and power dynamics that shape governance in crucial ways' (Bakker and Morinville 2013: 11).

In wider considerations of global environmental change, it must be acknowledged that a focus on high-tech irrigation is insufficient to address concerns regarding the sustainability of global water resources. This is especially true considering the paradox of irrigation efficiency which underlines that increasing irrigation efficiency does not necessarily save water at the catchment scale. In fact, increased irrigation efficiency through high-tech systems can make scarcity both worse and more difficult to manage (Perry and Steduto 2017). There is, therefore, a serious need to re-examine the widely held belief 'that increased irrigation efficiency will relieve the world's water crisis' (Ward and Pulido-Velazquez 2008: 18219). For GPN research, this shows the limit of a narrow and linear understanding of environmental upgrading, especially if there is a focus on chains rather than broader networks. The natural environment is always shared with actors, even those not participating in global production networks and value chains.

D) Stewards of the Environment?

The collaborative clearing of alien invasive plants (AIPs) is an example of collective action as foreseen by the water stewardship paradigm because it has a public-good outcome (WWF 2013). It brings together the private sector, here fruit producers, with governmental and non-governmental actors to tackle a highly relevant water issue. The participation of fruit producers in the clearing of AIPs is critical because considerable amounts of infestation are located on private farmland (van Rensburg, van Wilgen, and

Richardson 2018). While many fruit producers will clear some of their farmland independently, they receive financial incentives and in-kind support when collaborating with governmental or non-governmental stakeholders. Thus, these collaborative efforts can tackle critically infested land areas or do it more effectively. Importantly, collaborative efforts to clear AIPs have a public-good outcome – a key aim of water stewardship.

This public-good outcome of clearing AIPs, like the risk it brings, is multifaceted. By clearing AIPs, the fire risks across whole communities are reduced. If there are fewer AIPs, fires are easier to control and manage, which will not only benefit farmers but the wider community as it can reduce property damage. Reduced AIP fires are also beneficial for the ecosystem. Although the native fynbos vegetation is fire-adapted, AIP fires generally burn hotter and quicker, killing off fynbos seeds instead of dispersing them (Van Wilgen et al. 2010). Apart from fires, removing AIPs helps to conserve the native biodiversity in the study area, which is not only ecologically important but also a tourism asset, something the wider community can enjoy, and economic basis for livelihoods, such as wildflower harvesters (Bek et al. 2017, Blokker, Bek, and Binns 2015). In terms of water benefits, clearing AIPs increases the runoff into on-farm or community water storage facilities. A tangible example of this is how in the Overberg area of the Western Cape, the source of a key local river (Nuwejaars) was discovered after considerable clearing of AIPs on a local farm (Nuwejaars Wetlands 2019). Farmer-driven clearing of AIPs thus has beneficial effects beyond the farm-gate.

Collaborative efforts around the clearing of AIPs have interesting implications for water governance because of the range of actors getting involved. Conservation bodies like CapeNature or TMF usually do not engage in water issues but on biodiversity. Because in this case biodiversity and water are closely linked, these actors enter a key site of water governance. As discussed in Chapter 2, an analytical understanding of water governance accounts for the *who* and the *how* of water governance processes (Gupta, Verrest, and Jaffe 2015). The ‘external’ connections brought in by the clearing of AIPs push the boundaries of traditional understandings of water governance systems within the water sector. De Loë and Patterson (2017a) argue that actors and institutions outside of the traditional water sector can be critical for effective water governance but that they are likely to have non-water-centric interests, values, and concerns. Within the context of this study, collaborative efforts around AIPs clearing bring desired water outcomes because these differing interests, values, and concerns are acknowledged, e.g. fire or biodiversity, while also being critical to water governance.

The desired water outcomes of AIPs clearing for the fruit industry is increasing runoff within the wider region. Having such a public-good outcome serves the very specific water security interests of the fruit industry. This is mainly due to the perceived regulatory and political water risks that might affect agricultural water allocation. Commercial agriculture, such as export-oriented fruit production, has been bottom-listed for new water allocations and in terms of assurance of supply in the case of water shortages. In the study area, there are also concerns that rapid population growth, especially in the City of Cape Town, could threaten existing agricultural water allocations. Increasing runoff through AIPs clearing within the region could therefore 'free up' water for this growing population so that they do not have to be taken away from the agricultural sector (Baleta 2015). Therefore, while there is a direct public-good outcome from AIPs clearing, it is also driven by sector-specific water security interests.

7.2.2 Second Shift: Lawful Water Users

The second shift positions fruit producers as lawful water users. This is often put in direct contrast to the government which is largely perceived as failing in its regulatory duty. This is especially important within the context of local water institutions, such as Irrigation Boards (IBs) and Water User Associations (WUAs). IBs and WUAs are key sites of local water governance processes that, in the study area, are heavily dominated by fruit producers. Although technically tasked with local water management (and not governance), these institutions end up with considerable power over locally allocated water, as will be shown below.

The dominance of these local water institutions by fruit producers is largely due to the historical political economy of the Western Cape. IBs were formed when farmers pooled their resources to build shared irrigation infrastructures, such as dams and canals, with the aim to reduce agricultures' reliance on rainfall (Steyn et al. 2019). Water security was equated with access to reliable irrigation water, largely facilitated by the country's commitment to hydraulic engineering projects (Meissner 2019). The construction of such infrastructure was supported by both the colonial and the subsequent apartheid government, who provided subsidies and low-interest loans that were largely written off (Debbané 2013). Due to the geographical trajectory of colonial settlement in South Africa, the very first IBs were formed in the Western Cape (Steyn et al. 2019).

When South Africa transitioned to democracy in 1994, the policy expectation was that existing IBs would transform to the more inclusive newly conceptualised WUAs. While some did, precisely following legal requirements to do so (e.g. see Méndez-Barrientos

et al. 2018), they still largely remain vehicles to provide participating farmers with irrigation water and ensure their water security – albeit now under the new banner of transformed WUA. Although fruit producers' dominance of local water institutions is historically driven, this dynamic has been reinforced by producers' embeddedness in global production networks. This, in turn, links global production networks directly to water governance.

For example, in the Ceres Valley, producers still operate under a set of IBs. This is possible because the National Water Act of 1998 recognises such institutions as being lawfully established under previous law, i.e. the 1956 Water Act (National Water Act 1998). This is in line with the phased approach of implementing the new democracy in a way that minimised disruption to the economic pillar. Besides the legality of it, there are two main reasons for Ceres Valley's continued organisation as IBs. First, their initial proposal to convert to a WUA was rejected by the Minister as it did not fulfil the necessary transformation requirements, i.e. in terms of race and gender (water institution interview R19). This rejection coincided with wider questioning of the effectiveness of WUAs and more generally the role of parastatal organisations in delivering what was seen as a state-mandate. As a consequence, the process of transforming IBs to WUAs was put on hold for several years (DWA 2013, DWS 2014, Schreiner 2013). Second, there are clear benefits for fruit producers to remain organised as IBs as it does not require engagement with other water users (as foreseen in a WUA) and thus facilitates the maintenance of control over existing water resources. As IBs, producers can remain a relatively closed club with a unified vision about local water resource management that supports their water security for productive activities.

This perspective concurs with findings from other research into Ceres Valley and its fruit industry. For example, Debbané (2013) engages with the concept of 'dis/articulations' (Bair and Werner 2011) to examine critically how the Ceres Valley fruit industry's integration into global production networks is articulated with and contingent upon the production and circulation of water resources. She finds that despite the post-apartheid reshuffling of political and economic priorities, fruit producers in Ceres Valley were able to maintain and strengthen their dominance over the regional economy because of their ability to mobilise water resources in their favour through legal processes. This does not only have direct implications for water governance in terms of who gets access to how much water and why, but as Debbané shows, it also links to wider social-political

implications such as the devaluation of labour in Ceres Valley and a crisis of local government.

In a contrasting example, the Elgin Valley decided to transform into a WUA and did so successfully in 2005. The process created a legal opportunity for these farmers to increase the area under their control by amalgamating five different IBs into one WUA (GWUA 2009). While there have been efforts to include other water stakeholders; such as the historically disadvantaged, emerging farmers, and the municipality; the leadership of the GWUA remains largely dominated by commercial fruit farmers (GWUA 2014b). Thus, although 'transformed' according to the provisions of the new National Water Act of 1998, the WUA still primarily serves the same constituents as under apartheid rule.

Other research into WUA transformation processes in South Africa concurs with these findings. For example, Méndez-Barrientos et al. (2018), analysing a sub-catchment in the Thukela River basin in the KwaZulu-Natal Province, have found that commercial farmers there have used the legal transformation process to expand the geographical boundaries of the WUA by combining several IBs, similarly to the Elgin Valley (see also Kemerink et al. 2013). Förster et al. (2017) investigate WUA transformation in the Crocodile (West)-Marico river system in the Northwest Province finding that commercial farmers have completely dominated this process to protect, control, and expand their water security. In both cases, this dominance over local water institutions was largely enabled by (a) poor oversight from the government due to the public-sector capacity gap, and (b) considerable structural power of the commercial agricultural sector hailing from the apartheid era. This shows how commercial farmers in the Western Cape and South Africa more broadly have 'significantly more power to "play the institutional game of water" to their advantage' (Förster, Downsborough, and Chomba 2017: 530, emphasis in original). As a consequence, white commercial farmers have been able to hold on to their water allocations and 'this position has come to be claimed as not just legally compliant with the Act but also legitimate in terms of water allocation' (Peters and Woodhouse 2019: 5).

At their core, collaborations among fruit producers within WUAs or IBs can be understood as an example of 'collective action' as understood in the water stewardship paradigm (WWF 2013). As this type of collaborative effort is largely exclusionary of other water users (even in WUAs), it is difficult to see any public-good outcomes – in fact other studies support the opposite thesis of public-bads by maintaining inequity in the access to water for productive activities (Förster, Downsborough, and Chomba 2017, Kemerink

et al. 2013, Méndez-Barrientos et al. 2018) as well as creating negative social-political implications, such as the devaluation of labour (Debbané 2013). These insights, again, push the boundaries of water governance by highlighting the importance of historical, yet enduring power structures as well as the wider social consequences of water governance processes.

The strategy of dominating local water institutions to ensure water security for productive activities feeds into the broader debates about water reform in South Africa. It highlights the difficulty of ensuring not only equity in the access to water resources but also equity in the access to the benefits of water resource use, such as irrigation for productive activities. As explained by Peters and Woodhouse (2019: 7), '[such] discourse deflects detailed scrutiny of existing water use by commercial farming (and the potential for its reduction) on the grounds that it is both lawful and efficient'. These questions, it is argued here, are strongly linked to the third and final shift, which positions fruit producers as productive water users – a conceptualisation that has been key to maintaining and justifying agricultural water allocation.

7.2.3 Third Shift: Productive Water Users

The third shift positions fruit producers as productive water users. It revolves around the fruit industry's role in providing employment opportunities and acting as a catalyst for economic growth. It is largely based on the Economic Justification Narrative identified in Chapter 6, which has, as shown here, far-reaching and tangible implications for water governance. This third shift operates in two linked ways: first by tying water allocation for the fruit industry directly to the provision of employment; and secondly, by emphasising that this is a productive water use necessary for the region's economic growth. The aim of this shift is to justify agricultural water use in the past, present, and for the future. It exercises a direct influence on water policy and legislation, as shown below.

The origin of the Economic Justification Narrative can be traced back to the National Water Act (NWA) of 1998 and the provision therein to recognise water allocated in conformity with previous apartheid legislation as Existing Lawful Uses (ELU). Although foreseen as a transitional mechanism, ELU has effectively allowed the continuation of apartheid-era water uses. The main reason behind the introduction of ELU was to avoid economic disruption during the transition process (Movik 2014). It highlights how post-apartheid South Africa focused 'on "adding in" the water demand of millions of people, but not "allocating out" those privileged under other constellations of social forces as they contribute most substantially to economic growth' (Swatuk 2010: 521).

The Economic Justification Narrative was also heavily deployed during the drafting process of the official policy for water allocation reform (with the unfortunate abbreviation of WAR). WAR was developed to implement the rather broadly formulated aim of the National Water Act to allocate water for 'the beneficial use of water in the public interest' (National Water Act 1998). Similarly to the Economic Justification Narrative identified within this thesis, Movik (2009) identifies an 'economic productivity narrative' that dominated the discussions during the drafting of WAR between 2003 and 2006. Initial drafts of WAR, for example, stated that 'if this re-allocation of water is done too quickly […] the country may suffer economic or environmental damage as emerging users struggle to establish productive and beneficial uses of water' (DWAF 2005: 4). This statement equates productive water uses to existing water uses, e.g. such as (white) commercial agriculture, underlining the need for ELU. It also implies that existing productive uses are environmentally sound, while emerging uses (i.e. black livelihoods), on top of being non-productive, lead to environmental degradation. This not only disregarded the potential negative impacts of existing water uses, such as eutrophication from fertiliser use but as Movik (2009: 11) argues, it established a meta-narrative of 'poverty-environment-degradation', linking the economic and ecological dimension of Justification Narratives.

This perspective is reinforced in the second edition of the National Water Resources Strategy (NWRS2). The NWRS2 was published in 2013 and is strongly influenced by the National Development Plan (NDP) and its New Growth Path (NGP) published in 2012 (DWA 2013, NPC 2012). The following quote excerpted from the NWRS2 illustrates this focus:

> The New Growth Path (NGP) has identified economic sectors that have a potential for creating employment on a large scale, and water is critical for meeting economic growth and job creation targets. The NGP looks to the green economy, agriculture, mining, manufacturing and tourism industries for most of the employment opportunities. (DWA 2013: 12)

The NWRS2 estimates that roughly 8.5 million people are directly dependent on the agricultural sector for employment and income. Hence, despite the sector's water intensity, it considers it as an important economic pillar to create employment. In line with the NDP, there is an aim to increase the area under irrigation for agriculture by more than 50% to boost employment opportunities. Water is seen as the limiting factor, both in terms of quantity and quality, where the latter can negatively affect access to export markets and thus foreign income. While the NDP does not clarify where the water for these activities should come from, the NWRS2 suggests that increased efficiency

through technological innovation and the development of selected new water schemes can support this planned expansion. The focus on technological solutions, again, encompasses the first and third shift of good and productive water use.

The implication for water governance of these Justification Narratives is a depoliticised discussion about water allocation. By shifting the discourse to economic growth, job creation, and environmental sustainability, the unequal access to and control over water resources is legitimised and naturalised. This can be understood as a process of 'double diversion' (Freudenburg 2005), whereby privileged access (first diversion) to natural resources is legitimised by privileged accounts (second diversion) that remain largely unchallenged. Due to widespread unemployment in South Africa, economic growth and employment creation are important political priorities. At the same time, South Africa has a strong environmental lobby, which, for example, successfully advocated for the inclusion of the environmental reserve in the National Water Act (Muller 2014). In the study area, the Justification Narratives of economic growth, job creation, and environmental sustainability are co-produced by different actors, most prominently fruit producers and their industry associations, but also different levels of government and NGOs. The importance given to economically productive water uses largely defines these as the 'beneficial use of water in the public interest' foreseen in the NWA, critically so over the need to redress past injustices and achieve broader equity.

7.3 A Political Economy of Fruit and Water in the Western Cape

So far, this chapter has theorised GPN water risks as context-specific, actor-specific, produced, reciprocally constructed, and largely originating beyond the farm-gate. These GPN water risks act as causal drivers for the fruit industry to deploy strategies to ensure water security for their productive activities. These multi-scalar strategies, in turn, influence water governance in the study area, and in fact throughout South Africa. Three shifts in narrative, it is argued here, result from these water risk mitigating strategies and ultimately lead to a depoliticised discourse of water governance. These shifts in narrative position fruit producers as efficient, thus good, water users; as lawful water users; and as (economically) productive water users. By using water efficiently and productively while abiding by legislation, fruit producers are also positioned as environmentally sound water users. As a result, discourses of water governance are largely depoliticised. The core question of water governance – who receives how much water and why – is side-lined through the three shifts in narrative and reframed as questions of water management: these focus on issues of water monitoring, water transport, efficiency, and

conservation. As outlined in Chapter 2, water is a deeply political good and water governance is a political process. By shifting attention to issues of water management, the focus is taken away from these political processes underlying water governance, obfuscating power asymmetries and inequalities.

The three shifts in narrative discussed in this chapter, and their resulting implications for water governance, are largely enabled by the wider political economy of the new South Africa. The importance given to economically productive water usage coincides with the rightward shift in economic policy shortly after the democratic transition. Somewhat surprisingly, the otherwise left-leaning ANC replaced the social-democratic Reconstruction and Development Programme (RDP) (RSA 1994) relatively quickly with the orthodox economic reform programme, Growth, Employment and Redistribution (GEAR) (RSA 1996) (Carmody 2002, Fine 2003, see also Bond 2000, and Marais 2001). As a result, South Africa went through a largely proactive and self-imposed globalisation process post-apartheid. This is in contrast to other countries in Southern Africa that did so under externally imposed Structural Adjustment Programmes (SAPs) mediated through the World Bank and the International Monetary Fund (IMF) (Marais 2011).

There has been a sustained debate about the reasons behind this shift (Adelzadeh 1996, Michie and Padayachee 2002). Some reasons include: (a) the fact that the ANC never had a substantive debate on economic policy during the struggle, leaving it with no informed propositions of its own (Marais 2011); (b) growth of a powerful, but small, new black business elite, closely aligned with the ANC and with considerable influence on the post-1994 economic policy that had little interest in an interventionist state (Michie and Padayachee 2002); (c) a desire to do away with the apartheid-era statist system and its protectionist policies, which many associated with economic stagnation (Bond 2000); as well as a shock at the rapid depreciation of the Rand after the liberalisation of the exchange rate in 1996 – and the ANC's attempt to stem this by reassuring investors of its economic orthodoxy (Carmody 2002). The focus on such neoliberal economic policies, it is argued here, also translated into the new water governance framework, as economically productive water uses, such as irrigation for export fruit, are prioritised over the need for equity and redress (Mather and Adelzadeh 1998).

The shift to neoliberal macro-economic policy within South Africa also has had direct impacts on the (re)distribution of natural resources, including water but also land. Both are key to commercial agriculture (including the fruit industry) and it links the issues of water reform directly to questions of land reform (Woodhouse 2012). As outlined in

Chapter 4, apartheid led to dualistic agrarian structures across South Africa (Hall and Cousins 2015). It effectively divided South African agriculture into capital-intensive large-scale commercial farming linked to global markets in the now former 'white areas' and low-input, labour-intensive, small-scale forms of subsistence farming in the former 'black' homelands. The negotiated nature of the settlement between the apartheid government and the ANC not only resulted in the basic maintenance of the previous economic system but also included the respect of private property rights (Carmody 2002). This 'property clause' effectively recognised and protected existing land property rights, including commercial agricultural land owned by white farmers (Hall 2004). Land reform is a complex issue in South Africa that after 25 years of democracy has still not been resolved.[40] Its trajectory, however, can be traced back against the shifting economic policy of South Africa, from a pro-poor model to a largely commercial blueprint.

The retreat of the state under GEAR also meant the removal of direct state interventions for the agricultural sector, as had previously been customary under apartheid rule. It meant abolishment of subsidies, soft loans, state-run cooperatives, tax breaks while opening South Africa to international competition by removing tariff barriers. For new, i.e. black, entrants in the commercial farming sector, this was all exceedingly badly timed as they had to compete against global markets with little to no support from the government, putting them at a considerable disadvantage globally, but also creating expectations for them to succeed as well as the 'white' commercial sector had, without the support these had received from the apartheid state (Hall 2004, van Koppen et al. 2009). This process can thus be understood as an ideologically driven preference for commercial agriculture, as it is considered more productive, in line with the neoliberal paradigm.

Within the context of water, previous 'property rights' were abolished, however, and as discussed in Chapter 4 and 6, they were effectively recognised within the NWA by introducing the concept of ELU. At the same time, the focus on licencing new or future water allocations as a way to regulate water usage has proportionally disadvantaged small-scale agricultural units, who previously might not have had access to water that was considered legal under the 1956 Water Act; or are simply new entrants to the agricultural sector and now need to go through a complex and expensive administrative process to gain access to water for productive activities (van Koppen et al. 2009, van

[40] The Institute for Poverty, Land, and Agrarian Studies (PLAAS) at the University of the Western Cape has conducted excellent and wide-ranging research on the different facets of land reform in South Africa. See especially the works of Ruth Hall (e.g. Hall and Cousins 2015, Hall 2011, 2013, Hall and Kepe 2017)

Koppen and Schreiner 2014a). As a result, there has been a call to 'decolonise' formal water rights in South Africa, which would account for customary water rights not previously recognised under colonial/apartheid law (van Koppen and Schreiner 2018).

This thesis has shown how fruit producers, supported by their industry associations and their influence on local water institutions, are able to mobilise a considerable amount of 'collective power' (Henderson, Dicken, and Hess 2002: 451). Through this collective power, the fruit industry has been able to 'play the institutional game of water' (Förster, Downsborough, and Chomba 2017: 530) so to maintain access to and control over water resources, despite the political shift in priorities since 1994. Professor Kader Asmal, the first Minister of Water Affairs and Forestry after democratisation wrote in his introduction to the 1997 White Paper on Water Policy that '[t]hey harnessed the law, and the water, in the interests of a dominant class and group which had privileged access to land and economic power' (DWAF 1997: 2). He was referring to the apartheid government's policy to grant the white minority with preferential access to natural resources, including water, supporting their economic endeavours, while justifying the accompanying exploitation and segregation through law. It seems that despite the political reorientation, in reality, little has changed.

7.4 Chapter Conclusion

The purpose of this chapter was to discuss the implications of the findings presented in Chapter 5 and Chapter 6 for water governance in the Western Cape. To do this, it has first theorised water risks as GPN water risks, which are actor-specific, context-specific, produced, reciprocally constructed, and largely originate beyond the farm-gate. Theorising GPN water risks in such a way is important to understand the possibilities for water security. If water risks are conceived as uniform across society, then so is water security, negating power asymmetries within societies. In contrast, acknowledging water risks as GPN water risks that are actor-specific, context-specific, produced, reciprocally constructed, and largely originate beyond the farm-gate opens the possibility for an understanding of divergent water securities. Divergent water securities acknowledge different definitions of water security depending on actor-perspective and context. Fruit producers embedded in global production networks can thus be understood as primarily interested in their own water security to support their productive activities.

In a second step, the chapter has discussed how the different strategies deployed by the fruit industry to ensure their water security influence processes of water governance. It has shown that the multi-scalar strategies employed by these actors result in three shifts

of narrative that influence water governance. These shifts position fruit producers first as good waters users, due to their efficient irrigation strategies and their environmental stewardship. Secondly, they position them as lawful water users, thanks to the fruit industry's ability to 'play the institutional game of water' and manoeuvring the complex dynamics of the Western Cape water governance regime. Finally, the third shift, posits fruit producers as productive water users, as they provide employment and contribute to economic growth in return for their water. These three shifts have a depoliticising effect on processes of water governance. It obscures key questions of water allocation – who should get how much water and why – and moves the discussion to issues of water management: how water is transported, how water is applied, what technology is used, how efficient it is. Within the Western Cape context, this conceals the perpetuation of inequities in the access to water resources as well as in the access to the benefits of water resource use.

The three shifts in narrative and the associated depoliticising effect have arguably been enabled by larger political economy processes within South Africa. Most notably the subscription to the neoliberal paradigm with GEAR in 1996, which has favoured 'economically productive' water usage, such as irrigation of commercial fruit destined for export on large-scale farms, at the expense of redress and equity. This lack of progress in water reform is tightly coupled to stagnation in land reform. An important insight that results from this is the need to ground GPN analysis in the given political economy, especially (but not exclusively) when considering its interactions with natural resources.

The chapter has thus clearly shown how global agricultural production networks influence processes of water governance, here within the context of the Western Cape fruit industry. This has answered Research Question 4. A key insight from this is that non-environmental regimes, like those governing production and trade, influence environmental regimes, like those governing water (Newell 2008). It highlights the need to rethink the boundaries of water governance to account for 'external connections that strongly influence water-related outcomes of concern and contribute to governance failures' (de Loë and Patterson 2017a: 75). The next and final chapter of this thesis, Chapter 8, draws together the key findings and the main contributions of this thesis, makes recommendations for policy and practice, and outlines areas for further research.

8 Conclusion

The purpose of this thesis was to understand how global agricultural production networks influence processes of water governance. This has been investigated by unravelling the Western Cape fruit industry and analysing its influence on the local water governance regime. A particular aim was to untangle how this influence manifests and what the implications are for water governance in the Western Cape. Earlier GPN research has insufficiently investigated this environmental dimension. Fruit production relies on natural resources, particularly fresh water, and investigating the relationship between globalised production and its resource base is crucial against the backdrop of the impending climate crisis. That said, the key argument of this thesis is not that production and consumption have environmental footprints, as that is inevitable, but that these economic processes influence the way we manage and govern the natural environment.

The analysis has demonstrated how this influence unfolds and manifests by unpicking how the interactions between commercial fruit production and water governance have evolved within the specific context of the Western Cape. Introducing the concept of water risks, the thesis then critically examined how water risks manifest for the fruit industry, produced both by their embeddedness in global production networks and the dynamics of the local water governance regime. Water risks act as causal drivers for the fruit industry to deploy a series of water risk mitigating strategies to ensure water security for its productive activities. The rich details used to describe these strategies highlight their multi-scalar character, which arises from both the commercial dynamics of globalised production and the water governance regime. Finally, the analysis has argued that these strategies directly influence wider water governance processes. The fruit industry has leveraged its collective power, taking advantage of its ability to 'play the game' to maintain access to privileged water allocation despite a political reorientation post-1994. The present-day political economy of South Africa further enables these dynamics as they express a tension between the country's neoliberal economic policy and its political project of achieving redress and equity post-apartheid.

This concluding chapter presents the key-findings in relation to the research questions; outlines the empirical and analytical contributions of this research; considers the policy implications of the thesis; and discusses further research issues relating to Western Cape fruit industry and the broader issue of the influence of global production networks on governing the environment. Section 8.1 draws together the key findings of this thesis, with Section 8.2 outlining the empirical and theoretical contributions. The chapter then

discusses the thesis' implication for policy and practice (Section 8.3). Finally, Section 8.4 outlines areas for future research.

8.1 Key findings

The aim of this thesis was to investigate the link between global agricultural production networks and processes of water governance. This has been done by unravelling the global fruit production network originating in South Africa's Western Cape. In the Western Cape, it is impossible to produce fruit commercially without continuous access to enough clean water for irrigation. Apart from being water-scarce, the growing conditions for fruit are otherwise very favourable in the Western Cape. Yet, rapid population growth and increasing urbanisation characterise the Province, both of which raise demands for water (Sinclair-Smith and Winter 2018). Fruit production thus competes for water with other users. Furthermore, climate change is set to strongly affect the Western Cape through a combination of increased mean annual temperatures, higher maximum and minimum temperatures, more hot days and heatwaves, fewer cold and frost days, and a reduction in mean annual rain days (Jury 2019, MacKellar, New, and Jack 2014, Midgley, New, and Methner 2016). This will have significant impacts on the Province's water resources and increase competition over fresh water, which will also affect the fruit industry.

For the Western Cape fruit industry, fresh water remains the limiting factor for successful participation in global agricultural production networks. Because of the Province's winter rainfall patterns, commercial fruit production relies on the temporal and spatial mobilisation of water resources. These are questions of water governance, which describes the process by which we allocate fresh water to different uses. South Africa's Western Cape, therefore, emerges as an interesting context to investigate how global agricultural production networks influence processes of water governance. The four following research questions guided this thesis:

1. *How can the influence of global agricultural production networks on water governance be conceptualised using the GPN framework?*
2. *How does the historical and present-day political economy of the Western Cape influence the interactions between water and the fruit industry?*
3. *What factors drive and shape the influence of global agricultural production networks on water governance, and how have these played out in the Western Cape?*
4. *What are the wider implications of the influence of global agricultural production networks for water governance in the Western Cape?*

The four research questions build on each other to operationalise the aim of the thesis, which is to understand *how* global agricultural production networks influence processes of water governance. The following sections discuss how these four research questions were answered within the thesis and what key findings emerge from this.

8.1.1 Conceptualising the Link between GPN and Water Governance

The first research question asked *how the influence of global agricultural production networks on water governance can be conceptualised within the GPN framework.* It was explored theoretically and conceptually by reviewing existing academic literature and NGO reports (see Chapter 2). Chapter 2 located the gap in previous GPN/GVC literature, which has paid insufficient attention to the environmental dimension of globalised production and the interaction with processes of environmental governance (Bolwig et al. 2010, Coe, Dicken, and Hess 2008, Gibson and Warren 2016, Havice and Campling 2017). The thesis argues that beyond considering the environment vertically, i.e. how the natural environment shapes the formation and dynamics of the global production network downstream, we must consider the horizontal effects of global production networks using and appropriating natural resources, in this case, fresh water. To do so, the chapter reviewed the literature on water governance, identifying the concepts of water risk and water security as valuable for connecting global production networks to water governance.

Risk is a useful concept to link global production networks to water governance for two reasons. First, it can accommodate the multiple scales that both water and global production networks traverse (Bakker 2012b). Second, it offers a common language between the two strands of literature (Baleta and Winter 2016, Franz, Schlitz, and Schumacher 2018). Third, it allows for the conceptualisation of actor-specific mitigating strategies in response to risk (Coe and Yeung 2015, Havice and Campling 2017, Irarrázaval and Bustos-Gallardo 2019). Introducing water risks is thus the first step towards conceptualising the influence of global agricultural production networks on processes of water governance.

In this thesis, risks are understood as specific GPN water risks that can take the form of physical, reputational, or regulatory and political water risks. This categorisation has been informed by previous NGO and consultancy reports and academic inquiry. NGOs have leveraged the concept of water risks to engage lead firms on questions of global water sustainability (e.g. Barton 2010, Morgan 2017, Pegram, Orr, and Williams 2009). As a result, and because of the familiarity of the language of risk to business, several

MNCs and business consultancy have seized upon this understanding of water risks along supply and value chains (e.g. Addams et al. 2009, PWC 2015, Zurich 2016). In contrast, academic inquiries into water risks have been scant (Daniel and Sojamo 2012, Sojamo 2016) and almost always linked to NGOs or consultancies (e.g. Baleta 2015, Baleta and Winter 2016, Hepworth 2012, Orr and Pegram 2014, Orr and Cartwright 2010, Schulte, Orr, and Morrison 2014). Understanding water risks as physical, reputational, or regulatory and political fits with the relational approach of GPN. By emphasising this aspect, the thesis refines the understanding of risk in GPN 2.0 (Yeung and Coe 2015), showing how environmental risks can be underlying and ongoing (rather than just once-off shock events) and relate directly to other forms of risk.

Water risks then become one of the causal drivers that shape strategies of firm actors (Coe and Yeung 2015). Nature-based global production networks, such as those producing and distributing agricultural produce, heavily rely on the commodification of the environment. This is rarely a seamless process, creating risks for global production networks at different scales, requiring mitigating strategies by GPN actors (Boyd, Prudham, and Schurman 2001, Irarrázaval and Bustos-Gallardo 2019). In this thesis, physical, reputational, and regulatory and political water risks act as causal drivers for the Western Cape fruit industry to deploy strategies that ensure its water security. Understanding water risks as causal drivers of firm strategies marks the second step in conceptualising the influence of global agricultural production networks on processes of water governance.

Because of these causal drivers, agricultural production networks deploy water risk mitigating strategies. Strategies form an important part of the GPN 2.0 conceptualisation (Yeung and Coe 2015). These authors link strategies to specific objectives, e.g. market power, and characterise them in terms of governance structure to other actors, e.g. variations of inter- or intra-firm relationships. What is useful for this thesis is the concept of extra-firm bargaining, which describes the ‘contested two-way process of *negotiation* and *accommodation* between firms and extra-firm actors in order to reach […] a mutually satisfactory outcome in relation to the creation, enhancement, and capture of value through global production networks’ (Coe and Yeung 2015: 151, emphasis in original). Other research on the environmental dimension of GPN/GVCs has echoed the idea of firms deploying strategies to successfully commodify natural resources (Boyd, Prudham, and Schurman 2001, Irarrázaval and Bustos-Gallardo 2019). Similarly, in the water governance literature, the paradigm of water stewardship has emerged to structure how

businesses deal with real or perceived water risks (Hepworth 2012, Rudebeck 2017, Sojamo 2015). Combining these insights, the thesis presents a categorisation of strategies as (1) on-farm strategies, (2) collaborative efforts, and (3) influencing government. This is the third step in conceptualising the link between global agricultural production networks and processes of water governance. The final and fourth step – the questions of *how* this influence manifests and what its wider implications are – can only be investigated empirically and is discussed in Section 8.1.3.

An important aspect underpinning this theoretical and conceptual work is the political economy lens applied to it. A political economy lens on GPN analysis is useful to analyse economy-environment relations, such as those arising at the intersection of water governance and globalised agricultural production. It emphasises how economic organisations, e.g. firms, exist both within structural imperatives, such as capitalist modes of production, markets, etc. and the lifeworld of everyday agency and practice (Sayer 2001). They do not operate in vacuums. This is useful considering the next research question and its key findings presented in Section 8.1.2.

8.1.2 The Importance of Place and Context

The second research question sought to understand *how the historical and present-day political economy of the Western Cape influences the interactions between water governance and the fruit industry*. The purpose of this research question was to comprehend the context and conditions within which the commercial dynamics of the fruit industry and water governance processes meet in the Western Cape. This step was critical a) to do justice to the political economy perspective adopted here, and b) to inform the analysis and discussion of the data collected. This second research question was discussed in Chapter 4 and based on a review of academic literature on South African history and water policy documents.

The Western Cape is characterised by very specific political economy that arise from South Africa's history of institutionalised racial segregation and discrimination as well as the political economy of its transition to democracy. This thesis finds that agriculture and the associated mobilisation of water has featured centre point over this complex history. Importantly, therefore, the structure of the Western Cape's fruit industry must be considered against the backdrop of these historical and present-day political economy dynamics. Similarly, the way water is managed and governed today can only be understood within this broader picture. For this thesis, three aspects are of particular importance.

First, the history of water rights in the Western Cape coincides with the history of the ruling class. When the National Party won the 1948 election under the slogan of 'apartheid', they institutionalised racial segregation and sanctioned political and economic discrimination against non-whites (Marais 2001, Ross 2008). However, the processes that facilitated apartheid began much earlier under British colonial rule. Most notably, the Natives Land Act No. 27 of 1913 made it illegal for the African population to buy or rent land outside of allocated reserves (Feinstein 2005). Access to water, however, was tied to land ownership (Tempelhoff 2017). Most well-watered land was conferred to the white minority, while the land within reserves was notoriously arid, unyielding, with limited water resources (Tewari 2009, van Koppen et al. 2009). The commercialisation of agriculture, however, depended on access to water. Consequently, commercial agriculture became synonymous with white agriculture (Bernstein 2013).

Second, this development was aided by a series of state policies to support and develop white commercial agriculture, including: drought relief grants, export subsidies, soft loans (e.g. for irrigation infrastructure), single-channel marketing boards to protect farmers from foreign competition, and research and development services for irrigation and crop sciences (Debbané 2013, Feinstein 2005, Hall 2004). It enforced the dualistic agrarian structure by pitting white large-scale commercial farmers with capital and technology at their fingertips on vast stretches of well-watered land against black small-scale subsistence farmers with little to no government support confined to the arid reserves.

In the Western Cape, the dynamics of the first and second point became articulated in the mobilisation of water, which was key for the commercialisation of white agriculture (Funke et al. 2007). Due to the Province's uneven temporal and spatial distribution of the water resources, the apartheid government supported considerable engineering efforts that followed supply-oriented water management practices (Steyn et al. 2019, Swatuk 2010). Agricultural policy, therefore, subsumed much of colonial and apartheid water policy. As a result, the Western Cape fruit industry had privileged access to land and water resources and received considerable support from the government to develop as businesses.

Thirdly and finally, the end of apartheid in 1994 brought many changes to both water and agricultural policy. In 1998, the ANC government finalised the new water legislation and introduced the National Water Act, No. 36 of 1998 (NWA) (National Water Act 1998). It abolished private and riparian water rights, introduced an administrative water licencing system, proposed decentralised water governance structures, and had the clear aim to

redress past injustices in terms of access to water resources. At the same time, however, the NWA made provision to recognise what it called 'existing lawful uses' or ELU. It enabled the fruit industry to hold on to its existing water allocations obtained during colonial and apartheid eras. The purpose of ELU was to protect the economic pillar (Movik 2009). The government feared that if existing water uses would be reallocated to other users too quickly, the economy would suffer.

This thinking is in line with a wider reorientation of the South African macroeconomic project shortly after democratisation. In 1996, the orthodox economic reform programme Growth, Employment and Redistribution (GEAR) replaced the social-democratic Reconstruction and Development Programme (RDP) (Carmody 2002, Fine 2003). GEAR favoured neoliberal market restructuring that included trade liberalisation and export-orientation as a model of development. Shortly thereafter the fruit industry was completely deregulated, leading to a proliferation of global fruit production networks (Du Toit 2008, Mather and Greenberg 2003). Because the fruit industry was export-oriented and, therefore, was compatible with GEAR model, there was a reticence to withdraw water allocations from these actors (Movik 2009).

This reticence is part of the reason water reform has only slowly progressed in South Africa. Other reasons include a public-sector capacity gap in the water sector, due to a) an overburdened mandate of the Department of Water and Sanitation, and b) lack of public spending, also linked to GEAR (Bond 2010). At the same time, there has been ideologically informed reservation by the otherwise left-leaning ANC to decentralise water governance functions as foreseen in the NWA (Schreiner 2013). Therefore, and importantly for this thesis, the incomplete implementation of the NWA has led to a multiplicity of governance structures resulting in a complex water governance architecture. This complexity needs navigating, and it has been argued here that the Western Cape fruit industry, thanks to its considerable structural and collective power built up over the years, has been adept at doing that.

8.1.3 Influencing Water Governance

The third research question investigates the *factors that drive and shape the influence of global agricultural production networks on water governance, and how these have played out in the Western Cape.* This question was answered empirically, through the primary and secondary data collected and analysed within Chapter 5 and Chapter 6. The thesis found that water risks act as causal drivers for the fruit industry to deploy strategies that ensure its water security. Therefore, while water risks *drive* the influence of global

agricultural production networks on processes of water governance, the strategies deployed by the fruit industry *shape* this influence. The deliberations on the political economy of water and agriculture in Chapter 4 facilitated the analysis of these dynamics. The fourth and final research question - *what are the wider implications of the influence of global agricultural production networks for water governance?* – directly builds on this third research question, and the two are therefore discussed here together.

In Chapter 5, informed by the literature in Chapter 2, the thesis categorised water risks as physical, reputational, or regulatory and political water risks and outlined how these play out in the Western Cape. This was complemented by the theorisation of water risks in Chapter 7. Several key findings emerged from this description and analysis of water risks.

First, water risks manifest relationally for the Western Cape fruit industry. They form in relation to each other and in relation to the wider political economy processes within the Province and South Africa more broadly. Unlike the conceptualisation of environmental risks by Coe and Yeung (2015), water risks are here shown to be more than once-off shock events. They can be underlying, ongoing, and often form in relation to other political and economic dynamics, including state regulation or commercial requirements. This is an insight that has the potential to be translated into GPN investigations into other natural resources (e.g. Gibson and Warren 2016). This results in a theorisation of water risks as actor-specific, context-specific, produced, reciprocally constructed, and largely originating beyond the individual farm-gate. This theorisation allows us to understand water risks as specific GPN risks. They form as they do because of fruit producers' embeddedness in global production networks and in relation to the dynamics of complex water governance regimes.

Second, all types of water risks can lead to scarcity for individual fruit producers and/or the Western Cape fruit industry as a whole. Not having regular access to enough water of acceptable quality can undermine the commercial viability of each and every fruit producer interviewed for this research project. Therefore, water risks can translate into considerable economic risks. The only water risk that does not translate into water scarcity on the farm is downstream reputational water risk. These water risks, however, can curtail access to lucrative markets directly, resulting, again, in economic risk.

Growing and exporting fruit, however, is good business. For this reason, the fruit industry actively seeks to mitigate these water risks. Therefore, water risks can be understood as causal drivers for the fruit industry to deploy strategies that mitigate water risks. Chapter

6 discussed these strategies in more detail, categorising them as either deployed within the farm-gate, in collaboration with other actors or aimed at influencing the government.

One of the key insights resulting from this analysis is that fruit producers collaborate with a range of actors at multiple scales to mitigate their water risks. This provides evidence against the 'collective action chasm' often mentioned in water stewardship research (Morgan 2018: 24). Fruit producers in the Western Cape actively engage on issues regarding water, however, this collective action might not bring about public-good outcomes, as foreseen within the water stewardship paradigm. Even when there are public-good outcomes, such as those arising from the clearing of alien invasive plants, the actions themselves remain largely driven by individual water security concerns.

Overall, the collective action undertaken by the fruit industry is characterised by its considerable structural and collective power (Förster, Downsborough, and Chomba 2017, Méndez-Barrientos et al. 2018). We can trace much of this power back to the vast support commercial agriculture received during the apartheid years, as discussed in Chapter 4 and Section 8.1.2 above. It facilitates fruit producers' domination of local water institution and has created the powerful industry organisations that effectively influence the public water policy arena through lobbying of the government. Perhaps most subtly, this power manifests in the use and successful spread of Justification Narratives in relation to agricultural water use.

Building on this concept of Justification Narratives, Chapter 7 discusses the wider implications of the discussed water risk mitigating strategies for processes of water governance in the Western Cape. It finds that the cumulative effect of these strategies is a depoliticising one. This processes of depoliticisation is achieved through three shifts in narrative that portray fruit producers as 'good' water users because of their high irrigation efficiency and practices of environmental stewardship when clearing alien invasive plants; posit fruit producers as 'lawful' water users, thanks to the fruit industry's ability to 'play the institutional game of water' and manoeuvring the complex dynamics of the South African water governance regime; and position fruit producers as 'productive' water users, as they provide employment and contribute to economic growth in return for their water. As a result, questions of water governance – who gets how much water and why – are relegated to questions of water management – how water is transported, applied, conserved. Through the process of depoliticisation, it is argued here, the fruit industry is able to maintain access to and control over water resources. Within the Western Cape context, this conceals perpetuating inequities in the access to water

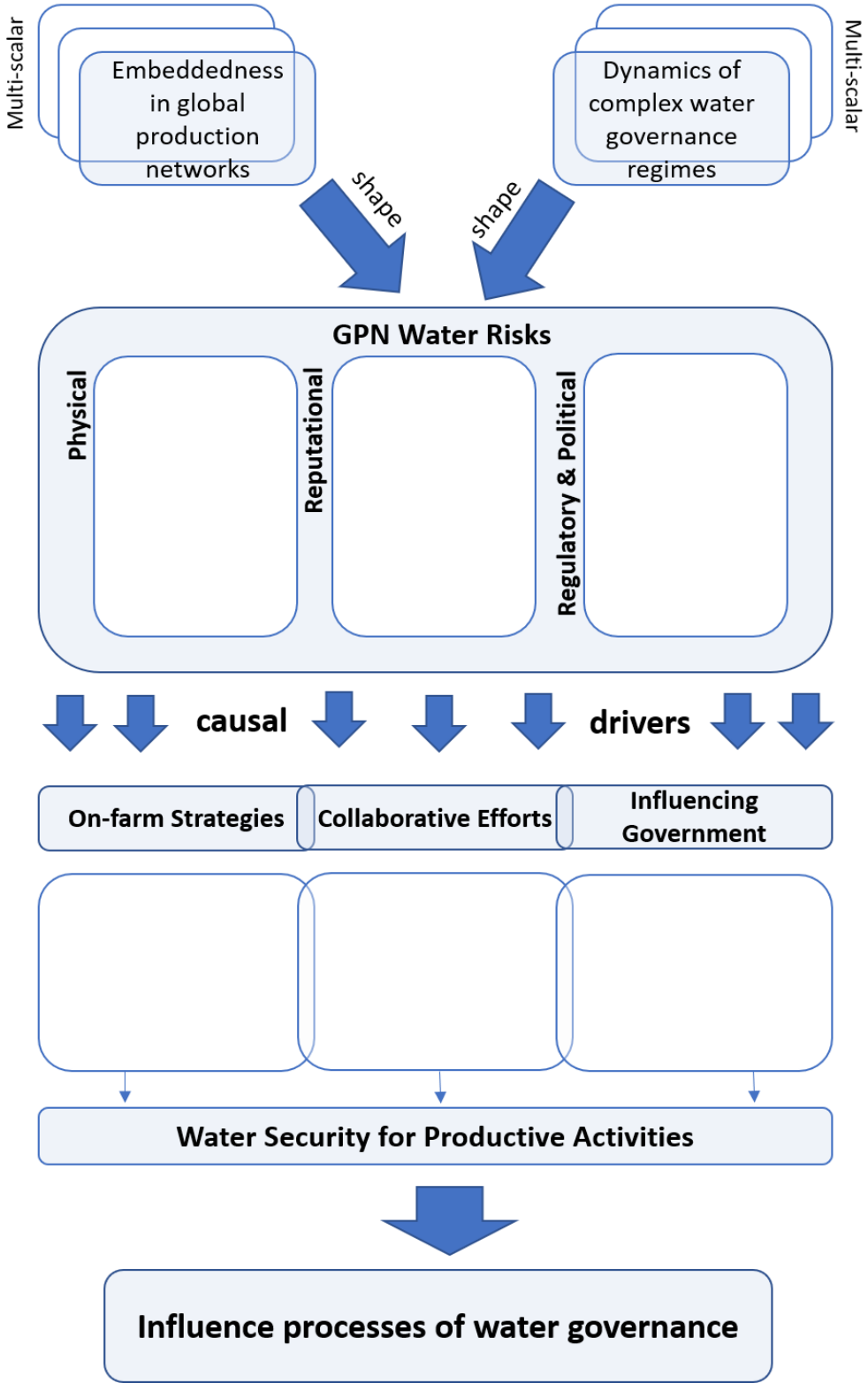
resources and in the access to the benefits of water resource use. Hence, water security for fruit producers does not necessarily equate to water security for other actors.

Overall, the thesis, therefore, argues that the process through which global agricultural production networks influence water governance in the Western Cape is contingent upon two factors. First, is the imperative of participating in global production networks. Producing fruit for export is lucrative, but water is its limiting factor. Consequently, the fruit industry aims to mitigate the different water risks it perceives through a range of strategies. Second, that these dynamics are set against the historical and present-day political economy of the Western Cape. South Africa's history of colonialism, apartheid, and democratic transition shape the way water risks actualise for the fruit industry and what mitigating strategies are possible.

These findings have been conceptualised over the course of the past chapters into a framework. In this conceptualisation, the framework has been 'filled out' with the findings garnered from the investigation into the Western Cape fruit industry. These insights lend themselves to a certain abstraction. The skeleton of the conceptual framework can be adapted to other water-intensive global agricultural production networks. Figure 8.1 shows an 'empty' version of the framework. It highlights the key dynamics identified in this research. Water risks form through producers' embeddedness in global production networks and the interactions with the complex dynamics of water governance regimes. We can categorise water risks as physical, reputational, and regulatory and political water risks. This categorisation is broad enough to be adaptable to a series of contexts while offering the opportunity for comparison across places and scales.

Different water risks act as causal drivers for the fruit industry to deploy water security strategies. These strategies ensure regular access to enough clean water to participate in global trade. Three categories structure these strategies: on-farm strategies, collaborative efforts, and influencing government. What matters in this categorisation is that it makes space for interaction with firm and non-firm actors at multiple scales. As the thesis has shown, these strategies often overlap, drawing in multiple actors at different scales. Finally, the framework indicates that deploying these strategies has wider implications for processes of water governance. This last part is more difficult to pre-categorise as the implications of deployed strategies depend on the prevailing political economy of a place. Nonetheless, the framework offers a way to analyse the influence of global agricultural production networks on processes of water governance and can guide this analysis in other sectors and places than the Western Cape fruit industry.

Figure 8.1: Conceptual framework depicting how global agricultural production networks influence processes of water governance



Source: author's analysis

8.2 Empirical and Theoretical Contributions

The thesis has investigated how the Western Cape fruit industry embedded in global production networks influences processes of water governance. In doing so, it has provided theoretical and empirical contributions to both GPN theory and the field of water governance. Table 8.1 (on the next page) summarises these contributions. Empirical contributions enhance existing GPN analyses of the Western Cape horticulture industry through the novel lens of water. The thesis also makes empirical contributions to water governance research in South Africa and provides important empirical insights for water stewardship and water security research. The main theoretical contribution of this thesis feeds into GPN theory by conceptualising the relationship of GPN with water governance through the notions of water risks and strategies for water security. In doing so, the thesis further theorises water risks, also making an important contribution to water governance literature. One of the key contributions of this thesis lies in the joining of the two fields, producing new and innovative insights into the intimate relationship between economic organisation and environmental governance in a world of global change.

8.2.1 Empirical and Theoretical Contributions to GPN Literature

The main empirical and theoretical contributions of this thesis are made towards GPN theory and associated literatures. The Western Cape horticulture industry has featured prominently within GPN/GVC analyses (Alford 2016, 2018, Barrientos and Visser 2012, Bek et al. 2017, Hughes, McEwan, and Bek 2015, 2013). None of this work has explicitly focused on the environmental dimension of globalised production. By focusing on the interaction between the Western Cape fruit industry and processes of water governance, the thesis makes an important empirical contribution. Besides providing evidence on the environmental dimension of GPN, this water lens is also relevant considering how water ties into social and political questions of sustainability and ethics in South Africa.

The overarching theoretical contribution of this thesis rests on the pushing of boundaries of GPN theory to encompass its influence on processes of water governance. To do this, the thesis introduces the concepts of water risks and water security. Water risks act as causal drivers for firms to deploy strategies to ensure their water security. These strategies exercise influence on wider processes of water governance, which affects other firm and non-firm actors within and beyond the global production network. The thesis thus contributes to the concepts of risk and strategies used in GPN 2.0.

Table 8.1: Summary of empirical and theoretical contributions

Field	Contribution
GPN	Connects the field of GPN to water governance, considering the environmental dimension of global production networks 'horizontally' instead of 'vertically' as done previously (e.g. Baglioni, Campling, and Havice 2017, Irarrázaval and Bustos-Gallardo 2019, Havice and Campling 2017). Provides empirical evidence through the water lens, contributing to existing GPN analyses in the Western Cape horticulture industry (e.g. Alford 2015, Barrientos and Visser 2012, Hughes, McEwan, and Bek 2015).
GPN 2.0: Risk	Refines the understanding of environmental risk (Coe and Yeung 2015), arguing that a) it must be viewed relationally, and therefore b) environmental risk can be underlying and ongoing, rather than once-off shock events.
GPN 2.0: Strategies	Analyses strategies from a non-lead firm perspective to unveil intentionality and agency of suppliers, here fruit producers (Yeung and Coe 2015). Discusses the implications of firm strategies, showing that GPN 2.0's 'little d' development approach (see McGrath 2018), which isolates economic development from 'social, cultural, and environmental dimensions of human existence' (Coe and Yeung 2015: 167) is insufficient in a world of global change.
GPN/GVC: Environmental Upgrading	Understands that increased irrigation efficiency as a process of environmental upgrading can have negative outcomes (Krishnan 2017), questioning a) the effectiveness of technological solutions to address environmental problems (De Marchi, Di Maria, and Ponte 2013, De Marchi, Di Maria, and Micelli 2013), and b) 'environmental upgrading' as a concept to capture the complexities of the environmental dimension of GPNs/GVCs.
Water Risk	Theorises water risks as actor- and context-specific, produced, reciprocally constructed, and originating beyond the farm-gate based on academic literature (Baleta 2015, Sojamo 2016), NGO and business reports (Morgan 2017, Pegram 2010, PWC 2015), and the empirical findings of this thesis.
Water Security	Provides empirical evidence for the understanding of 'divergent water securities' (Boelens and Seemann 2014), which states that water security for some does not equate to water security for all.
Water Stewardship	Provides empirical evidence against the 'collective action chasm' (Morgan 2018: 24) but highlights that such collaborative efforts may not come with public-good outcomes as foreseen within the water stewardship paradigm. Delivers in-depth and locally grounded research into firms' involvement in water management and governance (Sojamo 2016).
Water Governance	Shows how non-environmental regimes, like those governing production and trade, play a crucial role in water governance (Newell 2008), providing empirical evidence that actors outside of the direct water sector often influence key-sites of decision-making around water (de Loë and Patterson 2017a), and does so through a novel theoretical approach by bringing in GPN theory.

(Source: author's analysis)

A) GPN Risk

In this thesis, GPN environmental risks, i.e. water risks, are understood relationally, which challenges the conceptualisation of risk proposed by Yeung and Coe (2015: 41) in GPN 2.0. Yeung and Coe (2015: 41) propose five risk categories: economic risk, product risk, regulatory risk, labour risk, and finally, environmental risk. They describe environmental risk as once-off shock events, such as natural disasters (e.g. earthquakes, tsunamis). Through the empirical evidence presented here and by drawing on water governance literature, this thesis shows how environmental risks can be underlying and ongoing, and act as a constant causal driver. This is largely because the conceptualisation and theorisation of GPN water risks in this thesis is more fluid. Understanding environmental risk as relational enables its linkage to regulatory risk and product risk (product risk is similar to reputational water risks).

B) GPN Strategies

The thesis contributes to the conceptualisation of strategies in GPN 2.0 by explicitly analysing and discussing the implications of such strategies. GPN 2.0 introduced the concept of strategy to acknowledge the intentionality and agency of actors within global production networks (Yeung and Coe 2015). The theory offers a four-pronged typology of strategies: intra-firm coordination, inter-firm control, inter-firm partnership, and extra-firm bargaining (Coe and Yeung 2015: 123–159). Because most of the strategies discussed in this thesis involve non-firm actors, they would largely fall within the extra-firm bargaining category. Extra-firm bargaining 'offers the crucial analytical nexus for understanding how economic processes, embodied in firms, intersect with non-economic issues' (Yeung and Coe 2015: 51), including environmental sustainability or social justice. These are core issues of development, especially in contexts of the Global South, and this thesis demonstrates the importance of analysing the wider implications of different firm strategies in relation to water use, management, and governance. This contrasts with GPN 2.0's 'little d' development approach (see McGrath 2018), which isolates economic development from 'social, cultural, and environmental dimensions of human existence' (Coe and Yeung 2015: 167). Water resources, in the Western Cape, are fundamental for producing fruit commercially. Questions of water allocation thus decide who has the prerequisites to participate in global agricultural production networks. Firms taking part in global agricultural production networks have an interest in maintaining their access to these freshwater resources, and the strategies they deploy to do so affects other actors and their possibilities for development.

Another important contribution of this thesis is that it views these strategic actions from a non-lead firm perspective. Focusing on the lead firm has been a dominant approach in analytical work on global production networks and value chains (De Marchi, Di Maria, and Ponte 2013, Gereffi, Humphrey, and Sturgeon 2005). While GPN 1.0 did not explicitly zoom into lead firms, GPN 2.0 now emphasises that global production networks are 'coordinated by a global lead firm' (Coe and Yeung 2015: 2). This focus obscures important dynamics of globalised production, distribution, and consumption (Krishnan 2017). By not directly focusing on lead firms (e.g. retailers), this research can unveil the intentionality and agency of non-lead firms within the global production network, represented in this case by fruit producers. While fruit producers' embeddedness in global production networks motivates their strategies to ensure access to and control over local water resources, the way these play out could not have been investigated adopting a lead-firm perspective.

C) Environmental Upgrading

The discussion of strategies to ensure water security for productive activities furthermore contributes to our understanding of environmental upgrading. Environmental upgrading has been under-researched in GPN/GVC investigations so far. While not an explicit focus of this thesis, some of the identified water risk mitigating strategies can be categorised as environmental upgrades at the production stage. The focus on increasing irrigation efficiency, for example, fits into this category. Traditionally, GPN analysis has conceptualised environmental upgrading as a linear process of improvements in the production process that reduces the use of natural resources (De Marchi, Di Maria, and Micelli 2013). More recent work has refined this assumption (Krishnan 2017), by highlighting the non-linear and dynamic character of environmental upgrading processes. In her work on the Kenyan horticulture industry, Krishnan argues that 'farmers seek to conserve and protect their environment/land for purposes of care, attachment, bequest' (2017: 327). As the findings of this thesis show, within the context of water resources, ensuring water security for productive activities takes priority over the conservation and protection of the resource.

Empirically, this differing insight is linked to the specificities of water as a natural resource, i.e. its flow character, where the impacts or externalities of environmental upgrades may be felt elsewhere. Accordingly, farmers are not necessarily environmental stewards as environmental upgrading practices at the production stage may have negative impacts in certain contexts or for specific natural resources. Theoretically,

however, this leads to a questioning of the effectiveness of environmental upgrades at the site of production in addressing environmental problems. More specifically, it identifies the emphasis on technological solutions for environmental upgrading (e.g. Poulsen, Ponte, and Lister 2016, De Marchi, Di Maria, and Ponte 2013, De Marchi, Di Maria, and Micelli 2013) as problematic because it seems to conflate with efforts to generate supply chain greening. This is perhaps symptomatic of the lack of clarity around the concept of environmental upgrading itself. At present, however, the concept of environmental upgrading, as applied within GPN/GVC literatures, does not seem to be able to capture the complexities of the impact economic activity has on the environment, environmental management, and on processes of environmental governance.

8.2.2 Contributions to Water Governance Literature

The thesis makes several contributions to the literature on water governance. The first contribution lies in the theorisation of water risks as actor- and context-specific, produced, reciprocally constructed, and originating beyond the farm-gate. So far, water risks have been used as categories in academic literature (Baleta 2015, Sojamo 2016) and NGO and business reports (Morgan 2017, Pegram 2010, PWC 2015). This thesis actively theorises water risks as GPN risks that act as causal drivers for GPN actors to deploy strategies.

This understanding of water risks also contributes empirical evidence to existing work on water security. If water security is defined in terms of water *in*security, i.e. water-related risks, then this determines the possibilities for water security. As shown and theorised in this thesis, water risks for some may not be water risks for others. Therefore, water security for some may not lead to water security for others; or worse, water security for some may come at the expense of others' water security. We must acknowledge the power to define water risk, and thus water security. A way to account for these variations is the concept of divergent water securities, proposed by Boelens and Seeman (2014). An understanding of divergent water securities can capture how fruit producers' want for water security (to produce export fruit) differs greatly from achieving water security for a household in an informal settlement, or for a small-scale farmer, or a rainfed production site. This is because the understanding of water risk is different. Differing water risks then lead to divergent water securities that do not align.

Insights from this research also contribute to earlier works on water stewardship. To clarify, this thesis has not evaluated a specific water stewardship programme implemented by an organisation, such as an NGO; it does, therefore, not comment on

the effectiveness of such programmes. Instead, the research project has taken the concepts proposed within the water stewardship paradigm and used them to categorise the fruit industry's water risk mitigating strategies. It shows that despite not being enrolled in a formal water stewardship programme, fruit producers and the wider industry engage on the thematic of water to address related risks. It does this by highlighting how non-lead firms in global value chains and production networks address water risks, which has not previously been done (Sojamo 2016). The results show that collective action exists, both among fruit producers and between fruit producers and other actors. This evidence counters the idea of a 'collective action chasm' (Morgan 2018: 24), at least within the Western Cape fruit industry. The collective action that occurs does not necessarily bring public-good outcomes as foreseen within the water stewardship paradigm. Concurring with Sojamo's (2016) work on water stewardship, it highlights the need to acknowledge power asymmetries between different water stakeholders, and in society more broadly. Water governance, as a process, does not function in silos. Instead, policies need to address water as part of the broader economic, social, and cultural dynamics of a place.

The main insight from these considerations is that non-environmental regimes, like those governing production and trade, play a crucial role in water governance. The findings show how actors outside of the direct water sector often influence key-sites of decision-making around water. And these actors may bring with them very different policy priorities. This resonates with de Loë and Patterson's call (2017a) to rethink the boundaries of water governance to consider broader societal goals and governance in other realms. The GPN perspective brought to water governance in this project is an innovative way to do so. It permits the analysis of both vertical and horizontal connections between water on the one side and production and trade on the other side. This marriage between GPN analysis and water governance perspective not only provides a theoretical innovation but also interesting insights for policy and practice.

8.3 Implications for Policy and Practice

Production, distribution, and consumption always have an environmental footprint. The main argument of this thesis is that globalised agricultural production also influences the way we govern and manage the natural environment. Decisions about production and trade, as shown with the Western Cape fruit industry, influence processes of water governance. Some recommendations for policy and practice can be drawn from this insight and the wider research findings of this thesis.

Water risks pose a serious challenge to the production of fruit for export in the Western Cape. As this thesis has shown, so far, the fruit industry as a whole has been adept at mitigating those risks. However, it must be noted that individual strategies to ensure the fruit industry's water security are environmentally and socially unsustainable and undermine the effectiveness of the South African water governance regime. South Africa is still going through considerable social and political changes to transform into a more equitable society, while the climate emergency is affecting the country's natural resource base. These are profound questions about distributional justice and economic organisation, and therefore are not easily tackled. There are, however, practical steps fruit producers and the wider fruit industry can undertake to contribute to the effective governance of water resources.

First, there is a need for individual fruit producers to adhere to the regulatory framework governing water resources management in South Africa. For example, by not stealing water, drilling unregistered boreholes, or building or enlarging dams illegally. Many of these actions are spurred on by what fruit producers perceive to be an absentee government within a heavily bureaucratic system that limits their successful participation in lucrative export markets. It contributes to an ongoing animosity between the commercial agricultural sector and the government. It does, however, undermine any efforts to make formal water governance processes operate effectively. This, in turn, affects the sustainability of the water governance regime and ultimately the natural resource base.

Second, the continued expansion of fruit production in the Western Cape is not environmentally sustainable in the long run. Water resources are limited, and water demands in other sectors with a higher social impact and value are increasing. Fruit producers have made improvements in irrigation efficiency to 'do more with less' and increase their production without receiving increased water allocations. However, technological solutions such as high-tech irrigation systems have their limits. Many farmers already have more land than they can cultivate with water, and with increased temperatures – and therefore increased evaporation – it will become challenging to maintain the same number of hectares. Because fruit is a high-value product, there is potential to remain profitable with smaller orchards.

In the Western Cape, many fruit producers are already heavily engaged in biodiversity conservation and contribute considerably to the clearing of alien invasive plants. These clearing activities have a direct and positive impact on the Province's water resources.

The collaboration with nature conservation organisations can be particularly impactful, especially when it targets catchments or water source areas, which are often found on private land. The clearing of alien invasive plants by fruit producers is, therefore, to be commended and their investments and collaborations should absolutely continue.

Overall, the fruit industry needs to support formal water governance efforts to enable their effectiveness. This includes addressing the fundamental questions of water governance in South Africa, including those relating to water reform. The role and purpose of Water User Associations also falls into this category. As of now, many of these organisations still mainly serve only white commercial farmers and have not properly addressed their transformation requirements. There are structural reasons behind this that need a broader conversation about how and why natural resources are distributed in South Africa in a certain way. This is an uncomfortable topic for many farmers and is highly political throughout South Africa. It will need a more systemic interrogation, including addressing the link to land reform (Woodhouse 2012). Arguably it needs to happen in cooperation with the government, especially the Department of Water and Sanitation (DWS).

DWS, however, faces many challenges that include a lack of financial and human resources while dealing with a complex and muddied policy landscape. These and other factors have contributed to a suboptimal implementation of post-apartheid water legislation and policy. The findings of this thesis show, however, that a further major stumbling block is the tension between the neoliberal economic paradigm and the need to redress past injustices. While this tension is symptomatic of much of South Africa's present-day struggle, it manifests strongly in processes of water governance. While this is not a tension that can be resolved overnight, the effectiveness of water governance could be aided by explicitly considering economic priorities, policy, and associated actors.

Historically, the South African water sector has operated in a silo. During apartheid, water resource management has focused on the storage and transport of water through technocratic solutions (Steyn et al. 2019). Engineers working in a very 'water-centric' way dominated the Department of Water Affairs. Although this has been changing since democratisation, the legacies from this hydraulic mission endure because of the country's heavily engineered waterscape (Swatuk 2010). The post-apartheid neoliberal economic policy further subsumed processes of water governance, and as a result, processes of water allocation reform have stalled (Movik 2009). The process through

which productive water uses, such as irrigation for export fruit production, are privileged over other water uses have been insufficiently considered in South African water policy. This has frustrated attempts to redress past injustices in water allocation reform. If there is to be a true transformation in the access to water resources and in the benefits of its use, the Department of Water and Sanitation must move beyond silo-thinking and consider these economic priorities in its water policy thinking.

Recent water governance research describes a need to rethink the boundaries of water governance (de Loë and Patterson 2017a, 2017b). This is because the causes and drivers of many water issues lie outside the traditional water sector. Research and policy work, however, tends to adopt a water-centric perspective that may omit actors and institutions without a traditional water mandate. For such actors and institutions outside the water sector, water is often one of many factors considered in decision-making processes and is unlikely to be their top priority. Detrimental effects on water governance may result when such actors and institutions that play a central role, perhaps previously unrecognised, in affecting water outcomes are ignored in decision-making processes.

Therefore, and going beyond the South African example, formal water policy and wider processes of water governance cannot be approached in a siloed manner. Introduction of the SDGs further underlines the importance of a cross-cutting policy and practice (Bergöö et al. 2019). Sustainable management of water (part of SDG 6), responsible production (part of SDG 12), reducing inequality (SDG 10), and taking climate action (SDG 13) become, as in this research, enmeshed with each other. Considering increased pressure on our natural environments, we must, in policy and practice, explicitly consider how economic priorities shape the way we govern, manage, and allocate natural resources.

In that sense, the lead firms of such global agricultural production networks also have a role to play in enabling sustainable production. So far, lead firms have addressed social and environmental sustainability concerns through adherence to private and social standards. Within these standards, water quality has played an important role as it relates to food safety concerns. Water quantity, and what it means for the global supply of fresh produce and other agricultural products, has garnered much less attention. This is now changing slowly. The recent drought in the Western Cape made European retailers take notice of how water scarcity can affect their global supply and value chains. Because water is a flow resource that connects multiple scales, issues of water availability in water-scarce regions cannot be addressed on the farm only. This broader

reach of water sustainability issues poses a real headache for the audit-based compliance model of many private and social standards.

New approaches, based on ideas of continuous improvement, present a move away from tick-box exercises of traditional audits. They offer an opportunity for producers to improve the environmental sustainability of their operations. A prominent example is Woolworths' Farming for the Future programme (Woolworths 2019). It is an effort to manage the natural resource base on farms in ways that ensure the long-term sustainability of these resources. With water, however, things become again more complicated. Unlike land, water is not confined within borders and a continuous improvement approach can only be truly effective if it is based on a scientific evaluation of the wider hydrology within which individual farms operate to be able to assess the impact of water usage on that wider system. Adding to that, because of the political economy of water and agriculture in South Africa, a continuous improvement approach must include a social dimension. For lead firms, this means providing know-how and financial support to producers to establish the necessary knowledge base and facilitate continuous improvement. While this seems farfetched in the current system of prize squeezing by UK and European retailers, the other side of the coin is reduced assurance of supply, which the recent Cape drought has brought home to some leading retailers.

Linked to that, NGOs have the potential to act as intermediaries between lead firms, their suppliers, and even the government. The WWF water stewardship programme is one such example. WWF engages with different levels of government on the one side, e.g. around alien clearing, and with fruit producers and retailers on the other side. Water stewardship is also based on the idea of continuous improvement, as producers improve their on-farm water management and then start to engage beyond their farm gate to address wider water concerns within their catchment or area of operation. The difficulties, however, arise within these collaborations as there is a need to ensure that they are not hijacked to only benefit producers. Because of this difficulty, the danger is that such programmes fall back onto on-farm improvements that usually focus on efficiencies and technological solutions and fail to engage with the full complexity of environmental concerns.

8.4 Areas for Further Research

This thesis has adopted an intensive qualitative research approach focusing on the multi-scalar interactions between the Western Cape fruit industry and processes of water governance. As argued in Chapter 3, this approach has made it possible to study these

interactions in depth and offer a rich description, which was the focus of this thesis. It facilitated the establishment of the framework that conceptualises the influence of global agricultural production networks on processes of water governance. Having developed this approach and based on the findings of this thesis, additional areas for investigation emerge.

Further research could focus on a comparative approach. Comparative studies have the potential to unveil how these dynamics play out in different contexts. It would offer an opportunity to test the robustness of the conceptual categories proposed and whether these work across different political economy contexts. Of particular interest could be a comparison among regions embedded in different varieties of capitalism, as well as across the Global South – Global North divide. This could compare economies with export-oriented agricultural sectors from the Global North, such as Australia, New Zealand, or the US, with economies from the Global South, such as Chile and Argentina, or Kenya and Ethiopia, besides the South African case presented here. A comparative approach was discarded for the PhD itself because it sought to study the phenomenon in depth and the resources and time were limited to do so across different contexts.

As outlined in Chapter 3, a further avenue for research at the intersection between global production networks and water governance in South Africa needs to be the focus on other water stakeholders, including historically disadvantaged individuals. The way water connects different actors, from rural to urban, from rich to poor, is amplified in South Africa through the heavily engineered waterscape dominated by inter-basin transfers. There already exists considerable research on participative water governance, including the effectiveness of Water User Associations as a vehicle for such participation in South Africa (Förster, Downsborough, and Chomba 2017, Funke et al. 2007, Kemerink et al. 2013, Meissner, Funke, and Nortje 2016). The GPN approach could bring novel insights into such inquiries, linking questions of water allocation and its implied dimensions of equity, justice, and redress to the commercial dynamics of export agriculture in the Western Cape.

Another area for further research is the role of environmental NGOs. Environmental NGOs have become very active on water issues in South Africa, including water usage in the agricultural sector. Overall, their role in South Africa's environmental governance landscape has been under-researched. Of particular interest, however, is their role at the intersection of agriculture and processes of water governance. Many environmental NGOs now adopt business-like language to engage firms on these issues (Rudebeck

2017). There remains a question whether these efforts contribute to effective water governance and desired social outcomes, or whether they reinforce the *status quo*, and associated power asymmetries. As one interviewee for this thesis said 'I am really hostile towards environmental NGOs which don't have a social dimension to it, [they] don't understand the real political drive that this country is all about: livelihoods and inclusion in the economy' (researcher interview R40). Their role and influence in GPN theory, especially within the increased drive towards sustainability, need further investigation.

The role of lead firms for water governance provides a further interesting area of research within GPN theory. While global lead firms have been investigated as part of corporate water stewardship initiatives (Rudebeck 2017, Sojamo 2015, 2011), there is scope for more in-depth GPN analysis of these dynamics. So far, the dominant theoretical lens brought to these analyses has been based on different theories of water governance (e.g. global governance, hydro-politics). GPN theory could offer valuable insights into intra-firm and inter-firm behaviour as well as extra-firm bargaining by lead firms.

Finally, the present study has focused only on water. Water is a very specific natural resource, because of its flow characteristic and its localised nature. Water governance is a subset of wider environmental governance, which includes issues such as biodiversity, CO_2 emissions, and sustainable land management. It thus could be interesting to further develop the analysis presented here to include other aspects of environmental governance.

There is, therefore, considerable scope for further research into these unchartered waters. Global value chains and production networks have become a dominant form of economic organisation. These processes of production, distribution, and consumption are consistently evolving in terms of their composition, geographical spread, and governance structures, producing uneven outcomes. To varying degrees and in differing forms, all economic activity is reliant on natural resources. This is especially true for agricultural commodities. With the effects of the global climate emergency becoming increasingly tangible, and most pronouncedly so in the Global South, it is critical that GPN analysis pays attention to the interaction between economic organisation and environmental governance. As has been shown, this thesis has demonstrated that GPN can be usefully combined with language and concepts from water governance literature and thus provides new insights into the complex but vital need for combined economic, environmental, and social sustainability.

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Appendix 1: Interview Guides

Interview Guide for Exploratory Interviews

A. Background

Can you tell me a little bit about yourself? What your background is, how did you enter the water field, and what does your work focus on?

B. Water Governance Challenges

What are the main challenges for water governance that you come across in your work?

What is the role of the private sector in tackling those challenges?

What do you think remains unexplored within these challenges and needs further investigation?

C. Private Sector and Water Governance

Most research around corporate water engagement or corporate water stewardship focusses on large Multi-National Companies, such as Coca Cola, SAB-Miller, etc., what do you think is the role of companies not part of MNCs?

D. Sustainability and Water Governance

What are the important dimensions to consider when talking about sustainability and water governance?

How would you define sustainable water governance in your own words?

E. Finally…

Any other thoughts on what I should look at to investigate related to commercial agriculture and water governance?

Anyone else I should speak to about this?

Many thanks!

Interview Guide for Producer Interviews

Introduction	- **Introduction** of research project and how data it will be used - **Formalities** such as informed consent form and recording of conversation
Background & Context	- How would you **describe the business** and what your **role** is here?
Water Management	- How do you **manage** your water? ▪ Source of water, external influences (laws, regulations...)
Water Challenges	- What are the **main challenges** you face around water? ▪ Physical availability, quality, regulations, reputation ▪ What needs to **change**?
Water Strategies	- How do you **deal** with these water challenges? ▪ specific strategies? Improvements? Collaborations and cooperation?
Standard Questions	- What does **'good' look like** in relation to water management & governance? - What is the **most important thing** about water to you?
Factual Questions (ask if information is not available online)	- Are you a member of a **Water User Association**? - What is the **size** of your business (hectares and employees)? - What are your **core products**? - How do you **add value** to your product? - How does your product get to the end consumer? ▪ What are your main **export markets**? ▪ Who do you supply? Supermarkets, wholesaler…? - What **type** of company is this? ▪ Vertically integrated? Type of **shareholders**? o Family, small or large number, publicly listed…
Wrap Up	- Any **other things** I should investigate relating to water challenges? - **Anyone else** you can think of that I should talk to? - **Thank you** for participating

Interview Guide for Context Interviews (NGOs/Civil Society & Different Levels of Government)

Introduction	- **Introduction** of research project and how data it will be used - **Formalities** such as informed consent form and recording of conversation
Background & Context	- How would you **describe** this **organisation** and what your **role** is here?
Water Challenges	- What are the **main challenges/issues** related to water that you deal with in your work? ▪ Specifically in relation to commercial agriculture? ▪ What is at the origin of these challenges? ▪ What needs to **change**?
Water Strategies	- What are the **strategies** you suggest to deal with water challenges? ▪ Commercial agriculture? Challenges? Outcomes? - Do you have any **best practices examples**, as a benchmark?
Water Governance	- How do you understand **water governance**? ▪ Who is involved? Important dimensions? Analytical, e.g. focus on governance process. Normative, e.g. sustainability or good water governance?
Standard Question	- What is the **most important thing** about water to you?
'What if' Question	- What **further work around water** would you do if you had all the funding in the world?
Wrap Up	- Any **other things** I should investigate relating to water challenges? - **Anyone else** you can think of that I should talk to about water issues? - **Thank you** for participating

Appendix 2: Description of Participants

Code	Type of Interview	Format & location	Description of Interviewee
R1	NGO	Skype	Interview with the CEO of an NGO focused on sustainable water use and water stewardship, male
R2	NGO	Skype	Interview with a water stewardship specialist that works for an international NGO, male
R3	Government	Office, Stellenbosch, Western Cape	Interview with a representative of the provincial Department of Agriculture (Elsenburg), who is also a commercial farmer himself, male
R4	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with owner and farm manager, both male, farm produces deciduous fruit for export
R5	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export, wine for both local and export markets, and flowers for the local market
R6	Government	Office, Grabouw, Western Cape	Interview with a representative of the municipality, male
R7	Producer (Elgin)	Coffee shop, Somerset West, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export and some wine for the local market
R8	Industry	Office, Paarl, Western Cape	Interview with a representative of Agri West Kaap, male
R9	Producer (other)	On farm, Robertson, Western Cape	Interview with the owner, male, farm produces deciduous fruit and citrus for export
R10	Producer (other)	On farm, Bredasdorp, Western Cape	Interview with the farm manager, male, farm produces flowers for export
R11	NGO	Office, Stellenbosch, Western Cape	Interview with a freshwater specialist that works for an environmental NGO, female

R12	NGO	Coffee shop, Somerset West, Western Cape	Interview with a sustainability specialist that is strongly involved in the certification landscape of the agricultural sector, female
R13	Producer (Ceres)	On farm, Prince Alfred-Hamlet, Western Cape	Interview with the farm manager, male, farm produces deciduous fruit for export
R14	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export and wine for both local and export markets
R15	Water institutions	Coffee shop, Grabouw, Western Cape	Interview with a representative of the local water user association, male, he is also a commercial farmer
R16	Water institutions	Office, Worcester Western Cape	Interview with a representative of the Breede-Gouritz Catchment Management Agency, female
R17	Research	Skype	Interview with a researcher investigating sustainability and water governance issues, female, based at the University of Bern, Switzerland
R18	Producer (other)	On farm, Robertson, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export
R19	Water institutions	Office, Ceres, Western Cape	Interview with a representative of the local water user association, female
R20	Research	Office, Pretoria, Gauteng	Interview with a representative of the Water Research Commission (WRC), male
R21	Producer (other)	On farm, Hermanus, Western Cape	Interview with the farm manager, male, farm produces wine grapes and makes wine for local and export markets

R22	Producer (other)	On farm, Elim, Western Cape	Interview with the owner, male, farm produces wild fynbos for local and export markets
R23	Producer (Ceres)	On farm, Ceres, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export and some wine for the local market
R24	Consultancy	Skype	Interview with a freshwater specialist that works for a development consultancy, female
R25	Research	Skype	Interview with a researcher investigating water governance issues, female, based at the Council for Scientific and Industrial Research (CSIR) in South Africa
R26	Consultancy	Skype	Interview with two representatives of a Green Economy consultancy, both with expertise in the agricultural sector, both female
R27	Government	Coffee shop, Pretoria, Gauteng	Interview with a representative of the Department of Water and Sanitation that focuses on water resources management, female, interviewed her twice, retired shortly after last interview
R28	Producer (other) / processor	Office, Stellenbosch, Western Cape	Environmental manager for a fully integrated agribusiness with several farms producing apples and grapes, also process fruits to wine, spirits, and ciders, male
R29	Water institutions	Office, Worcester, Western Cape	Interview with a representative of the Breede-Gouritz Catchment Management Agency, male
R30	Water institutions	Office, Grabouw, Western Cape	Interview with a representative of the local water user association, male, he is also a commercial farmer

R31	NGO	Office, Cape Town, Western Cape	Interview with a freshwater specialist that works for an environmental NGO, female
R32	Market	Office, Cape Town, Western Cape	Interview with a representative of the sustainability programme of a South African retailer, male
R33	Consultancy	Office, Gordon's Bay, Western Cape	Interview with the owner of an environmental consultancy that works with the agricultural sector, male
R34	Government	Coffee shop, Stellenbosch, Western Cape	Interview with an agricultural economist working at the provincial Department for Agriculture (Elsenburg), male
R35	NGO	Skype	Interview with a representative of the South African arm of an NGO focused on sustainable water use and water stewardship, male
R36	Research	Office, Stellenbosch, Western Cape	Interview with a researcher investigating water quality and water security issues, female, based at the Council for Scientific and Industrial Research (CSIR) in South Africa
R37	Producer (Ceres)	On farm, Ceres, Western Cape	Interview with the farm manager (male) and the compliance manager (female), farm is part of a fully integrated agribusiness and produces deciduous fruit for export and vegetables for local and export market
R38	Government	Office, Pretoria, Gauteng	Interview with a representative of the Department for Agriculture, Forestry, and Fisheries (DAFF), female
R39	Government	Office, Belville, Western Cape	Interview with a representative of the Western Cape regional office of the Department of Water and

			Sanitation (DWS) that focuses on water quality management, female
R40	Research	Coffee shop, Somerset West, Western Cape	Interview with a researcher investigating water governance, male, based at the University of Witwatersrand in Johannesburg. He was involved in the drafting of the National Water Act and previously worked in the Department of Water and Sanitation.
R41	Market	Coffee shop, Stellenbosch, Western Cape	Interview with a fresh produce buyer of a South African retailer, male.
R42	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with the farm manager, male, farm produces deciduous fruit for export
R43	Industry	Coffee shop, Pretoria, Gauteng	Interview with a former representative of Agri SA, male, who retired just a few months before the interview took place.
R44	Research	Office, Stellenbosch, Western Cape	Interview with a researcher investigating agricultural economics and irrigation, male, based at the University of Stellenbosch.
R45	Government	Office, Stellenbosch, Western Cape	Interview with a representative of the provincial Department of Agriculture (Elsenburg), male
R46	Consultancy	Skype	Interview with an independent water consultant based in the UK with experience in the water stewardship field, male
R47	Market	Office, Paarl, Western Cape	Interview with the technical manager of a fruit exporting and marketing firm, male
R48	Market	Office, Paarl, Western Cape	Interview with a fruit processor based in the Western Cape, male

R49	Consultancy	Skype	Interview with a water consultant based within a Green Economy consultancy, male
R50	Producer (other)	Coffee shop, Hermanus, Western Cape	Interview with the farm manager, female farm produces wine grapes and makes wine for local and export markets
R51	Research	Skype	Interview with a researcher specialised in water governance, male, based at the Council for Scientific and Industrial Research (CSIR) in Pretoria
R52	NGO	Skype	Interview with a water stewardship expert working for an NGO and based in Zambia, male
R53	NGO	Coffee shop, Gaansbai, Western Cape	Interview with the representative of a conservation NGO, male, with expertise in alien invasive plants
R54	Government	Office, Cape Town, Western Cape	Interview with the representative of the provincial Department of Environment and Development Planning (DEDP), male
R55	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with the managing director, male, farm produces deciduous fruit for export
R56	Producer (Ceres)	On farm, Ceres, Western Cape	Interview with the owner, male, farm produces deciduous fruit and vegetables for export, as well as lamb meat and merino wool for local markets
R57	Market	Coffee shop, Paarl, Western Cape	Interview with the representative of a British fruit importing businesses that supplies British retailers, female
R58	Research	Skype	Interview with a researcher with expertise in the South African agricultural sector, female, based at the University of the Western Cape

R59	Producer (other)	On farm, Hermanus, Western Cape	Interview with the managing director, male, farm produces fruit for export
R60	NGO	Office, Stellenbosch, Western Cape	Interview with a representative of an environmental NGO, female, with expertise in the South African agricultural sector
R61	Market	Office, Paarl, Western Cape	Interview with the technical manager of a fruit exporting and marketing business, male
R62	Producer (Elgin)	On farm, Grabouw, Western Cape	Interview with the CEO of a fully integrated agribusiness, male, farm produces deciduous fruit for export, business also buys in fruit from other farms, packs and markets fruit
R63	Producer (Ceres)	On farm, Ceres, Western Cape	Interview with the owner, male, farm produces deciduous fruit for export
R64	Water institutions	Office, Grabouw, Western Cape	Interview with a representative of the local Water User Association, male
R65	Research	Skype	Interview with a researcher with expertise in water stewardship, female, based at Aalto University in Finland
R66	Government	Coffee shop, Stellenbosch, Western Cape	Interview with a former hydrological engineer that used to work at the Department of Water and Sanitation (DWS), male, retired
R67	Market	Office, Cape Town, Western Cape	Interview with a representative of the sustainability programme of a South African retailer, male
R68	NGO	Skype	Interview with a representative of a water NGO, male, based in the UK
R69	Market	Office, Stellenbosch Western Cape	Interview with the source technical manager of a leading British

			retailer, female, based in Stellenbosch
R70	Industry	Office, Stellenbosch, Western Cape	Interview with a representative of Hortgro, male
R71	Producer (other)	Office, Hermanus, Western Cape	Interview with the farm manager, male, farm produces wine grapes and makes wine for local and export markets
R72	Research	Office, Stellenbosch, Western Cape	Interview with a researcher with expertise in agriculture and water, male, based at the Council for Scientific and Industrial Research, Stellenbosch
R73	Research	Office, Stellenbosch, Western Cape	Interview with a researcher with expertise in water and alien invasive plants, male, based at the Council for Scientific and Industrial Research, Stellenbosch
R74	Market	Coffee shop, Stellenbosch, Western Cape	Interview with the source technical manager of a leading British retailer, male based in Stellenbosch
R75	Research	Coffee shop, Pretoria, Gauteng	Interview with a researcher, female, with expertise in water management and governance, based at the International Water Management Institute (IWMI) in Pretoria
R76	Research	Office, Pretoria, Gauteng	Interview with a researcher, female, with expertise in the South African water governance landscape, based at the University of Pretoria

Appendix 3: Participant Information Sheet

PARTICIPANT INFORMATION SHEET (To be kept by the participant)

1. Information about the project

Commercial agriculture as agent of water governance: evidence from the Western Cape, South Africa

The main *objectives* are:

- To understand why, how, and at what scale different sized (in-country) commercial agricultural companies engage in water governance;
- To investigate how this engagement can contribute to sustainable water governance;
- To examine the complex relationship between agricultural production for economic development and sustainable water management (e.g. effects on local water resource depletion, pollution, as well as on the distribution of water rights)

2. Why have I been chosen?

For the purpose of this study we need to interview a range of stakeholders involved in commercial agriculture (specifically in the flower and broader horticulture industry) and water governance, such as farm managers, non-governmental organisations, governmental and institutional actors.

3. Do I have to take part?

No. Participation is entirely voluntary. If you change your mind about taking part you can withdraw at any point during the interview and at any time in the two weeks following that interview. You can withdraw by contacting me via email, there are no consequences to withdrawing.

4. What do I have to do?

The interview will last between 30 minutes to one hour and will be audio recorded with your permission (please read and sign the consent form provided).

5. Making a complaint

If you are unhappy with any aspect of this research, please contact me (Nora Lanari). If you wish to make a formal complaint, please contact Professor Lyndon Simkin. Please provide as much detail as possible in your e-mail.

Professor Lyndon Simkin
Executive Director for the Centre of Business in Society and Professor of Strategic Marketing
lyndon.simkin@coventry.ac.uk

6. Will my taking part in this study be kept confidential?

Yes. Only I and my supervisory team will have access to the raw data. You will be anonymised for this study, so nothing you say can be traced back to you. I will only retain the raw data from the project until no more than 5 years after completion of my PhD. They will then be destroyed.

7. What will happen with the results of the study?

The results will be written up and presented as part of my doctoral dissertation and as part of scientific articles presented at conferences and lectures, and written up for publication in peer-reviewed journals.

8. Who has reviewed this study?

This study has been reviewed and approved by the Ethics Committee of the Faculty of Business and Law, Coventry University.

9. Key contact details

Nora Lanari (Doctoral researcher)
Department: Centre for Business in Society, Faculty of Business and Law
Email: lanarin@coventry.ac.uk

Dr David Bek (Supervisor, Research Fellow)
Department: Centre for Business in Society, Faculty of Business and Law
Email: david.bek@coventrry.ac.uk

Appendix 4: Informed Consent Form

Informed Consent Form

Commercial agriculture as agent of water governance: evidence from the Western Cape, South Africa

	Please initial
1. I confirm that I have read and understood the participant information sheet for the above study and have had the opportunity to ask questions	☐
2. I understand that my participation is voluntary and that I am free to withdraw at anytime without giving a reason	☐
3. I understand that all the information I provide will be treated in confidence	☐
4. I understand that I have the right to change my mind about participating in the study for a short period after the interview has concluded (within 2 weeks of interview)	☐
5. I agree to be recorded and for anonymised quotes to be used as part of the research project	☐
6. I agree to take part in the research project	☐

Name of participant: .....

Signature of participant and date: .....

Witnessed by (if appropriate): .....

Signature of witness:.....

Name of Researcher: ……

Signature of researcher: ……

Date: ……

Appendix 5: Certificates of Ethical Approval

Certificate of Ethical Approval

Applicant:

Nora Lanari

Project Title:

Agribusiness as agents of water governance: evidence from South Africa

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:

06 November 2016

Project Reference Number:

P46250

Certificate of Ethical Approval

Applicant:

Nora Lanari

Project Title:

The Thorny Business of Thirsty Roses: Stage 1

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Low Risk

Date of approval:

12 July 2016

Project Reference Number:

P44229