Responding to an Epochal Climate Crisis: Introducing a framework of Strategic Socio-Ecological Relational analysis (SSER) to position planetary, capital and hegemonic relations through state ensembles in Australia

by

James Gibson

Department of Political Economy
School of Social and Political Sciences
The University of Sydney

A thesis submitted to fulfil requirements for the degree of Doctor of Philosophy

The research reported in this thesis was supported by the award of a Research Training Program scholarship to James Gibson

Supervised by Dr Gareth Bryant
Submitted 30th December, 2024
Awarded April, 2025

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Acknowledgements

To my research supervisor Dr Gareth Bryant,
Thank you for first introducing *Capitalism in the Web of Life* (Moore, 2015) during my undergraduate degree in 2018, and since then, your continued guidance, support and wisdom, all of which have been invaluable to constructing this thesis. It is one thing to supervise a PhD, and another to do so during a global pandemic, so thank you for this, and for your unwavering support and friendship.

To my mum and dad, Wendy and Noel Gibson,
This thesis is a reflection of your continual love and support, and for always believing in me.

To my grandparents, Helen Banks and Stanley Banks, Shirly Gibson and John Gibson
Thank you for your endless love and kindness, and for your support from the very beginning of my schooling life. I owe my entire education to your sacrifices and generosity.

To my darling wife and mother of my child, Phoebe May Laing,
I could not have started, nor finished this thesis without you. Your patience, brilliance, understanding and love is everything to me and always will be.

I would also like to formally acknowledge the assistance of Phoebe Laing (Bachelor of Arts, honors in Spanish and Latin American Studies) for proof-reading this thesis.

To my baby daughter, Ruby May Gibson.
When the world seems dark, you give us light and love - I hope this work will one day not be relevant to you.

Dedicated to the memory of Stanley Banks and John Gibson, and to the future of Ruby May Gibson - December, 2024

Thesis Abstract

Historical and contemporary strategic projects and capital accumulation regimes have eroded critical planetary processes, escalating the risk of systemic tipping points and frequent global crises. This dissertation proposes that by understanding the varying state ensembles as the shifting, contested peaks of spatially-specific socio-ecological relations, there lies an opportunity to utilise a Strategic Socio-Ecological Relational (SSER) framework. As a proposed critical approach, the SSER framework is grounded in Jason Moore's World-Ecology approach and, in particular, the concept of the oikeios, the relational web of life on Earth. This work identifies an opportunity to augment Moore's approach with Bob Jessop's approach to the state, the Strategic-Relational Approach, to further enhance the complexity and scope of critical relational assessments.

Through the examination of unique socio-ecological relations, accumulation regimes and hegemonic projects, the SSER framework shows that Australia's key strategic axes are highly capitalised and globally significant, from the North-West shelf through to the Murray-Darling Water Basin. The SSER assessment highlights a variety of specific points of exhaustion across Australia's neoliberal, market-dominated critical axes of water, energy and terrestrial biocarbon. This work finds that the risk of exhaustion is amplified by state projects that ostensibly intend to 'restore nature' but in fact continue the capitalisation of recovery mechanisms, violent abstraction of natures, and the exhaustion of key planetary processes through the state ensemble. The adoption of this interdisciplinary approach to the assessment of socio-ecological relational bundles is vital in successfully reorienting a coherent socio-ecological response to the challenges of impending epochal collapse.

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Chapter One: nature, not Nature

1.1 Positioning the analysis of this dissertation

1.1.1 An introduction to the need for socio-ecological analysis

One of the defining features of the post-2000s contemporary era is the stark - and potentially catastrophic - disconnect between successive Australian governments' ways of understanding systems of economic accumulation, and the reality of the socio-ecological foundations of the web of life. As numerous reports (IPCC, 2023; WEF, 2024; ASLCG, 2024) now confirm, global warming of 2C° degrees and beyond is now expected to occur far sooner than initially anticipated. Existential threats to world-wide food and biocarbon, energy, and water relations are accelerating, and in turn raising the likelihood of further nonlinear system change, and the accelerating threat posed by approaching tipping points in planetary boundaries. Collapse and exhaustion are already being identified across socio-ecological systems, with climate processes rapidly moving beyond the predictions of scientific models (ASLCG, 2024). Significant changes include shifting ocean conditions (Fox et al., 2022; Philip Tuchen, 2024), sequential record-breaking heat waves (Poynting, 2024), coral die off throughout the Great Barrier Reef and south-east Asia (Readfearn, 2024), intensifying drought in China (Su et al., 2024), heavier and warmer monsoon seasons in the West Africa and Indian regions (Prabhu, 2024), and rapidly shrinking regions of permafrost (McSweeney, 2020). In turn, rising inter-state contestation and conflicts (Vision of Humanity - Global Peace Index, 2024), state instability (Brooke-Holland, 2023), and declining food yields (Morgan et al., 2022) are symptomatic of rising (and likely intensifying) political, economic and military conflicts, which then further undermine any strategic attempt to respond to possible tipping points.

As is to be expected, Australia's contemporary challenges mirror those of its global counterparts. The *2021 State of the Environment Report* found that 'the state and trend of the environment in Australia is poor and deteriorating' due to factors including climate change, the rate of resource extraction, and cumulative threats to habitat including land clearing and pollution (Department of Climate Change, 2021, p. 1). A warming climate has led to increasingly frequent extreme heat and fire weather, changes to rainfall patterns and streamflows, the acidification of oceans, and rising sea levels (CSIRO, 2024). Meanwhile, while Australia remains a significant southern frontier for global capitalism, America's more isolationist tendencies under newly re-elected President Donald Trump create significant questions about Australia's future strategic economic orientation, given the close alliance. This uncertainty comes at a time when rising levels of economic inequality are leading to a significant decline in social cohesion (O'Donnell, 2023), complicating the capacity for unity in the face of growing instability and environmental crisis.

Unfortunately, many existing analytical frameworks are not suitably structured to analyse the foundational causes and contributions to these issues in their full complexity. Those that propose a binary between human society and nature are severely limited in their ability to meaningfully

assess the inherently socio-ecological relations of the climate crisis, the state and associated accumulation strategies (Malm, 2019). Ignoring the inextricable interconnectedness of ecological, biophysical and social co-production of historical changes prevents such frameworks from understanding humanity in nature and humanity as nature (Moore, 2015). Others, while acknowledging the role of the state in capitalism, treat the totality of the state as fundamentally capitalist, thereby overlooking strategic variations of the state (Collard and Dempsey, 2017). Yet other existing frameworks arbitrarily separate or exclude core components of the state ensemble in their conceptualisation of the state and its role, which creates an inability to fully appreciate and analyse the state's function as the peak ensemble of socio-ecological power.

There is a clear and urgent need for a theoretical framework which can fully encapsulate the relationships between states, accumulation regimes and the socio-ecological axes of the web of life in order to understand, and propose solutions to, persistent, inter-inked and emerging existential threats. In response, this work introduces a theoretical framework involving Strategic Socio-Ecological Relational (SSER) analysis, otherwise referred to as the SSER framework. Building on the work of important contemporary theorists including Jason Moore and Bob Jessop, this framework provides a method for assessing socio-ecological power, with particular emphasis on the intersection between the state, contested accumulation regimes and the critical axes of the web of life, referred to in this work as the oikeios. This work utilises this framework to analyse the historical and contemporary Australian context across the critical axes of water, energy and carbon, identifying critical points of exhaustion which threaten both existing systems of accumulation and the socio-ecological relational processes upon which life depends. In doing so, this work seeks to offer a holistic analysis of critical challenges facing Australia, as well as identifying potential future opportunities to address and overcome these challenges.

1.1.2 Understanding Australia

Before progressing further, it is important to provide any unfamiliar readers with a brief understanding of the unique Australian context that forms the primary subject of this work, noting that this will be explored in more detail in Chapter Three. As alluded to above, Australia has a rich history of First Nations custodianship stretching back tens of thousands of years. One of the longest continuing human cultures on the planet, Aboriginal Australians entered Australia over fifty thousand years ago (Tobler et al., 2017). Migrating through both western and eastern coastal green belts, prior to the arrival of the British colonial state, the dominant regional socio-ecological practices and regimes across Australia was therefore that of over 500 Aboriginal clans (Tobler et al., 2017). These clans contributed to the historical co-production of the Australian terrestrial biocarbon relational conditions, alongside broader socio-ecological events including a mass drying event due to the intensification of the El Niño/Southern Oscillation during the late Holocene (Wurster et al., 2021). While these socio-ecological relations took tens of thousands of years to produce, it only took a few decades for them to be irrevocably disrupted.

In 1788, Australia was colonised by the British, who went on to undertake a genocide of Aboriginal Australians (Sentance, 2022). British colonisers forcibly possessed First Nations Peoples' lands to establish a penal colony as part of a concerted effort to secure cheap lands for the benefit of the British Empire (Patel & Moore, 2017). Beginning as a single colony in New South Wales (NSW), the colonies then grew to include Tasmania, Victoria, and South Australia, with British-styled Parliaments and institutions established by the *Australian Colonies Government Act 1850* (Brunkova & Shanahan, 2019); Queensland then became a formal colony in its own right in 1859 (Queensland Parliament, 2023). These expanding settlements represented the southern spatial expansion of the British state, and, through the reorganisation of bundled natures, the origins of the Commonwealth of Australia as the peak socio-ecological power ensemble.

While largely nomadic First Nations covered the full extent of the Australian continent, British settlement was initially concentrated in coastal areas rather than the arid interior. There were many features that appealed to the colonisers in their quest for Cheap Nature, not least the continent's vastness, with thousands of hectares of arable land encompassing areas larger than most European countries (Fitzpatrick, 1970). The colonial states then set about 'developing the land' in line with European views of development and progress (Bellingham & Fricker, 2024). In addition, Australia's ancient geological features attracted significant attention, particularly the discovery of gold in NSW and Victoria in 1851 which precipitated a significant international gold rush (Brunkova & Shanahan, 2019). First Nations Country was appropriated and degraded in support of prosperous accumulation regimes, with dispossession and violence facilitated by state legislation and policy (Fitzpatrick, 1970). Indeed, First Nations peoples were only recognised as citizens, as distinct from Australia's native flora and fauna, in 1967 (National Museum Australia, 2017). From the outset, Australia's abundant natures were viewed as Nature to be conquered and tamed, through the lens of accumulation and appropriation, with violent consequences for those who resisted.

The Commonwealth of Australia was formally established through Federation in 1901, which united previously independent British colonial relations between capital and nature as part of the spatio-political institutionalisation of an 'independent' sovereign state, with its own unique socially contested set of relations and national interest. Federation transformed the discrete colonies of NSW, Victoria, Tasmania, South Australia, Queensland and Western Australia into states, with the Australian Capital Territory and Northern Territory established soon after. While nominally independent, 'British subject' was the only citizenship status included in the Australian constitution; the concept of an 'Australian nationality' had no official recognition until the *Nationality and Citizenship Act 1948* was amended to the *Citizenship Act* in 1969 (National Archives of Australia, 2020). However, since this time, the concept of a discrete Australian identity has gained a strong cultural foothold, and indeed, Australia's strategic

orientation has shifted from its British orientation to an ongoing realignment towards American interests as the dominant imperial hegemonic power (Fernandes, 2018). As this work will later explore, the shifts in international power relations have directly shaped Australia's strategic orientation and accumulation regimes, and continue to do so to this day.

Like its cultural identity, Australia's political climate has evolved considerably since Federation over a century ago. Given that this work presumes a certain understanding of the Australian political climate, it is also necessary to provide a brief overview of the contemporary major Australian political parties. There are three main parties represented across the federal and State and Territory Governments: the Australian Labor Party, the Liberal Party of Australia, and the Nationals, formerly known as the Country Party. The Liberal and National parties have operated as a coalition government at a federal level since 1949, and also operate in coalitions of various forms across the States and Territories (Parliament of Australia, 2019). The Labor Party is the primary centre-left political party with strong connections to the trade union movement, and has been in government at a federal level since 2022. The Party's National Platform highlights policy priorities including an inclusive economy, environmental protection, and energy security (Australian Labor Party, 2023). The Liberal-National Coalition sits to the centre-right of the political spectrum. The Liberal party operates nationwide, but the National Party operates exclusively in Australia's rural and regional areas, with strong connections to the agricultural and industrial sectors (The Nationals, 2024). While the Coalition has been Australia's 'most successful governing partnership', there are ideological tensions between the two parties, with some of the Nationals' more strongly conservative stances performing poorly with the Liberals' urban voter base (Bongiorno and Lee, 2023). Noting that broader the political landscape also includes an evolving group of major parties, it is these three major parties that have directed much of the policy orientations analysed in this work.

Finally, it is important to acknowledge that this region has supported a rich intellectual history of a holistic understanding of the relationship between humans and their environment. In particular, First Nations groups within Australia utilise the concept of Country, of which there is no one singular definition and which can be difficult to translate into a Western cultural context. Broadly speaking, Country 'encompasses everything… [including] both living and nonliving elements. It holds everything within the landscape, including Earth, Water and Sky Country' (Government Architect, 2023). As this work seeks to develop a more holistic analytical framework that draws on previous foundational theoretical contributions, it is worth remembering that such ways of understanding already exist in differing forms within Indigenous cultures and epistemologies. This work acknowledges the continuation of Aboriginal Australians' traditions and knowledge despite years of oppression and suffering, and seeks to sufficiently honour this long history in its comprehensive exploration of Australia's past and present.

1.2 The basis of a Strategic Socio-Ecological Relational framework

1.2.1 Theoretical foundations and key contribution to this work

This work builds on decades of contributions from two leaders in their respective fields: Jason Moore and Bob Jessop. Moore's work provides a relational theory of the web of life in which capitalism is a socio-ecological regime, a way of organising natures. In turn, Bob Jessop provides a significant contribution to state theory which shapes the way this work assesses state relations and state projects. While the theoretical contributions of these authors are explored in greater detail in Chapter Two, the following introductory section provides a brief overview of key concepts upon which this work is built upon.

The title of this opening chapter is a reference to Moore's seminal work, *Capitalism in the Web of Life* (2015), in which Moore presents an alternative to analytical frameworks that treat society and nature separately. Rejecting 'modernity's most sacred binary', Moore treats all forms of crisis under capitalism as bundles of human and extra-human nature. Here, capitalism is not a separate economic system but a way of organising nature; capitalism treats Nature as external, something to be:

> *'coded, quantified, and rationalised to serve economic growth, social development, or some other higher Good. This is capitalism as a project. The reality – the historical process – is radically different. Well, the manifold projects of capital Empire and science are busy making nature with a capital N – external, controllable, reducible – the web of life is busy shuffling about the biological and geological conditions of capitalisms. The web of life is nature as a whole… Nature with an empathetically lowercase n. This is nature as us, as inside us, as around us. It is nature as a flow of flows. Put simply humans make environments and environments make humans – and human organisation'* (Moore, 2015, pp. 2-3).

Throughout this dissertation, the SSER framework will make reference to both natures, unique socio-ecological flows within the web of life, as well as Natures, externalised capitalist projects of attempted rationalisation.

Moore (2015; 2017; 2018) also proposes the use of the concept of the oikeios, a socio-ecological conception of the web of life. For Moore (2015, pp. 7-8), the oikeios is the culmination of the relational web of life on Earth, with 'no basic units, and a shifting barriers between organic and in-organic phenomena'. Through the web, 'species make environments, and environments make species', while the 'mosaic of species-environment configurations form and re-form' (Moore, 2015, p. 9). The oikeios therefore provides SSER with the relational foundation for assessing strategic bundles of the array of social-ecological relations that underpin intersecting projects of everything from competing state strategies, degraded planetary weather and oceanic processes, and accumulation strategies. It is this shifting web of organic and in-organic relations that

provides the methodological and conceptual relational base within which the SSER strategic analysis of unique axes is situated. A point of great significance to informing SSER analysis' assessment of accumulation regimes is therefore how capital relations, and the state, co-produce and are co-produced through the oikeios.

A further major contribution to this dissertation is Moore's work on the ways in which capitalism as a socio-ecological regime is re/produced, and the contradictions of its value relations. Fundamentally, endless accumulation and capitalist value 'does not work unless most work is not valued', and rests on two simultaneously expressed processes: endless accumulation of capital as abstract social labor and 'the ceaseless expansion of the relations of exploitation and appropriation, joined as organic whole' (Moore, 2015, p. 54). The first process of capital accumulation refers to the capitalisation of natures, the formal commodification of natures into the circuit of capital through rising surplus capital. For Moore (2015), the capitalisation of natures, to Nature, is a cumulative process that refers to the growing dependence on an expanding circuit of capital, which in turn shapes the reproduction of those natures. The capitalisation of natures, such as an agribusiness pursuing a heavily fertilised monocrop, offer short-term profit gains, if middle and long-term costs are externalised. However, capitalised natures depend on capital for both short and long term reproduction. This leads to two interlinked contradictions, with the first the rising technical mass of capital in production, which in turn reflects a rising value composition of production, and increasing costs. Secondly, the corrosive effect that capitalisation has through the 'interlinked temporal and spatial reorganization of primary production (Moore, 2015, p. 114), which then leads to exhaustion, here referring to the declining ability of specific complexes of natures to continue to deliver streams of work/energy.

The crucial exception, according to Moore (2015, p. 114), is whether the conditions of 'rapid appropriation of Cheap Nature has been achieved', as the conditions of cheaper electricity and raw materials 'not only reduces the value composition of circulating, but also, of fixed capital'. This is the second 'moment' of capital accumulation, accumulation through the appropriation of Cheap Nature, achieved through appropriating successive frontiers. Initially identifying labour-power, food, energy and raw materials as cheapened strategies in 2015, Moore collaborated with Patel in 2017 to extend this analysis to Cheap Care, Cheap Money and Cheap Lives. Critically, these are natures in the reproduction of life, forms of unpaid work/energy that remain outside the formal valuing of capitalism, but are fundamental to the value relations of capital regimes. This includes everything from unpaid domestic labour to soil microorganisms. Importantly, '*cheap is a strategy, a practice, a violence that mobilizes all kinds of work - human and animal, botanical and geological - with as little compensation as possible'* (Patel & Moore, 2017, p. 22). Methods of appropriation include 'extra economic processes that identify, secure, and channel unpaid work outside the commodity system into the circuit of capital…scientific, cartographic and botanical revolutions' (Moore, 2015, p. 17). Ultimately, the appropriation of 'new natures as objects of power and production', enables historical Nature, as 'new sources of

unpaid work/energy' (Moore, 2015, p. 112), yet the increasing capitalisation and appropriation of global natures in turn accelerates the degradation of natures.

The key contribution of Jessop to this work is the ability to assess shifting strategic socio-ecological relations. The Strategic Relational Approach (SRA) is detailed in *State: Past, Present and Future* (2015) and outlines Jessop's interpretation of the state as a shifting relational ensemble. While expanded upon in greater detail in Chapter Two, this approach has significant implications for the way in which SSER engages with both hegemonic projects and acknowledges the changing balance of forces in the state-ensemble. Fundamentally, the SRA approach rejects any 'particular essence of the state' (Jessop, 2015, p. 50), and instead views both the structure and agency of the state as relational. Further, Jessop (2015) positions class forces as both external and internal to the state, and the reflection of these classes as an integral part of the shifting balances of power within the state itself. As such, SRA views state power and the state as a particular and unique form of social relation, which has great significance for understanding socio-ecological power in the SSER framework.

This work draws on the contributions of these two seminal authors to propose an enhanced framework of SSER analysis. The SSER framework assesses the state as a socio-ecological ensemble, reflecting and refracting broader socio-ecological forces. The framework further rests on the assessment of axes of the oikeios, identifying unique socio-ecological processes as they are situated within the broader web of life. The benefit of the SSER framework is the ability to identify specific ways in which appropriation, accumulation and capitalisation are co-produced and contested through any particular state-ensemble within the web of life. This enables a coherent socio-ecological approach to assessing power, hegemony and state projects. This dissertation also draws on the work and socio-ecological contributions of Collard and Dempsey, Parenti, Harvey and O'Connor, with the specific contributions of these theorists expanded upon further in Chapter Two.

1.2.2 Overview of the dissertation structure

This work applies the SSER framework to the historical and contemporary Australia context. In doing so, it assesses strategic relations across the axes of the socio-ecological relational systems that make up the oikeios within Australia in the global context. The work first applies SSER to the historical Australian context before turning to contemporary Australia, examining the critical axes of water, energy and biocarbon. These central axes have been chosen due to their significance and features as both inorganic and organic, reflecting the complexity of the relational web of life in the oikeios. In addition to these axes, and critical to this work, is the treatment of the state as a unique axis which reflects the relational peak of socio-ecological power relations through the web of life. This section provides an overview of this work to assist the reader's navigation and understanding.

Chapter Two: Introducing A Theory of Strategic Socio-Ecological Relational Analysis presents the basis of the theoretical and critical framework of SSER analysis. The chapter undertakes a brief exploration of key contemporary theories of capitalism, nature, and the state, identifying points of consistency and departure from the SSER framework. It then explores the key theoretical contributions to this work, in particular those of Moore, in greater detail, identifying the critical components which have shaped SSER analysis. The in-depth introduction to the SSER framework includes an introduction to the strategic assessment of the axes of the oikeios, aligning this work's focus along specific axes of the oikeios that can inform an analysis of the crises impacting existing socio-ecological regimes. Finally, the chapter outlines the use of the SSER framework to analyse the relations of contested hegemonic projects throughout the state axis, and introduces the differentiated concepts of the 'substantial-state' and 'peak-state'.

Chapter Three: Early Australian Historical Natures and Strategic Hegemonic Projects applies the SSER framework retrospectively to historic strategic hegemonic projects in Australia under British imperialism, and subsequent American hegemony. The chapter orients the Australian state in historic international capitalism between British colonisation in 1788 and the end of WWII in 1945. It explores the way in which the Australian state ensemble facilitated the appropriation of Australian natures, using specific developmental, spatial and racial bundling to support the British Empire's strategy for its accumulation regimes, and to integrate Australia's historical natures into global imperial processes and circuits of capital. In the second section, the chapter examines the strategic reorientation of the Australian peak-state ensemble to support the newly dominant American hegemonic project. In particular, it examines how the Australian state ensemble repositioned Australia's historic natures to facilitate a new Cheap Nature export industry to south-east Asian states, particularly Japan, to prevent any excessive reliance on China. The chapter clearly identifies the integral role of the peak-and-substantial-state ensemble in appropriating and reorienting Australian natures, establishing crucial strategic context for the examination of the contemporary axes of the Australian oikeios in subsequent chapters.

Chapter Four: Water and the oikeios, applies the SSER framework to water, a core relational axis with unique roles in the web of life and of critical importance to the assessment of climate events and risk. In particular, the chapter focuses on the water relations of the Murray-Darling Basin, the drainage basin of the Murray and Darling rivers and arguably the most significant water system for Australia's eastern states, as a critical and complex example of Australian water relations. The chapter outlines the unique features of Australian water relations, noting that crisis events around water relations are particularly likely in the Australian context given highly variable rainfall and cyclical drought patterns that are likely to be exacerbated by climate change. It establishes that the contemporary relations of Australian water, and specifically the Murray-Darling Basin, are highly capitalised and contested, and as a result are at increased risk of exhaustion, given the inadequacies of market-oriented policies premised on the neoliberal

abstraction of efficient, cheapened water. In addition, it examines the contested water relations within the substantial-state, particularly in the face of impending climate tipping points. Overall, this chapter demonstrates that state projects attempting to appropriate Australia's water natures are increasingly fragile, contentious and precarious, with significant implications for the broader Australian oikeios.

Chapter Five: Energy in the Web of Life then applies the SSER framework to Australia's energy axis, with a particular focus on fossil fuel including Coal and Liquid Natural Gas (LNG). The chapter identifies energy as highly spatially embedded, exploring the way in which the co-production and appropriation of energy natures is achieved through the unique relations of each peak- and substantial-state ensemble. It assesses the historical relations of Australia's early energy projects, noting the way in which highly localised strategic projects have shaped Australia's constitutional mechanisms and fostered a broad socio-ecological attachment to cheap energy. The chapter then goes on to assess the neoliberal energy accumulation regimes that dominate the contemporary Australian energy axis, exploring the foundations of Australia's Cheap Coal regimes, the National Energy Market, and the contentious expansion of LNG extraction regimes. This analysis provides a crucial foundation for the chapter's analysis of the extensive points of contest and crisis within the energy axis, including diverging socio-ecological expectations, the influence of privileged socio-ecological classes, the complexity of Australia's constitutional mechanisms, and the competing interests across south-east Asian energy regimes. Ultimately, the chapter argues that Australia's contemporary energy accumulation regimes and related socio-ecological structures are not equipped to achieve a coherent national energy transition, and thereby ill equipped to meaningfully address a core element of the current epochal crisis.

Chapter Six: Carbon applies the SSER framework to Australia's carbon axis, with a focus on Australian terrestrial biocarbon (ATBC). As part of this focus on ATBC natures, the chapter examines the three interrelated systems of native forests, soil and mycorrhizal networks, exploring the millions of years of geological, atmospheric and living processes that formed these highly unique natures. It explores the historical foundations of accumulation regimes based on the appropriation of ATBC natures, and particularly the way in which European ideals of 'developing the land' set the foundation for accumulation strategies premised on the appropriation and exhaustion of these critical bundles. The chapter then goes on to explore Australia's contemporary ATBC regimes, examining the way in which Australia's neoliberal national hegemonic project enables the ongoing exhaustion of ATBC regimes by privileging the interests of those invested in capital accumulation, such as the agricultural and logging industries, for the benefit of foreign exports. It also provides an overview of Australia's carbon markets, which are argued to be fundamentally ineffective, before exploring the escalating points of crisis and contestation that are fundamental to the exhaustion of ATBC natures. Overall, the

chapter argues that the strategic orientation of Australia's socio-ecological regimes is poorly equipped for the challenging but critical task of repairing and adapting ATBC complexes.

Finally, Chapter Seven concludes the dissertation and provides an overview of the key findings of this work, including its theoretical implications and conclusions relating to the assessment of Australian historical and contemporary accumulation regimes. It offers reflections on Australia as a frontier, and the severity of risk and exhaustion in current approaches, as well as acknowledging the scope of and limits to this dissertation. The chapter concludes with an assessment of future applications of the framework.

1.2.3 Primary thesis

This work proposes a theoretical framework that can critically assess the socio-ecological regimes and processes that are essential to the co-production and reproduction of the oikeios. In particular, it provides a basis for assessing socio-ecological power ensembles across axes of the oikeios, including the relationship between particular accumulation regimes and the on-going and worsening disruption and collapse in planetary processes, systems and feedback loops. Inevitably, there are limitations to what this work can cover, and it is out of this paper's scope to define the full extent of prominent axes or analyse contexts beyond the historical and contemporary Australian context. However, the work will propose that the state, as a socio-ecological power ensemble, is a unique axis within the web of life. Given that, the SSER analysis' strategic assessment of the unique relations across axes helps to improve the understanding of the complex ways in which state ensembles facilitate the capitalisation and appropriation of natures across the oikeios. In doing so, this work identifies a number of central axes of the oikeios - the peak of socio-ecological power (the state), water, energy, and carbon - in its analysis of Australia as a contested frontier at a time of international crisis. Ultimately, it will argue that Australian socio-ecological relations are oriented towards private accumulation at the expense of the reproduction of the oikeios. It is hoped that the following work expands the conceptual toolkit that can be used to understand and evaluate the relations of the oikeios and identify crises within the web of life. While it is also beyond the scope of this work to present solutions to identified points of exhaustion, it is the intention of this work to provide the foundations to seeking alternative socio-ecological regimes.

Chapter Two: Introducing A Theory of Strategic Socio-Ecological Relational Analysis

2.1 Foundations of Strategic Socio-Ecological Relational (SSER) Analysis

2.1.1 Introduction to relational theory

The enormity of the challenges facing the relations of life on planet Earth require a rapid expansion of strategic frameworks and theories available to states, and to their constituencies. The following theoretical contribution to this cause rests on the decades of developed theoretical work of two key academics in their respective fields; Jason Moore and Bob Jessop. In his seminal work *Capitalism in the Web of Life*, Jason Moore (2015) acknowledges the vast undertaking of expanding available theoretical frameworks but positions his efforts as intended to inspire a discourse of 'young people of every age across the world - for their willingness to see the web of life in its mosaic of connectivity and creativity' (Moore, 2015, p. ix). Moore provides a relational theory of the web of life, incorporating the spatial social relations of the planet and thus its socio-ecological relations. A decade after his work was published, it remains highly relevant; this chapter intends to continue building on several of Moore's foundational theories while proposing several further additions to create a framework of strategic relational assessment.

This is where Bob Jessop's immense contributions to state theory provide a comprehensive foundation of the nuances of state relations and state projects. To improve the sophistication of assessment of the state, SSER rests in part on foundations provided in the framework built upon the extensive proposals in the work of Jessop in developing a 'Strategic Relational Approach' (SRA) to the state. In the framework of SRA, state power is an 'institutionally and discursive mediated condensation (a reflection and a refraction) of a changing balance of forces that seek to influence the forms, purposes and content of polity, politics, and policy' (Jessop, 2015, p. 10). Jessop (2015, p. 65) argues that class forces are an integral component of the state, and form part of groups of social forces reorganising through the state in their bids to shift 'the balance of power between them'. In the SSER framework, it is proposed that the balance of forces that contest the state are socio-ecological, and so too the conception of a reflection and refraction of socio-ecological forces in the peak, formal ensemble of the state. By adopting Jessop's 'rejection of the essence of the state' and instead 'respecifying the… [state's] structure and agency in relational terms' (Jessop, 2015, p. 50) (see in particular Section 2.2.1), the SSER framework has an opportunity to assess the strategic, shifting relations of the state within the oikeios. This work therefore takes the foundations of relational intersection of Bob Jessop and Jason Moore to create a socio-ecological relational framework to assess critical relational axes of the oikeios, in particular, of the Australian state.

The relations that produced and continue to produce life-making systems on planet Earth are vast. The interrelated systems of physical, social and atmospheric relations still require further research to fully understand the mechanisms of vital processes both within and between systems.

Yet the acceleration of shifts, disruptions and likely nonlinear collapse points (Hansen et al., 2023) have led to the increasing complexity and acceleration of interrelated tipping points that are simultaneously facing the planet (Stockholm Resilience Centre, 2023; Richardson et al., 2023). The complex relational network of the planet and its inhabitants underscores the defunctive approach of partitioning analysis of these challenges into the arbitrarily distinguished spheres of the environment, the economy and the state. As Moore points out, past assessments of strategic relations were considered 'as relations between humans first, and only subsequently as interactions with the rest of nature' (Moore, 2015, p. 42). This approach, as elucidated throughout Moore's work, ignores the objective ecological, biophysical and social co-production of historical change and prevents a sufficiently in-depth 'understanding of how humans are made by the rest of nature, and how nature is made by humanity' (Moore, 2015, p. 25). One cannot seek to understand the relations of Earth's biogeochemical and atmospheric processes without a strategic framework that clearly incorporates an assessment of socio-ecological relations that are fundamentally co-produced by specific power relations, accumulation strategies and states *within and through* the web of life.

The following chapter will therefore present several proposals that constitute the basis of the theoretical and critical framework of Strategic Socio-Ecological Relational (SSER) analysis. The work as a whole does not claim to provide the answers or suggest specific responses to the multitudinous avenues of academic and physical exploration that may allay disruption to critical axes. However, it does offer a framework that can be deployed across the axes of the oikeios to provide a critical understanding of shifting socio-ecological regimes that produce and are co-produced by the escalating disruption and collapse in planetary processes, systems and feedback loops. This chapter therefore intends to provide a theoretical foundation to assess strategic points, and the risks to these points, across the axes of the socio-ecological relational systems that make up the oikeios as the interconnected web of life on planet Earth. Building on several of the proposals raised by Moore, this chapter intends to contribute to a theory of assessing socio-ecological power; in particular, the ways in which to assess the strategic bundles of the peak ensemble of socio-ecological power - the state - and how this intersects with the unique relations of axes, accumulation strategies and contestation through and over the mosaic of oikeios relations, in particular of the Australian State. This approach thus facilitates relational assessments of state's roles in facilitating capitalist accumulation through natures and co-producing historical Nature.

This work highlights the utility of SSER in assessing the state as a peak-ensemble of human socio-ecological relations, across bundles of human and extra-human natures across critical 'axes' of the oikeios. A term throughout this chapter and across all later chapters, the bundling of human natures and extra human natures, constituting historical Nature, is best explained by Moore himself. In *Capitalism in the Web of Life*, Moore (2015, p. 29) writes:

> *I do not believe "Society" and "Nature " exist, at least not in their dominant usage: humans without nature and nature without humans. Nor do I believe these are mere "social constructions." They are, rather, abstractions at once violent and real. They are violent, in the sense that they abstract too much reality in the interests of conceptual clarity. And they are real, in the sense that Society and Nature are in fact operative forces, both in our knowledge structures and in capitalism's actually existing relations of power and production. Eschewing this, modernity's most sacred binary, I understand all forms of crisis— understood as turning points in the systemic organization of power and production— as bundles of human and extra-human nature. This is a big statement that implies manifold processes, the key point of which turns the conventional wisdom on its head: The crises of capitalism-in-nature are crises of what nature does for capitalism, rather more than what capitalism does to nature. This point of entry offers not only a fresh perspective— one that includes, centrally, the work of human natures— but also provides an opportunity for synthesizing two great streams of radical thought since the 1970s: the theory of accumulation crisis and the study of environmental crisis.*

Using Moore's work, one can understand that human and extra human natures unfold through the oikeios, 'interweaving biophysical and symbolic natures at every scale… they are irreducible to the aggregations of their so-called social and ecological dimensions' (Moore, 2015, p. 16). Whether the nature is labour power, class, food, energy, raw materials, it is co-produced through the oikeios. Utilising this foundation, SSER demonstrates that the state is not only an apparatus of shifting social relations and power, but inherently an axis of its own right in the oikeios, as the peak of spatial and socio-ecological relational power ensembles.

SSER is a framework that allows the strategic assessment of the vast intersections, appropriations and interactions that co-produce, and are co-produced by the web of life. Recalling the definition of cheapening in Chapter One, Patel and Moore have examined the relations of the capital fixes of the modern world through the cheapening of 'nature, money, work, care, food, energy and lives' (Patel & Moore, 2017, p. 3) The SSER framework, while identifying cheapening strategies in line with the above, aims to extend analysis to states's responses to crises facing the oikeios. Through its analysis of the core socio-ecological axes of Australian energy, water and carbon and the state, this work aims to provide a starting point and platform for further research to be undertaken into the diverse relations of the state ensemble, natures and the oikeios, which might include, but certainly is not limited to, gendered, geo-physical, post colonial racial and chemical material analysis.

In order to respond to the increasingly complex, interrelated risks and climate impacts, this chapter introduces the SSER framework in further detail, utilising a theory of World-Ecology drawn from Moore's work and a Strategic-Relational Approach drawn from Jessop's work to assess the socio-ecological relations of the state in the web of life. The chapter begins by assessing the theoretical impact of accelerating shifts across the web of life, before providing an

overview of contemporary theories of capitalism, nature and the state, noting significant points of difference between these theories and the SSER framework. It then goes on to detail the core features of the SSER framework, introducing the strategic assessment of axes of the oikeios, establishing the unique axis of the state as the peak ensemble of socio-ecological power, outlining the assessment of accumulation strategies, and addressing the way the framework analyses contestation across the 'substantial state'. A demonstration of the framework will follow in the later chapters, assessing the relational ensemble of the Australian state, its historic accumulation regimes, and the intersection of specific contemporary capitalist accumulation regimes across the four axes of the state, energy, water and biocarbon.

2.1.2 An accelerating crisis - the theoretical impact of global warming in the 'pipeline'

Underpinning the relational assessments in this piece of work, and the foundations of SSER as a theoretical framework more broadly, is the acceptance of the conclusions proposed by Dr James Hansen. Hansen is a former NASA Climate Science Chief who co-authored *Global Warming in the Pipeline* (Hansen et al., 2023). This seminal work concludes that, with the present geopolitical approach to GHG emissions, global warming will exceed 1.5°C in the 2020s and 2°C before 2050, and that 'impacts on people and nature will accelerate as global warming increases hydrologic (weather) extremes' (Hansen et al., 2023, p. 1). At the point of writing (2024), there are strong indications that the planet has already exceeded 1.5°C degrees of warming (Poynting, 2024) as predicted by Hansen. It appears almost certain that these trends will continue to destabilise the socio-ecological axes of the oikeios, irreversibly altering and exhausting relations across the web of life of Earth.

There are many interwoven factors causing the accelerating onset of turning (Moore, 2015), or tipping points (Richardson et al., 2023). These include the dynamics of warming oceans, declining aerosol emissions and their cooling effect, with 'clean air policies' contributing to accelerated warming (ASLCG, 2024), and the acceleration of tipping points in collapsing interrelated feedback loops in the Earth's planetary systems (Hansen et al., 2023). The conclusion that tipping points are accelerating is further supported by the disintegration of North Atlantic sea-ice and the dynamics of the Southern Antarctic Ocean (Hansen et al., 2016), and record ocean and sea surface temperature increases (Copernicus, 2024; McGrath et al., 2024) which are reaching 'way beyond the ranges projected by scientific modelling' given that models have not 'adequately accounted for all the system-level reinforcing feedbacks' (ASLCG, 2024, p. 20). Each conclusion underscores the relational crisis that will continue to rapidly amplify through the oikeios without considerable reorganisation of existing strategic bundles.

In particular, the SSER framework is designed with the understanding that the impending climatic and environmental shifts - some approaching ecological collapse - within key strands in the web of life are about to occur at an incredibly high rate, with additional feedback loops and

threshold limits that will then further exacerbate crises. This means the socio-ecological complexes that constitute the food, water, energy, and material orientations of Australian accumulation are exposed to far higher risk, extent, and rate of disruption than ever before. SSER analysis is a framework compatible with the empirical findings of scientists who observe intensifying tipping and exhaustion points, and disruptions to biophysical and ecological processes, comprehensively incorporating these as relational processes so that they can be understood fully as both producers and products of the contested socio-ecological relations in the web of life.

This work will demonstrate throughout each chapter that the response to capitalism's climate crisis should not be carbon-budget-centric (Dorman, 2022), but instead address the broad range of points of exhaustion, or nonlinear tipping points, in the interconnected planetary systems of the earth. Any strategic assessment of crises on the planet should acknowledge the multitude of 'boundaries' of the planet's systems, in which carbon emissions are merely one one factor that needs to be considered. The work of Richardson et al. (2023) places nine planetary boundaries that 'define a safe-operating space for humanity' (Stockholm Resilience Centre, 2023). These systems are Climate Change, which should be assessed through CO2 concentration and radiative forcing, as well as: novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biogeochemical flows, freshwater change, land-system change and biosphere integrity, including both genetic diversity and its functionality (Stockholm Resilience Centre, 2023; Richardson et al., 2023). While addressing limits of extra-human natures, these planetary limits don't take into account the dynamics of human natures and their limits, which are simultaneously co-produced through the oikeios, and its increasing disruptions. As Baer and Singer (2025, p.115) note, the concept of planetary health does not have to compete against Indigenous and non western understandings of planetary health. The SSER framework, through its understanding of the diversity of human natures throughout the oikeios, reflects the compatibility of planetary health and its utilisation with an understanding of the huge variance of human natures within the web of life.

SSER is unique in its ability to consider the cascading effect of non-linear climate tipping crisis points across the state, and specific strategic spatial planetary processes. Through its continual acknowledgment of anticipated accelerated disruptions within its strategic relational assessments, the use of SSER not only highlights points of exhaustion for capital accumulation regimes and the state ensemble, it assists in demonstrating the coinciding limits to planetary processes. The accelerated disruption of tipping points will continue to co-produce and be co-produced by the reorganisation of bundled historical natures through peak-socio-ecological power ensembles - the state and its geopower (Moore, 2023). The inclusion of shifting state relations provides the basis for the theoretical inclusion in SSER assessments of the development of an expanded theory of the understanding of state causes and responses to 'shock' and 'crisis' moments (Klein & Smith, 2008). Further accounting for the increased disruption and destabilisation of the core processes

of the oikeios (after a long period of relative stability), and the impact on the success and pace of state projects. From Cheap Cotton, using highly capitalised pumps to capture increased water after flooding in the Murray Darling Basin through to carbon-capture storage at an off-shore Liquid Natural Gas (LNG) export facility, the framework encapsulates the full impact of rapidly shifting socio-ecological relations amid escalating crises.

2.1.3 Differentiating contemporary theories of capitalism, nature and the state

Before expanding further on the methodological foundations of SSER, it's important to acknowledge contemporary theories of capitalism, natures and the state, both to draw out their key insights and to note key points of distinction between these existing proposals and the SSER framework. The rapid onset of system disruption due to climate change has resulted in a quickly growing body of academic work, with an increasing number of theorists who relate to, have built on or engaged with the foundations laid down by the work of Moore. The following section addresses the varying proposals, their contributions, and establishes the links, or significant differences, between these proposals and the SSER framework.

The first contemporary work that this section identifies as, in part, responding to Moore's (2015) *Capitalism in the Web of Life* is Collard and Dempsey's (2017) *Capitalist Natures in Five Orientations*. The work proposes a categorisation and grouping of five orientations of capitalist value embedded in accumulation regimes, and the bundled human and extra-human natures that form the valuing of historical Nature. Collard and Dempsey (2017, p. 9) designate the five orientations or 'bodies' as 'Officially "valued", the reserve army, the underground, outcast surplus, and threat'. For these authors, these orientations 'are not the sole result of accumulative logic of capital accumulation' but 'entwined with the orientating work of the state, the law and cultural norms' (Collard & Dempsey, 2017, p. 83). Collard and Dempsey (2017, p. 80) argue that 'Moore pays inadequate attention to domination and multiple forms of abstracted, hierarchical difference (beyond the nature and society binary) as crucial to producing and maintaining some bodies as cheap, available for exploitation, appropriation and killing.' This dissertation proposes that it is through greater specificity of analysing the oikeios, specifically through SSER analysis' examination of axes, that one can identify the array of appropriation strategies used to secure unpaid streams of work/energy, particularly through the socio-ecological state.

Collard and Dempsey's definition of bodies as 'orientation' is a highly useful relational conceptualisation. As covered in Collard and Dempsey's work, it is useful to mention Ahmed's explanation of orientation: 'an orientation, like a position, is relational – a body is always oriented or positioned in relation to something else, whether it is other bodies and objects, or commonsense ideas, social processes or institutions (Ahmed 2006, as cited in Collard & Dempsey, 2017, p. 81). Although confirming the importance of the state, Collard and Dempsey (2017, p. 83) adopt the position that while 'legal, political and economic processes are relatively

autonomous', they 'undoubtedly inflect one another'' (Knuth & Potts, 2016, as cited in Collard & Dempsey, 2017, p. 83) but in doing so 'maintain that the law in general operates as an orienting device'. Collard and Dempsey therefore identify the legal system as the key site of orientating 'bodies' of the socio-ecological relations of capitalist historical Nature. The SSER framework differs in the treatment of the legal system's position in relation to the state, placing the legal system firmly within the relational ensemble of the peak-state.

As the SSER analysis of state relations in the water, energy and carbon axes later in this work will demonstrate, accumulation strategies rest on an array of unique relations across the state axis. These range from the attempted roll-out of spatially strategic state hegemonic projects, to the non-enforcement of existing legislation by specific parts of the state and other state-enabled mechanisms that enhance financial opacity. While Dempsey and Collard's approach crucially identifies the legal system as contributing towards value relations, it should be considered that it does so as an inherent part of the state ensemble, and state axis. The legal system of a state is a heterogeneous shifting, geographic ensemble of socio-ecological relations with its power relations that are enforced, produced and co-produced with other parts of the ensemble of the state. For Australia this includes the federal, state and territory Houses of Parliaments, judiciary, departments of the public service, state and federal police, public defenders and public prosecutors. Using the SSER framework to assess the legal system as part of the state axis further informs the unique nature of the contemporary state ensemble as the height of socio-ecological geopower, which in turn informs the strategic consideration of key sites of territoriality, hegemonic projects and capitalist accumulation strategies.

As a further post-Moore work, Christian Parenti's *Environment Making state: Territory, Nature and Value* (2014) builds on Moore's (2011) assertion that capitalism does not have an ecological regime, but rather that it is an ecological regime. Parenti (2014, p. 830) proposes 'that the modern capitalist state does not have a relationship with nature, but that it is a relationship with nature'. Parenti (2014, p. 829) further proposes that states enable the 'use values of non-human nature to the process of capital accumulation' as the states are able to create 'property regimes, physical infrastructure, and scientific knowledge', thus building on the proposal that the unique relations of the state are inherently socio-ecological. However, Parenti's proposal, while acknowledging capitalism as a socio-ecological regime, does not look at the state's position within the oikeios in a holistic fashion, remaining focused on the capitalist state and its fundamental role to accumulation. This prevents the assessment of socio-ecological hegemonic projects outside of accumulation strategies, as well as the unique relations of state's inter-axis interactions across energy, water and carbon. So, while Parenti's work provides a useful framing of the relations between capitalism and the state, it is important to note that the totality of the socio-ecological state is not necessarily capitalist. Using Jessop's work on the strategic relations of the state is what further enables non-capitalist state analysis through the assessment of strategic variation of and within the state ensemble, and the analysis of organising natures.

A further contribution relevant to this work is Andreas Malm's (2019) *Against Hybridism: Why we need to distinguish between nature and society, now more than ever*. Malm presents a highly critical response to Moore's work in strongly re-prosecuting the importance of maintaining a binary of society and nature, and the need to assess the 'utter disharmony between the two' (Malm, 2019, p. 177). This approach advocates the continuation of research of the anthropocene, viewing Nature as a separate conduit to Humanity. To address this criticism, it's important to note that by maintaining a binary of Society and Nature within a critical framework that is intended to assess either ecological or capitalist crises as Malm suggests, the approach is then severely limited in its ability to meaningfully understand the vast and varying contemporary relations of humanity within the web of life. This means binary frameworks are unable to understand and draw meaningful assessments of what are inherently socio-ecological relations, whether these are shifts in the web of life, accumulation strategies, or the shifting relations and projects of the peak-and-substantial-state ensemble. Malm's framework fundamentally limits the ability to assess complex bundling of human and extra-human natures that inhibit axes across the web of life, including the state.

Malm goes on to repeat the suggestion that environmental crises should be assessed separately to that of crises of capitalism. He argues that 'the most serious consequences of environmental degradation afflict people and other species outside of the capitalist class and its circuits of accumulation' and 'the balance of evidence suggests that capital can thrive by ravaging the earth – not forever, of course, but under the crucial time span when crises such as climate change can still potentially be mitigated' (Malm, 2019, p.179). Other theorists have made similar arguments; Foster and Burkett (2016) observe that, historically, crises in nature have been local, but the overall system has continued to make profits elsewhere. Battistoni (2023, p. 36) summarise their position as arguing that while 'certain basic ecological conditions, like a minimally habitable planet, are required for ongoing capital accumulation, it might nevertheless be compatible with levels of ecological degradation devastating to both human and non-human life'. In effect, such theorists argue that despite localised losses that are likely to worsen under climate change, capitalism can, and will, continue to function in the face of socio-ecological crises.

Given the extent of collapse already occurring through oikeios, the proposal that capital can continue to apply 'fixes' and appropriate with only peripheral impact from the climate crisis, despite this crisis accelerating and worsening negative limits to further accumulation, is not realistic. By proposing a spatially non-specific, homogenous capital class that can pass on the varying consequences of planetary degradation onto the rest of the planet and its web of life, while simultaneously continuing to profit from the collapsed planet, Malm ignores the on-going limits and relational exhaustion caused by said capitalisation and appropriation. As such, Malm's reframing of the climate crisis as limited environmental degradation that will have a minimal impact against the 'capital class' misrepresents both the extent of the crisis, and the varied

impacts of compounding of non-linear events on accumulation strategies. Further, the notion that capital regimes can continue to appropriate the planet as a response to the impacts of climate change, while climate change is simultaneously mitigated, ignores the historical development of capitalism, its impact on climate change, and the reality of collapsing or rapidly shifting planetary processual systems.

Here the work on spatial fixes and capital regimes by David Harvey (1981; 1982/2018) is useful in framing the historical expansion of the frontiers of capital across the planet, especially amid contemporary attempts to resolve specific accumulation crises and to restore 'Cheap Nature' (Patel & Moore, 2018). Through his seminal work, *The Limits to Capital*, Harvey (1982/2018), established himself as an influential proto-socio-ecological theorist, who set critical groundwork for countless other socio-ecological theorists. Harvey (1982/2018, p. 17) proposes the concept of 'the spatial fix', a process of geographic spatially reconstructed expansion, which can be understood as 'a temporary solution to crises' that otherwise would be exhausted'. Yet, as Moore demonstrates, the historical development of spatial fixes and increasing capitalisation have inevitably and eventually led to numerous negative limits forming. As Moore (2015, p. 212) writes;

> *the paired, but spatially and temporally uneven, processes of appropriating unpaid work/energy and toxifying the biosphere have reached a breaking point…issuing contradictions that can no longer be "fixed" by technical, organizational, or imperial restructuring. The ongoing closure of frontiers limits the capacity of capital… The combination of depletion and unpredictability— co-producing rising costs of production— is the hallmark of the ongoing transition from "surplus" to "negative" value. The core processes of capital accumulation are now generating increasingly direct and immediate barriers to the expanded reproduction of capital.*

Moore (2015, p. 212) correctly asserts that climate change represents a fundamental challenge to the processes of appropriation and accumulation: regimes must now internalise costs (including emissions) and the costs cannot 'be offset through new Cheap Nature strategies that are themselves highly polluting', with direct consequences for any 'effective response to climate change'. However, with legally enforced emissions targets and other responses to climate change coordinated through the state, the SSER framework is highly useful in expanding the assessment of negative value through relations of geopower, and identifying points of depletion, exhaustion, unpredictability and risk. The work of Hansen et al. (2023) confirms that a likely tipping point has passed, with global warming locked in via aerosol loading, particularly with emissions continuing to rise. By building on the contribution of Moore's work on negative value and frontier limits and closure, the SSER framework further enables the assessment of capitalism as a socio-ecological regime that is reproduced through the state ensemble, including broadening the assessment of exhaustion and risk within socio-ecological projects.

The argument that growth could continue under capitalism largely unaffected by the dismantling of functioning socio-ecological reproduction of natures, not only neglects the interconnected essence of planetary systems and socio-ecological power, but also assumes that communities would endure increasing disasters without a proportionate response. Further, at their core, markets rely on living humans who in turn, rely on functioning socio-ecological systems, and the unchecked degradation of the latter will inevitably lead to the collapse of capitalist systems themselves. The fact that Foster and Burkett's position, in that ecological crisis has not directly limited growth, does not prove that the cumulative effect of multiple crises and points of exhaustion haven't worsened despite profits, nor that nonlinear collapse under this corrosion will not impact the ability to appropriate additional frontiers. While singular points of crisis might not have necessarily disrupted broader capitalist accumulation in the past, limiting crisis assessment to purely focus on relations of profit because of this, ignores the reality of the risks of crisis points extending and accelerating across the oikeios.

Beyond his seminal work on fixes, Harvey's work is also relevant to the SSER framework's conceptualisation of the state. For Harvey (1982/2018, p. 17), the state is a 'vital moment in the contradictory dialectics and dynamics of capital accumulation'. Importantly, however, Harvey (1982/2018, p. 17) is clear in the difficulty he found in accounting for the interrelations of state, empire and accumulation'. In *The Limits to Capital,* he notes that while the state's involvement is identifiably consistent throughout his theoretical framework, the rapid historical state shifts from neoliberal leaders such as Reagan, Thatcher, Hawke and Keating create a significant challenge in proposing a state theory. In response, Harvey (1982/2018, p. 18) calls for a further 'theory of a distinctively capitalist form of imperialism reformulated as 'a contradictory fusion of the politics of state and empire and the molecular processes of capital accumulation in space and time'.

The SSER framework accounts for the analytical challenges identified by Harvey in a number of ways. Firstly, although the ideology of neoliberal reforms has been heavily focused on 'rolling back the state', in the decades since the 1970s the overwhelming role of the state in the neoliberal project has been highlighted by state-enabled market creation, interventions, privatisations, and the facilitation of financialisation (Cahill, 2017). Harvey (1982/2018, p. 17) is correct in that there has been a proliferation of aligned US-hegemonic institutional 'state-like' arrangements at different spatial scales (from local to global) that now play key coordinating roles'. However, the SSER framework's conception of the state, drawing from the foundations of Jessop's work, firmly accounts for these historical shifts. Broad inter-state institutions are not only made up of states, but every aspect of their socio-ecological positioning is related to the territorial power of the same states - they are part of the peak-state ensemble. The SSER framework is also clear in that the boundaries of the formal, or peak state are constantly shifting, co-produced by broad socio-ecological projects of the substantial-state, as will be explored later in this chapter, the peak-state reflects and refracts the on-going broader socio-ecological contests present in the substantial-state.

Harvey (1982/2018) highlights the range of contemporary state forms that could further complicate analysis, as well as the increase in privatisation posing an issue to neoliberal state analysis in particular. Again, the theoretical guidance of Jessop regarding the social relations of the state are particularly useful in explaining this apparent contradiction. As Jessop (2015, p. 16) elucidates, 'once we recognize rather than ignore the messy, polymorphic, and poly contextual features of the state as a special kind of social relation, we need not despair about the apparent intractability of the state concept'. Building on Jessop's assertion further, the SSER framework can identify this 'special kind of social relation' as the socio-ecological dynamic between the vast web of life and an ensemble of socio-ecological power relations within it.

Another central conundrum raised by Harvey is then how to analyse the complex dynamics of the capitalist mode of production, beyond the simplified theory of 'the spatial fix' (Harvey, 1982/2018). Here, the work of James O'Connor helps to bridge the gap between the foundations of Harvey, and the later work of Moore. Critically, O'Connor (1998, as cited in Battistoni, 2023, p. 34) noted a 'disjuncture between the 'conditions of production' and 'means of life': capital needs 'conditions of production', while the 'means of life' are necessary for human and nonhuman existence but may not be essential to capital accumulation'. In other words, the web of life has been identified, but the link of capitalism as an attempt to organise through the web has not yet been proposed. O'Connor (2021, p. 20), like Harvey, identifies a significant contradiction between 'capitalist production relations and productive forces and conditions of production'. In other words, for O'Connor (2021, p. 20), capitalist production is unable to produce human labour power, state infrastructure and external nature, and because of this, the state or 'capitals acting as if they are the state' must regulate them. While the 'conditions of production' refer to the web of life, O'Connor's work lacks Moore's additional step of identifying that these conditions of production are in fact far more than a prerequisite for accumulation, they are conditions of the intricate web of life. As such, while O'Connor successfully identifies the importance of the socio-ecological state as a point of contestation over Nature, an externality, the state itself is not positioned-in-nature. Further, this work differentiates from O'Connors in its argument that capital does not act as the state - it is a way of organising nature, with the state a form of peak socio-ecological power.

Finally, Alyssa Battistoni (2023) presents a relevant categorisation method in her work, *State, Capital, Nature: State Theory for the Capitalocene*. In this work, Battistoni (2023, p. 41) proposes that contemporary socio-ecological theories can be categorised in 'four main configurations', marking them through the treatment of the state-capital relationship and the capital-nature relationship. Under Battistoni's categorisation, contemporary socio-ecological theories treat the state-capital relationship as either a relationship of class struggle (including Jessop and the SSER framework) or a structural relationship. In turn, these theories treat the capital-nature relationship as either one in which capital is socially and ecologically destructive,

but not self-destructive (including Burkett and Foster), or in which capital is self-destructive (including O'Connor, Moore and the SSER framework).

The SSER framework, built on the work of Jessop and Moore, falls into the top right category. As such, the state is treated as a contested socio-ecological ensemble through which class struggle occurs, and capitalism is treated as a socio-ecological regime that appropriates, to the point of relational exhaustion, arrangements of unpaid/paid work through and within the web of life. As demonstrated emphatically through Jessop's body of work, and brought together in *State: Past, Present and Future* (2015), rigid structuralist interpretations of a capitalist state fail to capture and assess the shifting relational ensemble of varying strategic priorities of parts of the state. As mentioned above, the approach of abstracting crises into separate categories of Society and Nature limits the ability to assess the complex socio-ecological crisis events that will continue to accelerate in severity and occurrence with the disruption of planetary systems. Avoiding the exhaustive relations of historic capital accumulation in a framework also prevents the proper assessment of limits imposed on future strategic orientations by on-going capitalisation and appropriation.

As such, this approach allows SSER analysis to assess the historical development of strategic inter-state contestation that constitutes imperial-colonial frontiers, hegemonic projects and capitalist accumulation strategies. Historical accumulation has led to a highly fractured contemporary geo-strategic terrain as states must respond to the contemporary climate crisis, along with the extinction and biodiversity crisis on a multitude of fronts, both spatially and across public state expectations of disaster response, health, education, and defence. The multiplicity of challenges demonstrate the self-destructive features of capitalist accumulation strategies, as well as the scale of the crisis, and the accelerating deterioration of stability within the planetary systems. Together, the SSER framework provides relational assessment of shifting state relations that not only co-produce the crisis, but enables the proposal of alternative strategic orientations of relations.

2.1.4 Foundations of SSER: positioning capitalism in the oikeios, and reevaluating crisis

Critical to using the SSER framework to assess the impact of crisis events is an understanding of the oikeios, the relational web of life on Earth. As raised in Chapter One, through the oikeios, the 'mosaic of species-environment configurations form and re-form' (Moore, 2015, p.9).

> *Comprehension… unfolded within a historical project that aimed at rendering nature external - Nature with a capital 'N' - the better that it could be subordinated and rationalised, its bounty extracted, in service to capital and empire. As capitalism evolves and restructures, so do the terms of the double internality. Every phrase of capitalism has woven together new and old strands of the oikeios: thus the new historical capitalisms and new natures flow together. These historical nature's take shape out of modernity's manifold revolution revolutions - scientific industrial, bourgeois, agricultural financial,*

> *demographic, and all the rest. they unfold through, while creating anew the oikeios . (Moore, 2015, p. 18)*

Moore (2015, p. 213) proposes that to understand the co-production of capital relations requires the acknowledgment of 'capital's internal crises as co-produced'. He elaborates, proposing further that the 'rising organic composition of capital, broadly conceived, entails the rising capitalised composition of global nature' meaning that the 'two are distinct expressions for a singular, uneven, historical process' (Moore, 2015, p. 213). In other words, the appropriation of 'new natures as objects of power and production', enabled historical natures as 'new sources of unpaid work/energy (Moore, 2015, p. 112), yet the increasing capitalisation of global natures in turn accelerates the degradation of natures. In assessing how capital regimes sustain increasing capital costs, Moore distinguishes between the relations of capitalisation: 'the progressive exhaustion of the natures within both the circuit of capital (exploitation), and in the orbit of capitalist power (appropriation)' (Moore, 2015, p. 79). Thus, the historical process of capitalisation and its appropriations continue to present limits to current and future regimes through past and current degradation of the web of life.

These limits are further elaborated upon by Moore through the conceptualisation of contemporary capitalisation's 'negative-value' and seven cheap natures. Negative-value can be understood as the accumulation of limits to capital in the web of life that are direct barriers to the restoration of Cheap Nature (Moore, 2015; Patel & Moore, 2017). For Moore (2015, p. 213), this concept captures the internally produced crisis of capitalisation of:

> *1) the ongoing, and impending, non-linear shifts of the biosphere and its biological systems; 2) the rising costs of production; and 3) the ongoing overaccumulation of capital. These three moments represent a bundle of contradictions within capital.*

This concept builds on Moore's (2015, p. 42) proposal of the framework of World-Ecology, intended to assess 'strategic bundles of relations fundamental to capitalist civilisation'.

An important contribution of World-Ecology theory to SSER is Moore's demarcation of two main types of 'world-ecological' crises. Moore specifies that they are 'not ecological crises in the Cartesian sense, but crises… that signify fundamental tipping points between or within modes of re-producing wealth, nature, and power' (Moore, 2015, p. 125); that is, developmental crises and an epochal crisis. Developmental crises represent risks or limits to socio-ecological regimes but can be mitigated by pivots or spatial fixes. In contrast, epochal crises are so serious that 'one mode of producing wealth, nature and power give way to another, such as the crisis of feudalism in the "long" fourteenth century (c. 1290-1450)' (Moore, 2015, p. 103). These concepts provide a firm response to the critiques attempted by Malm (2019) that 'capitalism will find a way', by acknowledging that as capitalism is a historical accumulation regime, past fixes

for developmental crises are essentially irrelevant given the onset of climatic disruptions, tipping points and extinction that is rapidly occurring, including to past fixes.

While Moore's work on a World-Ecology framework for capitalism is foundational to SSER analysis, this work aims to further the framework by enabling not just the assessment of socio-ecological capitalist bundles, but also the assessment of strategic bundles across the state and planetary systems. As recent socio-ecological theory has demonstrated, the state has a role in both valuing and devaluing natures to support capital regimes (Collard & Dempsey, 2017; Parenti, 2014). In order to comprehensively and effectively respond to the worsening climate and ecological crisis, policy makers and theorists must be able identify the multi-layered biophysical processes that are reproduced through the state and vulnerable to a range of organic and in-organic shifts (Moore, 2015). The strategic assessment of bundles and their relation to the state can be assessed by SSER analysis, which enables the examination of impacts ranging from changes to historical water supply, nutrient distribution in market exports, temperature variations, sea level changes and other climatic shifts, while simultaneously examining the contested socio-ecological relations of states, accumulation regimes and spaces.

As such, given that the Australian state is a socio-ecological ensemble, and has been a frontier for global capitalism, the SSER framework can and should be used to evaluate Australia's strategic orientations, contested projects and the way increasing crises have been navigated . The SSER framework allows the simultaneous assessment of social and biophysical relations, treating them as the part of the same socio-ecological ensemble in examining specific bundles of natures. That is, adequately understanding, addressing and responding to the vastly increasing range of issues facing Australia in a changing climate requires not only an understanding of the interrelated processes that underpin Earth's biosphere, atmosphere and geosphere, but also the competing strategic regimes of imperial powers at both a political, economic, environmental and, crucially, at a spatial level, simultaneously. The comprehensive utility of the SSER framework means that it is well positioned to undertake such a significant task.

2.2. Applying Core Concepts of Strategic Socio-Ecological Relational Analysis

2.2.1 Relational axes of the oikeios

The Strategic Socio-Ecological Relational framework utilises the concept of the oikeios to situate specific critical relational parts of the web of life, the shifting ensemble of the state, accumulation strategies and the complex, interrelated crises mentioned in Chapter One. This requires the framework to treat the relations of state conflict, core, unique and interrelated biophysical and ecological processes, and financial and economic power struggles as parts-of-the-whole relational web. In order to capture the depth, diversity and range of shifting, yet interrelated relations throughout the conceptualisation of the oikeios, this work proposes

acknowledging and aligning strategic assessments of natures along specific axes across the oikeios, that can help inform a broader understanding of the crises impacting existing socio-ecological regimes. Utilising the concept of axes effectively within the SSER framework requires first identifying and demarcating the importance of their analysis and relational orientations. To this end, the following work proposes furthering the conceptualisation of the oikeios to include an understanding of its axes: planetary significant relational bodies that exhibit unique, universal, fundamental and critical relational positions within the oikeios' reproduction.

The central or core axes of the oikeios can be defined in the SSER framework as relational bodies or 'threads' of unique and of planetary significance and scale – vital relational systems that can be categorised and identified across all scales of socio-ecological bundles through the oikeios. Axes can range from:

- socio-ecological power ensemble in a particular space, such as a state or tribe, to
- core biophysical axes, critical to the planetary life systems, such as water, food, energy and carbon systems
- or unique biochemical and physical properties such as energy, reflected in light and heat.

However, critically, given that axes are defined in relation to one another, and through their own unique relational properties, an SSER assessment must treat the relational bundles within axes as part-of-the whole oikeios. Unlike models proposed by Malm, axes are not violent abstractions intending to separate any proposed 'sphere' of society, nature or the economy, but instead enable a full relational composition of socio-ecological bundles that capture both system-wide relations, and specific, unique spatial variations within the web of life.

The axes of the oikeios are not homogeneous, given the varying and unique socio-ecological terrain of the planet. This results in the variation of strategic interests constantly shifting as a multitude of relational processes contribute to the co-production of the web of life. Thus, the SSER framework is able to assess rapidly changing processes or bundles, given its inclusion of the assessment of non-linear climate events and the impacts of contests in reorienting bundles embedded across axes. Given the significance and unique functions of particular axes, including the unpaid work and energy historically and contemporarily provided, certain relations of axes are foundational in sustaining states, accumulation strategies and regimes, as well as hegemonic projects or capitalist historical natures. Therefore, as accumulation and hegemonic projects are produced through relational bundles across axes of the oikeios, SSER is the framework that enables their comprehensive strategic assessment.

Considering different axes addresses the interrelated, complex crises facing planetary systems, as outlined in Section 2.1.2. Effectively, axes are all interrelated to one another - by definition relational parts to the whole of life on Earth, they must always be defined as a part-whole relation through the web of life. To extend the web of life metaphor, the concept of axes of the oikeios enables particular 'strands' of the web life to be assessed, while firmly retaining the

relational analysis' positioning of the part-of-the-whole web, and interactions with other axes. Utilising the SSER framework therefore provides clarification of the relational position of specific socio-ecological events or crises, that cascade across axes stemming from the universal relations of the oikeios. As such, applying SSER and the consideration of the axes of the oikeios contributes to understanding the extent of multifrontal threats posed by accelerating nonlinear events, and the cascading geopolitical responses.

One of the axes proposed in this dissertation and the SSER framework is the axis of socio-ecological power as it is re/produced through the oikeios. As part of the framework's conceptual understanding, state ensembles are viewed as the zenith of contemporary socio-ecological power structures. SSER therefore aims to assess a range of dynamics in the bundling of human and extra-human natures as they are produced through the state ensemble: its projects for, appropriation of, and contestation over particular historical natures and co-production in the organisation of the oikeios. The orientation of the contested socio-ecological relations of the state is a critical factor in the reproduction of historical natures, a specific historic relational bundling of human and extra-human natures. This is due in large part to the state's crucial role in the valuing of nature (Parenti, 2015), as well as reflecting broader societal contestation through state hegemonic projects (Jessop, 1990). Building on Jessop's (1990; 2016) work, this work proposes 'the state' as a complex socio-ecological institutional ensemble, and a contested axis of the oikeios in its own right. As established, this approach draws on the contribution of recent socio-ecological state theory of Parenti (2015, p. 830), who asserts that the 'state doesn't have a relationship with nature, it is a relationship with nature' as it shapes the valuation of natures. Building on these ideas, the SSER framework makes further proposals on *how* socio-ecological state ensembles engage with relational (re-)positioning through the oikeios and along its core axes. The framework is also constructed with the idea that geographical states actively contest socio-ecological regimes in the oikeios, and that this is reflected through contested socio-ecological relations both within the state structures and related accumulation regimes.

This work therefore proposes that socio-ecological power ensembles are a critical axis of the oikeios, and fundamental to species-environment territoriality relations. In this case, the focus is on the contemporary state, given the dominance of its socio-ecological power ensemble in reorienting the oikeios in the 19th, 18th and 21st centuries (Parenti, 2015). SSER assessments should treat the state ensemble as a critical, contested pivot point and as the peak ensemble of socio-ecological power, informing selective terrain of strategic inputs and fragmented social class struggle through state bodies or substantive state structures in the community. Furthermore, this applies regardless of the type or scale of state (Jessop, 2015); depending on the historical period, a city state, nomadic chief, or village can constitute the peak of socio-ecological spatial power. Socio-ecological power ensembles, feudal kingdoms, ancient empires, nomadic groups and city states, embedded in the varying socio-spatial ecological terrain of the planet, have

continually progressed, regressed and become exhausted through bundles co-produced in the web of life. While Jessop (2015, p. 298) asserts that modern societies are complex and differentiated with no 'single social determinant or apex of hierarchy or command ruling extending everywhere', an SSER approach in fact identifies a uniting determinant across the array of different types of states.

The state is therefore a polycentric socio-ecological institutional ensemble that has unequal opportunities and barriers (Jessop, 2015, p. 208). Within this framework, socio-ecological forces are shaped by the state's representation, its internal structure and its strategy of state projects. States are specific systems that have their own distinctive state capabilities and varying access and control of their own spatio-territorial environments, given the highly contested strategic bundles of the state and its substantial ensemble. The specific condition of state systems is further linked to the inheritance of processual, institutional, accumulation and strategic liabilities and advantages of previous historical regimes. A unifying factor for states, regardless of location, is the ensemble's position within the web of life, and therefore the socio-ecological interaction and strategic orientations of the state with different axes. The reproduction of the state is inherently linked to the core socio-ecological axes, including food, water, materials, labour, and energy, which are all processes relied on through the oikeios. Ultimately, state relations are part of all bundles of capitalism, without state ensembles being inherently capitalist.

By building on Jessop and Moore's contributions, the SSER framework proposes the relational assessment of the 'substantial-state', or equivalent terms such as the substance of the state or the substrate of the state. The substantial-state, is part of the socio-ecological institutional, community and family 'mass' that forms the parts-to-whole of the state axis and the broader web of life. As part of the state, this substantial-state ensemble reflects the ranging socio-ecological groupings outside the formal peak of the state, and so it more accurately reflects the broader strategic terrain allowing for opportunities and threats to the state to be examined. The substantial state effectively makes up the socio-ecological 'mass' of the state, the population, private business and, non-state institutions that unfold through the oikeios as parts-to-the-whole of the peak-state ensemble. The substantial-state ensemble accounts for the true array and depth of the scales of human and extra-human natures bundled through the oikeios that may not be immediately reflected in the formal peak of the state. Thus the proposed substantial state assists in further articulating the axis of the state, accounting for the relational base that is reflected from the substantial-state ensemble to the peak-state ensemble, and in doing so, provides a greater, more comprehensive conceptualisation of humans in nature and nature in humanity. The substantial-state ensemble can be seen in the variation of household, family, private and community civil organisations in 'nature', the oikeios; or part of the socio-ecological relational essence of the state. The ensemble of the state therefore includes the peak-and-substantial-state, and subsequently state projects, hegemonic projects and accumulation strategies.

2.2.2 Assessing accumulation strategies across the state and other axes

In building on the foundations of Moore, one can use the SSER framework to analyse socio-ecological accumulation regimes. Given that capitalist accumulation has resulted in the degradation of the planet, it is vital that SSER analysis is able to assess accumulation regimes and strategies across critical axes. Fundamentally, this means positioning accumulation in one state, as connected to the rest. The planetary crisis and its pressures continue to impact international socio-ecological dynamics; for example, direct confrontation over fishing waters, trade, and the consequent attempts to retain Cheap Energy and Cheap Nature fundamentally impacts the energy relations of Australia and south-east Asia, in particular Japan and South Korea. The SSER treatment of Australian accumulation regimes, alongside other international regimes, must acknowledge the historical expansion of socio-ecological frontiers by specific historical imperial state ensembles, and the need to place these accumulation regimes within the broader international dynamic of other state's strategies.

One of the core advantages of employing SSER analysis is the ability to assess the base relations of accumulation strategies, such as capitalisation, appropriation and exploitation, that are embedded in unique axes of the web of life and the cascading implications of significant disruption in those axes. Given the unique relations of the state, and its co-production with other axes through the web of life, the utilisation of SSER analysis enables the identification of critical base relations of accumulation regimes, specifically by identifying how specific, unique relational processes within axes in turn inform capitalisation and appropriation to co-produce accumulation regimes. The other central way that SSER analysis can be applied to accumulation strategies is by providing the means to examine socio-ecological groupings through their positioning through the state axis and the oikeios more broadly, and the subsequent relation to accumulation regimes, as opposed to basing traditional concepts of a purely economic class around the relation to the industrial means of production.

The application of SSER to the axes of the oikeios therefore provides insights into the physical and the social relations that underpin, rely on and threaten the interconnected planetary systems upon which capital accumulation equally rests. This provides a framework that identifies and critiques the unique strategies, mechanisms and projects through which states, the ensemble of peak socio-ecological power, can, or can fail to, address, resolve or prolong the appropriation, capitalisation and exhaustion of vital bundles to accumulation regimes and the oikeios. The SSER framework, in acknowledging that relational intersections of axes are co-produced through the state, provides a further understanding of capital appropriation, accelerating and unstable points of exhaustion, struggle and risk, and their attempted fixes that are not captured within economic orthodoxy and its treatment of 'externalities'.

As Moore proposes, capitalism's fixes based on a Cheap Nature strategy relies on the representation of 'time as linear, space as flat and nature as external' (Moore, 2015, p. 83). It is through these abstracted conditions that capitalist historical Nature - complexes of human natures and extra human natures - are bundled to co-produce a highly abstracted yet violently real capitalised Nature. So, in examining the socio-ecological relations of state mechanisms through SSER, it is not just the physical degradation of space that is highlighted, but also the examination of violent abstractions, and the co-production of bundles of capitalisation and appropriation that can form 'historical natures' that reproduce or pivot capital socio-ecological regimes (Moore, 2015, p. 81). The enhanced corrosion, negative limits and points of contradiction through capitalisation amplifies socio-ecological tension, as will be explored in subsequent chapters in relation to specific core axes. A key application of SSER is therefore the assessment of state mechanisms in supporting, or corroding, both accumulation regimes, state and hegemonic projects and relations of the further substance of the state.

Equally relevant in the SSER assessment of accumulation regimes is the impact of the continued exploitation, capitalisation and appropriation of human labour, or the specific orientation of socio-ecological relational positioning of labour - class. However, instead of framing the relational positioning of an individual or social grouping directly in relation to an immediate point or ownership of production, SSER proposes that it is more accurate to examine the position of individuals or classes within the relations of the oikeios. This approach to assessing accumulation strategies is supported by Jessop (2015, p. 65), who argues that groups of social forces seeking to influence the state will reorganise through the state axis, 'with a view to changing these forces or the balance of power between them'. For this reason, Jessop (2015, p. 65) argues that 'classes should not be seen as… [a] force that exists outside and independently of the state'. Jessop's definition of capitalist state, while extensively addressing the 'strategic relational selectivity' of the state ensemble, can be extended by SSER to consider how these relations are organised and organising through the broader axes of the web of life.

The SSER framework positions human labour within the broader metabolism of the web of life through which capital regimes reorganise. The contested relations within a state ensemble can therefore enable particular socio-ecological classes, certain states, and sections of capital accumulation regimes to secure appropriation along other axes at the cost of others in the web of life. This enables class struggle to be assessed beyond the 'point of production', and as Moore argues, covers the socio-ecological class struggle of 'strategic unity of big science, big capital and big empire' (Moore, 2022, p. 420). Given that socio-ecological power relations are reflected, even through repression, through the state, this makes assessment of the state critical to determine the socio-ecological positioning of groupings in accumulation strategies, and the impacts of the climate crisis through the substantial-state. Similarly, from a critical anthropological framework, Baer & Singer (2025, p. 76) identify that 'systemic inequality' can

be broadly linked to processes of ‘political centralisation’, which through the control of ‘social mechanisms’ give ‘leverage over productive resources’. With the pressure to contest surplus natures in the web of life increasing through historic shifts in the climate (Baer & Singer, 2025), this underscores the vital importance of positioning the axis of socio-ecological power within the web of life when assessing crisis events and inequality.

However, what is critical to note is that states, or certain parts of states, must now choose to continue to enact projects while attempting to retain the reproduction of a cohesive socio-ecological power ensemble under conditions of increasing crisis. The almost universal presence of these axes of unique base relations demonstrates not only the strategic value that can be appropriated or capitalised, initially contributing to ‘cheap work/energy’, but also the ways in which corrosion through the axes impacts and eventually accelerates the exhaustion of ‘Cheap Nature’ and a ‘declining ecological surplus’ (Moore, 2015, p. 81), impacting all related state projects. Furthermore, the universal nature of the crisis can be seen in diverging social groupings in response. Critically, these relations demonstrate how the climate crisis is now impacting socio-ecological class relations, creating new points of inequality, stress, contestation and strategic prioritisation . As such, the SSER framework can be used to identify specific risks in particular social or capital groupings from accumulation strategies, given the importance of certain axes’ position within reproduction of the broader web of life.

2.2.3 Examining contested and diverging relations of class and hegemonic projects

The final application of SSER analysis proposed in this work is using the SSER framework to analyse the relations of contestested hegemonic projects through the state axis, developing a further conceptualisation of the ‘substantial state’, socio-ecological classes, and the accelerating divergence in once coherent state projects. The foundations of SSER’s treatment of contested relations within state projects is provided through the concepts raised in the work of Jessop in developing a relational theory of hegemonic processes, which in turn includes the work of Gramsci and Foucault. These theoretical foundations inform the SSER conceptualisation of hegemonic projects through the axis of the state and the broader-makeup of the state ensemble.

The work of Jessop provides an understanding of socio-ecological mechanisms that are strategically bundled. For Jessop (1990, p. 207), hegemonic projects involve the ‘interpellation and organisation of different 'class-relevant' (but not necessarily class-conscious) forces under the 'political, intellectual and moral leadership' of a particular class (or class fraction)’. In turn, the key to the exercise of such leadership is the development of a specific 'hegemonic project' which:

> *involves the mobilisation of support behind a concrete, national- popular program of action which asserts a general interest in the pursuit of objectives that explicitly or implicitly advance the long-term interests of the hegemonic class (fraction)*

> *and which also privileges particular 'economic-corporate' interests compatible with this programme* (Jessop, 1990, p. 208).

SSER's treatment of hegemonic projects adopts the basis of this relational analysis but, given the socio-ecological relations of the state, extends the same socio-ecological relational assessment to hegemonic projects.

In viewing hegemony through a socio-ecological framework, SSER analysis expands the conceptualisation of strategic bundles as fundamentally resting on axes of the oikeios. The acknowledgement of unique relations across the axes provides a greater specificity to the ways in which the web of life provides both the 'economic, 'extra-economic' conditions and 'general interests' alluded to in past theories of hegemony. Moore (2023, p. 569) refers to the ability of the state to secure these conditions as 'geopower', asserting that 'through geopower, the alliance of capital, empire, and science identifies, secures and otherwise enables the appropriation of webs of life.' As a result, Moore considers 'imperial geopower—and all manner of environment-making territoriality' to be central to 'accumulation by appropriation' and 'necessary to reproduce accumulation by capitalization in successive eras' (Moore, 2023, p. 569). The SSER framework takes this understanding of geopower, and seeks to extend its application to socio-ecological state ensembles. This further widens the examination of strategic projects that reproduce conditions of geopower, or contribute to the exhaustion and collapse of existing socio-ecological power structures.

Consistent with its treatment of the state and hegemonic projects, the SSER framework similarly puts forward that class relational struggle and the positioning of classes is best reflected through a socio-ecological framework. Socio-ecological class struggle should be denoted a relative position in relation to the state-ensemble and its co-production of the spatial environment and the unique, varying relational web of life. This approach allows the full array of strategic socio-ecological complexities and nuanced relations within state ensembles to be assessed. Further, it enables class struggle to be assessed beyond the immediate 'point of production'; instead, as Moore argues, a struggle that interpenetrates across species of life, worker and soil as 'proletarian struggles unfold within and across these domains: production and reproduction, paid and unpaid, human and extra-human' (Federici 2004 in Moore, 2023, p. 569). As such, the SSER framework captures the relations of accumulation and unique spatial relations that reflect both struggles around the point of production but also across the vast relations in the web of life, as reflected across the peak-and-substantial-state ensemble. Given the spatial variety of the climate crisis, along with specific capacities and specific historical regimes and limits, it is beyond the scope of this work to contribute to a mass identification of specific socio-ecological classes and their positioning to the axes of the oikeios. Instead, the work will draw attention to specific socio-ecological groupings in Australia where possible as an initial contribution.

Critical to the analysis of contestation through the axes, identifying human and extra-human natures, and evaluating the success of strategic projects, is an understanding of the relational dynamics of state ensembles. This understanding requires further examination, and the methodological and theoretical incorporation, of what appear to be non-state relations but are in fact, what can be shown to be co-produced parts of the state ensemble. As such, to effectively use the SSER framework to assess varying strategic socio-ecological relations, this dissertation proposes that non-state or private civil society relations as the articulation of the substantial-state ensemble. Here, a further expansion of Jessop's conceptualisation of non-state relations and civil society is particularly useful, as accepting that Jessop's SRA proposal that 'class struggle can occur within as well as beyond the state' opens room for greater analysis of socio-ecological class struggle that occurs across the peak-and-substantial-state ensembles. As such, SSER understands state ensembles can be understood as 'diverse' and composed of mixed intentions given that 'class forces and class interests are not the only factors at play in securing the social bases of state power, in articulating state projects, and in promoting hegemonic visions' (Jessop, 2015, p. 90). Further, formal state relations can be considered part of the peak-state ensemble that ultimately reflects the unique socio-ecological relations and power imbalances in the broader substantial-state ensemble, given the relationship between hegemonic projects as projects shaped within and across the peak-and- substantial-state ensemble and its constituent parts.

This approach by Jessop builds on the work of Gramsci, emphasising the centrality of private associations and civil society in state power (Jessop, 2015), further supporting SSER's proposal of the substantial-state ensemble as vital to positioning the refracted relations of the peak-state ensemble. As such, it is important not to neglect socio-ecological apparatus and mechanisms in the substantial state, in assessing hegemonic and state projects, which include the 'many disciplining institutions in civil society' (Jessop, 1990, p. 194). Through SSER, disciplinary institutions and non-formal state mechanisms can be considered as part of the socio-ecological ensemble of the state. This enables a more accurate critique of the actual relational dynamics between key institutions that can (or can fail to) produce strategic state projects By acknowledging the further nuances of socio-ecological power throughout the state axis, the spectrum of historical bundling of human and non-human natures is further elucidated in producing regimes of appropriation, accumulation and exploitation.

Under SSER, what separates coercion with a hegemonic or state project is the actual support for the project within both the peak- and substantial-state ensembles, and whether the socio-ecological spatial regime is cooperative or forced. This then engenders consideration of the peak-state ensemble's intended strategic projects and interests. This can be extended further under the SSER framework to consider the impact that the climate crisis is having on diverging former socio-ecological class groupings, with new socio-ecological expectations placed on any state or hegemonic project. Acknowledging both the shifting and selective strategic terrain of the

state allows for specific opportunities and threats for certain socio-ecological classes. For Jessop (2015, p. 57):

> *how and how far state powers are actualized depends on…specific social forces located in and beyond the state' which in turn 'depend on the structural ties between the state and its encompassing political system, on strategic links among state managers and other political forces, and the complex web of interdependencies and social networks linking the state and the political system to its broader environment. [This] depends on widespread acceptance, within the state apparatus of a relatively coherent (and unifying) state project.*

Using this information, SSER positions socio-ecological class struggle occurs through the substantial state as well as the peak state, with hegemonic state projects designed to expand, build and restore support of the substantial state where required.

To add further nuances to the assessment of state relations and socio-ecological classes, the SSER framework also proposes identifying forms of state projects - oligarkhia projects, and sunekdokhḗ projects. Both are state projects between the peak-and-substantial-state ensembles, and involve private socio-ecological classes and accumulation strategies, but differ in their strategic alignment with peak-state strategy. Specifically, sunekdokhḗ forms of projects can be seen as strategically aligned with the stated strategy of the peak-state ensemble, while oligarkhia state projects facilitate individual or minority capital outcomes. Sunekdokhḗ projects, translated from ancient Greek, describes a relation of 'simultaneous understanding', which SSER analysis extends to demonstrate specific forms of socio-ecological projects. Delivered by a particular socio-ecological class within the substantial-state as they cooperate with the peak-state ensemble to fulfil broader state-wide strategic outcomes. Whereas oligarkhia, also translated from ancient Greek, denotes 'few to rule', whereby socio-ecological strategies pursued by parts of the state benefit and facilitate accumulation for a small socio-ecological class

Again, in looking at the nuance of shifting state relations, the principles that Jessop provides in the notion of 'one and two nation hegemonic projects' are highly useful in elaborating the dynamics involved in contested state projects, particularly as they help to identify state coercion as distinct from state projects. Jessop's work aids the SSER frameworks's consideration of contestation across state axes through his acknowledgment that the idea that 'hegemony wins almost universal support is misleading' while also distinguishing between 'one nation' and 'two nations' hegemonic projects' (Jessop, 1990, p. 211). This distinction assists in orientating analysis of inter exploitation and intersection of socio-ecological classes. A 'one nation' hegemonic project is intended to bring the entire nation together, while a 'two nation' project specifies and is selective of a few, limited segments of the substantial and peak of the state to benefit from the hegemonic project, at the cost of broader groups' (Jesssop, 1990, p. 211). This is a distinction utilised by the SSER framework that further clarifies forms of inequality, exploitation and corrosion in state projects.

This socio-ecological treatment of hegemonic projects and the substantial state is also in line with Moore's (2022) proposal of 'the civilising project' and 'promethean projects'. This socio-ecological hegemonic project is described by Moore as resting on the 'ontogenetically separated, hierarchically-structured, ideological zones: Man and Nature', with 'enlightened Civilizers' bearing 'the moral responsibility of rational oversight and active management' for the web of life (Moore, 2022, p. 418), as explored in Chapter Three. Thus 'one nation' hegemonic state strategies aim at an expansive hegemony in which the support of the entire population is mobilised through 'material concessions and symbolic rewards (as in 'social imperialism' and the 'Keynesian welfare state' projects)' (Jessop, 1990, p. 211). In contrast, 'two nations' projects aim at a more limited hegemony only concerned with mobilising the support of 'strategically significant sectors of the population and to pass the costs of the project to other sectors (as in fascism and Thatcherism)' (Jesssop, 1990, p. 211). Yet as elaborated in the following dissertation, the planetary and non-linear disruptions are so significant the costs of historic accumulation will be rapidly and increasingly borne by the entirety of the planet's web of life.

In considering the contested socio-ecological axes of the web of life through the state ensemble, it is important to acknowledge the scale, pace, and severity of the climate crisis is dramatically increasing the risk of diverging socio-ecological priorities across state projects and through the peak-and-substantial-state ensemble. As will be demonstrated in the following chapters of this work, the onset of worsening planetary crisis events and tipping points will continue to increase tension in both 'one and two nation' hegemonic projects that both seek coherence and to direct who and where will bear the costs/lives/impacts of reorganisation. Similar to the impacts of past capitalisation and accumulation regimes, past hegemonic projects, particularly those linked with particular contemporary accumulation strategies, continue to present constraints in relation to both the continuation and deviation from deteriorating socio-ecological regimes. The impacts of the climate crisis are not only increasing tension in all state hegemonic projects, but also across the substantial state, such as among business groups, Australian churches and social movements. Climatic changes extend an array of contestation across the oikeios, with both local and national sites of significance forming a strategic terrain of contestation, such as the condition of domestic living spaces or tension over sites of national significance. With crisis events, and collapsing 'cheaps', there is identifiable increasing pressure on human natures, in addition to extra-human natures, with institutions, projects and organisations exposed to relational exhaustion. Thus the non-linear epochal crisis events are accelerating the divergence between the ability to garner geo-spatial support across the geopower territoriality-state and deliver strategic projects, and continue capital regimes.

2.3 Conclusion

The SSER framework presented in this chapter has proposed assessing the state axis through the specific unique socio-ecological relations of the other interrelated axes in the web of life, through the relations of accumulation strategies that rest on these axes and the success of hegemonic projects. The unique relations of the axes of the oikeios inform the terrain and reorganisation of strategic projects and accumulation through the web of life. This allows for a strong assessment of the state as an axis of the oikeios, given that the state remains a contested spatial peak of socio-ecological power. SSER analysis demonstrates the relational exhaustion in bundles exacerbated by conflict between effects of accumulation strategies, socio-ecological class support and hegemonic nation projects. The framework provides an assessment of state strategy across socio-ecological hegemonic nation projects and accumulation strategies, and is able to examine whether non-linear climatic events, and related geopolitical and state responses will continue to reach tipping points or points of collapse.

In an extension from previous critical political economy and ecology, SSER analysis will enable the critique of specific complexes and regimes within exact geographies of the oikeios and their link to not only accumulation regimes and states, but also the relation of 'life-making' itself. In order to be able to generate a strategic framework of the oikeios, SSER analysis must rest on a transdisciplinary understanding of the physical, climate and biological sciences, socio-ecological accumulation, state theory and a conception of contested social relations. By utilising a trans-disciplinary approach, the SSER framework facilitates the engagement with contemporary analysis of shifting risk and strategic socio-ecological accumulation in an emerging climate crisis. However, SSER analysis can also be extended to look at both future orientations, and the restructuring of the oikeios, allowing an analysis of the strategic socio-ecological implications of geo-engineering, as well as further relational interaction even extending to natures in space. As such, the SSER framework can be used to inform both short and long term examination and planning of the oikeios.

Chapter Three: Australian Historical Nature and Strategic Hegemonic Projects

3.1 Framing Historic Australian Capitalism

3.1.1 Past critical approaches and chapter outline

The following chapter provides a demonstration of the utility of the SSER framework as applied retrospectively, assessing the historical relations of Australia's strategic socio-ecological projects. To do so, the framework is applied to the assessment of British and American historic strategic hegemonic projects, and the reorganisation of Australian human and extra human natures through the Australian peak-and-substantial-state ensemble. In doing so, the framework provides insights into contemporary strategic variation, which is significant for the following chapters examining core axes in detail, given that past accumulation regimes set the parameters for the possibilities of future regimes. By providing even a brief examination of historic international hegemonic projects and the shifting strategic orientation of the Australian state ensemble, the chapter accentuates the significance of Australia's interaction with the expansion of historic capitalism, highlighting how the Australian frontier was, and continues to be, integral to various foreign and domestic capital accumulation strategies and regimes.

To date, there has been a significant scholarly effort to examine the development of Australian capitalism and explore, as well as exploration of its links to British and American hegemonic state projects. Often adopting a traditional state-based Marxist approach, the discourse in much of the literature focuses on the critique of the imperial relationship between the UK and Australia and the extent to which the Australian colonial economy could be considered dependent on British accumulation. Some theorists have sought to highlight the nuance and underestimation of Australia's positioning in the imperial relationship; for example, Tsokhas (1990) proposes through his examination of 'wool growers' organisations and trading and mercantile businesses' that the 'relationship was far from one-sided.' In contrast, Rosewarne (1983, p. 187) summarises a significant number of Australian economists (Cochrane, 1980; Fitzpatrick, 1939/1969; Fitzpatrick, 1941/1969; McQueen, 1975) who position the Australian economy as 'dependent' on its imperial links, recounting that:

> *Brian Fitzpatrick's studies placed the economy firmly within the web of British imperialism. McQueen has pointed to the advantages the connections brought and, more recently, Peter Cochrane has argued forcefully that British capital played a prominent role in the rapid growth of manufacturing industry during the 1920s and 1930s.*

Buckley (1980) acknowledges Butlin's (1970) response to Fitzpatrick, which argues that the economic slowdown in the wool sector had domestic origins. However, Buckley (1980, p. 18) goes on to position Butlin's proposal against the work of McMichael, who 'points out serious problems concerning Butlin's interpretation', and instead demonstrates a 'close correlation between the respective trade cycles in Britain and colonial Australia'. Other writers such as Armstrong and Bradbury (1983) have contrasted Australia's economic history with Britain along

with the comparable colonial states of Argentina and Canada, highlighting the unique development features of each. However, despite the significant literature on imperial Anglo-Australian relations, the socio-ecological significance of the Australian frontier to international accumulation has been neglected. As such, while there is considerable literature on the development of colonial, imperial and foreign accumulation regimes in Australia, the socio-ecological nature of each of these regimes of accumulation within a cohesive analysis has been neglected. This represents a significant opportunity for the SSER framework to greatly extend what has been recounted in terms of orthodox marxist accounts of Australia's imperial links. Therefore, this chapter will utilise previous critiques of Australian capitalism and imperial powers but will develop an understanding of the degree to which Australian natures have facilitated global capitalism, and the resulting impacts throughout the web of life.

The SSER framework's conceptualisation of a state hegemonic project, as outlined in Chapter Two, can be extended to the consideration of the British and American alliances, and the intersection of their hegemonic projects with those of Australia. By extending the consideration of hegemonic projects from what Jessop (1990, p. 207) referred to as the 'interpellation and organisation of different class-like forces' to the assessment of the interaction of an array of forces across numerous state ensembles, SSER analysis can assess the intricate interrelationships of international hegemonic state projects. International hegemonic projects require the mobilisation of forces across numerous state ensembles in the attempt to gain support for a particular state orientation within an international accumulation strategy. The use of the SSER framework below demonstrates the significance of Australian natures to the strategic bundling across axes, which are in turn fundamental to the reproduction of geopower across states. The reorganisation of the Australian web of life can therefore be seen as a critical southern frontier for historic capitalism, with continuing implications for contemporary variations in the strategic terrain of the Australian state, particularly as it responds to the threat of an epochal crisis to capital accumulation.

To sufficiently encapsulate the processes underlying the Australian frontier and its contemporary accumulation regimes within the nodes of the nexus in Australia, it is necessary to understand the development of historical conditions of capitalist socio-ecological accumulation regimes in Australia. The development of Australia's 'historical capitalism' and 'historical Natures' (Moore, 2015, p. 29) in Australia has been unique and uneven, due to the varying impacts of contestation, ecology, climate and the socio-political and strategic-relational processes of the Australian state and people. Australia has long been regarded as a dependent semi-peripheral frontier to the imperial core (McMichael, 1980; Rosewarne, 1983), as well as an imperial proselyte in the shift to the US as the predominant hegemonic project (Fernandes, 2018). Within this context, this chapter seeks to understand and trace the unique development of the reorganisation of Australian historical natures with the processual ascension and descension of international strategic spatial

regimes, and the impact on contemporary limits. In doing so, the global significance of the flow of Australian Natures becomes clear.

While a series of different periodisations have been proposed for the processual development of Australian capitalism and the state-ensemble, this chapter will examine the broad dynamics of the British hegemonic project and the Australian state ensemble from the arrival of the First Fleet to the end of World War Two (WWII). From this point, the chapter will then examine the intersection of the American State's hegemonic project and the Australian state. This is not to say that British influence completely subsided after WWII, or that the United States did not have any influence on Australia until 1945; rather, these demarcations are used to demonstrate strategic shifts in the on-going reorganisation of Australian natures, and how they continue to facilitate different international hegemonic projects.

Guiding this chapter's analysis will be a focus on the most significant reorganisation of Australian natures and international capital, with relevance judged in terms of proportion and scale of the Australian export, percentage of Australian GDP and overall global supply. It is no coincidence that in its 120 years of existence, the Australian State has been one of the world's largest exporters of wool, wheat, zinc, iron ore, coal, bauxite, alumina and processed sugar (Donath, 1953; Fitzpatrick, 1970; Thompson, 1983). Each of these sectors constitute a specific socio-ecological accumulation cycle with extensive links to foreign imperial powers in the creation of Cheap Materials, Cheap Food and Cheap Energy. Further guiding analysis of these sectors are the structural patterns within the regimes, including state-backed capitalist monopolies, private cartels, high capitalisation and the proliferation of foreign capital (Fitzpatrick, 1970). The chapter will highlight the crucial socio-ecological relations underpinning these significant accumulation regimes, setting out critical contextual understanding for subsequent chapters' analysis of Australian axes and accumulation regimes from the mid-1980s onward.

The first section of this chapter seeks to orient the Australian state in historic international capitalism between the initial colonisation by the British Empire in 1788 and the end of WWII in 1945. The section outlines the beginning of the British penal colony, exploring the way in which the Australian state ensemble facilitated the appropriation of Australian Nature in adherence to the British Empire's strategy for its accumulation regimes, in particular its quest for Cheap materials. It then examines the Anglo-Australian civilisation project and its specific developmental, spatial and racial bundling, including the devastating impact on Australia's First Nations and complete rejection of preceding First Nations' socio-ecological regimes. Finally, the section applies SSER analysis to the orientation of Australia's early historical natures, as outlined above, exploring how the associated socio-ecological regimes were situated in developing global imperial processes and circuits of capital.

The following section then addresses the interrelated accumulation and reorganisation of the Australian state ensemble to support American interests as the dominant imperial hegemonic power; specifically, from the end of WWII to the mid 1980s. The section examines how, as part of the American-Australian Pacific Rim project, Australia's historic natures were repositioned through the state ensemble to facilitate a new Cheap Nature export industry to south-east Asian states to prevent excessive reliance on China. In particular, it explores how specific ideological rhetoric, state financial mechanisms, and the international expansion of US and allied defensive bases were used in combination with cheap international loans to finance the expansion of Australia's export capacity. The section also examines the contradictions in these neoliberal accumulation regimes, in particular the gap between the rhetoric of free market efficiency and the reality of neoliberal reregulation through state mechanisms. As will be established in Chapters Four to Six, this strategic bundling of historic Australian natures to align with American hegemony, and with British imperial interests before that, continues to shape the axes of the Australian oikeios today.

3.2 Capitalism and Australia's Eastern Frontier, 1788-1945

3.2.1 Australian natures and the British Empire

As established in the previous chapter, the historical significance of early Australian regimes can be positioned as a key dynamic underlying the contestation between global imperial powers, given the pursuit and attainment of the appropriation of Cheap Nature for social, economic and ecological hegemony. The spatial frontier of Australia has and continues to be a significant site of contested appropriations as world powers shift in primacy and pursue strategies to establish systems of Cheap Nature and maximise streams of unpaid energy/work. To assess the foundations of Australian capitalism is to assess the axes of the oikeios across the Australian continent: its soils, minerals, living creatures, vast forests, fields and plains of biocarbon, along with the socio-ecological regimes of its First Nation Peoples which violently intersected with the mechanisms of the British 19th century imperial hegemonic project.

The beginning of capitalism as a socio-ecological regime on the Australian continent started with the British landing and establishment of a penal colony. As outlined in Chapter One, this settlement, along with the eventual expansion of the other Australian States and Territories, can now be treated as southern spatial expansion of the British state, and through the reorganisation of historic natures, the origins of the Commonwealth of Australia as the peak socio-ecological power ensemble. Although this chapter does not have the scope to fully detail the full strategic orientation of the British imperial State over hundreds of years, it can broadly position the colonisation of the Australian state towards the second half of the British Empire. In doing so, it is critical to account for the historical frontiers and mechanisms already incorporated into the British State and its strategic relations by the 19th century. The environment-making and

territorial power of the British State and its Companies had already bundled human natures of cartography, surveyancing and private property rights with the appropriation of extra-human natures. Moore (2015, p. 68) argues that 'British capitalism at its mid-[18th-]century apex would nourish itself on the basis of cheap calories, grain and sugar, supplied from New World frontier zones in North America and the Caribbean.' Armstrong and Bradbury (1983) likewise recognise the importance of Australia and other dominion colonies such as Canada for British surplus capital, arguing that the cheap food and materials that these colonies provided underscored the special international significance for the dominion societies to British imperial strategy from 1870 to 1914.

Therefore, while Australian historical natures were transformed to provide a supply of European cheap grain and sugar to the imperial core, the development of the Australian sectors in the late 18th and early 19th centuries occurred after the peak expansion of British appropriation of cheap calories/energy (Tsokhas, 1992). As Patel and Moore (2017, p. 120) note, land was the highest strategic priority to the British Imperial State: 'cheap labor having been secured through enclosure and the conquest of Celtic peoples, cheap land was the greater priority for English colonialism' as well as the 'need to secure territory— and to produce ways of governing that secured rights of ownership.' Similarly, Rowley (1972) notes it was the First Nations' land rather than their labour power which was of most interest to the colonists due to the ready availability in most areas of cheap convict labour. While not 'physically depleted', the capability of British food accumulation systems to 'deliver a rising stream of cheap energy/calories was exhausted by the early decades of the 19th century' (Moore, 2015, p. 68). In the adoption of features of the British state, the mechanism of state-backed property ownership rights was embedded in each of the early state ensembles of its Australian colonies and continued to provide a dependable stream of cheap calories and materials.

The imported machinations of British capitalism were therefore foundational to the cartographical expansion and territorial reorganisation of Australia. This opening section will utilise the theoretical framework outlined in Chapter Two to assess the ways in which projects of the fledgling Australian state ensemble facilitated the appropriation of Australian historical natures, from the exploitation of millions of years of geological development in heavy base metal extraction to the introduction of tens of millions of sheep, embedding these natures in circuits of British capital as the British State pursued a specific strategy for its accumulation regimes. In other words, Australian natures were repositioned to continue to provide cheap food and cheap strategic materials for the socio-ecological strategy of Britain. The biophysical historical nature of the materials, the historical timing of World War One (WWI) and the relationship to the technology, armaments and uniforms of the British Empire at the time played a specific role in the ability for the Australians to assert a greater national interest in the relations of accumulation. The growth of Australia as the leading global exporter of zinc and wool, while firmly linked to

early imperial capitalisation, can be also linked to the strengthening of allied socio-ecological classes that inevitably reinforced Australian sovereignty amongst the state ensemble.

3.2.2 The Anglo-Australian civilisation project

The broad socio-ecological strategic relations of imperial Britain and the Australian Colonies was the Anglo-Australian Civilisational hegemonic project. Similar to other earlier Enlightenment-inspired constructs, this strong intellectual influence in Australia (Fernandes, 2018) was the dominant hegemonic colonial project that provided fundamental bundles to support ongoing socio-ecological appropriation and capitalisation of the Australian oikeios. The pervasive categorisation of, and attempts to hierarchise, race provided a broad social rationalisation, and moral justification to on-going relational bundles of accumulation and capital regimes that rested on the dispossession of First Nations Peoples from their land and waters. The rhetoric of racial categorisation had only recently manifested itself in the capitalist extraction regimes of British, slave-run sugar plantations in the Barbados, Bahamas and West Indies (Fernandes, 2018). Yet with the abolition of the slave trade, the British Parliament granted compensation to former slave owners, which then 'provided the starting point for several investments in Australia… [as] slave-owners and former owners settled in Australia using the proceeds of slave ownership and compensation' (Fernandes, 2018, p. 18). In Britain, a large flow of the compensation went to industrial manufacturing in Manchester and Liverpool, which, as will be shown, then further advantaged Australian socio-ecological regimes.

Critically, rhetorical devices of categorisation were paired with mass spatial and territorial reorganisation through the state axis. First Nations Peoples were moved onto 'managed reserves or stations'; in 1883 the Aborigines Protection Board was established to manage the reserves and by 1939 there were over 140 reserves in NSW alone (Human Rights and Equal Opportunity Commission, 1997, p. 34). This reorganisation included the practice of removing Australian Aboriginal children from their families and land via the Australian state and churches. As recounted in the *Bringing Them Home Report*, by 1890 it was the NSW's Aborigines' Protection Board policy to 'remove children of mixed descent from their families to be 'merged' into the non-Indigenous population'. By 1915, the NSW colonial state had passed the Aborigines Protection Amending Act which gave the Board the ability to separate children without 'ever having to establish in court that they were neglected' (Human Rights and Equal Opportunity Commission, 1997, pp. 34-35). This forced spatial reorganisation of Aboriginal families and communities represented an attempted hegemonic project, in line with Moore's theory of civilising projects.

Also crucial to the success of the Anglo-Australian Civilization Project was the complete rejection of the preexisting First Nation People's socio-ecological regimes as part of any state strategy. First Nations Peoples' inextricable link to Country was categorised as being

inconsequential as part of the British justification for expanding settlement and land seizures (Heyden, 2015). In 1816, the NSW Governor Lachlan Macquarie ordered the colony's armed forces on multiple trips to punish, terrify, and capture First Nations Peoples who were resisting the expansion of white farmers, instructing the commanders to compel any people captured as prisoners of war (Sutton, 2022). This violent dispossession through the human natures of property law, inheritance and state-property sales was codified into law in 1835 by the Governor of NSW, Sir Richard Bourke, who proclaimed the country to belong to no one, or Terra Nullius (Colonial Office of the British Government, 1835, as cited in Museum of Australian Democracy, 2000). This declaration was made in spite of the significant initial resistance of Cook's landing by First Nations People and the acknowledgment of first contact in Captain Cook's diary (Higgins and Collard, 2020). Through Bourke's proclamation, the early colonial state enabled the charge of trespassing for anyone inhabiting land without the state's permission. Indeed, the cartilogical and surveying tendrils of frontier expansion in a mapping expedition in Queensland saw the hanging of two First Nations People, from the Turrbal clan of Moreton Bay, Brisbane for resisting Queensland surveyors (Gott, 2014), exemplifying the violence of the reorganisation.

Yet the legal codification is only one part of the overall human natures bundled to produce the Anglo-Australian civilisation project. It was also accompanied by specific rhetorical concepts of development, expansions of cartographic surveying, the creation of reserves, the removal of children and sustained violence against any contestation (Sutton, 2022). As Jennett (1983, p. 120) recounts, in Australia 'development is usually associated with the Anglo-European concept of 'progress' in which it is assumed that it is the historical role of man to conquer nature…and that any that have not done so cannot…are 'inferior' …and should have 'development' imposed upon them' (Hodge, Struckmann & Dorland Trost, 1975, as cited in Jennett, 1983, p. 120). Other related rhetoric that reinforces the Anglo-Australian spatial reorganisation and the appropriation of nature includes the 'problematic terms… of 'the "discovery" of the Australian continent and adjacent islands, the "taming of the wilds," "pioneering," "exploring," and, importantly "civilising" both the landscape and the people already living within' (Bellingham & Fricker, 2024, p. 2). Such rhetoric continued well beyond the 18th century, as exemplified by Winston Churchill's testimony to the Palestine Royal Commission, otherwise known as the Peel Commission in 1937:

> *I do not admit for one moment that the dog has the final right to the manger even though he may have lain there for a very long time. I do not admit that right. I do not admit for an instance that a great wrong has been done to the Red Indians of America or the black people of Australia. I do not admit a great wrong has been done to these people by the fact that a stronger race, a higher grade race, a more world wise race to put it that way, has come in and taken their place.* (Churchill, 1937, as cited in Heyden, 2015)

The early Anglo-Australian hegemonic project delivered a national consensus that aligned dispossession with specific developmental, spatial and racial bundling, through the British and

colonial state ensembles, and strategically supporting specific accumulation regimes, appropriation and capitalisation. While one nation of white, mostly British-Australians benefited immensely from the appropriation of the Australian environment, the continent's oldest inhabitants became a second nation. In assessing the Anglo-Australian Southern Civilisation project, using the hegemonic theory raised in Chapter Two regarding 'a two-nation' hegemonic strategy, the clear strategic socio-ecological dynamics cannot be ignored. Core axes of the oikeios, including water, energy and biocarbon that supported British and the Australian colonial state strategies to establish regimes of cheap materials, food and energy were enabled by territorial reorganisation through a new peak socio-ecological power embracing a 'two nation' hegemonic British state project. This project provided significant prosperity to the growing white population while disenfranchising Australia's First Nations People.

Foundations of the British civilisation project relations were embedded in the colonial state ensemble, with Australia's foundational hegemonic project profoundly shaped by links, alliances, and exposure to international socio-ecological hegemonic projects of other states. British colonisation co-produced a civilisational project in its colonies which then continued to be reproduced post-Federation through the Australian state, as well as through other axes of the oikeios. Central to this project was the nationalisation of territorial and spatial dispossession of over five hundred First Nation clans (Behrendt, 2012) and appropriation of Australian natures into circuits of capital. Through the ongoing establishment of British institutions including churches, parliaments and legislation, the colony embedded and reproduced the 'ontologically separated and hierarchically structured, ideological zones; Man and Nature', asserting the responsibility of the management of the oikeios (Moore, 2022, p. 418). This violent reorganisation of human and extra-human natures was a critical relation in the appropriation of Australian natures, and would have profound and long-lasting impacts on the racial dynamic of the Anglo-Australian civilisation hegemonic project.

3.2.3 Orientating early Australian historical Nature

The following section of the dissertation examines the development of the dominant accumulation regimes of the early Australian colonies, as subjects of the British Empire. It explores how the peak-state ensemble enabled the appropriation of Australian natures, supporting international circuits of capitalisation. In particular, given the significance of these natures to the early Anglo-Australian civilisation project, this section examines the accumulation regimes of wool, gold, zinc and other metals, and wheat and sugar. In particular, the appropriation of Australian natures throughout these time periods align with the huge bursts of unreleased free energy gained through the appropriation of British coal (Malm, 2016; Moore, 2015), resulting in the British Empire importing vast amounts of Australian wool, zinc and lead. Again, this work does not have the scope to assess the full array of early regimes and their projects. However, it can demonstrate the strategic links and shared hegemonic project outcomes

in the appropriation of key historical natures between specific socio-ecological classes, across the state ensembles of the British and Australian states, and how hegemonic projects were implemented to secure strategic bundles of historical natures.

The Australian continent provided a crucial socio-ecological frontier for Britain's 18th century development, from the final decades of the peak of the British Empires through to this Empire's strategic contestation during both World Wars. Historic nature of Australian Wool rested on a huge spatial expansion and appropriation of unpaid energy/work in soil, bodies of water and unique wildlife, the scale of which fundamentally altered patterns of life and initiated a historic restructuring of the axes of the Australian oikeios across the continent. The secure provision of Australian wool rested on a wool belt larger than most countries, based on early pastoral grazing expansions that spread from Port Phillip, Victoria, north to Moreton Bay, Queensland and west to South Australia (Fitzpatrick, 1970). The Australian wool industry was the dominant socio-ecological, capitalised accumulation regime of the early colony, with an unprecedented scale of growth, and was the leading strategic consideration across the initial Australian socio-ecological reorientation. Beginning with the introduction of sixteen Spanish Merinos introduced by British Administrators in 1797, the first Australian wool was sold in the UK in 1807 (National Museum Australia, 2020). The industry's subsequent historical expansion and its unique features represents a vast and fairly rapid spatial co-option from the coastal capitals towards the interior of the Australian continent after British settlement in 1788. Furthermore, it demonstrates the critical links between the British home market and its reliance on imports from its colonies to the early dominant Australian socio-ecological regime.

The early Colonial State ensemble, as the peak socio-ecological power, played an integral role in facilitating the expansion of the wool industry. The state was integral in enabling the bundling of successive Land Appropriation Acts, the sale of Crown Land, Government Orders and Acts of Council (Fitzpatrick, 1970), alongside immediate imperial retributive violence against any First Nations People's attempt to resist land seizures and surveying (Gott, 2014). The state also tacitly enabled the extensive practice of 'squatting', which was the settlement of any white settlers outside the '19 counties of Sydney' extra-judiciously raising livestock; this group soon became one of the wealthiest socio-ecological classes (State Library of NSW, 2016). By 1840 there were four million sheep on the east coast of Australia, feeding on the unpaid energy provision of Australian grasses, soils, creeks and nutrients (Fitzpatrick, 1970). By 1880, there were over eighty million sheep, and by 1891, a peak of hundred and six million sheep, the most sheep living in any country in the world, subsisted in Australian ecology (Fitzpatrick, 1970). As Clark (1975, p. 53) states, 'in Eastern Australia wool reigned supreme', with 'the traditional external sources of raw wool for British industry, Spain and Germany… easily replaced by the Australian colonies.' This rapid expansion was a direct product of the peak-state ensemble's support, as part of a broader project to draw the Australian landscape into the international circuits of capital.

A key relation of the expansion of the cheap material regime, and of the historical nature of Australian wool, was the historical timing of the enlarged capital market offered by increased automation. In particular, the increased use of machines in English woollens manufacturing enabled considerably greater demand (Fitzpatrick, 1970), deepening the link between British industrial capital and the Australian frontier. Yet the early regime experienced the 'real historical limits' of capitalism (Moore, 2015, p. 101) as the Australian continent entered a period of intense drought; the on-going overgrazing resulted in the death of thirty five million sheep, reducing the population to seventy one million in 1900, with drought further reducing numbers again in 1911 (Fitzpatrick, 1970). The degradation of this early socio-ecological regime steadily increased the degradation of axes of the oikeios, in particular terrestrial biocarbon, with perennial grasslands experiencing an 'increase in soil erosion (both wind and water-driven), soil structural decline and infestation of woody weeds' (Mckeon & DNRME, 2004, p. 18) as a result of the historic overgrazing. This represents an early example of misalignment between capitalised accumulation strategies and the limits of Australian extra human natures.

One of the initial strategies by the Australian States was the deliberate exhaustion of Australia's unique biodiversity, exhausting relations within the axis of terrestrial biocarbon. This was implemented in an attempt to support the socio-ecological knowledge and strategy of the British Empire during the World Wars; for pastoralists, it meant working to remove grazing competition to support burgeoning sheep flocks (Bellingham & Fricker, 2024). The colonial state projects focused on 'developing the land' in line with Eurocentric views on grazing and soil conditions (Bellingham & Fricker, 2024). The scale of appropriation was so great that Australia went from having not a single animal with hoofed feet, to the single most sheep in the world (Fitzpatrick, 1970). The scale of exhaustion from the size and scale of the regime was immense, with pastoral land clearing and livestock compressing and reducing the stability of top soil, causing large-scale erosion (Queensland Government, 2013; Aubault et al., 2015). Yet the fledgling Australian state ensembles continued to seek a violent transformation of Australian nature, trying to implement European-styled civilised development of the land. While sheep's wool was interlinked with British capital, the rest of the Australian web of life was appropriated to deliver a rising stream of unpaid energy/work.

The sheer scale of appropriation of Country, forests, soils and the intertwined natures of the oikeios saw Australia supply, on average, 23% of the world wool market from 1909-1918, more than next producers Russia and Argentina combined (Fitzpatrick, 1970). By 1930 alone, the accumulation regime produced over 1,000 million lb or 453592.37 tonnes of wool, using an estimated minimum of 90700ML (calculations based on 204.3 ± 59.1L/Kg of greasy wool production) (Wiedemann, 2006, p. 128). Only 7% of the wool was used in Australia while the rest of the wool clip was exported, with the socio-ecological regime accounting for the principal item of export in 1938-39 (Fitzpatrick, 1970). In 1936, the Australian Wool Board (AWB), was created by the federal government to facilitate state-funded research into wool, as well as

promoting and marketing Australian wool (The Woolmark Company, 2019). By 1950-51 the gross value of wool production in Australia would reach its historic peak, increasing to 56% of the total value of all Australian agricultural accumulation due to the supply of wool needed for the imperial contest of the Korean War (ABC Rural, 2015). It was therefore the first national regime of wool that inherently bundled relations of the oikeios, through Australian geopower, 'capital, empire and science' (Moore, 2023, p. 569), and the capitalist reorganisation of Australian soils, forests, biodiversity and water through the ensemble of the colonial state apparatus.

As hectares of land were converted to grazing stations, the ancient geological features within the Australian crust quickly attracted rapid capitalisation and became an additional frontier of appropriation to the great benefit of the Anglo-Australian hegemonic project. Like wool, the historical relations of Australian gold are linked to international accumulation. With the discovery of gold by white settlers in NSW and Victoria in 1851, immediately after the discovery of gold in California (Brunkova & Shanahan, 2019, p. 24), the Australian gold regime had the effect of spatially extending the international frontiers available to prospector-based extraction. After a NSW colonial surveyor and geologist confirmed the presence of gold, the colonial state introduced an open licensing system, facilitating even those on a low wage to begin prospecting - termed a 'democratic form of mining' (Brunkova & Shanahan, 2019, p. 28). After the discoveries in the early 1850s, significant discoveries were made in Queensland (QLD) in the 1860s and 1870s, and in Western Australia (WA) in the 1890s, with discoveries of other minerals in the other colonies (Brunkova & Shanahan, 2019). The export of gold was continued through the on-going surveying and geographic expansion of extraction, and continued to rest on ideas of 'developing the land' in favour of international accumulation regimes.

The historical timing of gold-based accumulation strategies across the world meant the Australian discoveries were timed with an incredibly high interest in gold, facilitating spatial expansion over decades, as well as a huge inflow of migration. From 1851 onwards, over 500,00 mostly adult males moved into Australia, producing a 'three-fold increase in total Australian population, and a seven-fold increase in Victorian population, over the decade' (Clark, 1975, p. 54). Between 1852 and 1861, the colony of Victoria alone received almost 300,000 immigrants from Britain; during that time, almost 900 tons of gold was extracted from Australia (Sutton, 2022). Similar to the international significance of Australia's wool regime, the historical scale of Australian gold was enormous for British accumulation. The British paper *The Times* reported that:

> *Yesterday three vessels arrived in the River Thames from Australia with the extraordinary quantity of upwards of seven tons of gold on board. One of the ships, the Eagle, was freighted with the largest amount of the precious metal ever known to arrive in one vessel, (upwards of six tons). The ship Dido is expected in a few days, which will*

> *far surpass it, having on board…about ten tons and a half of the precious metal.*
> (The Times, 1852, in Sutton, 2022, p. 80)

The successive geographical expansion, historical labour relations and international capital regime continued to deliver: while the initial rate of over 90 tons per annum in the 1850s dipped to 78 tons in the 1860s, extraction again reached over 90 tons a year again in the 1890s (Brunkova & Shanahan, 2019). The gold rush increased the standard of living for the white Australian population to the highest in the world (Brunkova & Shanahan, 2019) and the through the financial profits, 'Australasia as a whole would absorb more than 30 percent of all British exports in the middle years of the decade' (Sutton, 2022. p. 80). Given participation in electoral democracy was linked to males who owned land of a certain value, the huge and rapid population migrations increased the value of Australian housing, which in turn provided the eligibility for more and more property holders to vote, increasing democratic participation in Sydney alone from 48% in 1851, to 95% in 1856 (Brunkova & Shanahan, 2019). As such, while the capitalist accumulation strategy based on the appropriation of gold relied on the Anglo-Australian hegemonic project, it also fundamentally shaped the Australian state ensemble.

While alluvial gold appropriation may have fostered 'democratic' gains for proposectors, the actual reality of alluvial techniques required to acquire gold saw Country, included systems of soil and water, degraded through 'digging, hydraulic sluicing, dredging and altering water courses and adjacent land for alluvial and deep lead mining' (Cahir, 2012; Frost, 2013; Waldron, Blake, and Mennen, 2023, as cited in Bellingham & Fricker, 2024). Yet again reflecting the two nation dynamic of the socio-ecological project, while the gold rush provided an increased standard of living for settlers, First Nations People suffered the violent degradation of their Country. As the Dja Dja Wurrung Clans Aboriginal Corporation (2017, p. 22) explains:

> *In the mid-1800s, large deposits of gold were discovered in our Country, enticing flocks of people looking to make their fortune. The miners cut down trees for firewood and building, diverted creeks and rivers and dug holes in the ground, pulling up large volumes of earth. Since that time, mining has been constant in Dja Dja Wurrung Country. This has left a legacy of soil erosion, salinity and toxicity from contaminants such as arsenic and mercury. The Country around the goldfields is very sick and a significant program of remediation is required.*

In addition to the degradation of Country and dispossession of First Nation Peoples, the Anglo-Australian hegemonic project is also reflected openly in the response of the state ensemble to the impacts of the corrosion of gold regimes. As the capitalisation of the gold accumulation increased, further appropriation inevitably required intense capital investment and equipment to exploit further, deeper and more complex mineral and ore arrangements. As a result, prospecting miners were increasingly locked out; the state ensemble then responded to the

increasing socio-ecological tension and pressure from the miners with the 'Selection Acts' in the 1860s (Brunkova and Shanahan, 2019; Clark, 1975). These acts enabled the sale of 'Crown land' across the colonies, which provided cheap revenue to the colonial state while also appeasing the demands for land by the increasing population of exhausted-alluvial gold prospectors. In doing so, the strategic terrain of the socio-ecological state in NSW reorganised beyond the former spatial dominance of wool regimes of squatter-based pastoralism, 'unsettling the pastoralists' dominant role' (Brunkova and Shanahan, 2019, p. 30) in favour of other broader extractive pursuits.

There were finds of other minerals in the other colonies that were also significant to the international economy, and hence Anglo-Australian accumulation regimes. In particular, the discovery of zinc was crucial to the systemic accumulation of the British Empire, given the advancement of fossil-fuel based industrial smelting across the European continent and the importance of zinc (and lead) to 19th and 20th century military industrial bases (Malm, 2016). An international socio-economic accumulation regime quickly formed from the capitalisation and extraction of the historical nature of the Broken Hill lead-silver-zinc ore body, the richest and largest of its kind in the world (NSW Department of Mineral Resources, 1981), the initial profits of which would go on to fund the industrial capital expansion of BHP's heavy metal industry (Fitzpatrick, 1970). The ore-body was pegged in 1883 by local sheep workers and by 1886 the Broken Hill Proprietary Company (BHP) began its first mine (Dixon, 1979), shortly joined by North Broken Hill, New Broken Hill Consolidated, Broken Hill South and Zinc Corporation (Ralph, 2004). The BHP mine alone over the next 54 years would extract over 189 million ounces of silver, 1,445,000 tons of Lead and 603,000 tons of Zinc from the Australian crust (Fitzpatrick, 1970). The ores, formed by complex volcanic and oxidation processes approximately 1685 million years ago, represented huge swathes of unpaid work to be appropriated by imperial accumulation (Crutchley & Lehane, 2020), and represented a further early instance of the bundling and expropriation of Australian extra-human natures.

Finally, early Australian accumulation regimes were also centred around the production of cheap food. The historical development of the Australian wheat sector resulted in another vital early socio-ecological regime for the development of the inter-state ensemble of the Australian state and the final years of British Imperial hegemony (Fitzpatrick, 1970). In turn, the sugar industry reflected the growing diversification of the Australian domestic-focused socio-ecological appropriation regime following the capitalisation of gold (Graves & Richardson, 1980). These food regimes began to contest the spatial dominance of wool, with historical natures of grain and meat strengthening in attractiveness for white settlers (Clark, 1975). While these historical regimes arguably started as British 'cheap food' regimes, the continuation of their accumulation became quickly linked with the cheap food strategies linked to the prosperity of the fledgling Australian political economy.

The expansion of appropriation was closely related to the shifts in other parts of the Australian state. In particular, the relational impacts of the historical gold regime saw both white squatters expanding into North Queensland in the 1960s, looking to establish 'a string of sugar and gold ports along Queensland's northern coast' (Australian Sugar Heritage Centre, 2010). At the same time, Sydney-based capital, through the formation of the Colonial Sugar Refinery (CSR) company, began to construct sugar mills in Fiji and Queensland from the 1880s onwards (ANU Archives, 2012). This expansion into the Pacific formed part of the sugar industry's utilisation of the racial hierarchy mythology in the Anglo-Australian hegemonic project. It was believed that, 'just like those countries of the New World, Queensland could not possibly be developed to its true potential without the benefit of cheap, hopefully even free, black labour' (Australian Sugar Heritage Centre, 2010). This was quickly identified in the nearby Pacific Islands, and between 1863 and 1904 over 65,000 Pacific Islanders either volunteered, were brought over illegally having been kidnapped or 'blackbirded', or were persuaded to leave their homes and travel by ship to Queensland by coercion, force or deception (Australian Sugar Heritage Centre, 2010; Graves, 1980; Griggs, 2011). The facilitation of these arrangements was a crucial way in which the Australian state ensemble supported the growth of a domestic food regime.

The early capitalisation of both the sugar and wheat regimes was firmly supported by the Australian peak-state ensemble. Both the Colonial Sugar Refinery (CSR), a public company, and the Australian Wheat Board (AWB), a federal-government institution, operated natural export monopolies (ABS, 2006; Fitzpatrick, 1970). The Australian Wheat Board operated through a single desk system, while the state-governments of NSW and Victoria built and managed freight railways, silos and grain elevators through state-owned companies (GrainCorp, 2022; State Library of NSW, 2013), all facilitating the flow of cheap Australian grain back to Britain. CSR in particular benefited from the capture and appropriation of Fiji's sugar plantations, soon becoming the largest public company in Australia after the monopolisation and absorption of Fiji's sugar mills (Fernandes, 2018). Notably, the expansion of the sugar industry came to reflect the Australian peak-state ensemble's interest in expanding its own imperial frontiers, given that the British State had already secured cheap sugar imports through its colonial expansion into, and historic sugar production in, the Caribbean (Graves & Richardson, 1980). As such, given that sugar was not required by British markets due existing Caribbean and American regimes, the Australian sugar regime reflects a more domestically oriented 'cheap food' strategy focussed largely on domestic consumption.

The ecological impact of the reappropriation and reorganisation of Australian soils, nutrients and water ways to support the export of Australian wheat and sugar, has been immense. In 1861, 349,000 hectares of the Australian frontier, its forests, soils, and water bodies had violently

transformed to produce European wheat; by 1939, it was over 5,804,000 hectares of specific Australian varieties (Banerjee, 2016). Through capitalisation, developments in 'breeding new varieties better suited to Australian soils and climate' and the 'fertilisers, crop rotation and new implements', Australian wheat yields increased from 4 million acres of wheat in 1896 through to 12 million acres in 1915 (Tsokhas, 1992, p. 2). This expansion of wheat was also into 'areas formerly dominated by wool growing' (Clark, 1975, p. 62) and was accompanied by 'significant acts of landscape authorship across the continent to provide water to settlements and foster economic development', with hydraulic engineers constructing dams and other water infrastructure with the intention to attain a secure supply of water in the dry climate' (Morgan, 2011, p. 159). Like the capitalisation of wool, assessing sugar and wheat regimes highlights the growing Australian geopower, as the peak-state ensemble directed scientific research into expanding yields, and cheapening costs (Clark, 1975). Simultaneously, the corrosion of appropriation of the Australian oikeios accelerated, with greater streams of energy flowing from expanding frontiers of inland soils through the introduction of fertilisers, and increasing water extraction.

Early expansion of the regime reached points of exhaustion as frontier yields started to fall. Farmers believed that 'virgin soil was higher yielding, leading to minimal efforts at further cultivation, such as full-trench ploughing, spreading of manures and other soil improving techniques' (Banerjee, 2016, p. 131). Instead, farmers relied on further and further expansion, despite the aridity of Australia's interior. During the early expansion of the wheat frontier in the 1900s, farmers pushed out 'into low and unreliable rainfall areas... causing a great deal of irreversible damage done to the soil' (Donath, 1953, p. 70). Cockfield and Botterill (2007, p. 50) argue that 'the wheat frontier has in fact retracted as the limits of climate and fertility are acknowledged and costs of production felt.' Pursuing these increasingly capitalised food regimes has caused irreversible and significant damage to Australia ecosystems through the destruction of soil and the introduction of pests.

In terms of the impacts of sugar, initial attempts to establish cane plantations in NSW resulted in successive ecological failures of the land, as early sugar crops failed in frost (Griggs, 2011, p. 48). However, farmers were eventually successful in planting within a north-east corridor of the coast, stretching '2100 kilometres between Mossman in Queensland and Grafton in New South Wales' (Australian Treasury, 1992, p. 3). This was not achieved without difficulty, with Australia's canegrowers forced to respond to native termites after they 'attacked the young cane crops along the Macleay River in 1870' (Griggs, 2011, p. 155). Simultaneously, other introduced insects including cane beetles and cane grubs cut into early yields, prompting the ecologically disastrous release of the cane toad to little effect on the numbers of beetles (Griggs, 2011). As well as the calamitous introduction of invasive pests to protect the industry, given the the specific geography of Australia's sugar regime along the north-east coastline, the increase in fertiliser use from the 'green revolution' has caused significant phosphorus run-off into the Great Barrier

Reef, causing historical bleaching (Mallela & et al, 2013). As such, while the development of the Australian wheat and sugar regimes experienced considerable success, these regimes also led to persistent, ongoing points of exhaustion across historic Australian natures.

3.2.4 Variations to the Anglo-Australian strategic terrain

This section examines the broad conditions of Australia's socio-ecological accumulation regimes as they were situated in developing British imperial processes and circuits of capital. In using SSER to frame the following historical variations in the strategic terrain of the Anglo-Australian hegemonic project, it should be noted that the relative strategic divergence and independence of the Australian state ensemble increases, while remaining strategically coordinated with Britain. Assessing the historic projects provide insights into Australia's core axes, including any historical limits or shifts reinforced by selective strategic terrain. This is particularly the case as the Australian state ensemble continued to re-organise socio-ecological accumulation regimes beyond the immediate strategic concerns of the U.K. The peak-state ensemble helped to facilitate the strategic shifts occurring after exhaustion from accumulation regimes, as well as dynamics in the historic progression of hegemonic projects. It accomplished this through a wide range of mechanisms, surmised by Crough and Wheelwright (1983, p. 27) as:

> *numerous producer-dominated marketing boards, from apples and pears to wheat and wool; ...the protection of the manufacturing industry in its various phases; the control of the import of people as well as of goods; the licensing of banks; and the prevention of foreign ownership and control in the media and in air transport.*

Initially, the interests of the Australian colonial state ensembles were directly aligned with those of Britain. Through the commissariat system, the colonial state ensembles provided a link to the British state, and a joint project providing the colonial state with cheap materials and British finance. The initial NSW state ensemble in particular essentially facilitated market-convict relations of a colonial outpost on the other side of the world until the 1840s (Clark, 1975; Dictionary of Sydney, 2008). However, over time, the strategic divergence of the two state ensembles increased. As Clark (1975, p. 62) recounts, 'with the formation of the ALP in 1891 and its growing political influence, a consensus emerged across a broad spectrum of Australian society in favour of more direct State regulation of economic activity.' The federal government began to move towards greater economic independence; for example, in addition to the array of mechanisms to support Australian accumulation, in 1915 the newly created federal government formed a 'Commonwealth Government Line of Steamers, a public enterprise that it was hoped would reduce dependence on British shipping' (Tsokhas, 1992, p. 2). More broadly, the spatial and temporal revolutions that steam engines and expanding railways represented to capitalism would remain in the ownership of the peak-state ensemble. Thus while a flow of capitalised

natures continued to be exported, Australian accumulation regimes began to reflect a greater range of interests than those of British imperialism.

Returning to the wool industry as an example, despite the socio-political links of the British to the Australian frontier and its provision of wool and heavy metals, British capital did not have complete financial supremacy over the accumulation regime. In fact, there are significant nuances within the Anglo-Australian wool finance that co-produced Australian wool. Both regimes were the sites of specific and unique financial and imperial contestation between the British Empire, and Australian and German finance (Tsokhas, 1990). The development of Australian and Anglo-Australian brokerage houses and local lending in the capital cities of Australia during the 1880s was a unique development that meant by 1914, 70% of the Australian wool clip was sold in Australian auction houses under Australian control (Tsokhas, 1990). The enduring link between frontier farmers and finance houses resulted in 'Anglo-Australian and Australian pastoral companies, local specialised wool brokers and large wool producers, who dominated the Australian Wool Growers Council, unifying into a mutually supportive alliance' (Tsokhas, 1990, p. 5). This resulted in a significant political relation of Australian sovereignty and national interest reflected in the financial base of the socio-ecological regime.

From the turn of the 20th century, the power of the imperial British-led accumulation cycle was in decline (Moore, 2015, p. 120) but was still yet to face its most contested years, engaging in the imperial contests of WWI and WWII. These wars can be viewed as imperial competition between regimes over the appropriation of nature, markets and capital and a 'stake of international hegemony', fought through physical and economic domination and conquest (Mandel, 1986, p. 14)**.** As the peak of imperial contestation in the 19th century, the World Wars had lasting impacts on the early socio-ecological accumulation regimes, as the British Empire moved to secure monopoly supply of Australia zinc, lead and wool. For the Australian zinc and lead sectors, given the previous dominance of German capital around the outbreak of WWI, the war enabled a reorientation of the financial and processing base of the accumulation regime.

Broken Hill was heavily contested by other imperial European powers, as part of the capitalisation and development of material-industrial bases. Prior to 1914, the appropriation of the Broken Hill ore-body was 'dominated by German finance capital' which had developed superior technical processing capabilities, allowing them to undercut the British in price (Carrigan, 1983, p. 164). Furthermore, at one point BHP had more German shareholders than British financiers (Carrigan, 1983); prior to WWI, this financial and processing link resulted in Australian ore getting shipped and processed in Germany, before it was eventually exported to the UK (Burns, 1995). The subsequent war between Germany and Britain - and hence Australia - represented an imperial contest over the accumulation of Australian minerals. To counter the German influence, British capital flowed to subsidise the Collins House Group in their

endeavours to replace continental German processing with the Australian processing of minerals (Burns, 1995). Despite moves towards increasing independence on the part of the Australian state, the dominant strategic orientation remained aligned with British imperial interests.

In line with the conception of the Australian state as a contested sphere of social relations (Jessop, 2015), the Australian State apparatus mobilised to assist and 'defend the interests of the U.K. imperialist class', arguably the 'economically and politically dominant' relation within Australia at the time (Carrigan, 1983, p. 174). This was achieved through the passing of the *Trading with the Enemy Act 1914*, which, as the name suggests, prohibited trade with those deemed 'the enemy' as of the declaration of war in 1914 (Carrigan, 1983, p. 174). Likewise, through lead contracts signed at the beginning of the imperial conflict, the Collins House Group formed a joint firm, the Broken Hill Associated Smelters, which won a monopoly contract with the British Government, specifically the Department of Munitions (Burns, 1995). In terms of processing, it resulted in a 'rapid downstream integration of the processing of lead' for the Collins House Group (Burns, 1995, p. 10). In this light, the Federal Government and Collins House Group can be seen as a sunekdokhḗ project - a state project that benefits private socio-ecological classes and accumulation strategies but remains strategically aligned with the broader interests of the state. In broad terms, this arrangement meant the historical nature of the Broken Hill ore was utilised to fuel imperial contestation throughout the European continent and globe.

The Second World War had a similar impact on the re-orientation of Australia's wool regime. Prior to the outbreak of WWII, nearly 50% of Australia's wool was exported to Axis powers (Tsokhas, 1990). However, the introduction of the British Imperial Wool Purchases of the entire Australian wool clip meant the UK tax system effectively subsidised Australia wool producers throughout the war (Fitzpatrick, 19705). This resulted in the unification of the wool farmer, brokerage houses and the Australian state negotiating as a monopoly block to form the British Australian Wool Realisation Association (BAWRA), an 'Australian-controlled, bilateral monopoly' (Tsokhas, 1990, p. 48). Through the co-option of Australia's entire wool clip and heavy metals regime, the socio-ecological regimes ensured the UK received the adequate materials to continue its imperial contestation.

From the outset of the Australian colonies, even while linked to the state ensemble of the UK, there was significant state divergence across the on-going reproduction of accumulation regimes, as multiple state ensembles sought to reshape human and extra-human natures. The Australian landscape from colonisation onwards was violently transformed, providing a flow of crucial historical Natures in a system of international ecological appropriation. From the 19th and 20th centuries, Australia would become the world's largest supplier of wool and a major global supplier of heavy metals. Despite the hegemonic power of the British Empire at the time, the socio-ecological spaces of the Australian frontier remained somewhat contested, with both

German and Australian sovereignty evident. Despite this, through the intensification of contestation of the World Wars, the accumulation regimes were diverging but cooperative with the strategic priorities of the British Empire in its declining days.

3.3 Australia's Western Frontier: American hegemonic projects, and the flow of Nature towards South-east Asia (1945-1985)

3.3.1 Introduction to post world war two hegemonic restructuring

In the following section, the SSER framework is used to examine how the former dominant hegemonic imperial power of Britain receded away from the Australian frontier, and instead Australian natures were extracted to support US-aligned multi-state strategic socio-ecological regimes. To do so, the SSER framework is applied to the relational disruption caused by WWII, as by the end of war, British socio-ecological power was greatly diminished. Britain's bunding of human and non-human natures across its colonies and domestically had been exhausted over the course of the war, with the value of UK assets declining from $4.4 billion at the start of the war to $1.5 billion by 1941 (Beresford & Kerr, 1980). By the 1950s most of the British colonies were independent, or 'well on the way to becoming so', including Australia and Canada which gained dominion status (self rule by retained by the British Monarch) (Dunbabin, 1994, p. 58). This period was marked by a dramatic shift in the dominance of the British hegemonic project, both in its former colonies and in international strategic relations as the US hegemonic project gained prominence. Indeed, Britain itself became increasingly reliant on the US, as indicated by its considerable financial debts to its former colony (Allen, 2018), while also shifting its attention towards Europe when it joined the European Union in 1972 (Perkins, 1997). As the British started to selectively withdraw, the Australian state ensemble continued to realign itself towards American interests as the dominant imperial hegemonic power (Fernandes, 2018). While Australia remained a close ally of the British state, its strategic orientation became increasingly focussed on its American alliance.

By way of example, the impact of shifting imperial relations is clearly visible in Australia's food regime. Britain's entry into the European Union in 1972 marked an end to the British reliance on the Australian socio-ecological frontier (Perkins, 1997). Strategic projects around cheap food shifted with the 'green revolution', with massive advancements in food productivity causing the global production of grains and food stuffs to soar - global cereal output grew by 126% between 1950 and 1980 - while prices fell dramatically (Moore, 2015, p. 249). Expanding fertiliser and pesticide use increased British domestic production of wheat from 23% in 1936-39, to 67% in 1974-75 (Perkins, 1997), which, combined with the direct impact of newly introduced European tariffs on Australia's food regime, meant that by the mid 1980s, 'the UK was taking less than two per cent of Australian rural exports' (Keogh, 2016). The impact of the reorientation of British strategic projects and accumulations strategies post-WWII, and the later the re-organisation of

the American international hegemonic strategy, has had lasting effects on the appropriation of Australian natures. Appropriation was repositioned through the peak-state ensemble, facilitating the flow of Cheap Nature to a broader bloc of south-east Asian states, and further securing the alliance between the peak-state ensembles of the United States and Australia.

Attempting to assess the full array of spatial positioning of international American hegemonic projects, across the planet and in outer space is far beyond the scope of this chapter. However, in the following section, the historic shift of Australia's adherence from British to American strategic hegemonic projects is briefly examined in the Pacific Rim and neoliberal projects, given the immense impact on Australian natures. As such, the remainder of this chapter aims to highlight the key strategic relations of the intersecting Australian-American project of the Pacific Rim Project in south-east Asia from 1945 through to 1985. In particular, the SSER framework demonstrates how the allied and contested strategic state-ensemble within south-east Asia continued to rely on the appropriation and exhaustion of the reorganisation of cheap energy and material regimes, and the related historic natures within key relational axes. This chapter will therefore demonstrate the scale, capitalisation and historic appropriation of Australian natures in accumulation regimes, as they are co-produced within a broader hegemonic strategic project.

3.3.2 Australian-American strategic hegemonic projects

As mentioned earlier in the chapter, historical hegemonic projects, like historic accumulation regimes, continue to pose limits and points of exhaustion for contemporary socio-ecological projects. In the remaining section of the chapter, the SSER framework assesses the complex, global socio-ecological regimes with a view to understanding the impacts on subsequent contemporary relations explored in later chapters. Examining the socio-ecological relations of the Pacific Rim project as relevant to Australia reveals a number of key strategic processes in the bundling of human and extra-human natures in the attempt to capitalise and appropriate cheap energy and historically strategic materials. More specifically, specific ideological rhetoric, state-financial mechanisms and the international expansion of US and allied defensive bases were all critical in the bundling of strategic historic natures in line with the American–Australian hegemonic project.

Strategic consideration of the future socio-ecological regimes of Asia and Pacific were well underway prior to the conclusion of WWII. The peak of the Australian state was already aware, through the involvement with US forces in the Pacific theatre, how Australia's on-going participation in the American international hegemonic project in south-east Asia and the disruption of pre-war socio-ecological regimes in the Pacific would be integral to the viability of its own future strategic considerations (Fernandes, 2018). In 1945, the Australia's Immigration Minister summarised the consensus of the peak of the state regarding their relative position in the international state system:

> *One lesson from the Pacific War . . . we cannot continue to hold our island continent for ourselves and our descendants unless we greatly increase our numbers. We are but seven million people and we hold three million square miles of this earth surface. . . . A third world war is not impossible . . . within the next quarter of a century. . . . We may have only those next 25 years in which to make the best possible use of our second chance to survive.* (Arthur Calwell, as cited in Fernandes, 2018, p. 33)

For several years, at the conclusion of WWII, the nationalist government of the Republic of China (ROC) was the major state ensemble that facilitated a flow of Cheap Nature from the Chinese mainland to the capitalist reconstruction of the Japanese state, but with the ROC's withdrawal to Taiwan in 1949, ROC-Japanese strategic accumulation regimes collapsed. As a result, the American and Australian states believed that if south-east Asia was not able to reorient accumulation and capitalisation regimes to provide Japan with 'food and raw materials and the purchase of its exports', then 'Japan would have little choice but to orient itself to China', an undesirable outcome given increasing tension between China and the West (Fernandes, 2018, p. 72). The American-led response to this dilemma was the Pacific Rim project, in which the Australian peak-state ensemble was critical in realigning the strategic direction of the appropriate of Nature, away from the British hegemonic project, and reorientated to centre the Japanese state ensemble as the principal benefactor of the input of cheap Australian Nature. As recounted by Crough and Wheelwright (1983, pp. 21-22), the Pacific Rim project was proposed as;

> *Strategy which involves the reorganisation, and integration, of the Asian Pacific region into four tiers. The first involves the U.S.A. and Japan, which act as the providers of capital and technology; the second, Australia, Canada and New Zealand as suppliers of foodstuffs, raw materials and energy; third, the cheap-labour countries of Asia and Latin America which will follow export-oriented industrialisation strategies; and fourthly, the socialist countries of the Asian region, particularly China*.

It was through this arrangement that the Australian peak-state redirected the flow of appropriated Nature, and simultaneously supported the expansion of the American peak-state ensemble through military force projection. This arrangement was formalised through the ANZUS treaty between the US and Australia, which fundamentally established both state's recognition of the importance of south-east Asia and joint commitment to the capitalist development of the region (Middleton, 2010). From the end of WWII to the end of the Cold War, the number of inter-state US bases within Australia grew markedly, an expansion which, together with post-war aid capitalisation, contributed significantly to the international expansion of the US hegemonic projects, including the Pacific Rim project (Catley and McFarlane, 1980). The ANZUS treaty, and the associated expansion of joint Australian-American military force projection, was from that point on, a vital strategic element to the bundling of exported Australia Natures in south-east Asia specifically. Simultaneously, the flow of Cheap Nature from Australia critically fulfilled the

strategic reorganisation of the oikeios in line with the Pacific Rim project, and associated efforts to counter Chinese- and Soviet-directed socio-ecological regimes.

The expansion and implementation of US-lead strategic projects was further achieved through an extension of the US peak-state ensemble through the creation of post-war institutions, of which the Australian government joined after the war (Armstrong & Bradbury, 1983). These institutions, including the International Monetary Fund, World Bank and World Trade Organisation and their associated mechanisms broadly reflect the reproduction of specific human natures in the ideals of liberalism, and later neoliberalism (Cahill & Konings, 2017). These human natures can be assessed as part of the relational extension of expansive post-WWII American hegemony. The historical and ideological dominance of the broader American hegemonic international project, as well as domestic aligned projects, has been essentially structured to expand appropriation and capitalisation, partly through violent abstractions and ideological rhetorical devices. This shift had significant implications for state structures, accumulation regimes and the Australian oikeios more broadly. To this end, the American-lead hegemonic project can be identified through SSER as an international and inter-state, historic socio-ecological project that has enabled accumulation regimes that are spatially corrosive, highly capitalised and rest on specific neoliberal human natures. These will be assessed in greater detail in Chapters Four, Five and Six of this dissertation.

Before examining the neoliberal hegemonic projects of the US, it is beneficial to provide a brief overview of this work's understanding of neoliberalism, which is a somewhat contested term. Across the differing conceptualisations of neoliberalism, there is a general consensus regarding the 'increasing salience of markets' and the emphasis of neoliberal intellectuals on critiquing collectivism in favour of a *laissez-faire* approach to market regulation (Cahill et al. 2018, p. xxvii). Neoliberal rhetoric espoused by prominent theorists including Friedrich Hayek and Milton Friedman focus on the benefits of free market competition and efficiency, promoting deregulation in order to limit the perceived inefficiencies of government administration (Cahill et al., 2018). Within contemporary accumulation regimes, neoliberalism has guided the privatisation of public assets in favour of private management and fostered public discourse in which government regulation is assumed to be inherently inefficient. However, as Cahill and Konings (2017) note, there is a significant disparity between neoliberalism in theory and neoliberalism in practice, with significant inconsistencies in what might be termed neoliberal policies and a tendency towards deregulation that is often instead realised as reregulation.

Neoliberal bundles are characterised by contradictions and incoherence, particularly in regards to the role of the state. Cahill and Konings (2017) provides a comprehensive summary of these contradictions, particularly in their assessment of 'actually-existing' neoliberal state mechanisms to support relations of accumulation. Crucially, Cahill and Konings note that there is a clear disjuncture between espoused neoliberal pro-market rhetoric portrayed by classes within the

substantial state, and the reality of actual socio-ecological mechanisms employed to support accumulation and further capitalization of historical natures. Cahill and Konings (2017, p. 10) argue:

> *Certainly the rhetoric of neoliberal politicians like Thatcher and Reagan consistently praised the virtues of free markets and railed against the stifling effects of big government and a bloated welfare state. Yet, the reality was often quite different. Under both Thatcher and Reagan state expenditure was not retrenched and, indeed, in Britain, the US and across much of the world, the neoliberal era gave birth to a whole host of new state regulations and regulatory institutions – widespread privatization and deregulation notwithstanding.*

In assessing the conditions of strategic bundling of neoliberal capitalist natures within a hegemonic project, it is important to note the divergence and contradiction in the reproduction of accumulation regimes of specific human natures. Given the vast array of specific state processes that have been identified to underpin capitalist accumulation regimes, there is a consistent divergence between rhetoric and the actual mechanisms used to support projects of capitalisation, accumulation and appropriation. However, as the SSER framework demonstrates, capitalism is a socio-ecological accumulation regime and strategy that is always co-produced or oriented through the axis of peak-socio-ecological power. In this instance, despite the pro-market rhetoric, the state was fundamental in reorganising human and extra-human natures, representing the clear gap between the espoused exposed Neoliberal ideological tenets of free-market efficiency (Friedman, 1958) and the reality of neoliberal reregulation co-produced through state projects and regulatory mechanisms (Cahill and Konings, 2016). In other words, neoliberal hegemonic strategies promoted minimal state oversight while relying on the geopower of the state.

3.3.3 Post-war appropriation of Australia's north-western frontier

In assessing the historical shifts of the dominant hegemonic project of the Australian peak-state ensemble, the SSER framework demonstrates the critical role and on-going impact that the state axis has had in co-producing and altering historical bundles that produce strategic historical natures. In this instance, the framework analyses the accumulation strategies that made Australia the largest global export of 'cheap' strategic materials including coal, iron ore, alumina and bauxite by the 1980s (Crough & Wheelwright, 1983). Using the SSER framework shows how Australian accumulation strategies were co-produced by the state through the vast reorganisation of human and extra human natures within the oikeios during intense global imperial contestation, which then shaped the geopolitical positioning of states. The following section demonstrates the historical appropriation regimes of the Pacific Rim, and in doing so, demonstrates the shift in human natures associated with the American post war project, the repositioning of the Australian State and the continuation of an international neoliberal hegemonic project.

The reconstruction effort after WWII was far from uniform; socio-ecological regimes remained strategically contestested and the development and direction of state-ensembles varied greatly. That said, there were points of consistency: the historic timing of post-war industrial accumulation meant that reconstruction efforts required vast amounts of aluminium and iron (Thompson, 1983). These materials supported investment in emerging material-intensive industries including aerospace and communications, as well as the crucial reconstruction and expansion of destroyed industrial bases. Within the Australian accumulation regime, the rate and scale of capitalisation of iron and other minerals increased dramatically (Thompson, 1983). This represented a vast expansion in the appropriation of extra-human natures through the expropriation of Western Australian minerals, a key contribution to the Pacific Rim that continues to play a critical role in the contemporary international economy.

The post-WWII expansion of Australian capital regimes continued to push westward, with a significant accumulation project established in the Pilbara region of Western Australia (WA). This area alone accounted for 90% of Australian iron production and 15% of the world iron reserves identified at the time (Thompson, 1983). Yet extraction and appropriation regimes were not limited to iron, with coal, alumina, bauxite, and mineral sands on the WA coast providing 70% of the total value of Australia's mineral exports (Crough & Wheelwright, 1983). The spatial proximity of the Pilbara and WA mineral regimes to the south-east Asian markets contributed in part to the domination of Australian natures in the cheap historical nature strategies of south-east Asia given comparatively reduced transport costs (Thompson, 1983). By the 1980s Australia was the largest exporter of iron in the world, as well as the second largest producer 'only behind the U.S.S.R' (Thompson, 1983, p. 75). The scale of reorganisation and accumulation of over 100 million tonnes of Australian each year was not without risk; Thompson (1983, p. 75) identified future limits posed by the intensive accumulation regime, stating:

> *Australia, for many of its minerals, is producing and exporting far greater quantities than the level of our reserves would justify, which will, of course, mean that future generations may have a much smaller mineral base on which to create national wealth.*

One of the central strategic projects in the reproduction of export of Australian natures in line with the Pacific Rim project was through the mega socio-ecological accumulation regime of the North-West Shelf. The area has been described as the 'Great Australian Bank' (Purcell & Purcell, 1988, p. 6) but even by the 1950s was 'one of the least known regions in the world (Fairbridge, 1953, as cited in Purcell & Purcell, 1988, p. 14). The size of the North-West Shelf extraction regime was so large it crossed into both federal, state and territory jurisdiction. Across these jurisdictions, the socio-ecological reorganisation and accumulation was directly facilitated through peak-state ensembles, with the Commonwealth Government passing the *Petroleum (Submerged Lands) Act 1967*, and Western Australia and the Northern Territory following suit

passing Petroleum Submerged Land Acts of their own (Purcell & Purcell, 1988, pp.5-7). Today, the North-West Shelf is the site of the largest and most expensive development project in Australian history, setting up the region as a major population and industrial centre in the Australia North (Purcell and Purcell, 1988, p. 14). As discussed in Chapter Five, the project remains one the largest and most highly capitalised in its co-production of Australian natural gas.

In line with Australia's strategic reorientation as part of the Pacific Rim project, Japan became the largest recipient of Australian minerals, receiving 'over 50% of mineral exports, including 76% of the value of iron ore, and 72% of black coal' (Crough & Wheelwright, 1983, p. 19). In turn, Australia became a key source of cheap minerals for south-east Asian economies, with Taiwan and South Korea taking up to '70 percent of their ore from Australia' (Thompson, 1983, p.78). Further interlinked strategic historic natures included the regimes of alumina and bauxite; although relatively minor for the domestic economy, with refined aluminium only making up 2% of Australian exports, Australia became the world largest extractor (Crough & Wheelwright, 1983, p. 25). While alumina and bauxite are both historical natures in themselves, the bundling of these minerals with cheap energy through state-owned coal-fired power stations represented a temporary but vast increase in the scale of alumina export as a cheap historic nature. These regimes were then in turn interlinked in the Pacific Rim project, with industries from communication, space, ballistics, packaging, automobiles, rocketry to aerospace relying on an on-going supply of cheap aluminium, and coal. Through the production of cheap historical natures, Australia provided a flow bountiful cheap natures that ensured the Japanese state and other south-east Asian nations did not need to turn to China.

3.3.4 Increasing flows of Australian Cheap Energy and Cheap Nature

Having 'missed' the scale of earlier eastern accumulation based in NSW, Victoria and South Australia that was 'characterised economically by a large pastoral and agricultural sector' (Thompson, 1983, p. 80), the ensemble of the West Australian State was determined to deliver a new socio-ecological accumulation regime under the hegemonic project provided through the revised relations of south-east Asia. The mechanisms proposed and enacted by the WA peak-state-ensemble reflect an eagerness to directly facilitate both a frontier of appropriation, and the capitalisation of natures in the western part of the continent. From 1958-1963, the Western Australian Government's expenditure in the state's north-west Pilbara region doubled, with 'transport surveys, roads, port facilities and harbour dredging' facilitating the mass appropriation of natures from the remote Australian interior (Thompson, 1983, p. 80). Resistance to the expanding frontier, such as the Kimberley Land Council's occupation of an oil drilling site at Noonkanbah, was in turn met by a 'para-military operation to break opposition', organised by the WA Government (Jennett, 1983, p. 138). The strategic priorities of the peak-state ensemble highlight that, despite Aboriginal Australians' receiving formal Australian citizenship in 1967 after nearly 91% of the Australian electorate voted in favor (National

Museum Australia, 2017), the reality of First Nations Peoples' land rights continued to reflect a two-nation hegemonic project, in which multinational mining appropriation was (and remains) privileged over Native Title law. In this way, Australian state ensembles were involved in the violent but very real abstraction of both Australian extra-human and human natures in forging Australian cheap materials and energy.

Applying a framework of SSER to the mechanisms of the Pacific Rim and liberalisation projects highlight the strategic identification, reorganisation and appropriation of historical natures of the 'north-west' frontier of Australia, including WA and the Northern Territory (NT). From 1960 to the 1980s, the surveying, appropriation and export was facilitated directly through the Western Australian Government through the North-West Planning and Coordinating Authority (NWPCA) in WA, which assisted predominantly Japanese and American firms in navigating the state's planning and development processes. The NWPCA was set up as a non-statutory body designed to 'cut red-tape', facilitate the transfer of 'crown land for the construction of a town, harbour, railways, roads', and 'assist [companies] to obtain adequate labour' (Thompson, 1983, p. 80). It is worth noting that Queensland, too, similarly adopted generous state-directed capital-infrastructure projects to attract investment (Thompson, 1983). In this way, as a direct formal constituent of the peak of the Western Australian state, the NWPCA (and comparable state bodies in other jurisdictions) directly co-produced monopolised bundles of iron regimes and implemented a state-direct regime of cheap materials and energy.

The other feature of the Australian bundles was co-production of extraction with foreign ownership, and often foreign capital, further distinguishing the development of historical socio-ecological accumulation in the North-West Australian frontier. The relations of the Pacific Rim cheap energy strategies continued to expand the appropriation of the Australian historical natures, notably shifting from a majority of Anglo-Australian capitalist bundles based on the British imperial expansion, to the south-east Asian inter-state ensemble cooperating and organising projects on the historical natures of North-Western minerals and fossil energy. Crough & Wheelwright, 1983, p . 18) use ABS data to argue that:

> *key sectors of the industry [mining and energy] show what must be some of the highest levels of foreign control in the world, including brown coal, crude petroleum and natural gas 84%, tin 82%, silver, lead and zinc 75%, and mineral sands 62% ... for the State of Queensland, foreign control was measured to be 84%.*

As part of the strategic neoliberal project, billions of dollars in American and Japanese in cheap loans were made available to Australian peak-state ensembles, especially after joining neoliberal institutions like the IMF and World Bank. Cheap finance was attained by states with the intent to fund coal-fired power stations and invest in cheap carbon energy regimes, as well as investing in towns, rails, and ports (Thompson, 1983). In turn, through government ownership of the power stations, this investment provided cheap energy for aluminium smelting. Effectively, the state

directly intervened to intensify the capitalisation of Australian socio-ecological regimes to maintain global cheap energy natures. Crough and Wheelwright (1983, p. 30) note that:

> *One of the most important areas of borrowing relates to the expansion of the electricity generating capacity, particularly of the eastern states, and primarily in relation to supplying the needs of new aluminium smelters. Early in 1980 it was announced that the N.S.W. Electricity Commission and the State Electricity Commission of Victoria were seeking at least $100 million overseas, following borrowings of over $100 million in 1979.*

However, while expansion strategies were enthusiastically embraced by the peak of the state, there were differences in the strategic priorities of the varying parts of the state ensemble, particularly in the acceptance of 'cheap money' in taking vast amounts of overseas debt. This debt accumulation effectively accelerated the historical capitalisation process, with capital now flowing from multiple co-operative imperial hegemonic states. An SSER assessment demonstrates the projects of cheap materials, facilitated through cheap energy, occurred through the state axis, with State Governments taking on foreign loans to fund 'projects such as coal loaders and power stations (particularly to provide power to a number of new aluminium smelters), which are too large for private capital to undertake' (Crough & Wheelwright, 1983, p. 30). Thus an assessment of the reorganisation of Australian natures must acknowledge that diverging state loans were utilised for both a cheap historical export nature (through state-funded coal loaders), as well as a domestic processing cheap energy strategies through state owned coal fired power stations (through overseas loans), and then providing foreign accumulation project with further cheap energy relations through long-term cheap energy contracts (through state-owned power stations in NSW and Victoria).

While the hegemonic Pacific Rim Project retained broad state support, relational-tension across peak-state ensembles remained over the exact strategic orientation the states should pursue. As will be demonstrated in later chapters of this work, contestation is amplified across the state ensemble given that the coordination of socio-ecological regimes between the Australian Federal and State Governments is diverged under the Australian Constitution. In this instance, the responsibility for export and taxation on minerals lies with the Federal Government, whereas the coordination of mining and environmental improvements lies with State Governments (Parliament of Australia, 2018). The inter-state tension reached a tipping point in a series of meetings by the Loan Council of Australia in 1976, 1977 and 1978, with arms of the state-ensemble, namely the states of Western Australia and Queensland, pushing for dramatic changes to foreign loan provisions (Crough & Wheelwright, 1983). Whereas international loans had previously been managed through the Loan Council, Western Australia and Queensland lobbied to allow states to independently borrow from international lenders to fund private accumulation in the mining industry. While around 70% of the capitalisation of the mining regimes already came from loans, 40% of which were from overseas lenders, international

dimensions of the accumulation regime, such as Japanese and American buyers, continued to push for state assistance with community infrastructure, particularly after the OPEC oil crisis (Crough and Wheelwright, 1983). The Western Australian and Queensland governments thus sought to enhance their ability to independently increase public debt to further private capital accumulation.

The decision by the Australian Loan Council, under pressure from the Western Australian and Queensland Governments, accentuated the inter-state competition over foreign-lead accumulation regimes. The significance to the overall Australia state strategy of this decision cannot be minimised, given that for the previous fifty years:

> *Australia was unique among other Federations because it co-ordinated the loan programmes and loan raisings of both the Federal Government, the States, and even larger loan raisings of local government and semi-government authorities. This coordination was intended to eliminate competition between the States in the international capital markets and reduce the borrowing costs.* (Crough & Wheelwright, 1983, p. 29).

Yet the socio-ecological classes dominant within the state ensemble 'strongly argued that their ability to fund large infrastructure projects in relation to mineral development was constrained by the provisions of the regular loan programmes' (Crough & Wheelwright, 1983, p. 29). As a result, flows of Cheap Money through US financed debt were directed to parts of the Australian peak-state ensemble constitutionally empowered to facilitate further appropriation, specifically Australia's State and Territory Governments.

3.4 Conclusion

This chapter applied the SSER framework retrospectively to assess the ways in which the historic Australian accumulation regimes have been particularly interlinked with British and American strategic projects. These findings demonstrate the consistency with which Australia's peak-state ensembles have historically strategically aligned themselves with a larger socio-ecological power (Fernandes, 2018). The British civilisational project of enlightenment ideals was a two-nation hegemonic project that consistently privileged the white settler population over Australia's First Nation Peoples and, through colonial peak-state-and-substantial state ensembles, violently reshaped the web of life in Australia. Vast flows of appropriated natures; soil, water, minerals and native animal life have been exhausted to enable the increasing capitalisation of Wool, Wheat, Sugar, Zinc, Gold and Lead regimes. Similarly, following the decline of the British Empire, the Australian state's support of the American-led Pacific Rim project and associated projects of liberalisation and neoliberalism resulted in the bundling of specific ideological rhetoric in accumulation regimes oriented towards the provision of Cheap Natures to south-east Asia, furthering the corrosion of many of Australia's historic relational bundles.

The temporal scale of the appropriation of Australian natures is violently short, particularly compared to other world powers. After only decades of accumulation regimes resting on the appropriation of unpaid energy, as well as unpaid flows from vast acres of land, soil and water, Australia became a significant provider of Cheap Nature to international markets. The pace at which Australia Natures have become capitalised reflects the historical timing of the entry of Cheap Nature from Australia into an already highly capitalised 18th century, as well as the vast scale of accumulation in the Australian frontier. The historic orientation of Australia's accumulation regimes towards foreign markets, as well as foundational attitudes towards and mechanisms to facilitate the appropriation of historic natures, continues to shape contemporary accumulation regimes today. The corrosive impact of historic regimes lays the foundation, and crucially the points of exhaustion, for contemporary regimes, and sets the parameters for the strategic orientation of the peak-and-substantial-state ensemble across the core axes explored in further detail in the following chapters.

Chapter Four: Water and the Oikeios

4.1. Assessing Water Relations

4.1.1 Introducing Australian water, water as a core axis and the chapter structure

The following chapter applies the SSER framework to a core relational axis of the web of life, water. Water's unique role in the web of life has significant implications for the state, and attempts to secure water have been at the forefront of many accumulation regimes. Water has been integral to Australia's historic accumulation regimes examined in Chapter Three, including wool, wheat, sugar and cheap energy provided from coal-fired power stations. This has not come without significant challenges, given that a defining feature of Australian water relations is the prevalence of long periods of drought, which is then often broken by intense flooding events (Leigh et al., 2014). Given historic accumulation and capitalisation of these natures fundamentally rested on the appropriation of water, contemporary contradictions in water increase the extent of depletion and unpredictability of water relations, signalling the increasing limits of negative value.

The following chapter outlines how water acts as a key relational constituent of other critical planetary socio-ecological processes, such as the reproduction of organic energy, an array of biogeochemical reactions or the food and terrestrial biocarbon systems (Feldman, 2012). SSER analysis treats water as a unique and critical axis of the oikeios, a vast, complex planetary system of critical importance to both the web of life and the assessment of crisis events and risk. The increasing severity of climate change on Earth, with embedded global warming in the pipeline (Hansen et al., 2023), poses a fundamental risk of disrupting stable reproduction along the water axis through the oikeios. Given the breadth of the water axis and noting the scarcity of water in Australia, this chapter will focus on Australia's inland bodies of water in this dissertation, and specifically the Murray-Darling Basin as one of the country's largest systems, rather than its oceanic territory or national parks. As noted later in this work, there are considerable further opportunities for the application of SSER analysis of the socio-ecological systems of Australian blue carbon and oceanic contestation. Crisis events around water relations are particularly likely in Australia, given the expected changes to the severity and duration of extreme droughts, highly varied rainfall patterns and unpredictable seasonal shifts (Green & Moggridge, 2021). As the driest inhabited continent, evaluating Australia's array of strategic relational positions of water - in strategic bundles, accumulation regimes and through the state - is crucial to informing the responses that enable the reproduction of the Australian oikeios.

The Australian State is a crucial point of analysis, as it acts as the peak, product and producer of socio-ecological relations on the Australian continent, a poly-centric site of socio-ecological power. The complex shifting institutional structure of Australian water relations reflects the socio-ecological geographical contestation of space i.e. how Australian basins are organised and valued, and how they are appropriated on a global scale. Water both produces and is produced by

broader state socio-ecological ensembles. This broad ensemble of water policy makers range from the federal government, its members, ministries and federal public service, along with corresponding groupings in each of the State and Territory Governments, as well as additional inter-state institutions like the Murray-Darling Basin Authority. As such, the socio-ecological hydrological analysis undertaken in this chapter is inextricably intertwined with an examination of the State axis.

After establishing the unique socio-ecological relations of water, this chapter demonstrates that the contemporary relations of Australian water are highly capitalised and contested. As a result, bundles resting on cheap Australian water are at risk of exhaustion, with increasing tensions around hegemonic projects in the substantial state, as both droughts and floods are seized upon in crisis and shock strategies (Klein & Smith, 2008). Appropriation through Australian geopower has ranged from wide ranging implementation of 'water infrastructure', dams and levees, to appropriation of floodplain, underground and surface water sources, through to the financialisation and creation of private water markets within the Australian east coast basin. This chapter utilises the SSER framework over three sections to examine strategic, multi-scalar interactions between the axes of the State and water, and the linked contested reproduction of the Australian oikeios, with a particular focus on the Murray-Darling Basin. By considering the strategic implications of the contemporary water axis for the Australian state, the SSER framework is used to account for and assess the on-going disruption and exhaustion linked to contestation and capitalisation of key water projects and regimes.

The first section of this chapter outlines unique features to consider in examining water relations, as well as identifying the Australian water-state as the site of strategic contestation. This section will highlight the significance of the Murray-Darling Basin area as Australia's largest and most highly appropriated river basin (SBS News, 2019), examining its capitalised recovery strategy through the National Water Initiative (NWI) as part of a neoliberal hegemonic state project. As this chapter will show, the extraction of the Murray-Darling Basin ('the Basin') is a complex historical socio-ecological project, and further appropriation through additional state projects faces increased corrosion and growing social resistance. The chapter will also show that major drought events have impacted on water strategies as crisis conditions continue to worsen, threatening the ongoing viability of the Basin system.

The second part of this chapter examines the neoliberal abstraction of efficient, cheapened water, and the outcome of the capitalisation of Australian water relations through the creation of water finance markets. Critically, the highly capitalised water recovery mechanisms that require the Commonwealth Government to purchase water rights from irrigators and publicly fund 'efficiency' infrastructure have not resulted in the intended restoration of water flowing through the Basin. This section continues with an examination of further attempts to appropriate water, from the sustainable diversion limit adjustment mechanism, the Victorian Food Bowl

Modernisation Project, and the Queensland New Bradfield Scheme. It concludes with the use of SSER to demonstrate the socio-ecological tension and impact of the accumulation regimes of cotton and floodplain harvesting. Specifically, it argues that the co-production of floodplain harvesting reflects the expanding appropriation of Australian water in the face of crisis by a particular privileged, oligarkhia socio-ecological class, attempting appropriation of water through highly capitalised reorganisation of the temporal and spatial flows of flood events. This section highlights the attempt to appropriate Cheap Water in the Australian State despite the paradox of cheap water in Australia.

In the third section, the SSER framework is used to examine escalating points of crisis and contested water relations in the face of climate crisis tipping points. In particular, the section provides an overview of the actual and potential points of crisis facing the Murray-Darling Basin as rampant capitalisation continues in the face of climate changes. The SSER framework reveals that the project of capitalisation has dramatically increased the exhaustion of water natures, including climate destabilisation, species extinction and the collapse of water bundles. The section also explores contested water relations across both the peak-state and the substantial-state ensembles, exploring the spatially unequal socio-ecological impacts of current accumulation regimes. In particular, the section examines the on-going disenfranchisement of First Nations peoples within the Basin, as part of the continuation of the 'two-nation' hegemonic project. Overall, given the broad public support for water conservation and the reproduction of Australia's water natures, the section finds that current accumulation regimes would not be possible throughout the substantial state without a significant degree of opacity in regulatory approaches.

This chapter demonstrates the broad capitalising relational complexes underpinning Australian peak-and-substantial-state ensembles' attempts to respond to historic and contemporary water regimes and the associated impact on the oikeios. As this chapter will demonstrate, along the state-water axes are the sites of complex biophysical reactions that reproduce the web of life, as well as sites of complex power and accumulation struggles. SSER analysis is well placed to examine the impact of current and future crises in the water axis, including the contradictions in the further expansion of a hydrological frontier in the face of escalating crisis events. The core challenges, contests and processes of water on Earth are all socio-ecological. As demonstrated in the following chapter, state projects that attempt to direct floods, droughts, unequal access, over-irrigation, cities and floodplain harvesting, as well the supply, quality and stability of water features, are increasingly fragile and precarious, and are approaching negative value.

4.1.2 Unique bundling of water in the oikeios

As outlined in Chapter Two, the SSER framework regards water as a core axis of the web of life on the planet, with an almost universal breadth of water relations across the oikeios. The

implication of this is that the axis of water must be considered by SSER analysis on several strategic scales, with both local and global socio-ecological projects, accumulation strategies and regimes presenting across a diverse, uneven hydroscape as the planet faces an epochal crisis. This is no different for Australia, with water systems at the forefront of governments' strategic considerations (Productivity Commission, 2021). As poly-centric socio-ecological power bases and actors attempt to implement differing strategic orientations within the peak-and-substantial-state ensemble, the bundles of relations that make up the regimes are increasingly exhausted and placed under pressure.

As raised in Chapter Two, this work understands that due to aerosol loading in the atmosphere as a result of historic and contemporary capital accumulation regimes, even with significant emissions reductions, the planet will continue to warm (Hansen et al., 2023). The consideration of disequilibrium across specific processes in the web of life therefore underscores that carbon-centric, net-zero projects by the peak-state ensemble are not enough to respond to the risks across unique socio-ecological axes, such as water. In other words, renewable energy does not reduce the corrosion and degradation from the appropriation and capitlisation of other natures (Wall, 2010 in Baer & Singer, 2025). The encroaching epochal crisis of locked-in warming will cause irrevocable shifts across the water axis, with patterns of rainfall, extreme weather and humidity all set to shift under a changing global climate system (Padulano et al., 2019; van Oldenborgh et al., 2021). As the peak of socio-ecological power, socio-ecological relational complexes of Australian water are embedded within Australian state ensemble institutions. This combination of interwoven relations of state, water, capital and crisis has broader strategic implications for reproduction, accumulation and regional contestation of both hydro-relations, and broader accumulation regimes that are relationally linked through specific hydro-flows. There are numerous implications for SSER analysis given the unique socio-ecological relations of the water and state axes.

The water axis is a socio-ecological transitory system for all space on earth, through the three states of water. From its molecular base, its solutes and its flow rate, the strategic relations of water are extensive, and critical to fundamental processes on a cellular, individual, local and planetary scale (Feldman, 2012). At an astrobiological and atomic level, water is the major point of agent and reagent interaction, a vessel for vital functions from biomass, heat, nutrients, and minerals (Lipin & McKay, 2018) - everything critical to the long-term planetary life systems (Shevlin et al., 1983). Underpinning the SSER analysis of water is the acknowledgement of water's atomic orientation and its foundation as the contributing strategic social-relations of water (Linton & Budds, 2014). The unique polar properties of the dihydrogen monoxide (Lipin & McKay, 1989, p. 7), or water atoms, have a huge range of biological, geophysical, ecological, industrial and socially strategic uses (Feldman, 2012). It is the only molecular substance on the planet that can readily be found in all three states of matter (solid, liquid, gas) (Lipin & McKay,

1989). These unique properties contribute to water's integral role across the oikeios, and highlight the profound potential consequences of points of exhaustion within water relations.

Similarly, water's ability to act as a broad solvent, float on water as ice, and to retain high capacity for heat absorption have had critical implications for a stable reproduction and evolution of the oikeios on the planet (Water Science School, 2018). The stable temperatures that humans have relied on to sustain previous food, energy, and elements are a direct result of the heat-absorption capacity of the planet's oceans (Allan, 2014). Therefore, a controlled supply of water can provide a wide range of industrial, technological and strategic processing uses, to a specific actor, institution and State, highlighting the points of state diversion and contestation as scarcity increases, and the need to consider the contestation of specific bundles of hydro relations (Feldman, 2012). In particular, corroding impacts of capitalization on the planet have dramatically degraded the condition and contamination of water (Feldman, 2012), as in other axes. The presence of heavy metals, pollutants and other industrial by-products of accumulation regimes contaminate water systems, with significant, direct impacts on broader ecological health.

The relations of water shape the spatial impact of capitalisation-linked corrosion as water is a transitory system, moving through a vast number of processes in atmospheric systems, oceans, estuaries, polar caps, rivers and rainfall (Feldman, 2012). This means water relations are constantly shifting and moving, with climate change increasing variability. The related conditions and impacts of socio-ecological regimes in one space directly impact the conditions and stability of other spaces through hydro links, such as downstream exhaustion through up-stream over-extraction (Feldman, 2012). Water relations are also highly linked to broader atmospheric and climate systems on the planet; there are a number of interlinked climate tipping points, all woven through relations of the water axis, with both cascading and domino impacts. Globally, the water axis encompasses, in various forms, the shutdown of the Atlantic Meridional Overturning Circulation, the West Antarctic and Greenland Ice shelves disintegration, the reduction of the Amazon Rainforest and Boreal forests through reduced rainfall and humidity, West African and Indian monsoon shifts, melting permafrost and methane hydrates, coral reef die off, and extreme regional drought and flooding (Lenton et al., 2019). The oceanic relations of water refracts into a system of systems, wherein the condition of water is not only significant at a molecular level, but plays a systemic role in vital climate and weather systems at a planetary and continental level.

The largest water system in Australia, and the most heavily capitalised, the Murray-Darling Basin, is highly reflective of the transitory condition of water bundles and global atmospheric process, along with the unique geological processes that co-produced the Australian web of life. That is, the combination of the incredibly flat landscape, as well as highly cyclical rain patterns given the southern atmospheric impacts of El Nino and La Nina (Deacon, 2022), has resulted in a vast proportion of the Murray-Darling Basin becoming a 'enormous floodplain containing over 5.8 million hectares of wetland ecosystems' (Environment Victoria, 2023, p. 3). Shifts in the

transitory system of water have significant implications for the durability of socio-ecological regimes that rest upon them (International Committee of the Red Cross, 2021), a proposal that will be explored in greater depth through the following chapter.

To assess the axis of water, and an array of related socio-ecological projects of peak-state ensembles, it is necessary to acknowledge that relational bundles of water are co-produced unequally, through specific spaces, past-regime and geopower. This means bodies of water should be considered as co-produced by specific socio-ecological bundles, constructed locally and globally simultaneously, via the unique atomic properties of water within the broader web of life on Earth. Water is a crucial part of the planet's social-biological systems, universal in its immediate relative biological 'value' and utility across the planet, but its relative composition, use and ownership is not universal, with exploitative co-production prevalent across the planet. This provides a point of contention for states as they each try to secure water for their populations, while also assisting the appropriation of water for private capital. Through the historical expansion of capitalist states, the co-production of water varies dramatically from space to space along with the unequal geographical expansion of capitalism. As such, through capitalisation, water systems have been substantially and unequally co-produced.

Rivers and water bodies are co-produced throughout the oikeios. From the Murray Darling, to the Thames, the Hudson, the Congo river, Ganges and Yellow River (Piper, 2014), the impact of capitalism on the planet's waterways is clear, with water acting as a cheap input for waste removal (Linton & Budds, 2014). Similarly to the appropriation of other historical natures, water has been a key factor in the Australian cheap food export system, but unlike other natures, water is unique in its capability to significantly interact with vast numbers of other socio-ecological and biological systems. This interaction is both co-production and producer of the water axis relations, and through climate change, co-producer and product is further becoming disrupted and distorted, as former systems slow down, shut down or shift. Due to the uneven and exploitative impact of past accumulation regimes and power relations, the spatial inequality of accessing clean drinking water is prevalent, and well documented (Piper, 2014; UNESCO, 2024). Inequality within the access of water relations is therefore reflective of the expanding appropriation of capital regimes, and the demonstrated intent to contest further flows.

Contestation over water relations can be seen in peak-and-substantial-state ensembles across the planet in across multiple scales; conflict over the organisation of water natures has occurred within and between nomadic groups, towns, regions, business and countries. As such, SSER's acknowledgement of a shifting, contested peak-and-substantial-state ensemble provides a greater scope to consider the historical co-production of unequal water ownership and infrastructure, monopolistic extraction licenses and the private over-pumping of rivers (Piper, 2014). In Australia, these range from forces of capitalisation, agribusinesses, hedge funds and water finance markets, to forms of socio-ecological and cultural reproduction for First Nation peoples

and regional communities (Jasper, 2023). The stability of past water regimes is now greatly diminished in the face of climate change, and as such SSER must view past, existing and future water regimes as historically co-produced.

In summary, crucial to the perpetuation of life on earth is the water axis and all it encompasses, making hydrological flows significant to both local, national and planetary socio-ecological reproduction and accumulation systems. Water is therefore a critical axis of the oikeios, forming a key base relation to the environmental conditions of the planet. It informs key strategic decisions regarding energy, food, waste and manafacturing. Due to the unique molecular properties of dihydrogen monoxide, water has a huge range of biological, geophysically, ecologically and socially strategic uses. Bodies of water both shape and are shaped by socio-ecological forces, and the location, availability, quality and supply of water impacts the strategic organisation of socio-ecological environmental reproduction. Water also has a great significance to many indigenous spiritualities and connection to the land. Water is crucial to both local and planetary socio-ecological reproduction and accumulation. However, the shifting climate is changing the pace, location and temporal relations of hydrological flows, and existing, planned and conceptual water infrastructure is placed at risk of a rapidly shifting national and international hydrosphere.

4.1.3 Historical relations of state-water appropriation in Australia

Two key socio-ecological events that had lasting influence on Australian state-water projects was the Federation Drought, which lasted from 1895 to 1903, and the Millennium Drought, which lasted from 2001 to 2009. In 1895, at the beginning of the Federation Drought of eastern Australia, there were approximately 106 million sheep facilitating the wool accumulation regime, but by 1901 over 56 million sheep had perished from the impacts of the drought (Fitzpatrick, 1970). The extensive losses to pastoral squatters highlighted the regime's corroding over-expansion, and the reality of the variability of Australian water cycles. As a result, historic appropriation in Australia has been marked by drought-linked collapse and an associated national awareness of water scarcity in the substantial state, which has raised tensions with particular socio-ecological classes who continue to expand private water appropriation of crucial floods.

Across the peak-and-substantial-state ensemble, strategic socio-ecological projects focused on water appropriation are reflected in the direction of the peak-state funded capitalisation of water infrastructure to remake depths, flows, tributaries and storage across the Murray-Darling Basin (Environment Victoria, 2023). Tisdell et al. (2002) point out that the role of the colonial water authorities was to 'engineer dams and supply systems to capture and promote the use of available water, rather than plan or implement national or state economic or social policies.' The Murray-Darling Basin was heavily modified from grazing in the 19th century, and from 1950 to

1990, irrigated diversionary infrastructure, particularly in the South Basin (Chen et al., 2021). By 1990, the seemingly 'cheap water regime' was collapsing, and the cost of supplying an ever greater flow of Cheap Water was rapidly increasing, as corrosion linked to appropriation continued to worsen (Tisdell et al., 2002). While the non-human natures of water bundles were increasingly depleted, so were the human natures identified in the Australian substantial-state ensemble. Tisdell et al.'s (2002, p. 5) research indicates that 'growing public concern for environmental objectives', along with consideration of the quality of drinking water, was increasingly prominent across the substantial-state ensemble from the 1990s onwards, with tension over the 'institutional settings' which were 'geared to resource expansion rather than the optimal allocation of a scarce resource'. This concern over historic extraction across the substantial-state ensemble was only further amplified by the subsequent onset of one of Australia's worst droughts.

The Millennium Drought, starting in 1996 and ending in 2009, unlike other Australian droughts, was not limited to one specific region of Australia but instead stretched across the entire continent for over a decade (Heberger, 2012, p. 98). The scale of the Millenium Drought, and its impact on water bundles, prompted a different kind of socio-ecological strategy pursued previously. This project involved the peak-state ensemble, including all states and territories and the Commonwealth government, in attempting to coordinate a coherent strategic national objective for state-water relations - the National Water Initiative (NWI). While this chapter cannot encompass the broad existing literature on specific water regimes, it can acknowledge the NWI as a central capitalist socio-ecological project that perpetuates a specific historical nature of water. In this section, the SSER framework immediately identifies significant points of risk, exhaustion and paradox within the on-going viability of a dominant capitalist ecological regime within the Australian water axis.

The NWI in 2004 is the latest intergovernmental agreement on the strategic management of 'reforming' Australian water, with subsequent water laws, like the national *Water Act 2007*, and institutions, such as the Murray-Darling Basin Authority, reporting on and reflecting the objectives of the NWI as the principal state-water project. Examining the stated objectives, and the corresponding strategic orientation of the NWI reveals a number of significant socio-ecological contradictions. These contradictions pose significant threats to the on-going stability of regimes, as well points of exhaustion facing the epochal crisis.

> *National water initiative Objectives*
> *Full implementation of this Agreement will result in a nationally-compatible, market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes by achieving the following:*
> *i) clear and nationally-compatible characteristics for secure water access*

entitlements
ii) transparent, statutory-based water planning;
iii) statutory provision for environmental and other public benefit outcomes, and improved environmental management practices;
iv) complete the return of all currently overallocated or overused systems to environmentally-sustainable levels of extraction;
v) progressive removal of barriers to trade in water and meeting other requirements to facilitate the broadening and deepening of the water market, with an open trading market to be in place;
vi) clarity around the assignment of risk arising from future changes in the availability of water for the consumptive pool;
vii) water accounting which is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management;
viii) policy settings which facilitate water use efficiency and innovation in urban and rural areas;
ix) addressing future adjustment issues that may impact on water users and communities; and
x) recognition of the connectivity between surface and groundwater resources and connected systems managed as a single resource.

(Commonwealth of Australia et al., 2004)

Examining the strategic socio-ecological relational bundles established as ideal in its objectives, the NWI confirms a capitalist abstraction of ecological restoration, and its accompanying system-wide risk. The Australian Water strategy is simultaneously tasked with the 'restoration of allocated areas', while also the 'progressive removal of barriers to trade in water' (Commonwealth of Australia et al., 2004). The strategic objectives are not compatible, and as a result the Murray-Darling Basin remains heavily contested (Cunningham, 2020), with dramatic declines of water expected within the decade. Several reports since the conception of the NWI have noted the failure to achieve sustainable water use in overallocated or stressed water systems (Commonwealth of Australia et al., 2004), with expected ecological outcomes across the Murray-Darling Basin continuing to fall (Shepherd, 2022). Despite this, bundles of socio-ecological relations, both accumulative and reproductive, continue to be based upon the strategic goal of a cheap water market within the Basin.

In particular, monocrop almond farms have proliferated across the Basin (Davies, 2019a), drawing vast amounts of water for the profit of overseas agri-funds (Page, 2021). As of 2024, almonds are now the largest crop grown in the lower Murray, covering 45,000 hectares, taking over as Australia's most valuable and water-intensive agricultural export, expected to exceed $1.3 billion in export sales in 2025 (Kennedy & Mackintosh, 2024). However, despite the

conflict between an expanding water-intensive industry and water relations approaching points of exhaustion, there is considerable contestation among the state ensemble as to the appropriate response - while Victoria has imposed a moratorium on further almond planting, NSW and SA have not followed suit (Kennedy & Mackintosh, 2024). Despite myriad points of contestation, water-intensive agricultural uses continue to occupy a privileged position within Australia's accumulation regimes.

The key site of water contestation is through the state, as the peak socio-ecological power upon which water regimes rest (Linton & Budds, 2014). The social responsibility of the peak-state ensemble presiding over water capitalisation is a paradox, as it had initiated a socio-ecological project of efficient water management and preservation, but it simultaneously facilitates appropriation. Water 'management' is a key socio-ecological project that the peak-state ensemble must preserve and deliver into the future, but there are a vast number of competing 'water projects' that risk exhaustion, collapse and corrosion of life-systems. These projects range from state-directed water buy-backs for the environment, and the greater capitalisation of water flows through infrastructure (Chen et al., 2021; Shepherd, 2022; Yang, 2019h). Similarly to other capital accumulation regimes, the environmental corrosion of past capital hydro relations continues to present limits to future bundles of hydro relations (Reading, 2017). Water systems remain a unique social relation that exists beyond the state, while remaining a core feature of the state socio-ecological responsibility. There is conflict and contestation between differing social water projects that create limits to all existing and future projects that rely on the reproduction of the Basin.

4.2 Accumulation and capitalisation of Australian Water

4.2.1 Capitalisation of neoliberal contemporary Australia state-water projects

The neoliberal water project of the NWI has enabled increasing capitalisation in the face of climate- and appropriation-related exhaustion. The opening line of the preamble of the Intergovernmental Agreement on the NWI states that 'water may be viewed as part of Australia's natural capital' (Commonwealth of Australia et al., 2004). This 'natural capital' is implied to be for Australia's waiting extraction, a necessary part of the expansion of the Australian frontier, further entrenching the appropriation of water by the state. One contradiction reproduced by the NWI is that it enforces a specific contested historical conception of water as 'natural capital' that can be divided into 'environmental water flows', as well supporting 'sustainable diversion limits'. This is the first major point of exhaustion for the NWI framework, as water is disembodied into multiple disconnected abstractions - water for industry, water for towns, water for the environment - but all remain within Australia's hydrological finance market. Framing and fragmenting water natures as only partially 'environmental' is a key part of the neoliberal NWI pro-market rationalisation hegemonic project.

Furthermore, the NWI project attempts to insinuate that the State has only a partial stake in the on-going ownership of water (Commonwealth water holdings for the environment), despite simultaneously being charged with the regulation and disbursement of water licences. This system requires the Australian peak-state ensemble to purchase 'environmental flows' from private water holders, who can meanwhile engage in financial speculation over the entitlement. Environmental flows are Commonwealth Water Fund-owned flows of water that are intended to travel systems to deliver ecological benefits, improve river and wetland health, and enable breeding cycles for species across the basin (Slattery & Campbell, 2019a). Environmental flows are meant to 'reduce the impacts of dams and water extraction by mimicking the natural condition in our rivers' (Office of Water, 2024). The Australian peak-state ensemble has been tasked with water-buybacks, a scheme that has capitalised the reductive environmental flow system itself, the only part of the water system allocated towards environmental flows; the flows critical to reproducing the web of life must be bought from existing 'water-right holders' (Shepherd, 2022). This embodies the contemporary Australian water-state paradox of neoliberal-based market restoration through further capitalisation, whereby the peak-state ensemble is entitled to direct only part of the hydrological flows to 'environmental flows', despite seemingly also having the rights to regulate the entirety of the river system.

Under the system set out under the NWI, there is no acknowledgement of the quality or oversight of the environmental water. Instead, as the Commonwealth Environmental Water holder, the state purports to reduce its ecological responsibility to a financial trader's highly limited capitalist water 'product'. Capitalisation and accumulation of Australian water is marked by mass fish deaths (Lu, 2022), high water use crops in the face of impending scarcity (Davies, 2019a) and financial funds co-opting the basin's environmental water flows for cotton (Australian Competition and Consumer Commission, 2021). The associated consequences of capitalisation, ranging from drought, collapse of ecosystems, food and capital regimes, land system degradation, to the creation of opportunities for water fraud and theft (Pittock, 2018) and flood-plain harvesting, create tension and conflict in the on-going viability of all state-backed water projects.

Strategic neoliberal reforms to the state, in creating abstracted water markets and governing supply through 'economic efficiency', have resulted in specific elements of the water-institutional-ensemble securing a greater dominance over the balance of socio-ecological projects in the water axis than others, accentuating the impacts of epochal shifts. The on-going socio-ecological abstraction of water occurs through several state-mechanisms outlined in the NWI. The NWI has been successful in expanding highly financialised, opaque water markets, through tax-payer funded infrastructure projects, increasing the cost of water without improving efficiency. This has resulted in corporate agri-business dominating water ownership, as well as around 10% of water entitlements held collectively between the UK, US and China (Schremmer

& Isa, 2019). After the implementation of the Murray-Darling Basin Plan, water ownership in the Barwon-Darling region of the Murray-Darling Basin was consolidated to 70%ownership between two corporations, one of which, Webster Ltd, 'owns more water than anyone else in this country outside the Federal Government' and has been accused of pumping environmental flows for private cotton production (Four Corners, 2017). The concentration of water ownership among private capitalist interests increases the rate of appropriation and capitalisation, and hence exhaustion.

Despite being touted as the most regulated river system in the world (Robinson et al., 2024)) and a 'water-reform success story' (Department of Climate Change, Energy, the Environment and Water, 2024a), there is little oversight, compliance or even desire to regulate the water markets (Barnes, 2018). In 2014, the Abbott Federal Coalition Government abolished the National Water Commission, which had been providing independent advice to the rest of the state ensemble and statutory audits on the river basin health, and the overall effectiveness of the implementation of the Murray Darling River Plan (Thackray & Condon, 2021). As a result, the water markets worth between $4-6 billion lack effective oversight and enforcement, with two-thirds of irrigators in NSW alone non-compliant with pumping transparency (Thackray & Condon, 2021). Trade data also shows over a third of all water trades are priced at $0, with no indication or transparency of the purpose of the corporate treading (Miller, 2019; Farrell & Donnellan, 2020). The lack of transparency has increased tension within the substantial-state ensemble over the peak-state response, with staff from the NSW Government's Department of Water on record claiming it would be impractical to monitor water trades in the Murray-Darling Basin (Farrell & Donnellan, 2020). In particular, and as explored further below, agricultural interest groups and aligned political parties such as the Nationals have consistently resisted efforts to improve the scrutiny of water management in the Basin.

In applying the SSER framework to the principles outlined in the NWI , it becomes evident that as a water restoration project in response to a perceived over extraction, the state ensemble's attempts to intervene to co-produce a neoliberal-market lead recovery has not only failed, but it continues to perpetuate a corrosive abstraction of water. In the on-going attempts to create secure water entitlements for water appropriation in highly variable conditions, water planning has been ad-hoc, unsuccessful and has led to the worsening of public health outcomes in numerous basin communities (Gooch & Testa, 2020). The Basin system remains over-extracted while the Commonwealth Government's 'buy-back' of water entitlements (a further capitalisation of Australian water relations) has led to millions of dollars spent on non-existent water (ghost water) and water privately connected to Federal Ministers (Brewster, 2020b). The impacts of 'environmental water' have not been realised as anticipated through water infrastructure projects, with 2 GL recovered out of a targeted 450 GL (Sullivan, 2022). The NWI project seeks to both acknowledge the corrosion of Australia's water regime in overused systems, but also aims to

embed the same system further in neoliberal 'market-based' water trading and environmental water, further accelerating points of exhaustion within and beyond the river systems.

4.2.2 Accelerating the capitalisation of water through the Australian State

Under the market hegemonic project of the NWI, the state ensemble, including governments from both major parties across the States and Territories, have sought to co-produce an efficient and secure accumulation and capitalisation of Australia water in line with a commodified, tradable and highly capitalised abstraction of water natures. The following section identifies key examples of state mechanisms that are used to co-produce the historical nature of Australian water beyond the initial mechanisms of markets and buy backs, with mechanisms reflecting the unique hydro-spatial terrain of each state and territory of Australia. These mechanisms include intergovernmental coordination and contestation through the Murray-Darling Basin Plan (MDBP) by the contesting basin of states of Queensland, New South Wales, Victoria,South Australia, and the Australian Capital Territory. Across the peak-states, the outcomes of the MDBP project remain contested through additional peak-state mechanisms. As explored throughout this section, these range from Sustainable Diversion Limit Adjust Mechanism (SDLAM) projects, in addition to individual state projects such as Queensland's New Bradfield Scheme and Victoria's 'food-bowl' modernisation project. In turn, Queensland, with its high rainfall and strategic position at the top of the Murray-Darling Basin, has enabled massive water extraction projects while attempting to pursue vast water efficiency and supply projects that reshape the entire interior of the state's water system. This is a typical example of the way in which the water system's transitory nature creates spatially unequal impacts from the one broader socio-ecological regime, contributing to significant points of contestation across the state ensemble.

The MDBP, based on the neoliberal guidelines agreed to in the NWI (Commonwealth of Australia et al., 2004), was the attempted strategic socio-ecological project intended to reverse the degradation of historic water appropriation, and to recover water for environmental purposes, through the creation of a water market (ACCC, 2021). This was to be achieved through the Commonwealth government purchasing water on open tender from newly created water markets, which took place under the Rudd-Gillard Labor Commonwealth Government from 2007 onwards (Crase, 2019). In 2015, the Abbott Coalition Government closed tenders, reduced the amount of buy-backs and instead directed state funding to supply-side infrastructure, intended to improve the efficiency of water flows (Crase, 2019). This strategic reorientation not only provided an opportunity for greater financialization but also enabled the socio-political justification for the reduction of environmental flows (Slattery et al., 2019). The reorientation of water recovery thus signified an even greater acceleration in the capitalisation of the reproduction of water flows.

The Federal Government, particularly under the Liberal-National Party Coalition Government terms between 2013 and 2022, has expanded the capitalisation of water through highly capitalised water infrastructure projects with the stated intent of reducing environmental water flows but delivering the same environmental outcomes. Relying on a neoliberal ideal of achieving economic 'efficiency' in water, the MDBP allowed for mechanisms to modify the initial environmental flow targets (Wentworth Group of Concerned Scientists, 2017). These range from efficiency, supply and constraint projects: efficiency projects are intended to deliver more environmental outcomes with less environmental water flows; supply projects are intended to increase the scale of storage in the river system; and constraint projects are intended to improve the efficiency of flows (Murray-Darling Basin Authority , 2024). Examined through the SSER framework, as the state's socio-ecological project of water flow restoration is drawn into the capitalisation cycle, it too reaches a point of cost limit as the cost of delivering environmental water becomes higher and higher. As a result, as the climate crisis increases pressure on Australia's water systems, the socio-ecological project that is ostensibly oriented towards the reproduction of these systems become increasingly difficult and contentious.

One of the central points of contradiction that arise from Australia's NWI, and the MDBP are SDLAM projects, socio-ecological projects across the basin states of New South Wales, Victoria and South Australia. The location of these projects directly corresponds to the mass of capitalised agriculture in the food bowl of Australia, which stretches over the south basin of the Murray Darling. As such, it touches all three states, beginning in north-east NSW and extending through to Victoria and then to South Australia, the driest state, at the bottom of the river basin. The intent of SDLAM projects is to increase the efficiency of the basin, so less environmental water is needed to deliver the same environmental outcomes, thus making more water available to irrigators (Murray-Darling Basin Authority, 2022). SDLAM projects represent the attempt of the peak-state ensemble to increase private appropriation through further capitalisation of the reproduction of the Murray-Darling. However, despite the Federal Government spending more than $6 billion to reallocate water to environmental purposes, most of the money allocated to SDLAM projects has subsidised water appropriation infrastructure (Walker et al., 2021). Despite operating a system with self-contained limits, key social-ecological agents remain able to direct mechanisms to dismantle environmental water flows.

Contestation of so-called environmental mechanisms within and beyond the state-ensemble has taken many forms across different projects. The SDLAM projects have faced prolonged local contestestation and resistance (Gooch & Testa, 2020). For example, the Menindee Lake Rescope project was one highly controversial SDLAM project, as it became publicly known that the intention was to purposely shrink the Menindee Lakes to paradoxically deliver more 'environmental water' than what is currently being delivered (Davies, 2018d). Protests and lobbying forced the NSW Government to postpone the Menindee Lake Rescope project, before eventually succeeding in its cancellation (Landau et al., 2022). In other instances,

state-sponsored mechanisms have been deliberately misappropriated. An independent review of the Federal Government's irrigation efficiency subsidies demonstrated that the irrigators who received the subsidies extracted up to 21-28% more water than those who didn't receive the subsidy (Wheeler et al., 2020). There have been some moves to negate social contestation; for example, the peripheralisation of the private irrigation dams receiving peak-state directed water efficiency funding (Grattan, 2019) maintains a level of opacity that limits genuine understanding across the state ensemble. However, ultimately, as the commodification and capitalisation of both water and water recovery worsens points of exhaustion within the Basin, contestation across and beyond the substantial-state ensemble is only set to increase.

Queensland, the most north-eastern state, receives high, although variable, annual rainfall relative to the rest of Australia on its coastal basins but has a drier interior. The scale of accumulation based on the appropriation of water reflects an eagerness in the Queensland state-ensemble's water strategy to further extend the appropriation of water. A prominent example is the new Bradfield scheme, first proposed in the 1930s by engineer John Bradfield but recently re-proposed by Queensland's Liberal National Party (Horn, 2019). The project would redirect floodwaters from Northern Queensland to the more arid interior, with the intention to expand irrigated agriculture; the party claims it would produce 80,000 square kilometres of 'black soil plains' for an estimated cost of $15 billion (Horn, 2019). Similarly, in the 2022 Federal Election the Liberal-National Coalition supported the proposal of the $7.4b Hells Gate dam in Northern Queensland (Saunders & Denniss, 2022), which Townsville Enterprise, the peak economic and tourism advocacy organisation, describes as potentially providing '60,000 hectares of irrigated agriculture and offers scalable opportunities for both the dam and irrigation schemes (Townsville Enterprise, 2022). In the face of the escalating degradation caused by the capitalisation and accumulation of Basin water natures, these efforts to extend the appropriation of water are indicative of parts of the Queensland peak-and-substantial-state ensemble taking advantage of the strategic socio-ecological positioning of the appropriation of water flows at the head of the Basin, spatially removed from the most serious consequences of corrosion.

In applying the SSER framework, the dynamics of this socio-ecological positioning can also be identified in the sheer scale of Queensland water appropriation and infrastructure projects. The most overt example of this is Cubbie Station, an incredibly capitalised regime of Cotton, positioned in the floodplains of southern Queensland which comprise the northern basin of the Basin. Cubbie Station is licensed to take 460,000 megalitres a year (Wilkinson, 2009; Wilkinson, 2022), and is the largest producer of cotton in the southern hemisphere (Chen, 2020). The scale of the project is likewise reflected in the scale of corrosion, with a single dam wall collapsing on the Station causing over 30,000ML flooding cotton production (Marshall & Hewson, 2022), and other nearby properties. It had been favoured by Chinese state manufacturers and finance for several years (Smith, 2019), was then purchased by Macquarie Infrastructure in response to concern over growing Chinese-state ownership and in light of an inquiry by the Foreign

Investment Review Board (FIRB) (Alsop, 2022). The example of Cubbie Station reflects not only the eagerness within the Queensland peak-and-substantial-state ensemble to appropriate significant volumes of water from the Basin - at the expense of downstream socio-ecological water relations - but also the tension across the substantial-state ensemble regarding ownership of Australian Water natures.

Beyond Queensland, the neoliberal water efficiency project has been directly facilitated by southern parts of the peak-state ensemble, demonstrating a consistent prioritisation of private irrigators in the peak-state ensemble. Victoria's 'Foodbowl Modernisation Program' was the post-NWI Victorian response to the severe Millenium Drought in the mid-2000s (Wheeler et al., 2020). The project saw a $4.9 billion state-funded capitalisation of irrigation infrastructure across the Victorian MDB 'food bowl', a 65 thousand square kilometre area responsible for 90% of irrigation use in the state. (Office of the Victorian Privacy Commissioner, 2012). Through the construction of dams, locks, weirs, and major headwater storage throughout the southern Basin, this project has irreversibly capitalised the reproduction of water flows and fundamentally altered the flow variability, reversed flow seasonality, and resulted in reduced, less regular flood events (Environment Victoria, 2023). Effectively, this contemporary project reflects the lingering contemporary influence of the historic civilisation hegemonic project, particularly in the strategic intent to reshape Nature. In the case of the southern Basin, as Australia's oldest water appropriation regime, points of exhaustion can be identified not only in the growing value composition of the basin's fixed water capital, but also from the displaced corrosion from contemporary accumulation regimes in the northern basin. Across the overall basin system, since the MDBP was implemented, water extraction has increased and corrosion continued, and by 2019, the flows in the MDB had reached an all-time low (Morton & Readfearn, 2022). As such, the attempts to secure an abstraction of reliable and efficient water rights has undeniably resulted in a reduction in the reliability of all water rights across the Basin and broader water axis.

As mentioned earlier in this chapter, the SSER framework is useful to assess these relations as it considers water bodies to be socio-ecologically co-produced. This conception of water relations then enables the further consideration of the historical modification and lasting corrosion of water bundles. Critically, as explored in the following section, the northern basin appropriation regimes have increasingly relied on floodplain harvesting, which has increased the scale of the appropriated flow of water natures, and significantly increased the risk of the exhaustion through the entire transitory system. This section has examined the overarching strategic neoliberal project of the NWI, and the subsequent MDBP projects enacted according to its framework. Attempts to respond and reverse the degradation caused by historic accumulation have in fact resulted in increased scale of appropriation, and highly capitalised water flows. Across the different projects, there is remarkable consistency across the peak-state in the privileging of irrigators. However, as explored in the following section, one particular socio-ecological class can be identified within this group as particularly significant.

4.2.3 State mechanisms, spatial frontiers in the capturing the flood and expanding capitalisation

A raised in Chapter Two, the concept of an oligarkhia socio-ecological class is useful in assessing particular dynamics in the complexes of water relations, particularly in positioning the capitalisation of Cotton in the following section. By applying the SSER framework to the contemporary Murray-Darling Basin, a specific socio-ecological class can be identified, holding privileged positioning and relations with the state-ensemble; namely, financialised corporate water holders who choose to pump water from environmental flows to grow cotton in the Barwon-Darling river section. The NSW Government acknowledges the socio-ecological project of managing the Murray-Darling Basin, but has repeatedly utilised this management to protect the holders of private water rights through the voting down of water transparency bills (Calver, 2020). As a prominent example, cotton growers in the north have utilised the New South Wales peak-state ensemble to expand water appropriation before flows reach the southern basin. In 2011, the NSW Liberal-National Government altered the Cap on surface water diversions, meaning irrigators around the Barwon-Darling/Barka river were owed flows by the state. In addition, in 2018 the Liberal-National Commonwealth Government voted to reduce the environmental water recovery targets in the northern Basin by 70GL, a reduction of 18%, and also permitted irrigators to take 300% of their original allocation if there was insufficient water the previous years (Slattery et al., 2019). As a result, instead of reducing the consumption of water, subsidies meant for this purpose increased the private benefit to irrigators and reduced stream and groundwater flows (Grafton & Wheeler, 2018; Grattan, 2019), a powerful indication of the ability of this privileged, oligarkhia socio-ecological class to co-opt state-backed environmental mechanisms.

Despite the current strategic orientation of the Australian peak-state ensemble towards facilitating water appropriation, the opportunities that the socio-ecological state offers for specific accumulation regimes are unequal. The cotton accumulation regime in particular has a strategic and privileged socio-ecological position in the Basin and peak-state ensemble, although one that is highly contested. This can be seen through numerous complexes maintaining their regime to the detriment of the broader system, principally floodplain harvesting (as explored below). Despite the cotton regime offering low employment, with around 5% employment rates in cotton producing areas, its reliance on illegal floodplain harvesting and the need for extensive on-going capital works (Campbell & McBride, 2021b), the cotton industry remains influential within the state, including through lobbying and integration in political parties such as the Nationals. The Nationals and prominent irrigator institutions often enact a socio-ecological project together, prioritising specific groups and projects of capital and space, such as the $500m pipeline to Broken Hill, shown to benefit cotton growers (Davies, 2019b). The direction to

continue appropriation of over-appropriated hydro-complexes, particularly in the northern flood basins, undermines any attempt to restore proper ecosystem processes in the southern Basin.

A prominent example of the state-ensemble's current strategic orientation towards facilitating appropriation is the on-going development of highly damaging floodplain harvesting, which creates immediate biophysical limits to connected and future capital regimes. Floodplain harvesting is a highly contested frontier of water appropriation, which despite being illegal, remains a method of creating cheap water by co-opting relations of Australia's floods. NSW Water officials have known for decades that unmeasured floodplain harvesting was illegal, but did nothing to limit the industry's actions (Brewster, 2020a). This enabling by the peak-state ensemble has continued in the face of declining environmental conditions - despite water scarcity in the southern Basin, cotton irrigators in the north can continue to access water in crisis drought conditions (Slattery et al., 2019). Indeed, the State's response to crisis events is highly indicative of its strategic priority; for example, the NSW Berejiklian-Coalition government lifted the floodplain extraction embargo during the initial flood flush of Summer 2019-2020, allowing north-west cotton farmers to extract flood waters for three days (Mabin et al., 2020), a clear move to capitalise on socio-ecological crisis. Applying the SSER framework to the cotton accumulation regime demonstrates how peak-state ensembles have seceded the appropriation of crucial temporal hydro-flows to private cotton regimes, with successively capitalistic water laws continuing to avoid any intervention to limit the private extraction and capitalisation of key processes in the oikeios. In the face of climate change inaction, counter-socio-ecological relational bundles have only grown in strength, undermining any meaningful state-backed conservation efforts.

The privileged oligarkhia socio-ecological class positioning of the Barwon-Darling Cotton regime can be identified in the initial Barwon-Darling water sharing plan. In the plan, then National Party NSW Water Minister Katrina Hodgkinson allowed 'irrigators to extract up to 32% more water', and enabled water extractions during low flows (Davies, 2018a). The changes occurred after the lobbying efforts of the Chair of large irrigators of the Barwon-Darling continued to meet and write with the Minister, who then modified the plan after public consultation had closed (Davies, 2018a). This has lead to independent reports finding 'that water-related compliance and enforcement arrangements in NSW have been ineffectual and require significant and urgent improvement' (Matthews, 2017, p. 7). Other major investigations allege that water pumping has continued with water meters that have been tampered with, not-installed, or are old and outdated (Davies, 2018b; Four Corners, 2017). The resignation of water ministers, investigations by the Independent Commission Against Corruption, leaked recordings of senior water officials and large irrigator lobbyists indicate a key-socio-ecological axis of power, as Irrigators NSW and cotton farmers have direct access to the Water Ministry (a clear form of regulatory capture) (Davies, 2018b; Four Corners, 2017). This demonstrates a key agent-actor relation that supports the on-going capitalisation of the water oikeios.

It is important to note that the privileged socio-ecological classes can both be the recipient of favourable state action, or in relation to compliance, the recipient of a favourable lack of response by the state, despite clear illegality. In 2020, it was found that almost 2 trillion litres of water had been removed from the Basin system despite the Basin project attempting to recover water for the last 7 years; despite $6.7 billion spent between state and federal governments spent on water conservation in one of the 'driest periods the basin has ever seen', '20 percent of the water expected to flow was simply not there' (Slezak et al., 2020). The NSW Independent Commission Against Corruption found the changes to the Barwon-Darling water plan enabling floodplain harvesting overly favoured irrigators and represented a failure of 'water priorities' (Independent Commission Against Corruption, 2020, p.8). Critically, the Commission found that the Department of Primary Industries - Water, responsible for regulating the sector, was 'entrenched in its approach to stakeholder consultation, which focused on the irrigation industry, while restricting information to other stakeholders, including environmental agencies' (Independent Commission Against Corruption, 2020). That is, private water holders were consulted on water relations over other parts of the state responsible for environmental water flows, a further example of this socio-ecological class's powerful position within the state-ensemble.

Utilising the SSER framework reveals highly capitalised, over-leveraged points of risk in the water-state strategic orientation. As shown in this section, this is in part due to the position of privileged socio-ecological classes who shape and benefit from favourable action - or inaction - by the peak-state ensemble to secure their advantageous position within contemporary accumulation regimes. In particular, cotton farmers have used their privileged socio-ecological position to expand the appropriation of water flows at the risk of greater exhaustion of Basin water relations. Despite significant contestation, privileged classes such as the cotton industry are able to continue to appropriate already over-appropriated hydro-complexes due to the state's on-going strategic orientation towards facilitating appropriation.

4.3 Contest and Crisis in the Water State

4.3.1 Assessing the relations of water crises

As planetary systems increase in instability, and the likelihood of conflict grows (World Economic Forum, 2024), it is critical that strategic frameworks are able to assess crisis and contestation of natures. The following section demonstrates the use of the SSER framework in identifying a range of crisis relations, and points of contestation specifically within the water axis. The increase in extreme rainfall and drought events, as well as the increase in the variability and unpredictability of rainfall, will amplify tension across vulnerable socio-ecological arrangements, having a fundamental impact on the precarity of Australian water accumulation

strategies. The SSER framework is able to assess the variability and exhaustion within Australian water-state relations to highlight the exhaustion of the co-production of the historic nature of 'rational water'. The transitory relations of water examined earlier in the chapter are also shown to be linked to dislocated exhaustion in floodplains. The second part of this section will examine the points of contestation both within the peak-state ensemble and the substantial-state ensemble, highlighting the difference. The SSER framework highlights that while peak-state ensemble differs over the scale of capitalisation, the rationalisation project itself is not contested; however, a greater level of contestation is clearly evident in an examination of the substantial-state ensemble.

The breadth of water relations through the web of life similarly means a breadth of potential crisis points, from disturbed oceanic currents to extreme weather patterns increasing the risk of disrupting existing water systems. As mentioned earlier, the unique socio-ecological features of the Australian waterscape means drought and water scarcity are highly likely to worsen. Since 2000, average water flows in the Basin have dropped around 39% (Hannam, 2021). As oceanic systems approach tipping points such as the shifting capacity of freshwater to be transported (Westen et al., 2024), other freshwater bodies such as lakes, deltas and rivers are similarly vulnerable to irreversible tipping points (Hessen et al., 2024; van de Vijsel et al., 2024). Tipping points in these systems can range from irreversible changes in microbial balances, turbidity, erosion, the extinction of native species and the spread of invasive species, or species adapting to the construction of dams (Hernández et al., 2023). The dynamics of Australia's eastern basins are highly variable, with specific water processes, such as frequent small flood events and overbank flows, needed to sustain the socio-ecological relations of life throughout the Murray-Darling Basin, but in the floodplain in particular (Environment Victoria, 2023). As such, in their highly capitalised state, these basins are highly vulnerable to encroaching crisis points.

As expected, Australia's water relations face a considerable range of actual and potential future crisis points as the climate rapidly changes. Rainfall has declined in the south-east and south-west of Australia 'since the mid-1970s' (Steffen, 2015, pp. 9), and with global warming in the pipeline, it is expected to continue to decrease. Severe flooding and drought events are expected to grow in frequency and severity, with 'drought hazard metrics predicted to increase significantly over the Murray-Darling Basin' in particular (Falster et al., 2024, p. 1384). Steffen's (2015) research points to a warming climate pushing rain-bringing Southern Ocean fronts further south, amplifying droughts in the south-west and south-east of Australia. From 2017-2019, the Murray-Darling Basin experienced the 'hottest and driest three-year ever recorded' and soil moisture was also at the lowest level it had been across large sections of the state (Dorman et al., 2020). The water cycle is also increasingly characterised by extreme variations: in 2018, 99% of NSW was impacted by drought (Steffen et al., 2018) but three years later in 2022, Sydney and NSW received the most rain-fall ever recorded, causing flash-flooding throughout the year

(Evershed, 2022). These drastic climatic changes are both produced by, and produce significant consequences for, existing accumulation regimes.

As both drought and flooding events not only increase in severity, regularity and beyond recorded-historical patterns, socio-ecological projects resting on Australian water across the water axis face several points of collapse. As this chapter has demonstrated, the Murray-Darling Basin is Australia's most capitalised and appropriated water body, with most of the southern Basin now having some form of capital modification (Environment Victoria, 2023). As such, further climate disruption, amplified by capitalisation processes, to previously already variable socio-ecological processes, will increase the extent of risk, exhaustion and disruption to the Murray-Darling Basin from climate events, until irreversible tipping points are reached, such as those outlined above. In on-going strategic assessments of Australian water, the increasing variability of water crisis events must be acknowledged and assessed.

The increasing variability of water relations also has a significant impact on the reproduction of water appropriation. The historical Nature of Australian water, through the parameters of the NWI, has been intended to be a rational, tradeable, efficient and monitored nature that would lead to the repair of over-extraction in the Murray-Darling Basin. In actuality, by co-producing a fragmented use case for water - that is, only a certain percentage of water flow is required for the on-going reproduction of the ecosystem - the Australian state-ensembles have inevitably enabled a greater degree of appropriation. Even as the Albanese Labor Government looks to renew the NWI agreement with the State and Territory Governments, the attempted rationalisation of water has numerous crisis points, as SSER analysis identifies weakening geopower as a result of contradictions in the accumulation of Australian water. As established in Chapter Two, geopower, or the environment-making territoriality of the state, rests on bundling of science and capital accumulation (Moore, 2023), which this work demonstrates unfolds through the state ensemble. Using the SSER framework, this chapter has highlighted flaws in attempts to account, track and metre water flows as well as the failure to achieve intended water recovery. These contradictions underline the weakening of geopower to secure water as Nature to be appropriated cheaply.

Guiding Australian principles of water policy is a project of capitalisation that, in ignoring climate data and pursuing market-based restoration, has dramatically increased the severity of climate destabilisation, species extinction, and collapse of water bundles. In terms of restoration outcomes, the South Australia Royal Commission found the MDBA had not taken climate change into account when setting water recovery targets (Government of South Australia, 2023), meaning more water now needs to be recovered to achieve the original intended outcomes (Slezak et al., 2020). Almost $3.5 billion in water efficiency infrastructure upgrades to the Basin have resulted in lower environmental flows than anticipated, and in some instances have reduced net river flows (Williams & Grafton, 2019). After years of the infrastructure in operation, and

following the suppression of earlier reports for political expediency (Morton & Readfearn, 2022), the 2022 State of the Environment report shows Australia has made minimal contributions to environmental water targets, with 2 gigalitres recovered out of a target of 450 gigalitres by 2024 (Sullivan, 2022). This latter failure in particular highlights the significant gulf between stated objectives of balancing economic and environmental objectives with a system that is fundamentally oriented towards facilitating exploitation and accumulation.

In examining points of corrosion or risk in the bundling of water relations, interlinked transitory features of water systems need to be accounted for, as the unique relations of water systems mean that exhaustion from over-extraction is often dislocated from the point of extraction. Illustrated by contested northern-southern relations of the Murray-Darling Basin, the corrosive impacts of one accumulation strategy are often borne by other regions down-stream, given the interrelated nature of hydro systems. That is, many of the consequences and corrosion stemming from over-extraction and increased capitalisation through corporate floodplain harvesting in the northern Basin is inflicted instead onto bundles of relations in the southern Basin. In particular, the unmetered extraction and expansion of private storage, irrigation modification, locks and weirs, have 'reversed seasonal patterns, depriving wetlands and floodplains of water and seriously degrading the habitat of native species that depend on fresh water flows for their survival' (Environment Victoria, 2023). Other effects on southern communities have included water shortages, hyper-toxic events, wet-land recessions, and mass kill events (Sullivan, 2019; Lu, 2022). As a result, floodplains in the MDB are reaching a crisis point, with tension growing across the substantial, and peak of the Australian state.

This dislocation of exhaustion has exacerbated tension across the state ensemble, with the crisis relations of transitory water dynamics reflected in the peak of the socio-ecological state. The National Party and the Shooters, Farmers and Fishers (SFF) have suffered large electoral losses, with party schisms directly due to differences regarding floodplain harvesting specifically; in NSW, the Member for Murray, Helen Dalton, left the SFF over the issue of floodplain harvesting (Polkinghorne et al., 2022). While South Australian water-recovery projects are on track, and the state has called for further action to maximise water recovery, both NSW and Victoria have requested time extensions to meet their targets (Government of South Australia, 2023). Furthermore, Federal National Party Senators representing NSW and Victoria have claimed that 'South Australia does not need freshwater' (Martin et al., 2021), while Victoria has opposed the restarting of Commonwealth environmental water-buybacks (Environment Victoria, 2023). These dynamics highlight the spatial complexities in developing a coherent water project, when features of water exhaustion are not distributed equally.

Using the SSER framework, this chapter has shown that water markets remain unconnected, trade compliance is unenforced (Four Corners, 2017), and large-scale non-monitored water extraction is occurring in vulnerable flood plains. In the northern Basin, the Murray-Darling

Basin Authority (MDBA) estimates that 75% of surface water extraction remains unmeasured, while from 2012-2018, expected water flows were 20% lower than initially accounted for (Slezak et al., 2020). So, while Australian water markets categorise water entitlements by a degree of security, the socio-ecological project of market-based restoration has actually increased the precarity of water flows, as well as concentration in ownership. In addition, the unequal distribution and impacts of exhaustion points are causing increasing tension across the peak-and-substantial-state ensemble, further undermining the ability to develop a consistent, coherent response to address escalating crisis points. These socio-ecological contradictions highlight the flaws in the abstraction of Australian water as a rationalised market commodity.

4.3.2 The strategic variation of water contestation across the Australian State

Water rights, sources and systems have been contested consistently across the planet (Dutta, 2021), with peak-socioecological powers initiating competing projects. This contestation is ongoing despite increasing on-going climate disruptions to global water systems that will continue to intensify both scarcity and the need for a more cohesive response to water relations (Hanasaki et al., 2013). Applying the SSER framework to the Australian state ensemble highlights the difference in contested water relations between the peak- and substantial-state ensembles. The following section highlights points of contestation in the peak-state ensemble that have centred over the scale of mechanisms such as water buybacks, while the substantial state reflects greater contestation to the entire rationalisation project, particularly in the lack of Aboriginal and Torres Strait Island water rights.

In examining Australian water relations, the peak of the Australian State-ensembles, Federal, State and Territory Governments, are still attempting to restore environmental water flows through market-led environment restoration, highlighting the enduring adherence to the prescriptions of the neoliberal project in the peak of the state-ensemble. The strategic water priorities of the state are strongly contested, but only within the parameters of the water rationalisation project - Australian peak-state ensembles acknowledge the over-extraction of water, but continue to endorse a socio-ecological project of alleged ‘sustainable diversion’ and market-based environmental water flow recovery purchases. A key point of contestation within the neoliberal water market project is the mechanism of recovery, with the former Morrison Coalition Federal Government committing to ‘build new dams in the Murray Darling, rejecting leading research that suggests they wouldn’t fill due to climate change’ (SMH, p.11, June 10, 2021). Despite creating a capitalised method of water-recovery, the Coalition Government limited federal environmental voluntary buy-backs to 1500GL (Haensch et al., 2019); water-purchases that did proceed were generally ineffective buy-backs and did not represent value for money (Brewster, 2020b). The construction of water infrastructure in turn was labelled the justification for the state stopping water-buy backs for environmental flows despite two thirds of water recovery coming from this method (Sullivan, 2020). Today, the current Albanese Labor

Government committed to enacting the Murray-Darling Basin Plan in full (Jasper & Sullivan, 2023), in the continuation of an approach that has clearly failed to secure the ongoing reproduction of the Basin system.

Yet even with the former Federal Coalition Government moving to accelerate capitalisation in water infrastructure, the National Party have consistently gone against their Liberal partners in the Coalition, and tried to completely dismantle state mechanisms to return 450GL of environmental water (Sullivan, 2021). In addition, the National Party has sought to further prevent the Commonwealth from purchasing water from irrigators in the Federal Senate, despite the historic levels of appropriation in the Basin (Sullivan, 2021). These attempts underscore the fact that despite the risk posed by global warming in the pipeline, parts of the Australian peak-state ensemble are determined to continue to appropriate and capitalise Australian water. While the election of the Albanese-Labor Government has now seen the Federal Government coordinate with the Basin states to restart water-buybacks, the Victoria government refuses to provide their support to any plan involving buy-backs (Jasper & Sullivan, 2023). While this reflects an increased priority of water-recovery compared to the former Coalition Government, the Federal state continues to fund water infrastructure projects, as well as buy-backs in line with NWI. In addition to this, the states have agreed to a reorientation and time extension of SDLAM projects, with only 7 projects proceeding ((Department of Climate Change, Energy, the Environment and Water, 2024b). These socio-ecological strategies reflect a re-prioritisation of environmental outcomes, but through the same highly capitalised mechanism as before.

Water systems with significant accumulation regimes co-produce a spatial socio-ecological inequality, with the resulting tensions, corrosion and exhaustion reflected to a greater degree in the ensemble of the substantial-state ensemble. One of the greatest inequalities reproduced through the NWI is the lack of Aboriginal and Torres Strait Islander water rights. In using an SSER framework, contestation over water relations can be identified through Australia's substantial-state ensemble, particularly through First Nations' connection to water on Basin Country and contestation of water relations in the Murray-Darling Basin (Davies, 2018c). First Nation institutions within the substantial-state ensemble, like the Murray-Lower Darling Rivers Indigenous Nations (MLDRIN), are leading campaigns for greater ownership (Davies, 2018c) and have contested the neoliberal rhetoric of current Environment Minister Tanya Plibersek (Jasper, 2023). In 2023, over 50 legal professors and academics published an open letter to the Federal Government, calling for reforms to the Murray-Darling Basin Plan to acknowledge and safeguard Aboriginal and Torres Strait Islander water rights, ending what they describe as 'decades long cycle of discriminatory water reforms' (Jasper, 2023). Water ownership of the First Nations in the Murray-Darling Basin fell by 17% from 2009 to 2018, and by 2020, 0.17% of the basin's water flows were owned by First Nations peoples (Jasper, 2023), compared to 40% of land ownership through native title. This is despite the fact that the former Federal Coalition Government allocated $40m to purchase water rights for First Nations; the fund has remained

unspent by the state, meaning that with the increase in the price of water, the purchasing power of the unspent funds continues to decrease (Jasper, 2023). Without significant changes to the NWI and current accumulation regimes, this socio-ecological inequality is unlikely to be meaningfully addressed.

The broader Australian population also has a shared narrative of the value of water, with strong support for water conservation (Dolnicar & Hurlimann, 2010). This has also been reinforced through water efficiency messaging by the state in times of drought (Heberger, 2012). Previously, public anger over the mismanagement of water resources has forced the resignation of multiple NSW Water Ministers, including the burning of an effigy of a Minister (Woodburn, 2019). Critically, this is a significant point of contestation, with the public resistance to over-extraction a particular concern to Australia's democratically elected governments. If transparently understood by the public, it is highly likely that current water extraction regimes would not enjoy broad social-support, as indicated by the response to water theft and threats to the former NSW Water minister (Woodburn, 2019). This broad valuing of water beyond the confines of a water market has meant socio-disciplining institutions in the substantial-state ensemble continue to apply pressure to the peak-state ensemble through legal cases over the inclusion of climate change data in water plans (Environmental Defenders Office, 2021), as well as public reporting of outcomes, shortfalls and contradictions (Environment Victoria, 2023; Wentworth Group of Concerned Scientists, 2017). Whether tension within the substantial-state ensemble can successfully shift the entrenched orientation of the peak of the state remains to be seen.

The SSER framework has shown that water relations are contested throughout the peak-and-substantial-state-ensemble. Points of crisis continue to grow, as the on-going efforts to transform Australian water relations into rational and tradeable Natures only serves to exacerbate over-extraction in the Basin, dramatically increasing rates of exhaustion. While this project enjoys broad support across the peak of the state, contestation is far greater in the substantial state, reflecting both the barriers to the peak-state ensemble as well as the enduring two-nation hegemonic projects that continue to exclude First Nations. As points of exhaustion continue to grow, the gulf between the relative consensus in the peak-state ensemble regarding the market orientation of water relations and the differing attitudes within the substantial-state ensemble regarding the broader values of water may itself become a significant point of exhaustion in socio-ecological relations.

4.4 Conclusion

This chapter has highlighted the unique relations between the axis of water and the State, as the peak site of socio-ecological contestation. Socio-ecological relations of rivers, dams, and community water groups are unique and create a diverse hydrological terrain in Australia. These

unique relations must be managed on a case-by-case basis, not only to account for the unique socio-ecological features already embedded in the hydrological space, but also for future extreme weather patterns and abnormal weather patterns. SSER analysis captures the relational positioning of the peak-state ensemble as it seeks to implement (or avoid implementing) a coherent strategic position in the face of contestation or other forces. The SSER framework must engage in the analysis of multiscalar spatial, temporal and capitalisation relations within the water axis, examining the contested, capitalised and exhausted bundles that underpin socio-ecological power embedded in water relations. In particular, the framework acknowledges that as the Earth undergoes major hydrological shifts and crises (floods, droughts, storms, bushfires) and spatial and temporal disruption, these relations will become increasingly precarious.

A key use of the SSER framework is to demonstrate how the on-going dynamics of socio-ecological relations within the axes of the state and water present barriers, points of exhaustion and increased risk on future strategies, regimes of relations and actors within the Australian State and space. As the broader environment of water is socio-ecologically constructed, in addition to the the extra-human geographical relations making up the water axis, the steady construction of dams, levees and water capture infrastructure each disrupt and alter the broader processual reproduction of the greater relational system, in particular water flow coordination and mapping. The future implications of current accumulation regimes and relational contests is the appropriation and increased extraction of crucial flood flows and other marginal or unconventional water sources within the Basin, resulting in potential socio-ecological collapse and future extreme droughts.

The SSER assessment in this chapter confirms that any project designed to restore water flows in the Basin must first acknowledge the peak-state ensemble as a point of contention in the capitalisation in the water frontier of the Murray-Darling Basin. The capability, and focus of the state's response to the crisis should be illustrated through a multiscalar socio-ecological analysis, examining the friction and exhaustion amongst the interaction of differing, shifting bundles of socio-ecological relations. The chapter demonstrates that the SSER framework can examine the multi-scalar relational complexes between broad axes of the oikeios (categorical groupings of similar socio-ecological complexes i.e. water, energy, food) and localised socio-ecological accumulation regimes. In doing so, SSER analysis has identified the interplay of biophysical, geographical and climatic systems that cross over the contested spaces and peak socio-ecological bodies relevant to the Murray-Darling Basin, highlighting key challenges in reorienting the strategic focus of Australian peak-state ensembles to secure the future reproduction of Basin water natures.

Chapter Five: Energy in the Web of Life

5.1 Assessing the socio-ecological relations of energy

5.1.1 Introducing Australian energy, energy as a core axis and chapter structure

Energy is a core axis of the oikeios on the planet (Karlsson, 2018; Moore, 2015; Patel & Moore, 2017), a fundamental relational strand of unique processes that contributes to the co-production of the web of life on Earth. Just like the fellow relational axes of water and carbon, an examination of human and non-human relational energy complexes requires an acknowledgment of the unique processes specific to energy bundles. Energy arrangements and systems are historically, spatially and temporally unique socio-ecological projects, with processual complexes entrenched within the interaction of energy across the planetary network of the webs of the oikeios. From coal-fired power stations to fracking and liquid natural gas, pumped hydro, wind and solar farms, and geothermal regimes - each has its own inherent unique sociological relations. Using the SSER framework, the following chapter highlights the importance of assessing the range of energy regimes across Australia as they are conditioned through the peak- and substantial-state ensembles within the web of life. The SSER framework is applied to the abstraction and capitalisation of the historical Nature of Australian Energy, as well as the appropriation of energy natures in the web of life, which are co-produced through a highly fluctuating and contested peak-and-substantial-state ensemble.

As demonstrated in the previous chapters, the SSER framework can be deployed to examine the contemporary Australian peak-and-substantial-state ensemble as a contested and highly capitalised socio-ecological frontier that is critical in enabling national projects and accumulation regimes. As explored in Chapter Three, by the end of the 20th century the Australian peak-state ensemble had already engaged with internationally significant energy projects, including the direct export of cheap coal to south-east Asia in line with the Pacific Rim strategic project (Thompson, 1983). Contributing to the complexity of the historical Nature of Australian electricity is the fact that energy natures have previously been directed towards a regime of cheap energy within the substantial state, particularly linked to Australian post-WWII manufacturing that included rearranging frontiers in the east coast states and South Australia. In line with the American-Australian hegemonic project of reorienting socio-ecological strategic considerations to south-east Asia, the Australian state-ensemble directly facilitated the production of cheap energy through its ownership of coal fired power stations and adopting of cheap international financing (Crough & Wheelwright, 1983). The flow of cheap American debt to Australia secured a flow of capitalised, but still relatively cheap, energy, locked in by cheap long-term contracts with Japan and South Korea, and later China (Fernandes, 2018). The strategic orientation of this historic project has shaped the Australian energy axis, and associated key relational bundles in the oikeios can be identified as having significant, ongoing implications for contemporary Australian energy regimes.

Given the on-going international, and importantly, imperial inter-state contestation of energy relations, Australia's energy regimes provide an extensive opportunity for the utilisation of an SSER framework. However, the complexity, and nuances of specific regimes prevents this chapter from engaging the full range of differing state energy regimes in depth (Aisbett et al., 2022; Blakers & Cheng, 2022). Similarly to the approach taken in Chapter Four, given the limits of this dissertation and relevance to the climate crisis, this chapter will focus on the capitalisation of fossil fuels, particularly coal and gas, the largest of Australia's energy exports. Critical to the strategic assessment of Australia's contemporary energy regimes is an examination of the varied processes of carbon life and subsequent spatial distribution of 'fossil energy' frontiers on Earth, the capitalisation of which has been highly sought-after by key socio-ecological classes in the peak-and-substantial-state ensembles. However, as for water, and as will be demonstrated in relation to terrestrial biocarbon, there are certain universal relations and conditions through the state ensemble that characterise the Australian energy axis, many of which are illuminated in the focus of this chapter on Australia's fossil fuel natures.

This chapter demonstrates the use of the SSER framework in identifying the key unique socio-ecological relations of the Australian State ensemble's energy regimes, and their relations to the climate crisis. Applying the SSER framework highlights the wide range of factors shaping the considerations for the implementation and coherence of any strategic energy regime in response to epochal climate disruption and crisis, including the form of capitalised energy generation, the state ensemble of energy institutional and regulatory bodies, the infrastructure of distribution and transmission, and the power held by retail firms and finance funds (McConnell & MacGill, 2023). Broadly, the appropriation of energy natures ranges from past carbon life that has been appropriated and abstracted, the co-production of fossil fuels through to that of continually produced and infinitely available solar rays and wind, and through to energy patterns identified beyond earth's atmosphere. However, as this chapter will demonstrate, Australia has struggled in moving beyond the appropriation of fossil fuels due to a wide range of complex socio-ecological factors.

Moore (2015) asserts that capitalism as a socio-ecological regime does not need to rely on the provision of fossil-fuel based cheap energy and, with the use of the State, could re-position other socio-ecological energy arrangements. These might include a heavily financialised mega-dam, nuclear, or other arrangements to extract profit elsewhere. Moore and Patel (2017, p. 113) argue that 'the strategy of cheap fuel doesn't depend on carbon, it has in the past but there is no reason it needs to in the future'. There is also some evidence of this within the Australian context; Tasmania gains over 83% of its energy needs from hydro-electric dams (Tasmanian Economic Regulator, 2023). However, as this chapter will show, Australia's historical accumulation regimes have shaped a culture of social attachment to cheap carbon-based energy, which, alongside state-enabled mechanisms privileging and embedding the interests of those who benefit from

fossil-fuel based accumulation, complicates any coherent national transition towards renewable energy.

The first part of this chapter will examine foundational relations along the energy axis as well as the historical specifics of Australian energy regimes. This chapter first acknowledges the broad universal intertwining of energy in its many forms of human and non-human life on Earth, exploring the ways in which energy regimes are spatially embedded, with critical bundles that are both disembodied and fixed. The section also examines the influence of the unique spatial variation of past life on current socio-ecological power ensembles, noting that the appropriation of energy natures is co-produced through the unique relations of each peak- and substantial-state ensemble. The section then goes on to explore Australia's early energy projects, which began as highly localised strategic projects that have fostered broad socio-ecological attachment to cheap and efficient energy. In addition, the section examines the way in which this historical context has shaped Australia's contemporary regulatory context, in particular its constitutional mechanisms as relevant to energy.

In the following section, the chapter examines energy and accumulation, including the neoliberal energy market and the appropriation of Australia's historical energy natures. The section examines the historic and contemporary foundations of Australia's coal regimes, highlighting the foundations of diverging energy strategies in the peak-state ensemble's support of coal-based accumulation. The second part of this section will then assess the introduction of the National Energy Market (NEM), and the impact of a neoliberal energy project on points of contradiction across Australia's energy regimes. The third part then applies the SSER framework to Australia's Liquid Natural Gas (LNG) regimes, an energy project that is highly capitalised and emissions intensive, yet highly profitable for the owners of production, who represent a privileged socio-ecological class or oligarkhia.

Finally, this chapter concludes with an examination of the contest and crisis of the Australian energy state. The section considers the attempts by influential parts of the peak-and-substantial-state ensemble to sustain a cheap energy project in the face of energy regime collapse and epochal crisis, with temporary interventions failing to solve the broader fragility in the current energy market. The application of the SSER framework in this section identifies points of contestation relating to socio-ecological expectations, the influence of privileged socio-ecological classes, the complexity of Australia's constitutional mechanisms, and the competing interests across south-east Asian energy regimes. The section demonstrates that the Australian State is sustaining a number of international, carbon intensive and highly contested energy regimes that support the interests of a privileged few at the expense of the reproduction of the broader Australian (and global) oikeios.

As noted, this chapter is particularly focussed on Australia's fossil fuel natures, including coal and LNG, demonstrating the global significance of these particular energy regimes and the inherent contradictions of their specific strategic orientations. Doing so enables further analysis of the socio-ecological tensions in the Federal Australian State, and the various State and Territory Governments as they attempt to create a coherent national energy transition project amongst the orientations and barriers presented by existing accumulation regimes embedded within the state axis. While the scope of this particular analysis is limited, the findings of this chapter still have relevance for appropriation based on Australia's other energy natures, including solar, wind and other forms of renewable generation, as well as broader relevance to discussions surrounding energy transition within the Australian context.

5.1.2 Assessing unique energy relations in the oikeios

As shown in relation to the water axis, given the involvement in the breadth of life and the vast corresponding carbon spatial relational arrangements, the energy axis has unique socio-ecological relations that need to be accounted for in strategic assessments. From the sun's position in the solar system, solar energy travels through space to be embedded in specific social-spatial relations of the planet's elements, water-bodies, soil and carbon life itself (Deamer, 2012). From the outset of life on earth, carbon-based energy has been vitally important, with clear processual links to the biophysical development of chemical energy and the sun. Given that the atmospheric and geographic conditions on Earth are highly variable, the evolving and self-producing socio-ecological arrangement of billions of years of life has produced an equally varied geography and interaction between base atomic elements, carbon-based life and other geoprocesses (Deamer, 2012). The creation of any contemporary fossil fuel regime has required millions of years of solar energy, combined with a specific historical socio-ecological relation with humans. This variance creates strategic opportunities for specific socio-ecological ensembles in capitalist exploitation, appropriation and capture across the planet. Regardless of the disembodiment of the final energy product, particularly as seen in petroleum, gas, solar energy regimes, energy regimes remain spatially embedded, both on land and in the ocean.

As the Australian continent split from the mega-continent of Gondawana, rainforests stretched across the continent as the Earth warmed during the Jurrassic, Cretaceous and Mesozoic Eras (Wet Tropics Management Authority, 2014). This geological drift was accompanied by millions of years of the development of unique processual webs of life, creating vast carbon-geological features, with coal and gas deposits identified along both the east and west Australian coasts, as well as off-shore continental shelves (Fernandes, 2018). Over time, energy regimes have grown in complexity as socio-ecological systems have evolved, moving from relational bundles centred around the household, such as individuals gathering wood-fuel, to a shift in orientation towards a larger scale of energy production including pipelines (Ignatieva, 2022), privatised generation and transmission infrastructure (Wood, 2020), and moving beyond the domestic scale to encompass a

range of international energy export terminals (Aisbett et al., 2022). As examined in Chapter Two, given the spatial dynamics of peak-and-substantial socio-ecological power ensembles, the spatial arrangements of the historic carbon axis impact the relations of contemporary state ensembles. In other words, the unique spatial variation of past life is reflected in current socio-ecological power ensembles, which has great significance in a time of energy transitions and instability.

Given the fact that energy natures vary greatly over time and space, so too do human arrangements and exchanges of energy, particularly as a capitalised Nature. This means that socio-ecological relations of energy systems are inherently transport relational systems, moving energy via multiple Natures. As such, the appropriation and capitalisation of socio-ecological energy regimes can be identified as having critical bundles that can be both disembodied and fixed. For example, fuel and electricity as abstract historical Natures are disembodied from their point of production; in general, fueling a vehicle or turning on a light switch does not have a fixed relationship with any one point of production, or even method of production. Yet, examining the socio-ecological appropriation and capitalisation of contemporary energy natures highlights bundles that are highly fixed, such as gas pipelines, nuclear power plants, hydro-electric dams and inter-state power connectors. These cannot move, and are fixed to particular historical spaces and socio-ecological frontiers, which has significant implications for the strategic assessment of energy in the web of life, particularly in regards to the influence of the peak-state ensemble.

The prevalence of energy in life presents immediate implications for the consideration of energy projects under the SSER framework, given the multitude of forms of energy interactions and both disembodied and fixed critical bundles across any one area of focus. Each type of energy project requires the reorganisation of unique parts of the Earth, capital intensive technical infrastructure, and supportive or enforced social arrangements of bundles to provide an energy supply which is essential across widely differing scales, from industrial regimes, domestic manufacturing and pumped water supply through to refrigerated food and electrified houses. In other words, given the unique and spatially varied co-production of energy natures within the web of life, the appropriation and capitalisation of energy natures, relies on a coherent strategy between a collective of individual socio-ecological projects and spaces. Thus while the sun and planet share a core position in energy production throughout the oikeios, the final array of energy regimes built upon this relation each require discrete, tailored socio-ecological analysis. As established in Chapter Two, the SSER framework provides an entry point for assessing these complex energy relations in its treatment of both the energy and state axes as socio-ecological.

In their work describing the value relations of cheap energy strategies in capitalism, Moore and Patel (2018) highlight that energy systems are inevitably collective projects. Firstly, cheap energy, as a capitalist way of organising nature, does several things at once:

> *It makes both energy and inputs cheaper: cheap coal makes cheap steel; cheap peat makes for cheap(er) bricks. This reduces the costs of doing business and enhances profitability. Cheap energy also helps keep labor costs down, by controlling one of the largest costs (after food) in a family budget.* (Moore & Patel, 2017, p. 165).

The vast array of strategic uses of energy underscores its strategic importance to a wide range of interests; indeed, contemporary peak-state interest in energy is almost universal. Secondly, and critically, these relations occur to a collective of humans over space, including vastly unequal levels of access, influence, and control. This means the strategic use of energy is unequally influenced and inevitably contested by different power ensembles, and that the co-production of energy relations is vital to assess through the SSER framework, examining energy relations through contested peak-and-substantial-state ensembles.

This point is made further salient in examining the importance of cheap energy to imperial state projects. Throughout history, Dutch, British, Russian and American empires and capital regimes (to name only a few) have successfully appropriated, and been directly shaped by, the uneven spatial variance of the socio-ecological complexes of energy in all its forms. Patel and Moore (2017) identify the importance of wood and forests, or terrestrial biocarbon, in early appropriation regimes as a form of fuel and food, which are directly linked to the cartographical expansion of Columbus and the other European state-capitalist regimes. Access to these resources shaped the spread of settlements: *'Here would be a good site for a town or fort, by reason of the good port, good water, good land and an abundance of fuel. Journal of Christopher Columbus, Tuesday, November 27, 1492'* (Patel & Moore, 2017, p. 161). Access to fuel also directly shaped the socio-ecological relations of early imperial regimes; for example, as a result of growing unrest over the increasing restrictions on the use of land by commoners, King John signed the Charter of the Forest, which acted as a complementary charter to the Magna Carta and assured the english peasantry's fundamental rights to access the forests for fuel (Patel & Moore, 2017). For centuries, the axes of energy and the state have been inextricably intertwined, and integral parts of the complex web of the oikeios.

The dynamics between peak-and-substantial-state expectations, support, and funding of electricity generation, networks, and transmission are vital to understanding the socio-ecological nuances of specific energy systems. Importantly, the co-constitution of contemporary socio-ecological power ensembles and socio-ecological energy regimes highlights the importance of SSER analysis in assessing the energy and state axes together, considering the fragmentation and capitalisation of energy natures throughout the web of life. Furthermore, given the relations of energy are so closely embedded in patterns of socio-ecological power relations, particular oligarkhia socio-ecological classes, with privileged and powerful positioning of socio-ecological accumulation through the substantial-and-peak state ensembles, can be identified through the co-produced spatial dynamics of energy regimes. In Australia, oligarkhia relations can be identified in both coal and gas accumulation regimes as processes of

capitalisation occurring across key geographic regions of energy are co-produced within the state, with a range of mechanisms used to sustain the facilitation of spatial expansion and subsidising appropriation of private energy regimes for the benefit of particular socio-ecological classes.

For capital regimes, Australia, with its peak-state ensemble's project of identifying unique geological shifts and patterns of past life, represents a vast frontier of energy Nature that is open to being capitalised. Numerous oligarkhia socio-ecological class projects have been strategically oriented to further enable appropriation of these energy frontiers throughout the Australian peak-state ensemble. Through the 20th century, a range of socio-ecological projects centred on expanding frontiers of coal and gas were linked to the energy regimes of south-east Asian states, including Japanese firms purchasing Western Australia natural gas (Thompson , 1983), as well as the Chinese-state-owned Yancoal taking over coal extraction in the Hunter Valley, NSW (Claughton, 2023). Even from the mid 2020s, attempts to expand fossil energy appropriation have continued, despite the fact that on-going appropriation and extraction of these emissions-intensive fossil fuels directly destabilises and corrodes socio-ecological systems across the web of life on Earth (Hanson et al., 2023). As this chapter will show, and similarly to the findings of Chapter Three regarding energy relations in the later half of the 20th century, the strategic relations of Australian energy natures are inherently contested, given the desire to benefit from vast flows of unpaid energy/work. Contested by varying socio-ecological forces with their own strategic priorities, these range from particular parts of the Australian peak-state ensemble, international energy regimes in south-east Asia, and oligarkhia class projects.

Competing global powers continue to pursue strategic carbon energy arrangements despite the impact of climate change (EIA, 2016). In 2024, the Biden administration expanded American continental shelf claims near the coast of Alaska, adding close to 400,000 square miles suspected of containing vast deposits of natural gas (The Maritime Executive, 2023). Similarly, China's energy strategy still relies significantly on Australian coal and it has equally invested in natural gas pipelines (Maiden, 2013). As climate change creates new pressures on energy systems, states increasingly rely on the interaction and contestation of other international regimes for the unique assembly and disassembly of energy relations and complexes, given both the uneven socio-ecological energy terrain and the impact of increasingly exhausted historical frontiers (Packham & Macdonald-Smith, 2023). In other words, renewable transitions, aging infrastructure, depleted fossil fuel extraction points and overt geopolitical tension and contestation impact energy systems globally. As will be shown throughout this chapter, the complexity and interconnectedness of global energy relations, particularly during a period of epochal crisis and increasing contestation, reinforces the importance of SSER framework's theoretical emphasis on the analysis of state relations. State ensembles have significant and enduring relevance as the shifting relational peak and substance of territorial socio-ecological power, upon which energy regimes fundamentally rely.

5.1.3 Historical Australian energy state projects

Before examining colonial coal regimes following the arrival of the British to Australia in 1788, it is first important to note that Australian First Nations utilised fire regimes extensively. These regimes signify a key collective socio-ecological energy regime within the history of the Australian oikeios that is sometimes overlooked in historical analysis, reflecting the lingering impacts of the past, two-nation, hegemonic civilisation project. The importance of fire as an energy system cannot be understated, with fire ingrained in several Australian biomes and firmly in the reproduction of specific First-Nation socio-ecological cultural and sacred sites (Bowman et al., 2011). Indigenous fire regimes have varied around the world, including the unique regimes of the Maori people in New Zealand (Patel & Moore, 2017), but there is significant evidence of Australia's first nations fire regimes from at least 45,000 years ago (Enright and Thomas, 2008), demonstrating energy regimes far predating capitalism in Australian social-ecological relations. However, with the arrival of the British, so too formed the historical Nature of coal, noting that the natures of fossilised carbon long-predated their arrival. Under the SSER framework, previous ecologies of life are examined as both frontiers of eventual appropriation to capitalist energy regimes, as well as pre-capitalist socio-ecological energy regimes in their own right.

Early Australian energy regimes reflected the two-nation hegemonic project of civilisation implemented by early Australian state ensembles. The historic expansion of energy supply in Australia was seen as a civilising project, with engineers conceptualised as a civilising force attempting to achieve mastery of Nature. In reflecting on 100 years of engineering in Victoria, past president of the Institute of Engineers, Australia Harper (1934, p. 354) writes of the 'rise of Victoria, during this 100 year period, from a condition of primeval simplicity to that of a highly civilized state.' Here, the othering implicit in 'primeval simplicity' reflects the contemporaneous rhetoric of racial categorisation, as outlined in Chapter Three. In historic terms, the two-nation hegemonic project is clearly visible in the way in which historical energy provision focused on white-settler cities, and even today continues to exclude remote First Nations communities.

The provision of energy to humans is a socio-ecological regime, and the variation of different forms of energy projects is highlighted in the historically broad energy focus of peak-socio-ecological ensembles. Australia's first fossil energy projects started as highly localised strategic projects, embarked upon by a range of institutions and authorities within the peak-and-substantial-state ensembles. The principle energy consumption of this time was the system of public lighting in the growing Australian cities (Bate, 1934). In Victoria, early energy generation was commenced by parts of the state ranging from the Postmaster-General of Victoria to Victorian Railways, as well as private generators providing lighting for hyper-localised parts of Melbourne (Bate, 1934). Similarly, the evolution of NSW's pre-Federation, Sydney-based energy regimes can be seen centring around local governments, specifically local governments in

the initial 19 counties of NSW. According to Nolan (1940), in 1936, the NSW Government owned 3 generators, privately owned generators numbered 66, and local municipal governments owned 120. As populations expanded, demanding a larger scale of energy generation, the projects grew from localised settings through to management by State and Territory Governments; the State Government of Victoria took over energy supply in 1930, while NSW took over all of the state's energy generation in 1950 through the Electricity Commission of NSW (Nolan, 1940). This represents an early example of the way in which co-production of the strategic orientation of Australian energy projects shifts between and within the peak-state and the substantial-state ensembles.

The historical expansion of Australian energy relations was therefore closely linked to local experience, which can be seen as the foundations of particular hegemonic energy expectations in the substantial state, directed towards the peak-state. The provision of energy is closely linked to the provision of healthcare, food and water new household technologies, myths about Australian nationhood, and financing, with support for proposed future projects often dependent on past experiences of former energy regimes (Baer & Singer, 2025; Griffin, 2003; Moore, 2015; Rosewarne, 2022). In Australia's case, the origins of Australian cheap energy being completely embedded in local spaces (Bate, 1934), and not initially intended for international export, has fostered broad socio-ecological attachment to, and expectations of receiving, cheap and efficient energy. As a result, access to reliable, cheap energy, particularly in relation to the stable provision of electricity, has become an expectation within the Australian peak-and-substantial-state-ensemble.

This broad socio-ecological expectation in the substantial state has a significant impact on the outcome, support and success of any shift in energy strategy, given the role of energy in contemporary human metabolic reproduction (Moore, 2015). Chester (2010, p. 893) has previously demonstrated the polysemic nature of 'energy security' and the deployment of its use as a strategic project, employed by a wide range of groups across a variety of times, forms and spaces, with the 'factors influencing [energy security], *however it is defined*, constantly changing'. This has particular significance for analysis of the Australian context on two particular fronts. Firstly, given that electricity networks strongly reflect the historical state ensemble and spatial expansion and capitalisation of energy as a Nature, understanding of historical energy regimes requires an understanding of the social relations upon which it was contingent for support. Secondly, in relation to contemporary energy regimes, understanding predominant social relations is similarly necessary in assessing the challenges to, and feasibility of, energy transition and regime shifts in the face of an epochal crisis. In particular, and as will be shown later in this chapter, efforts to decarbonise Australia's energy generation by shifting away from coal and gas have been strongly shaped by social attitudes towards the parameters of acceptable energy provision.

The localised nature of Australia's initial energy and electrification regimes, together with the lack of national consensus regarding a formal energy strategy at the time of federation, has also shaped the dynamics between different parts of the peak-state ensemble. In particular, this foundation has shaped Australia's constitutional conventions, specifically Section 51 of the *Commonwealth of Australia Constitution Act 1901* (Parliament of Australia, 2018) which designates the powers of the Commonwealth Parliament. While mentioning telegraphic poles and postal services, indicating their national importance, electricity is not referenced; in fact, Section 51 makes no mention of energy, the environment or climate, thereby leaving the power to implement and reproduce energy regimes to default to the socio-ecological ensembles of the Australian State and Territory Governments (Parliament of Australia, 2018). However, the 'Competition clause' included in Section 51 of Australia's Constitution allows the Commonwealth Government to regulate the NEM, while the Foreign Affairs clause enables the Commonwealth government to sign international climate treaties. Therefore, using the SSER framework to assess the contemporary capitalisation of energy regimes in Australia across contested state ensembles is beneficial; SSER analysis' understanding of the state ensemble as relationally shifting and contested highlights tension in the co-production of energy through the Federal, State and Territory Governments. While the response to the climate crisis inevitably requires a coherent national response to achieve significant reform to carbon-centric energy regimes, the constitutional mechanism to set energy law, production and transmission rests with individual State and Territory Governments, each with their own unique interests.

While much of the powers relating to energy regimes may rest with Australian State and Territory Governments, the Commonwealth government remains a critical strategic ensemble to energy capitalisation bundles and regimes. In particular, Section 51 (xxix) of the Australian Constitution allows the Commonwealth of Australia to legislate in respect to 'external affairs' (Parliament of Australia, 2018). This has enabled the diplomatic, intelligence and defence mechanisms of the national government to support the territorial expansion and appropriation of Australian historical energy Natures (Fernandes, 2018). Using these mechanisms, the Commonwealth government has negotiated and facilitated the export of Australian fossil fuel Natures, established and deployed the defense force to protect coal and gas shipping lanes, and facilitated and financed underwater surveying expeditions to map Australia's continental shelf. Under the Law of the Seas Convention, the spatial mapping provided evidence for the territorial extension of Australia's territorial sea, and so the southern frontier was intended to 'attract international investment' to the vast stores of Australia hydrocarbons (Fernandes, 2018, p. 93). The Commonwealth government has also acted by omission in the utilisation of its foreign affairs powers; for example, by delaying the ratification of a maritime border treaty with East Timor, the government was accused of appropriating 'millions' of dollars of oil revenue belonging to East Timor, given the position of territorial waters of both states (Davidson, 2019). The peak-state ensemble's integral role in facilitating the appropriation of cheap energy validates

the SSER framework's emphasis on assessing the state axis alongside other core axes of the oikeios.

Despite the constitutional mechanisms lying with the state and territory parts of the Australian peak-state ensemble, energy, climate and environmental projects are increasingly identified as the responsibility of the Commonwealth government across the substantial-state ensemble. Often cited as an example of cooperative Federalism (Department of the Attorney-General, 1980), the Commonwealth government led a strategic project of national scope through the establishment of the NEM, a project explored in greater depth later in this chapter. The perception of energy and climate issues as a national responsibility within the substantial-state ensemble can be explained by the inherently international nature of both energy and climate projects. That is, contemporary energy projects are often owned by overseas investors (Claughton, 2023), while the government negotiates trade deals and sets national emissions reduction targets. Similarly, negotiations regarding climate policy are undertaken at an international level by Commonwealth government representatives, as indicated by the references to international agreements such as the Kyoto Protocol in national discussions around emissions reduction (The Australia Institute, 1998). The fact that this perception is not aligned with the reality of Australia's constitutional mechanisms is not in itself a barrier to a coherent national energy policy; there are many examples of cooperative Federalism throughout Australia's history that might provide a valuable model. However, the reality of the co-production of Australian energy natures across the varying state ensembles does have clear implications for any future national energy project directed by the Federal State, such including renewable energy or net-zero projects.

While outside the scope of this chapter, it is important to note that other forms of energy regimes outside coal and gas still require the peak-state ensemble's intervention and support. For example, the extensive infrastructure needs and enabling land use planning regulations to establish hydroelectric dams demonstrate that a cheap energy strategy always depends on states. Along this vein, Australian state ensembles have actively pursued alternatives to fossil fuel-intensive energy generation, such as the Commonwealth Government coordinating with State governments to build and manage the Snowy River Hydro energy generation scheme (Griffin, 2003). Likewise, upgrades to the transmission grid, and initial funding of large-scale renewable generations, has continued to rely on state strategy, funding programs, grants and non- or low-interest loans. The central role of the state ensemble has implications for any future regimes of 'cheap', 'renewable' energy regimes given that peak-state ensembles must justify and seek support for contrasting and conflicting energy regimes across the complex terrain of Australian socio-ecological energy relations, which presents a further risk of incoherence for a national Australian energy strategy.

5.2 Accumulation and Capitalisation through Australian Energy

5.2.1 Coal and the Australian State

As mentioned previously, the relations provided by cheap energy are a major precondition of the periods of extended capitalisation and profit for particular accumulation that have characterised Australian energy regimes. This section examines the relations of Australian coal, which is a critical area of focus as the earliest and largest contributor to Australia's emissions (Rosewarne, 2022). Australian coal has been co-produced from large sedimentary basins of past terrestrial-biocarbon, predominantly plant life between 145 and 299 million years old (Geoscience Australia, 2023). In the space of just over 200 years between 1791 and 2022, over 1,000 million tons of coal has been mined in Australia, a contrast in timeframes which highlights the rapid rate of capitalist appropriation since British colonisation (Geoscience Australia, 2023). Today, Australia has the fourth-largest share of coal reserves in the world (Geoscience Australia, 2023), and in 2024 is the world's second largest thermal coal exporter (Geoscience Australia, 2024). As established in Chapter Three, alongside the exploration of offshore gas, Australia's rich coal deposits have historically been seen as critical to Australia's economic prosperity (Thompson, 1983), a longstanding attitude which continues to shape the contemporary socio-ecological relations of coal.

To understand the orientation of the appropriation and capitalisation of any of Australia's contemporary energy regimes, it is necessary to first assess the appropriation and capitalisation of coal in Australia. As the main source of generating electricity domestically, strategic projects to expand the appropriation of coal have been central to strategies pursued across both the Australian peak- and substantial-state ensembles (Rosewarne, 2022). After coal was first discovered when it was spotted on the surface in Newcastle, NSW in 1791, the extraction of coal remained mostly for domestic use in the highly localised energy projects before expanding in line with the growth of British settlement (Geoscience Australia, 2023). Subsequently, as explored in Chapter Three, the post-WWII Pacific Rim project further expanded the incorporation of Australian natures into south-east Asian capitalism. As a direct result, Australian coal has been appropriated in scale for the historical development of south-east Asian capital regimes from the 1950s onwards (Rosewarne, 2022). Reflecting the scale of these regimes, Newcastle, NSW remains the site of the largest coal export port in the world, exporting over 144 million tonnes in 2023 (Port of Newcastle, 2023). From its initial discovery through to its present-day status as one of Australia's most lucrative exports, Australian coal has undergone rapid, sustained appropriation and capitalisation alongside the evolution of modern Australia itself.

Expanding the frontiers of coal appropriation was the first central strategic energy project of the Federal peak-ensemble, with coal remaining central to Australian cheap energy strategies. As

localised energy production began to shift to a larger scale, the Commonwealth Government facilitated the expansion of cheap energy regimes by establishing the Bureau of Mineral Resources in 1946, now known as Geoscience Australia, which is the agency responsible for surveying and mapping coal and other natural resources to facilitate their appropriation, demonstrating one way in which the relations of Australian coal are bundled as a core project across the state axis (Geoscience Australia, 2014). As explored in Chapter Three, Federal and State peak-ensembles also took on massive amounts of overseas debt to expand cheap coal production; in 1979 alone, both the Electricity Commissions of NSW and Victoria sought loans of $100 million each to fund coal-fired power stations and coal loaders at ports (Crough & Wheelwright, 1983). While there was a coherent focus on facilitating the production of cheap coal across peak-state ensembles, there was some strategic divergence within the states themselves, between the focus on domestic consumption or international export. Coal regimes in the highly populated south-eastern states of NSW and Victoria focussed on pursuing a project of domestic manufacturing through the coal-fired power stations, while also building coal loaders at ports like Newcastle, NSW, while the much smaller energy market in Western Australia was orientated towards international exports (Crough & Wheelwright, 1983). Although the focusses on domestic or international consumption are not necessarily incompatible, there are elements of tension that arise in the face of possible cuts to production which continue to shape contemporary energy relations.

As well as being produced by domestic state ensembles, coal as an abstracted Australian Nature is co-produced through broader international energy relations that are fundamentally intertwined with those of the Australian oikeios. In particular, the co-production of cheap Australian coal was directly assisted by the timing of the collapse of cheap oil. The oil crisis of 1973, in which the Organisation of Arab Petroleum Exporting Countries (OPEC) initiated an oil embargo and production tax hike, resulted in the price of oil increasing by almost 300% (International Monetary Fund, 1999; Moore & Patel, 2018). This price shock and associated drop in the supply of cheap energy in the form of oil represented an opportunity for Australian peak-state ensembles to expand industrial mineral processing based on cheap coal, which was in turn used to undercut the price of another historical nature, aluminium (Thompson, 1983). With the cost of oil-fired power stations increasing rapidly following the OPEC crisis, Australia, 'with its abundant coal reserves' was seen as 'a logical place to expand smelting capacity' to fill the gap in the international supply of cheap energy and provide greater protection against potential future gaps in oil supply (Crough & Wheelwright, 1983, p. 25). In particular, and in line with the Pacific Rim project outlined in Chapter Three, Australian state-ensembles were able to further integrate cheap Australian coal as part of south-east Asian energy strategies, thus undermining the existing cheap energy strategies based on cheap oil from the Middle East and South America.

The socio-ecological relations of coal began to shift in the second half of the 20th century as concerns grew around the implications of greenhouse gas emissions for the Earth's climate. In

1988, the Toronto Conference on the Changing Atmosphere: Implications for Global Security warned of the potentially severe consequences of global warming triggered by human-induced atmospheric changes (World Meteorological Organization Secretariat et al., 1989). However, despite the goals established at the Toronto Conference to address this threat, the scale of Australian coal exports actually increased from this point onwards (Geoscience Australia, 2024). The expansion of Australian coal exports from the 1990s was directly connected to the scale at which it was appropriated for two particular state-led strategic energy projects within south-east Asia, namely the growing socio-ecological powers of both the Indian and Chinese state-ensembles, both of which were substantially expanding their manufacturing activities and required a secure supply of cheap energy (Chester, 2010). Today, 78% of Australia's exported liquid natural gas, metallurgical coal and thermal coal is imported by Japan, China, South Korea and India (Grant & Hare, 2023). As such, despite the existential threat posed by global warming in the pipeline, the appropriation of Australia's Coal and Gas has continued, maintaining a short-term flow of cheap energy at the cost of the stable reproduction of the oikeios.

The prioritisation of short-term accumulation interests was evident in contemporaneous peak-state publications. In 1991, the Keating Labor Commonwealth Government commissioned a report on *'The Costs and Benefits of Reducing Greenhouse Gases'* (Industry Commission, 1991a), which recommended that, given Australia's abundant coal supplies, coal should remain an important source of energy accumulation. The report found that 'any attempt to meet the Toronto goal would compromise Australia's comparative advantage in energy-intensive industries that had been consolidated with the recent State investments in large-scale coal fired power stations' (Rosewarne, 2022, p. 21), a finding that neatly encapsulates the way in which historic accumulation regimes shape, and constrain, contemporary and future regimes. The report also recommended delaying a national emissions reduction target, and distancing the Commonwealth Government on climate action, arguing that responsibility for protecting the environment ultimately rested with the State and Territory Governments (Industry Commission, 1991b). This latter argument is an intriguing illustration of the implications of Australia's constitutional arrangements - not only can the split of powers across Federal, State and Territory Governments complicate genuine efforts to implement a coherent energy transition strategy, it can also be used as justification to undermine attempts to implement such a strategy.

The influence of immediate accumulation imperatives over the appropriation of Australia's coal natures was directly enabled through neoliberal mechanisms established by the Commonwealth government. For example, in 1989 the Hawke Labor Government introduced the Resources Assessment Commission, which was tasked with applying a cost-benefit analysis to proposed controversial mining projects (Rosewarne, 2022). In line with neoliberal ideals espoused by the Reagan and Thatcher governments, these analyses were heavily market-focussed, limiting costs and benefits to market outcomes while sidelining broader socio-ecological impacts as externalities. As a result, 'the [project] evaluations became more of a technical exercise reducing

the opportunity for community submissions', employing individualised and abstracted cost/benefit equations to consider project metrics, and thus limiting opposition to otherwise controversial projects (Galligan & Lynch 1992, as cited in Rosewarne, 2022, p.22). Furthermore, projects were assessed individually without consideration of cumulative impacts, which reduced the probability of imposing conditions relating to emissions reduction. Such mechanisms deliberately afforded greater precedence to strategic projects that expanded the appropriation of cheap Australian coal to export to foreign states, rather than responding meaningfully to the international project set out in the Toronto Conference on the Changing Atmosphere, and then the Kyoto Protocol.

As shown in this section, coal has played a central role in Australia's strategic energy orientation, directly facilitated by the peak-state ensemble. Coal continues to play a major role today: in 2022, Australia was responsible for over half of global metallurgical coal exports, and in 2023, Australia exported 873 million tonnes of carbon dioxide through its combined metallurgical and thermal coal exports (Grant & Hare, 2023). Despite the widespread awareness of the climate crisis that is directly attributable to emissions from fossil fuels, including coal, and public pledges to achieve net-zero emissions by 2050, in 2024, Labor's Federal Environment Minister approved three new coal mines, following the seven approved in 2022 (The Australia Institute, 2024). The peak-state ensemble has played an integral role in developing mechanisms which orient Australia's energy policy towards coal-based accumulation and entrench the interests of those appropriating cheap coal over the longer term reproduction of the Australian oikeios. Together with the complexity of Australia's constitutional mechanisms relating to energy, this long history of relations between the state and energy axes has significant implications for Australia's contemporary energy strategy.

5.2.2 Assessing the socio-ecological relations of Australia's neoliberal energy market project

As briefly outlined in the preceding section, the neoliberal reforms of the 1980s and 1990s resulted in Australian Coal extraction regimes facilitated even further into the corroding-reproductive circuits of capitalisation, despite the scale of growing emissions. This section explores one of the most prominent neoliberal mechanisms in its examination of the frameworks, decisions and outcomes of the NEM, a strategic energy project facilitated through peak-state ensemble. The Hawke-Keating Labor Commonwealth government, which held office between 1983 and 1996, saw energy reform as a way to address both growing concern over climate change and to further progress its political project of neoliberal economic rationalisation in line with the prevailing American and British hegemonic economic project. This section shows how the creation of an energy market relied on competition and market forces to create the conditions of cheap, efficient, reliable electricity, which meant that associated state institutions created in support of this project reflect a number of the assumptions (and

contradictions) inherent to the neoliberal school of thought. As established in Section 5.2.1 in relation to coal, these historical institutions have ongoing implications for Australia's current strategic energy orientation.

The NEM was formally launched at the end of 1998, with the Governments of the Australian Capital Territory (ACT), NSW, South Australia, Tasmania, Queensland, and Victoria joining the national project (Rosewarne, 2022). The Northern Territory and Western Australia did not join the NEM, largely due to the immense geographic distance between their energy regimes, and the historical co-production of their regional gas-based energy markets (Australian Energy Regulator, 2009). The *National Electricity (South Australia) Act 1996* enabled the creation of The National Electricity Market Management Company Limited, which was registered in South Australia but had all relevant states and territories represented on the board, and within two years the NEM was in operation (Rosewarne, 2022). While this project represented the point in time in which the national socio-ecological energy project was most consistent across the states and territories involved, with identical pieces of legislation passed in the involved states and territory parliaments, there was an element of contradiction in the fact that the NEM mechanism was technically managed by a state corporation. However, regardless of the technicalities, the creation of the NEM meant that the Commonwealth Government was more directly associated with energy provision than ever before.

Adopting the rationale of the neoliberal hegemonic project of reform under the NEM, State and Territory Governments across the political spectrum have enabled the further capitalisation of Australia's energy natures, with energy infrastructure including networks, transmission, generation and retail firms all sold to private owners. By 1998, the Olsen Coalition Government of South Australia privatised every single energy asset available (Hudson, 2018). In Victoria, the Kennet Coalition Government sold numerous state-owned generators and network companies; one of the largest current owners of Victoria's electricity networks and gas pipelines is SGSP (Australia) Assets, which is 60% owned by State Grid Corporation of China and 40% owned by Singapore Power (Maiden, 2013). Similarly, NSW Labor and Coalition Governments commenced substantial privatisation efforts from 2010 onwards, selling retail, generator network and transition firms to private companies including Macquarie Bank, British-Columbia Investment Management Corporation, and the Qatar Investment Authority (Endeavour Australia, 2021; Gerathy, 2015). Consultancy firms reported profiting $74 million from the energy sell off (Nicholls, 2017). Finally, in Queensland, the Labor Bligh Government privatised coal-fired power stations from 2009 along with elements of the retail sector (Quiggin, 2017). While the full array of energy asset privatisation is beyond the scope of this chapter, the consistent policy of privatisation is clear, leading to considerable complexity in the ownership of energy generation assets, transmission and distribution points across the Australian energy axis.

In addition to facilitating ownership, the peak-state ensemble has also enabled private interests to gain significant influence over the management of the NEM. In 2003, the Ministerial Council on Energy, an Australian intergovernmental committee, recommended both the consolidation of governance and oversight of the NEM, as well as the elevation of the NEM and its rules over any state-based electricity or gas projects (Rosewarne, 2022). The regulatory consolidation took place in 2009, through the Council of Australian Governments (COAG), with the creation of the Australian Energy Market Commission (AEMC) and the Australian Energy Regulator (AER). The AEMC was given a directive to set the rules and regulations, while the AER is intended to enforce compliance (Rosewarne, 2022). In the same set of market reforms, gas was merged with the rest of the market for the first time, under the supervision of the new Australian Energy Market Operator (AEMO). The creation of the AEMO was significant in that it enabled the private owners of NEM energy generators, which now included gas operators, to join government representatives on the board of the market regulator, in what Rosewarne (2022, p. 18) rather drily labels a 'unique organisational arrangement'. As a result of these reforms, the power of the NEM institutions was enhanced even as private accumulation regimes were given increased power to influence these institutions' strategic orientation.

The reorganisation of Australia's energy regimes from the peak-state to the substantial-state ensemble, through one of the largest privatization regimes in the OECD (RBA, 1997), has significant implications on the coherence of a national transition project. The coherence of any national energy project rests on the alignment of disparate strategic orientations across the State and Territory Governments. However, critically, the entrenchment of the ownership of private energy generators in the part of the peak-state ensemble tasked with regulating and directing a strategic project of energy security is a glaring contradiction (Chester, 2010). In particular, there is a clear contradiction between the strategic self-interest of institutional shareholders seeking a return on an investment from an aging coal generator , and the indicated emissions reduction goals of the peak-state ensemble (Beeson & McDonald, 2013; Mercer, 2024). Along with the privileging of a neoliberal market project, the array of privatisation reforms has inevitably shifted the strategic orientation of Australia's energy regimes into multiple diverging and conflicting strategies.

The Australian neoliberal project also rested on particular human natures in the bundling of violent abstractions of free market efficiency and expanding Coal appropriation. Neoliberal rhetoric provided justification for peak-state ensembles to abdicate responsibilities in regards to energy transition or to actively encourage investment in fossil fuels (Conifer, 2020), particularly in the case of governments where this was directly aligned with their political orientation and attitude towards sustainability in general. These strategic socio-ecological dynamics can be clearly seen in 2001; in response to a report on the dangers associated with greenhouse emissions, the Howard Coalition Government affirmed its position that business was best placed to develop emissions reductions on a voluntary basis (Rosewarne, 2022), despite private

businesses having no direct incentive to prioritise the sustainable reproduction of the oikeios over their own individuals interests. Two decades after this, in 2020, the Morrison-Coalition Commonwealth government raised the proposal of using climate funds to invest in 'clean coal', but dropped the idea after backlash across the substantial-state ensemble (Conifer, 2020). These decisions highlight the complexity of any strategic orientation of a national energy project undertaken in Australia, particularly where reorientation may threaten the potential for additional capitalisation and appropriation.

As a result of the neoliberal hegemonic project, and in line with that observed in relation to Australia's coal natures, the strategic orientation of the broader NEM reflects relations of Australian energy oligarkhia, with a disproportionate influence of those invested in the appropriation and capitalisation of energy natures. In 2017, the energy market went through another round of reform with the *Finkel Independent Review into the Future Security of the National Energy Market.* The AER and the AEMC made submissions to the review, arguing 'against the inclusion of any reference to environmental considerations in the NEM' (Finkel et al., 2017, p. 176). In 2019, at the conclusion of the review, COAG agreed to establish and collaborate with the Energy Security Board (ESB), which was directed to plan for the long-term strategic direction of national energy. The positioning of the ESB reflects the submissions of the AER and AEMC, with energy transition couched in the terms of adapting the market to changing technologies, increasing security and reliability, expanding consumer choices and large scale generators leaving the market (Energy Security Board, 2022). In line with Chester's (2010) argument that the definition of energy security depends on the user, the ESB effectively reframed energy transition during a period of epochal crisis to focus on the continued appropriation and capitalisation of energy generation, albeit including renewable energy resources. Here, as observed in relation to coal, the influence of oligarkhia socio-ecological classes with vested interest in appropriation and capitalisation over the substantial state, and indeed the peak-state, maintains the orientation of Australia's energy regimes towards private accumulation, rather than any domestic cheap energy regime, or of course, the sustained reproduction of the oikeios.

The influence of these socio-ecological classes over regulatory bodies like the ESB is visible in the direction of Australia's proposed energy transition in response to the climate crisis. By framing the transition in terms of energy security, market opportunity and technological change, this part of the peak-state ensemble, the ESB and the other AEMO regulatory institutions, attempt to frame the project through the relations of a sunekdokhḗ project. Here, the stated intent is to achieve the peak-state ensemble's aim of emission reduction while continuing private energy accumulation. Yet, the energy regulatory bodies of the peak-state have proposed extending the use of gas, in line with global rhetoric positioning gas as a 'firming' and 'stepping stone' fuel (Wood, 2011; DISR, 2024; Radka & UNEP, 2023). In AEMO's *Integrated Systems Plan*, a 25-year strategic plan for transition within the NEM, gas is positioned as critical, alongside solar and wind power, to guarantee the most secure and cheapest energy (Australian

Energy Market Operator, 2024). This is similarly reflected in the current Albanese Labor Federal Government's *Future Gas Strategy*, which commits to securing new sources of reliable gas supply as part of the transition to a Net Zero economy by 2050 (DISR, 2024). However, while natural gas does produce less carbon emissions compared to traditional fossil fuels, it is highly carbon intensive compared to genuinely renewable sources of energy such as wind, solar and geothermal energy. The prioritisation of gas as a fuel source directly undermines Australia's energy transition, but does provide opportunities for the further violent abstraction and appropriation of Australia's energy natures in line with the interests of powerful socio-ecological classes. So while presenting the intent of sunekdokhḗ-styled project, the strategic project of the Australian energy transition project reflects the on-going influence of Australian coal and gas oligarkhia classes.

Across Australian state ensembles, as elsewhere, the influence of particular socio-ecological classes over the strategic orientation of national energy regimes serves to frame the climate crisis as simply a consumer-led transition. The neoliberal mechanisms embedded in Australia's NEM have ceded considerable power to 'market forces' with vested interests in ongoing accumulation and appropriation, as well as conflating energy transition with cheap and reliable electricity in line with the public expectations that have long shaped Australia's approach to energy provision. These changes have also enhanced the complexity of the strategic orientation of Australia's national energy policy, and, as will be explored in Sections 5.2.3 and 5.3, have significant implications for the focus of Australia's contemporary energy policy.

5.2.3 The appropriation and capitalisation of Liquid Natural Gas

This section explores Australia's Liquid Natural Gas (LNG) extraction regimes, one of the most highly capitalised fossil-fuel extraction processes. The historical abstraction nature has become increasingly important to Australia's energy sector; in 2022, the impact of Russia's invasion of Ukraine on global energy prices and supply saw 'the value of Australian LNG exports [surge] 86 per cent…to almost $93 billion' as 'exports hit a record volume of 81.4 million tonnes in 2022, keeping Australia almost on par with the US and Qatar in terms of global exporters' (Toscano, 2023). The section explores the North-West Shelf extraction regime on the WA coastline, as well as on-shore east coast production of CSG, highlighting the way in which both points of extraction are characterised by a high concentration of foreign ownership and a clear orientation towards export interests. Essentially, LNG extraction within Australia reflects an oligarkhia project between a range of peak-state ensembles to benefit a particularly privileged socio-ecological class of LNG owners, based on a dislocated and highly capitalised accumulation regime linked to foreign interests.

Similarly to the way in which the early Australian state ensembles enabled the appropriation of historical natures through cartological surveying, the contemporary Australian Federal

Government has played an integral role in facilitating the appropriation of Australia's LNG. The Federal Department of Foreign Affairs and Trade (DFAT) claimed that Australia's national interest required the mineral and petroleum reserves located on the continental shelf to be assessed in a 'thorough and timely manner', an exercise which was then funded through the Continental Margins Program (Fernandes, 2018). The rationale behind identifying the 'full extent and possible location of hydrocarbons' along the continental shelf was directly linked to the facilitation of foreign investment, with DFAT noting that investors would be 'unwilling to speculate without a basic information framework' (Fernandes, 2018, p. 119). Importantly, the mapping undertaken by the Federal Government fulfilled the requirements of Part VI of the Law of the Sea Convention relating to the continental shelf, which would then go on to enable the legitimised establishment of the North-West Shelf Gas Project (Fernandes, 2018). Effectively, the Australian peak-state ensemble made historic Australian natures legible for investors, thus subsidising the establishment of foreign energy accumulation regimes.

The North-West Shelf LNG extraction regime is a marine-based appropriation of hydrocarbon natures in Australia's North-Western basins. As briefly introduced in Chapter Three, the North-West Shelf represents one of the most expensive development projects in Australian history, and, at the time of construction, was the largest fossil fuel extraction project in the world (Purcell and Purcell, 1988). The project delivered its first LNG export from the Karratha Gas Plant to Japan's Sodegaura Terminal in 1989 (NWSG, 2019), and has since become one of the most highly capitalised and contested LNG regimes in Australia. While directly enabled by Australian state ensembles through mapping and the passing of enabling legislation such as the *Petroleum (Submerged Lands) Act 1967* (Purcell and Purcell, 1988), the provision of foreign capital was also essential to the project's development. Today, the regime involves a consortium of major companies, including BHP, BP, Chevron, Shell, Woodside Petroleum, Mitsubishi, Mitsui & Co, which is 100% foreign owned, with major shareholders including US capital funds such as Blackrock and Vanguard (CCWA & The Australia Institute, 2021). This foreign ownership is a deliberate outcome of Australian peak-state ensembles' energy regimes, and is visible elsewhere in Australian LNG extraction.

The extraction of LNG in Australia is not solely limited to the North-West Shelf, but has also formed a central part of Queensland's contemporary energy regime. In 2015, LNG was exported from the East Coast, and hence the NEM, for the first time as Queensland began to export LNG from the Gladstone Terminal (Santos, 2015). Similarly to the North-West Shelf, ownership of this terminal is heavily concentrated in foreign capital, owned by a consortium of energy multinationals based in Australia, Malaysia and France and South Korea (Santos, 2015). Reflecting the exhausted appropriation of easily accessible reserves of natural gas, Queensland's LNG regime is predicated on the appropriation of unconventional sources, particularly coal seam gas (CSG), of which Queensland has 98% of Australia's reserves (de Atholia & Walker, 2021). CSG is one of the most ecologically damaging gas extraction methods; it relies on the extraction

of significant amounts of groundwater which can result in surface level subsidence (IESC and DOE, 2014) and the pollution of both surface and groundwater systems (Ali et al., 2017). These impacts also further corrode the appropriation of Australian soil, given the locations of CSG wells on agricultural accumulation regimes in Queensland (Brown, 2023). However, the impacts of these potential points of socio-ecological exhaustion are heavily influenced by the concentration of foreign ownership across Australian LNG extraction.

As noted above, Australia's peak-state ensembles have deliberately facilitated foreign investment and ownership of Australian LNG extraction as part of the sector's broader export orientation to fulfil international capital's demand for cheap energy. Australia's LNG regimes are overtly more favourable to foreign cheap energy regimes, with the average length of domestic gas contracts 1-10 years less than half of the standard international contracts of 20 years plus (de Atholia & Walker, 2021). The WA Government, which governs the state responsible for 12% of global LNG exports and 57% of Australia's LNG exports in 2020 (Goods and Ellen, 2024), exports two thirds of its gas without any tax or royalty (Carter & Campbell, 2022). The WA peak-state ensemble in particular has consistently enabled and directly subsidised international energy projects, with benefits flowing to a tiny proportion of private Australian capital and the rest to foreign capital (Carter & Campbell, 2022). These arrangements often directly contradict Australia's domestic interests; for example, historical domestic supply relations mean that WA is far more dependent on gas than the rest of the Australian States, with over 60% of the WA domestic market linked to gas, yet over 90% of WA's gas production is for export (Goods & Ellen, 2024). The strategic orientation of LNG extraction regimes to benefit foreign capital has impacts beyond the loss of domestic income, but also directly impacts points of socio-ecological exhaustion within the Australian oikeios.

The orientation of LNG extraction regimes to benefit foreign interests exacerbates the socio-ecological points of exhaustion that are inherent to methods of LNG extraction. LNG extraction is a highly energy-intensive process - the process of cooling liquidation of natural gas consumes thirty six times the amount of gas used by the most gas-intensive sector of the Australian manufacturing industry (Swann & Ogge, 2022). The favourable arrangements set up by the States means that LNG 'cheap' extraction regimes are underpinned by the facilitation of free consumption of extracted natural gas to underpin the immense energy requirements of LNG export infrastructure and processing requirements (Swann & Ogge, 2022); in other words, the export orientation of the LNG sector in itself requires the extraction of greater amounts of LNG. As a result, the creation of a co-producing LNG fossil-intensive energy export sector requires over 400 petajoules of gas, or 80% of all gas produced merely to meet processing requirements (Swann & Ogge, 2022; Morrison & Denis-Ryan, 2024). In addition, to meet the demands of foreign capital, LNG extraction regimes have been capitalised to the point where extraction methods have stretched further into the Australian seabed or relied on corrosive methods of extraction such as CSG, which have greater impacts on water and soil quality.

The concentration of ownership in foreign capital within the North-West Shelf LNG extraction regime represents a clear dissociation between production and consumption. To a significant extent, LNG regimes inherently represent a disassociation between the initial point of appropriation, transmission and consumption, particularly in relation to off-shore LNG extraction. When it comes to LNG extraction regimes that are entirely owned by foreign capital or oriented towards export markets, there is a marked dissociation between the relational complexes surrounding production and the impacts of capitalisation on the Australian foreign and the final point of energy consumption; in other words, both the owners of production and the consumers are almost entirely removed from the socio-ecological impacts of points of local exhaustion. This means that fierce localised contestion, such as the Lock the Gate alliance between green groups and farmers seeking to reduce the impact of CSG on arable land (Lock the Gate, 2024), may place pressure on Australian peak- and substantial-state ensembles but has limited direct impacts for the distanced producers and consumers of the contested natures themselves.

Amidst the current focus on a transition towards renewable energy, the WA peak-state ensemble has also leveraged the export-orientation of its LNG sector to avoid genuine transparency around gas emissions. Given the gas used in the production of LNG itself, the North-West Shelf LNG project is already Australia's largest emitter of emissions (CCWA & The Australia Institute, 2021). The WA Environment Protection Authority (EPA) has recommended extending the operation of the project until 2070, if the operator Woodside is able to show steady emissions reductions from the plant or purchase carbon offsets (Shine & Turner, 2024). However, the EPA does not assess the emissions from burning the gas, which means the broader climate impacts of the continued export of gas is not assessed as part of the state's assessment of socio-ecological impact (CCWA & The Australia Institute, 2021). As such, even as the capital, energy and environmental costs of Australia's LNG regimes increase the socio-ecological tension over any additional climate and energy policy, the mechanisms put in place by the peak-state ensemble are largely privileging the interests of foreign capital over a genuine energy transition.

The points of exhaustion relating to Australia's LNG extraction regimes are not solely related to environmental impacts or the broader concerns relating to emissions, but are also linked to socio-ecological contestation over the price of domestic energy, impacting the reproduction of energy relational bundles. Since LNG exports began to flow from Australia's east coast terminals in Queensland in 2015, the price of energy on the national market has tripled, with the price of gas not expected to return to 2015 levels for decades (Morrison & Denis-Ryan, 2024). Essentially, the profits of foreign owners have been prioritised over domestic affordability, a controversial move in a society that places high value on cheap, reliable energy, as explored in Section 5.1.3. Australia does have a Domestic Gas Security Mechanism in place, which places limits on exports or directs producers to find new supply sources if a shortfall in gas supply is

predicted (DISR, 2021). Here, the SSER framework's understanding of capitalism as requiring the appropriation of an ever expanding flow of unpaid energy/work provides an explanation for the institutional preference of expanding appropriation. That is, even though Australia has more than enough gas to meet domestic needs, the class of LNG owners have different strategic priorities. Australia's export-oriented gas markets essentially undermine domestic energy security - which is ironic given the justification for gas as a stepping stone fuel - and ensure that global energy price shocks have a greater impact on the NEM, potentially impacting future points of unrest and contestation.

This section's review of Australia's LNG extraction regimes has highlighted the privileged socio-ecological class of foreign gas ownership in Australia, particularly in the gas-intensive state of WA. Relations of oligarkhia can be identified in the way that state-ensembles such as the WA Government have enabled and underwritten LNG production, but required minimal tax or royalties from those privileged socio-ecological classes directly benefited from these state investments. Indeed, in 2018/19, the Australian gas industry paid $1.7 billion of income tax on income worth $110 billion, a taxation rate of approximately 1.5% (Vorrath, 2022). While the WA government has promoted the gas sector as a job creator and generator of profit for the state, this is a poor misrepresentation, with LNG taxation contributing around 1% to the WA budget, and less than 1% of the state's workforce (Carter & Campbell, 2022). Simultaneously, state mechanisms are structured in a way that provides unequal influence for these privileged socio-ecological classes and embeds an energy regime that is fundamentally oriented towards private accumulation by foreign capital at the expense of the broader Australian oikeios.

5.3 Contest and crisis in Australian Energy

5.3.1 Assessing the relations of contemporary contestation and increasing energy crises

Following years of energy regimes fundamentally oriented towards the appropriation of fossil fuels to facilitate cheap energy, Australia's energy production is now highly vulnerable to crisis. With the 2024/25 summer predicted to be Australia's hottest on record, Australia's coal-fired power stations are vulnerable to overheating, and are consistently forced offline for 8-10% of each year (The Climate Council, 2024). In addition, an increasingly volatile climate including bushfire and flooding events, combined with frequent blackouts in periods of high energy demand, increases public concern over sustainability and undermines the socio-ecological foundations of Australia's carbon-centric energy production. Nonetheless, state mechanisms that have historically supported Australia's coal regimes continue to privilege fossil-fuel based accumulation at the expense of a cohesive energy transition in response to the climate crisis. This section uses the SSER Framework to provide an overview of significant points of contestation within Australia's energy axis, including escalating points of failure, diverging socio-ecological

expectations, complex constitutional mechanisms and the demands of international energy regimes.

Australia's energy markets have begun to experience tension and failure with increasing frequency. In 2022, the NEM failed when the spot price hit the AEMO's regulatory cap of $300, causing the AEMO to suspend the national market for the first time in its history (Norman, 2022). The AEMO was forced to directly intervene to direct gas towards Victoria, and required NSW to import directly from Queensland until Victoria had sufficiently replenished its energy stores (ABC News, 2022). This event is likely to occur again in future: under the rules set out by the AEMC, providers have greater financial incentive to provide energy during market suspension, rather than sell energy with the standard price cap in place (Foley, 2022). The Federal Government has also been forced to intervene in the gas market: as a result of a forecast shortfall in gas supply, the Government developed a new Heads of Agreement with east coast gas producers to secure domestic gas supply until 2026 (DISR, 2022). However, this is merely a temporary fix, with the AEMC predicting a possible gas shortfall in south-east areas of Australia during the mid 2030s, even while research by Saunders (2024) demonstrates that Australia currently exports 35 times the gas required to fulfil domestic demand. Such temporary interventions, without genuine intervention to restructure and reorient Australia's energy regimes, demonstrate the points of fragility in current energy regimes.

Contemporary energy regimes' orientation towards accumulation by privileged socio-ecological classes is also enhancing points of tension amid a cost of living crisis. Ongoing capitalisation and export, facilitated by Australian peak-state ensembles, has enabled gas giants Woodside and Santos to make 'more money in 2022 than in any year in their history' (Macdonald-Smith, 2023). Meanwhile, alongside widespread high inflation across a range of essential products, power prices along Australia's east coast have increased by over 25%, which is partly attributable to the way in which the domestic price of gas is increasingly connected to soaring international prices (Robertson, 2022a). In addition to unrest over soaring prices and investor profits, there is growing concern over the impact of a fossil-fuel intensive energy regime on Australia's climate. This has led to direct conflict between the peak-state ensemble and the broader substantial state, with Australia leading the world in its arrest of climate protesters (Berglund et al., 2024). This growing contestation on multiple fronts creates considerable pressure on peak-state ensembles; as Moore and Patel (2017, p. 174) note, 'keeping energy cheap requires sustained state intervention' and 'when the State fails, we see the politics of resistance'. The Albanese Labor Federal Government is actively intervening in the NEMO to temporarily cap soaring prices as part of a broader attempt to coordinate a national energy transition (Healy et al., 2023; Prime Minister Albanese et al., 2022), but faces significant challenges in coordinating a cohesive national energy strategy and limiting accelerating points of contestation.

As noted in Section 5.1.3, past energy regimes continue to shape the parameters for contemporary energy regimes, particularly during a period of transition. The contemporary Australian experience and attitude towards socio-ecological relations of energy is bundled with the historic experiences of cheap, carbon-centric energy regimes, influenced by individual and collective memories and the experiences of conditions associated with it. This is particularly true in places like Colle in WA, La Trobe in Victoria and the Hunter region of NSW, which have been, and still are, integrally connected to coal regimes and reliant on these regimes for employment and prosperity. In these places, and indeed beyond, support for a transition towards a renewable energy regime is far from universal, and there has been considerable backlash to climate protests focussed on these communities (Layt, 2019). To further complicate matters, some of these locations are the proposed sites for massive renewable energy projects, such as a proposed off-shore wind project in Newcastle, NSW, the site of the world's largest coal port, which has been protested by community members (Stephens & Tillman, 2023). Lingering memories and social attachments to past cheap coal regimes present on-going challenges to any transition, just as the historical dominance of previous coal-based energy regimes of coal continues to be reflected in contemporary state mechanisms (Rosewarne, 2022). These attachments present both barriers and opportunities in the re-production of the certain energy narratives, and complicate the coherence of energy regimes at a national scale.

Australia's energy transition is also complicated by the complexity of ownership and control over critical points of the national energy project, including energy transmission, generation, extraction and finance. Many parts of the project sit outside direct ownership and control by the peak-state ensemble, but remain embedded within the substantial-state ensemble through the regulatory role of state institutions, such as the AEMO. In particular, the array of sovereign-wealth funds, financial asset and pension funds, and institutional investors (Chester, 2015; Endeavour Australia, 2021) broadens the differing strategic orientation of each relational bundle in the energy axis, with diverging and at times directly conflicting interests competing for power across the substantial-state ensemble. For instance, while parts of the substantial-state are seeking to further the renewable energy transition, others use price surges and projected fossil fuel shortfalls to justify appropriation of further frontiers of carbon natures including natural gas (Foley, 2022). This compounds the divergence between the public expectations of a nationally coordinated response to climate change via energy transition, and the reality of actual relational ensembles.

In addition to the points of divergence caused by the concentration of private ownership of Australia's energy infrastructure, there are considerable challenges relating to the constitutional mechanisms governing energy provision across the Federal, state and territory peak-state ensembles. As explored throughout this chapter, despite the fact that constitutional responsibility for energy sits with State and Territory Governments, the Australian Federal peak-state ensemble has routinely attempted to support or undermine State and Territory Governments' energy

strategies depending on its shifting political priorities (McGreevy et al., 2021). Recent Federal interventions into the NEM and gas market demonstrate the way in which accelerating points of failure increase the intersection between the Federal Government and the mechanisms of the State and Territory Governments, placing pressure on constitutional boundaries in energy capitalisation. This creates tension and inconsistency given the considerable divergence between the two major parties in relation to climate and energy policy: whereas Labor has committed to 82% renewable energy generation by 2030 (ALP, 2023), the Federal Coalition opposition has proposed a transition to nuclear power stations, which in reality would mean coal-fired power generators would continue to remain in operation for much longer compared to Labor's proposal (Middleton & Readfearn, 2024). These markedly different approaches, combined with increasingly polarised politics, lay the foundation for increasing points of contestation within the peak-ensemble, particularly between the Federal, State and Territory Governments.

The (likely increasing) points of tension across different levels of Australia's peak-state ensembles has significant implications for energy transition as crisis events increase. Across the substantial-state ensemble, climate justice protestors have regularly decried voluntary carbon markets and offsets as 'a form of carbon colonialism' (Baer & Singer, 2025). Even within peak-state ensembles, the relational socio-ecological bundles supporting the Neoliberal energy market are increasingly incoherent, as Australian States and Territories continue to pursue diverging energy strategies, some of which undermine the current Federal focus on renewable energy transition. For example, the WA Government, which governs an economy heavily reliant on fossil-fuel based accumulation, has directly lobbied the Federal Government to undermine national environment reform in favour of protecting the interests of private capital (Greber, 2024). These discrete and sometimes diverging strategies, which State and Territory Governments are justified in pursuing according to the Australian Constitution, detract from a cohesive national approach even as Australian energy regimes are increasingly under pressure from epochal crisis. This creates complications for the implementation of Australia's international commitments relating to emissions reduction, and significantly enhances the complexity, and thus undermines the coherence, of Australia's national energy strategy.

Australia's renewable energy transition is also heavily influenced, and indeed undermined, by geopolitical socio-ecological tensions in south-east Asia. The regional contestation over supply of LNG for Japan, South Korea and China, all highly capitalised and influential global powers, reflects the ongoing international contestation of Australian based regimes. Diplomatic pressure has resulted in the Australian state giving assurances to Japan and South Korea regarding the supply and fulfilment of long term gas contracts, which have become a critical part of diplomatic relations with both states, as well as making commitments to the growing power of China, who is Australia's largest trading partner yet the subject of increasing tension with close ally, the US (Jie, 2024). In 2002, the North-West Shelf project signed a $25b deal to 'provide gas to China's Guangdong province with more than 3 billion cubic tons of LNG for a period of 25 years'

(Fernandes, 2018, p. 105). Despite the climate crisis, and in line with Australia energy regimes' strategic orientation towards the interests of foreign capital, both Federal and State Labor Governments continue to support a LNG energy regime is firmly linked to the energy security of special national state allies of Japan and South Korea (de Atholia & Walker, 2021; King, 2022). This complicates energy transition further, given that moves away from LNG may jeopardise Australia's standing with key international allies, as makes Australia's energy natures more vulnerable to international contestation at a time of increasing global tension.

The analysis undertaken in this section is fundamentally limited to a high level analysis, given the complexity of Australia's energy regimes and the wide range of points of crisis and contestation within the Australian energy axis. Nonetheless, it is clear that current Australian energy regimes are not equipped to deal with the epochal crisis presented by climate change. Even while energy is seen as a fundamental responsibility of peak-state bodies, control over the strategic orientation of Australia's energy regimes is in fact heavily influenced by a wide range of actors across the substantial state. Socio-ecological crisis events continue to amplify relational tension in energy capitalisation regimes, further diverging Australian strategies in the face of a shifting global energy and climate strategic terrain. Further, the strategic orientation of Australian energy appropriation towards international energy regimes creates considerable potential for increased tension and volatility, even as an epochal crisis requires stability and cohesion.

5.4 Conclusion

This chapter has focussed on the unique energy relations of the Australian oikeios, with a particular focus on the fossil-fuel Natures of coal and gas. Using the SSER framework has highlighted the diverse ways in which Australian energy Natures are abstracted and capitalised through Australian peak- and substantial-state ensembles, which are themselves highly fragmented and contested. Historical accumulation regimes based on the appropriation of fossil-fuel Natures to support cheap energy regimes for both domestic and international consumers have shaped an international regime based on the appropriation of massive coal and gas deposits over both terrestrial and marine frontiers, contributing to the accelerating climate crisis. More recently, the neoliberal hegemonic project across both Australian and international state ensembles has supported a strategic orientation that privileges capital accumulation over genuine energy transition, and thus over the ongoing reproduction of the Australian oikeios.

International shocks and crisis events have resulted in price crises and supply shortages for Australian citizens, and mega profits for the export orientated regimes, which are highly exposed to foreign accumulation regimes. The relational bundles and complexes supporting capitalisation of Australian coal and LNG energy regimes are increasingly placed under greater tension, as the epochal crisis worsens globally and a variety of relational intersections face increased risk of

exhaustion. In face of the collapse of former cheap fossil-energy regimes, international shocks in European energy regimes, and the highly public expansion of LNG export capacity to the detriment of Australian domestic consumers, the mechanisms of the Australian peak-state ensembles are increasingly contested and placed under pressure. While historically, Australian peak-state ensembles have firmly supported capital accumulation, as the epochal crisis disrupts energy markets, international cheap energy regimes will increasingly conflict with Australian domestic energy relations.

Despite points of coherence, in the short- to medium-term it appears clear that the Australian Federal, State and Territory Governments will continue to diverge on strategic energy regimes, impacting relational conditions across Australia. Historic processes of capitalisation have resulted in a highly variable and incoherent national energy strategy, which will have increasing implications for any national energy transition and other meaningful responses to climate change. Without genuine collaboration across peak-state ensembles, despite the challenges of Australia's constitutional mechanisms, Australia will continue to struggle to move on from its dependence on fossil fuel natures. Greater collaboration and strategic coherence, including a move away from the neoliberal hegemonic project, is required to sustain the ongoing reproduction of Australia's energy natures and the broader oikeios.

Chapter Six: Living Carbon

6.1 The unique socio-ecological relations of carbon

6.1.1 Introduction to the socio-ecological analysis of Australian carbon

Chapter Six contains the discussion of the final axis examined within this dissertation, that of carbon. The examination of carbon and strategic-state projects is not only critical because of the immediate link between carbon emissions and the accelerating epochal crisis, but also more broadly given carbon's vast and varied positioning throughout the rt4555555ftrgweb of life on earth. The forms and processes of carbon reflect its centrality to the re/production of the planet's biogeochemical processes fundamental to the reproduction of life; quite literally making up the material of living species, as well as contributing to the reproduction of the complex systems stabilising atmospheric and marine feedback loops. The significance, diversity and breadth of the carbon axis across the oikeios cannot be understated, and an in-depth understanding of carbon's socio-ecological implications for, and impacts from, strategic state projects is therefore critical in both responding to the capitalist origins of the climate crisis, and sustaining a stable reproduction of the oikeios.

The socio-ecological relations of carbon are identifiable across many different interactions within the oikeios, with the scale of carbon interactions reflected in the diversity of atmospheric, geological, and terrestrial carbon processes that are critical to planetary functions and the reproduction of life. The depth of unique processes and relations of carbon prevent this chapter from assessing the full extent of critical carbon processes relevant to the Australian oikeios, and indeed beyond, such as atmospheric carbon regimes, or marine biocarbon. As such, this chapter will focus on the unique scale and historical conditions of Australian terrestrial biocarbon natures (ATBC). In particular, it examines the three interrelated ATBC systems of natures in native forests, soils and its organic carbon content, and the mycorrhizal relations that sustain carbon and nutrient exchanges and drawdown. As was established in regards to the water and energy axes of the web of life in Chapters 4 and 5, terrestrial carbon bundles vary greatly over space and time, with each of these three interrelated systems embedded in the spatially-unique, historical socio-ecological relations of Australia's continental conditioning, past and contemporary capital accumulation regimes.

The strategic relations of Australia's terrestrial biocarbon bundles are globally significant, given the high rate of endemic species and low rate of categorisation (Woinarski et al., 2021). Some 85% of plants and 41.3% of chordates are endemic to the continent; among chordates, individual endemics rates are as high as 94% in frogs, 93% in reptiles, 87% in mammals, and 45% in birds species (Chapman et al., 2009; Green & Moggridge, 2021). This means the reproduction of Australia's biodiversity has historically rested on the associated relational processes of endemic species. The ATBC natures explored in this chapter provide crucial habitat for these unique species through forest biomes, sub-surface soils and mycorrhizal networks, as well as sustaining

the reproduction of food and materials upon which all human and extra-human life relies. As such, ATBC natures are intricately connected with the high rates of biodiversity loss and land clearing that characterises Australia's contemporary oikeios; indeed, the level of degradation and appropriation of Australia's native forests is highly correlated with the high extinction rates of Australian biodiversity (Foley, 2020; Williams et al., 2021). Given the huge range of the foundational exchange of nutrients and resources supporting microbial processes and biointegrity, this chapter employs the SSER framework to examine ATBC natures not only through a mainstream carbon-centric lens, but also as highly connected to broader socio-ecological reproduction.

Nonetheless, exploration of ATBC natures must include consideration of these complexes' role in carbon drawdown amidst an epochal crisis that is largely underpinned by excessive rates of carbon emissions. The ability to draw down carbon, along with countless other critical processes such as nitrogen exchange, places immense importance on an effective understanding of terrestrial biocarbon's interrelated systems and related socio-ecological strategies. The three interrelated systems examined in this chapter have distinct strategic roles and processual implications in the unique ATBC processes of drawdown and sequestration within the oikeios. This chapter will therefore assess the unique relations, capitalisation and contestation that inform the future of strategic relational orientation of ATBC complexes. It will identify strategic projects and accumulation regimes co-produced through the state ensemble that have enabled the creation of world-leading agricultural exports and carbon markets based on terrestrial biocarbon offsets, alongside globally significant scales of extinction and soil organic carbon (SOC) loss, with Australia having reached the 'third highest cumulative loss of soil organic carbon in the world in just over 250 years' (Williams et al., 2021, p. 10). Here, the SSER framework is critical in enabling a comprehensive understanding of the role played by the peak- and substantial-state ensembles in enabling national projects and accumulation regimes that both appropriate and capitalise ATBC nature complexes.

This chapter begins with an overview of Australia's foundation terrestrial biocarbon natures. It explores the millions of years of geological processes that formed Australia's highly unique biocarbon natures, and the role that these natures have played in the reproduction of life and carbon drawdown across the Australian oikeios. It then goes on to explore historical accumulation regimes based on ATBC natures, noting that this is inherently restricted given the way that ATBC natures are connected to the reproduction of essentially all life. It examines the relationship between Aboriginal Australians, fire regimes and the reproduction of ATBC natures, which was profoundly interrupted by British settlement. As British colonists 'developed the land', land clearing and modification rapidly increased the rate of ATBC exhaustion and imposed foundational strategies that continue to shape contemporary ATBC accumulation regimes.

The second section of this chapter goes on to explore these contemporary regimes in more detail. In assessing the socio-ecological abstraction of terrestrial biocarbon, this section's assessment encompasses the interconnected processes and exchange across ATBC complexes, the financialisation and the orientation of restoration policies, and the limitations of carbon market offsets based around terrestrial biocarbon. Similarly to energy and water, the section explores how the highly contested appropriation of ATBC natures through a neoliberal national restoration projects ultimately enables the ongoing appropriation and exhaustion of ATBC natures through the dominance of the abstraction of market forces and limited oversight of accumulation. The section then goes on to explore Australia's carbon markets, identifying key points of contradiction in the intended strategic outcomes of these ineffective market-based mechanisms. In particular, it explores the flaws in the methodology and implementation of these markets that paradoxically enables the continuation and increase of industries premised on the exhaustion of ATBC natures.

The third section then uses the SSER framework to identify key points of exhaustion which are simultaneously co-produced across ABTC relations and further increase the volatility of the stable reproduction of the oikeios. In assessing the relations of both above and below ground carbon biomass, the section identifies the full extent of exhaustion from accumulation strategies, in addition to the processes governing the dynamics of complex carbon growth, and long-term carbon drawdown. This chapter explores how the dynamics of escalating points of crisis and socio-ecological contestation across the peak- and substantial-state ensembles impact the viability of Australian socio-ecological strategy towards the axis of terrestrial biocarbon, and the long term operability of accumulation regimes, carbon markets and restoration markets with increasing negative value limits imposed on complex carbon coproduction. As will be demonstrated in the following chapter, applying SSER analysis to Australia's terrestrial biocarbon relations highlights an incoherent accumulation strategy and national strategy which is fundamentally incapable of a strategic reorientation to support the ongoing reproduction of critical ATBC natures.

Before undertaking this analysis, it's important to note from the outset that even a brief SSER assessment of ATBC regimes demonstrates the disparity in knowledge, active strategy and consideration of the different biocarbon systems. That is, while native forests and, increasingly, soil has received significant attention by the state-ensemble, the interconnecting mycorrhizal relations have not. While this is a finding in and of itself, it also limits, to some extent, fully equivalent analysis across all three systems in this dissertation given the gaps in existing knowledge and socio-ecological ATBC projects. While this chapter seeks to assess the full extent of appropriation across these socio-ecological systems, the limitations of our current understanding presents challenges both for this work, but also for any comprehensive reorientation of ATBC regimes.

6.1.2 Webs on webs: assessing foundational terrestrial biocarbon relations in the Australian oikeios

The interrelated ATBC systems of native forests, soil, and mycorrhizal networks have long served to reproduce Australia's native biodiversity, as well as acting as an extensive carbon sinks. These spatially interlinked systems can be identified within the web of life in the surface and near-surface biosphere and its varying biomes, including above-ground biomass with its forests, grasslands and associated genetic diversity of animal and plant life existing within (Williams et al., 2021). ATBC complexes are also plentiful below-ground, with mycorrhizal networks and organic soil carbon acting as critical nodes in carbon processes including draw-down, material exchange and plant health (Hawkins et al., 2023; Frey, 2019). These systems, even before they were identified and recognised as such, have long been appropriated as part of historical and contemporary Australian accumulation regimes, which have capitalised on their unique ability to co-produce life.

Australia's unique terrestrial biocarbon relations reflect the uniqueness of Australia's climate, including its levels of glacial disturbance, high temperatures and low rainfall. The Australian continent, as part of the on-going separation of Gondwana, separated from Antarctica approximately 90 to 100 million years ago (Wet Tropics Management Authority, 2014). The nature of Australia's unique continental shift provided latitudinal stability that resulted in the continent avoiding the ice age that other continents experienced, meaning that the spatial impact of glacial disturbance was vastly limited in comparison (Eldridge et al., 2018). In addition to the consequently unique formulation of the continent's soils, carbon and broader biomass, Australia's climate is also distinctive in its aridity; Australia is also the driest inhabited continent, with dryland soils that cover over 70% of the Australian landmass (DCCEEW, 2022). These conditions, the combination of which is found nowhere else on Earth, laid the foundation for a unique web of intersecting terrestrial biocarbon across the Australian oikeios' carbon axis.

The historic socio-ecological co-production of ATBC relations has shaped its surface level biomes, particularly in relation to Australia's forests. Whereas other major dryland biomes around the planet are often dominated by grasses and shrubs, the Australian landscape features both dry open Eucalypt and wet sclerophyll forests stretching from Tasmania's tall eucalyptus forests to wet eucalypt open forests of Northern Queensland (Bastin et al., 2017; Eldridge et al., 2018; Maestre et al., 2021). Over 86.5% of the Australian continental landmass features native vegetation, of which Eucalyptus woodlands are a central feature (SOE, 2021, p. 19). Eucalyptus species have 'flourished as the continent kept becoming warmer and drier, giving them the chance to outcompete their rival trees' (Weule, 2022). In addition, Eucalyptus forests, like Australia's Ash forests, enjoy early rapid growth after a fire, due both to lack of competition from other species and their increased growth in fire-heated soil (Attiwill, 2002). Unlike other species, the 500+ eucalyptus breeds present within Australia's forests can 'cross-breed' and

‘hybridise’, eventually become new species or subspecies by themselves (Weule, 2022). As a result, Australia’s surface level biomes are continually evolving in a way that both produces, and is produced by, below-ground ATBC complexes.

Given its unique combination of terrain and climate, along with myriad other factors, Australia’s ATBC relations have the capacity to draw down a significant amount of carbon, within both the forest biome and in SOC levels. Tasmania’s tall eucalyptus forests accumulate carbon faster than any other natural forest ecosystem in the world (Wardlaw, 2024), while Victorian Mountain Ashs are the most carbon dense in the world, holding 1900 tonnes of carbon per hectare (Mackey et al., 2008a; Salleh, 2009). The irreplaceable carbon storage of dead plant matter has a greater stability in these forests due to slower decay rates; while warmer forests have a higher growth rate, this environment also produces a high rate of decay (Mackey et al., 2008c; Salleh, 2009). Comparatively, cooler Australian native forests have an extensive storage of dead biomass that lasts much longer (Salleh, 2009), contributing to the higher carbon storage per hectare of cool Australian native forests. However, the rate of SOC decomposition is significantly impacted by an increase in temperature (Attiwill, 2002; Conyers et al., 2015), which poses a threat as average Australian temperatures rise in the face of climate change.

As noted in Section 6.1.1, a critical portion of ATBC exists below the surface, including Australia’s unique soils. The soil microbiome is a mega-diverse and functionally important ecosystem, and critically, ‘essentially a non-renewable resource’ (DAWE, 2021). The health of the soil microbiome underpins the success of land-restoration efforts (Frew et al., 2022; Yan et al. 2020) and is closely coupled to the above-ground vegetation community (Bowd et al., 2021). While Australian soils are relatively nutrient-poor compared to those of other continents, they nonetheless play a significant role in carbon storage (Hobley et al., 2015). The characteristics of soil, in addition to other features such as topography, precipitation and wind, have been found to contribute to a wide variety in the characteristics of otherwise identical Eucalyptus species (Weule, 2022), which in turn have been found to have a direct impact impact on SOC levels in soil (Attiwill, 2002; Conyers et al., 2015; Hobley et al., 2015; Mackey et al., 2008a). The land management practices which visibly change Australia’s forest biome and landscapes thus have direct impacts on extensive ATBC networks below the surface.

Like soil, Australia’s unique mycorrhizal features play an integral role within the Australian carbon axis. While arbuscular mycorrhizal fungi are normally found in grasslands, in Australia, Eucalyptus species utilise arbuscular mycorrhizal networks during initial life stages and then, unusually, ‘switch over to ectomycorrhizal fungi as they grow into adults’ (Weule, 2022). Australia mycorrhizal fungi can survive up to 35 degrees celsius, compared to 28 in the northern hemisphere, a level of resilience with significance for Australia’s socio-ecological projects focussing on carbon drawdown (Conway, 2022). With 75% of terrestrial carbon stored below ground and mycorrhizal fungi forming a symbiotic relationship with ‘nearly all land plants’,

mycorrhizal fungi are a 'key entry point of carbon into soil food webs' (Hawkins et al., 2023, p. 560). Indeed, Plett (as cited in Conway, 2022) estimates that 'inoculating eucalyptus [with the] … right mycorrhizal partners could cut fertiliser use by up to 40 per cent, and increase the storage of carbon underground'. As alluded to in Section 6.1.1, mycorrhizal natures have been traditionally misunderstood and neglected as a historical nature, and generally misappropriated by privileged landholding socio-ecological classes.

As demonstrated extensively across Mackey et al's work (2008a; 2008b; 2008c), Australia's terrestrial forests and the soil and mycorrhizal features to which these forests are intricately connected are critical to global carbon drawdown. Australia's native forests are the dominant point of terrestrial, land-based photosynthesis, acting as the surface biomass and entrypoint of carbon biochemical energy reproduced throughout the oikeios (Mackey et al., 2008a). Critically, as a by-product of the exchange of elements, carbon dioxide is sequestered into the biome, with photosynthesis enabling the drawdown of carbon into modifiable nutrients and sugars for further long-term storage and sequestration (Mackey et al., 2008c, p. 11). The size and features of these systems means they have a pivotal role in the overall global carbon cycle, with native biomass and related soil and mycorrhizal networks storing 'approximately three times the amount of carbon that is currently found in the atmosphere' (Mackey et al., 2008b, p. 9), highlighting the enormous scale of drawdown potential, of Australian terrestrial biocarbon complexes.

6.1.3 Australian terrestrial biocarbon as a Historical Nature

An overview of ATBC as a historic nature exposes the vastly differing approaches across Aboriginal Australian regimes and those of settlers following British colonisation. This section explores the way in which both Aboriginal Australians and British settlers have shaped ATBC as a Historical Nature. In particular, it focusses on accumulation regimes following colonisation, and the rapid appropriation and exhaustion of historic ATBC natures that were perceived to have been previously unmanaged. There are some difficulties directly exploring the appropriation of ATBC as a Historical Nature, given that settlers were unaware of crucial components such as mycorrhizal networks, and didn't necessarily develop conscious strategies in the same way as for more tangible natures such as water. However, given the ubiquity of ATBC natures across the Australian oikeios, the broader land management practices and alterations imposed by settlers provides a clear opportunity to examine the way in which ATBC natures were appropriated, either deliberately or ignorantly, in support of historic capital accumulation.

Over their tens of thousands of years of custodianship of Australian natures, Aboriginal Australians have played a critical role in shaping ATBC complexes, as an early example of the interaction between socio-ecological groups and natures. As outlined in Chapter One, the Australian continent experienced a mass drying event in the late Holocene, due to the intensification of the El Niño/Southern Oscillation (Wurster et al., 2021). As this drying trend

progressed, Wurster et al. (2021, p. 1) identify a decoupling between fire intensity and frequency, landscape vegetation, and the source of vegetation burnt, suggesting that 'indigenous fire management …reduced fire intensity and targeted understory tropical grasses, enabling woody thickening to continue in a drying climate'. The overall weight of evidence indicates that smaller, lower-intensity fires were prevalent across the continent (Enright & Thomas, 2008), suggesting that Australian Aboriginal socio-ecological relations co-produced unique fire regimes. These fire regimes directly shaped ATBC relations, with the frequency of fires and mycorrhizal development post-heat in the Australian ecosystem linked to spread of the Eucalyptus, which, as noted, in turn co-produces ATBC relations (Weule, 2022). The sustainable use of fire regimes was only one aspect of Aboriginal Australians' socio-ecological projects, all of which have directly shaped the contemporary Australian oikeios.

Evidence points to a cohesive co–produced fire and terrestrial biocarbon regime under the management of diverse Aboriginal nations, contributing to unique soil, forests and mycorrhizal fungi that is closely linked to the reproduction of eucalyptus and mountain ash forests and high levels of pyro black carbon. While, as noted in Chapter Five, fire regimes constitute early energy regimes, the relationship between fire and ATBC complexes extends well beyond fuel, with native eucalyptus forests and their below-ground networks providing shelter, food and tools to First Nations peoples. While Aboriginal Australia's accumulation regimes were not without points of exhaustion, including the extension of Australia's megafauna (Letnic, 2000), these historical regimes were fundamentally more conducive to the ongoing reproduction of Australia's oikeios; for example, Aboriginal Australians' socio-ecological relations avoided the extensive creation of anthropogenic soil through nomadic grazing practices, in contrast to European agricultural regimes post-colonisation that ultimately led to Australia having the third highest losses of topsoil and SOC (Borrett, 2024; Sanderman et al., 2017). The arrival of British settlers and the consequent development of the land in line with Eurocentric ideas of capitalism and progress would ultimately degrade historical Australian natures that had previously been sustainably managed for tens of thousands of years.

In the early years of colonisation, Australia's legal structures directly reflected those of Britain, including its strategy of land reform. This meant that the Charter of the Forest also applied to the Australia context, essentially securing forests for the contemporaneous equivalent of Australian 'peasantry' by securing forests and wood as food and materials (Patel & Moore, 2017). Essentially, control of the forests was delegated throughout the substantial state, with the subsequent forest enclosure signifying an early form of privatisation (Patel & Moore, 2017) as part of a hegemonic project of developing the land. Indeed, when early colonial peak-state governments in NSW and Victoria privatised claimed Crown land after the gold rush, part of the contract of sale required buyers to 'develop the land', or in other words clear the land of its native forests, as part of the broader civilising hegemonic project (Bellingham & Fricker, 2024). Land clearing directly enabled key early accumulation regimes, including the 'rapid proliferation

of wheat and sheep industries' in NSW (Norton, 1996) and the on-going expansion of the cattle industry in Queensland (Brown, 2024). As a result, since colonisation Australia has lost nearly 40% of its forest cover (Bradshaw, 2012), which has directly contributed to the erosion and accelerating exhaustion of historic ATBC networks.

Australia's carbon relations have significantly different microbial and biodiversity profiles compared to the northern hemisphere (Conway, 2022), meaning that Australia cannot not rely on simply employing the same biocarbon strategies utilised in the northern hemisphere. Yet, this was exactly the approach of early pastoral and agricultural accumulation regimes. Early pastoralists sought to maintain high herd numbers during drought to then sell when prices rose, which placed considerable pressure on vegetation, soils and water systems that were already stressed due to drought conditions (Letnic, 2000). Combined with the deliberate introduction of non-native species that were ill adapted to the Australian environment (Cook & Dias, 2006; Setterfield et al., 2018), this would often result in the failure of the underlying systems of which systems of accumulation based on the historic natures of wheat and wool depended (Fitzpatrick, 1970). In addition, settlers directly interfered with below-surface ATBC systems in their extraction of gold and other mineral natures (Cahir, 2012; Frost, 2013). Geomorphic records show that European settlement, land clearing and agriculture resulted in rapid increases in erosion and soil loss (Cook, 2019), as well as 'soil structural decline and infestation of woody weeds' (McKeon, 2004, p. 18). Ultimately, and as established in Chapter Three, the approach undertaken by the British colonies ignored the unique socio-ecological evolution of Australia and chose to support rapid expansion of key industries at the expense of ATBC natures.

In addition to direct intervention in the landscape to support accumulation regimes, European settlers also neglected to undertake activities that had long shaped and sustained ATBC natures throughout the Australian oikeios. In particular, European colonisation fundamentally altered the relationship between fire regimes and the Australian oikeios. Following colonisation, Aboriginal burning practices ceased throughout much of Australia, resulting in the build up of fuel in the absence of regular low-intensity fires (Letnic, 2000). As a result, large, high intensity bushfires became more common, destroying 'large areas of habitat' and 'directly killing animals or destroying their food and shelter' (Letnic, 2000, p. 299). Given the direct relationship between the nature and frequency of fires, forest biomes and mycorrhizal development (Weule, 2022), these sudden changes to Australia rapidly altered ATBC relations and the many human and extra-human natures that were, and are, dependent on the reproduction of these historic natures.

As noted in Section 6.1.1, ATBC natures are extensive and subject to impacts from almost all forms of accumulation regimes throughout Australia's history and into the contemporary era. While this brief exploration of historical accumulation regimes cannot explore the full extent of impacts on ATBC natures, it has shown that ATBC has been drastically altered by historic accumulation regimes, and since colonisation has been deliberately exhausted and appropriated

in support of capitalist accumulation regimes. Early Australian colonial and post-Federation peak-state projects supported accumulation strategies based on a high rate of land use change over a comparatively short time, providing minimal scope for adaptation and reproduction across ATBC natures. These historical rates of exhaustion and appropriation have set the foundations for contemporary regimes, which continue to be characterised by fundamental misunderstanding and exhaustion of ATBC natures and the broader Australian oikeios.

6.2 Accumulation and capitalisation through through ATBC

6.2.1 Assessing contemporary conditions of ATBC appropriation and capitalisation

As illustrated in Section 6.1.3, and previously in Chapter Three, the peak of the Australian State ensemble has privileged specific strategies both prior to and post-Federation to support terrestrial biocarbon accumulation regimes. The initial historical colonial socio-ecological regimes became foundational in contemporary Australia's approach to land clearing and management. Specifically, these regimes have rested on national projects that enable and direct the rapid expansion of a southern capital frontier at the direct cost of the Australian oikeios. ATBC accumulation regimes became built on socio-ecological practices of native logging, land-clearing, soil degradation, and overuse of fertiliser and pesticides, as well as the deliberate introduction of non-native and invasive species (Williams et al., 2021). Any reorientation or restoration strategies must respond to the limits imposed upon irreplaceable ATBC systems by these historic accumulation strategies that have set the foundation, and in many ways the parameters, for the contemporary ATBC strategies enacted by the Australian State.

Despite the criticality of ATBC relations to the broader reproduction of the Australian oikeios, particularly during a period of epochal crisis in which effective carbon drawdown has heightened importance, ATBC natures are continually framed in terms of their capacity for capital accumulation. For instance, despite the fact that Australian soil dynamics are still not fully understood and vary greatly over geographic areas, much of the focus has been on soil's value equivalent, which is estimated to be valued at $930 billion AUD, or around $600 billion USD (Soil Science Australia, 2019), with the 'contribution' through agricultural production alone valued at approximately AUD $63 billion per annum (DAWE, 2021). Together, this makes soil Australia's most valuable 'asset' (Williams et al., 2021, p. 35). This framing of soil is just one example of the degree to which historical and ongoing capital accumulation rests on ATBC relations, and the way in which these relations are largely valued for their economic contribution. As explored in Chapters Four and Five, core axes of the Australian oikeios are impacted by the numerous processual peak-state-ensemble projects aligned with broader neoliberal hegemonic projects, and ATBC relations are no different, with accumulation regimes characterised by the dominance of market forces and poor oversight in favour of rampant capital accumulation.

Land clearing and modification has continued as an expanding frontier well into the 21st century. Arguably Australia's oldest privileged socio-ecological class, pastoral landholders have become increasingly concentrated in corporate ownership, with foreign ownership by Chinese and Middle East regimes growing (Böhme, 2020), in addition to existing British and American ownership (Skilbeck, 2016). As identified in Chapter Five, pastoral landholders are able to capitalise on state-funded carbon credits, despite serious flaws in the project that have underpinned the concurrent acceleration of the degradation of ATBC natures (Macintosh et al., 2022). From 2019 to 2024, Queensland has seen the highest rate of land clearing in the country, with 1.4 million hectares of forests and bushland cleared, with over 70% attributable to the reorganisation of nature to facilitate expanding beef farms (Wilderness Society, 2024a). This is a continuation of the historical trend: pastoral landholders were responsible for historic land clearing in the 1950s to support wheat regimes and bauxite mining in south-west Western Australia (Bradshaw, 2012). Of significance, high rates of clearing have continued well beyond the period in which clearing was mandated as part of peak-state policy and has continued as a regime across the substantial-state and beyond, reflecting persisting oligarkhia relations.

A permissible land clearing regime, which this section will later show is directly supported by the peak-state ensemble, has been central to Australia's highly capitalised food export regimes. For example, in NSW, despite growing concern about rates of clearing, land clearing increased by 800% between 2013 and 2016 following a change in the clearing regulations that allowed private landholders to self-assess their environmental impact (Davies, 2018), resulting in the deterioration of the state's woodlands and grasslands (Wilderness Society, 2024a). Clearing has directly enabled the production of cheap food, with almost half of Australia now used for dryland cattle and sheep grazing (48.2% in 2015–16) on native vegetation and modified pastures (Williams et al., 2021). In key food production areas such as the Northern Rivers and the Murray-Darling Basin, water-intensive monocrop agriculture has proliferated, reshaping the region's terrestrial biocarbon for the benefit of overseas agri-funds (Davis, 2019a; Page, 2021). In effect, this means that formerly flood- and drought-tolerant native terrestrial biocarbon have been appropriated for the short-term capitalisation of highly water-dependent monocrop for the benefit of foreign export markets (Falster et al., 2024), making vast swathes of areas even more vulnerable to worsening droughts .

Many of the contemporary accumulation regimes continue to be premised on an geopower-linked abstraction of a increasingly capitalised and fertilised soil (Tsokhas, 1992; Skilbeck, 2016), an approach that reflects a general disregard for the complexity and centrality of sub-surface ATBC natures to the reproduction of the oikeios. In particular, mycorrhizal fungi have a 'largely unrecognised role in modulating global climate through influence on terrestrial biogeochemical cycling of nutrients and carbon' (Hawkins et al., 2023, p. 561). Mycorrhizal fungi and surface-plants have formed partnerships for more than 400 million years (Hawkins et al., 2023), but contemporary agricultural accumulation regimes, among others, that rely on the

use of insectoids and fertilisers threaten these partnerships, causing the reduction of insects and fungi that support soil productivity and carbon exchange (Goulson, 2021). Agricultural practices drive the replacement of natural vegetation and mycorrhizal destruction by ploughing and excess fertilisation, both directly exhausting ATBC natures and making Australian landscapes more vulnerable to invasive species (Soudzilovskaia et al., 2019). Contemporary ignorance of substantial parts of ATBC natures essentially continues the ignorance shown by early settlers, yet with far less justification given the significant advances in scientific knowledge since colonisation.

The current methods of appropriation, and corresponding exhaustion and risk have significant implications for the rates of carbon drawdown, which is a vital process given warming in the planetary pipeline (Hansen et al., 2023). Australia's native forests are globally significant given their geographic extent and irreplaceable old-growth carbon stores (Noon et al., 2021), and draw down comparatively large amounts of carbon - Victoria's Mountain Ash forests store up to ten times more carbon than tropical forests (Mackey et al., 2008a). However, in the face of ongoing, extensive appropriation and modification, there are important distinctions that must be made between the carbon dynamics of natural forests and industrialised forests, especially monoculture plantations. While positioned as a 'climate-friendly' approach in response to the climate crisis (AFPA, 2024), plantation forests are a highly fragmented historical Nature, in which the relations of mycorrhizal fungi and soil continue to be appropriated to capitalise surface plantations. Whereas the majority of biomass carbon in natural forests resides in the woody biomass of large old trees, commercial logging changes the age structure of forests so that the average age of trees is much younger (Mackey et al., 2008c). The result is a significant (more than 40%) reduction in the long-term average standing stock of biomass carbon compared with an unlogged forest (Roxburgh et al. 2006) More broadly, changes to soil properties, nutrients and water storage impact SOC stabilisation and dynamics, destabilising the capacity of sub-surface ATBC natures to draw down carbon (Román Dobarco et al., 2023). As such, the high rates of land clearing and modification across the Australian continent has significant implications for efficient carbon storage, as well as on broader biodiversity levels.

Although land clearing and modification is no longer mandated by the peak-state ensemble, peak-state ensembles continue to play a fundamental role in enabling the appropriation and capitalisation of ATBC natures through a neoliberal hegemonic project. Similarly to the trends explored in Chapters 4 and 5, extensive capitalisation has been achieved in large part through concerted privatisation efforts across Federal, state and territory peak-state ensembles. Key parts of the peak-state ensemble responsible for facilitating past accumulation strategies have been privatised, including the Australian Wool Board, the Australian Wheat Board, and the NSW Grains Elevator, a former public service collecting grain along railways which was renamed as GrainCorp and floated on the stock market (GrainCorp, 2020). This has meant that key regulatory bodies overseeing the appropriation of ATBC natures are now solely oriented towards

the interests of private capital, and thus an increasing minority have significant influence over vast swathes of land (Skilbeck, 2016). For the most part, this has enabled further appropriation and capitalisation that has resulted in the mass exhaustion of contemporary ATBC natures, making the impacts of global warming in the pipeline even more disruptive, given the increasing vulnerability.

Enabling export regimes for the benefit of private capital has been a significant driving factor in the appropriation and capitalisation of ATBC natures. The logging industry, while relatively small on a global scale, has a persistent export orientation - Australia was the world's 'second largest exporter of wood chips (in value terms) and the 8th largest exporter of whole logs (in volume terms) in 2017-18', with the majority of exports directed towards China (Whittle, 2021). The unpaid extraction of value/energy of native logging regime is immense, with irreplaceable complex ATBC bundles appropriated and corroded to maintain a cheap supply of wood chips to Chinese capital regimes (Sanderman et al., 2017). More broadly, Australia's agricultural sector exported around 72% of total value in the years between 2016-17 and 2019-20 (DAFF, 2023). Capitalised agricultural regimes, as well as native forestry, have been fundamentally enabled by the appropriation and exhaustion of ATBC natures, and together they now stretch over 55% of Australia's landscape (DAFF, 2023). ATBC natures, particularly, have been exhausted in favour of agricultural products that could be consumed or exported, eroding the ability of these natures to reproduce within the oikeios to which they have adapted over millions of years.

As has characterised the peak-state ensemble's neoliberal hegemonic projects in the appropriation and capitalisation of Australia's water and energy natures, the neoliberal hegemonic regimes facilitating the appropriation of ATBC natures is characterised by a lack of effective regulation and compliance (Wilderness Society, 2024b). This has been particularly apparent in the ineffective regulation of land clearing, as illuminated in two recent reviews of NSW's land clearing regulations. In 2023, an independent review of NSW's *Biodiversity Conservation Act 2016* found that the state's land clearing regulations were failing to conserve biodiversity at a 'bioregional or state scale', and that the 'diversity and quality' of ecosystems was rapidly declining (Henry et al., 2023). Mirroring the lack of water market compliance and oversight by the NSW Department of Primary Industries - Water explored in Chapter Four (ICAC, 2020). Critically, the Commission found that the Department of Primary Industries - Water, the contemporary peak-state ensemble, equally contains elements that reflect an oligarkhia project. In a concurrent review of land clearing regulations under the *Local Land Services Act 2013* by Local Land Services (LLS), LLS found that policy objectives of NSW land clearing regulations remain 'valid' and 'appropriate', while acknowledging some scope to 'better manage environmental risk' (Local Land Services, 2023). Given that LLS is a NSW government agency that provides support to agricultural regimes, these contrasting projects of protection and appropriation across the peak-state are a clear illustration of the way in which those with vested

interests in facilitating capital accumulation can, and do, influence the strategic orientation of the peak-state ensemble's regulation of Australian natures.

Similar issues have been experienced within attempts to address appropriated and exhausted ATBC bundles at a Federal level. The primary mechanism for this has been the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Starting as a pollution control Bill in 1999, the EPBC Act clarified the Australian Government's role and processes in the protection and conservation of the unique Australian environment, listing the key species subject to heightened levels of protection across the continent. However, the protections offered under the Act are inadequate in relation to critical elements of Australia's ATBC natures - despite the fact that over 30 species of Australian fungi are listed on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Williams et al., 2021), no fungi are currently listed under the EPBC Act, and only a few are listed under corresponding pieces of State or Territory legislation. A statutory review of the EPBC Act in 2020 found the EPBC Act to be 'ineffective' (Samuels, 2020, p. 19), with '79% of approvals under the Act… found to be non-compliant' and levels of regulation 'not proportionate to environmental risk' (Cox, 2020). Indeed, the review found that 'Australia's environment [has been] in a state of decline despite all policies since 2000' (Cox, 2020), a prime example of the exhaustion via appropriation enabled through the peak-state ensemble.

In addition to inadequate regulation, and in line with Australian neoliberalism's ideological prioritisation of market forces as both inherently efficient and self-regulating (Cahill & Konings, 2017), there have been numerous instances in which peak-state ensembles have actively intervened to enable further appropriation and capitalisation at the expense of the ongoing reproduction of ATBC natures. During the negotiations over the Kyoto Protocol, which was ratified in 1997 and set binding emissions targets for signatory countries, Australia's Commonwealth Government argued for the inclusion of the 'so-called Australia clause', in the Kyoto Protocol, using record land clearing in 1990 to inflate the baseline of Australia's emissions by 30% (Hemming, 2023). This gave Australia credits under the agreement, which the Morrison Liberal Government then attempted to carry over to meet the Paris Climate Targets without substantive action to reduce carbon emissions, the only country in the world to do so (Clarke, 2020). Effectively, the peak-state ensemble actively intervened in international negotiations to mitigate any threats to accumulation regimes based on the exhaustion of ATBC natures.

In summary, this brief overview of Australia's contemporary accumulation regimes based on the appropriation of Australia's spatially interlinked terrestrial biocarbon natures has highlighted the way in which points of exhaustion have only endured and accelerated since the onset of British capital accumulation predicated on the appropriation of Australian lands. In particular, contemporary agricultural regimes rest on the appropriation and exhaustion of interconnected

ATBC natures through land clearing and the ongoing modification of Australia's landscapes. These regimes, which are largely export-oriented, are facilitated by the peak-state's hegemonic neoliberal strategy, with its corresponding prioritisation of capitalisation, lack of effective regulation and the strong influence of those with vested interests in private capital accumulation over the strategic orientation of peak-state ensembles.

6.2.2 Appropriating and abstracting carbon drawdown through the state

This section explores the peak-state ensemble's project of emissions-reducing Australia's carbon markets, which have been introduced as a way to capitalise ATBC natures as part of efforts to reduce carbon emissions. As has been explored in this chapter, considerations relating to ATBC under the SSER framework are much broader than its capacity for carbon drawdown. However, given that ATBC natures play a major role in carbon drawdown processes and long-term planetary carbon storage, it is appropriate to consider this function as the project attempts to violently abstract the process of carbon drawdown and long-term storage. Indeed, the role of ATBC natures in carbon drawdown has been the primary focus area of current projects under the carbon credit system across the peak- and substantial-state ensemble. In applying the SSER framework to this project, the strategic orientation of the peak-state's fundamentally reductive project is an abstraction that fails to appreciate ATBC natures in their interconnected systemic complexity within the relations of the web of life. Here, the Australian peak-ensemble has used a project of carbon market creation to continue to enable particular capitalisation regimes to further appropriate ATBC natures under the guise of initiating emissions reduction.

The abstraction of carbon drawdown through carbon markets in Australia has been highly contentious, which has been directly reflected in the national market's volatile development. From 2007 to 2011, the Rudd-Gillard Labor Commonwealth government introduced a carbon tax and a voluntary carbon market through the Carbon Farming Initiative (CFI) (ABC News, 2014). Reflecting the stance of emissions intensive mining and energy firms, (Mazengarb, 2022), the Abbott Coalition Federal Opposition was strongly opposed to genuine regulation of carbon emissions and campaigned strongly against the carbon tax; following the Coalition's victory in the 2011 Australian Federal election, the Abbott Government then repealed the tax but maintained the voluntary CFI project (Hemming et al., 2022). In 2014, the CFI was repealed by the Coalition Government in favour of the Emissions Reduction Fund (ERF) and the Safeguard Mechanism. The ERF was a $2.4 billion scheme to purchase Australian Carbon Credit Units (ACCUs), but in the reform, the Coalition government critically widened the scope of eligible projects to receive state funding under the CFI (Hemming et al., 2022). In this system, the Commonwealth Government would be the main purchaser of credits, so effectively, Australian tax-payers would bear the cost of emissions-intensive regimes voluntarily taking steps to reduce emissions. The ERF was renamed several times, to the Direct Action Fund, and later the Climate

Solutions Fund, but these constant evolutions did little to address the fundamentally ineffectiveness of the voluntary Australia's carbon markets as is demonstrated further below.

The Safeguard Mechanism included a baseline of emissions for around 200 large, emissions intensive industrial projects (mainly energy projects) (DCCEEWb, 2022). Initially, these baseline levels were set so high that eligible projects were able to legally increase the extent of emissions released (DCCEEWb, 2022). Unsurprisingly, the projects did exactly that, increasing their emissions by 4.3% between 2016 and 2021 (Carbon Market Institute, 2023). In 2022 the Albanese Labor government reformed the Safeguard Mechanism to implement the gradual lowering of emissions limits, and introduced a formal legal target of net-zero emissions by 2050 (Australian Labor Party, 2023). The requirement of emissions reductions can thus be seen as a required Australian human nature that must be bundled into accumulation strategies, given the mechanisms and social-expectations of that peak-and-substantial-state ensemble. Further use of the SSER framework below highlights that this bundling fundamentally increases the contradictions and corrosion across the carbon axis, particularly in relation to the interconnections between exhausted ATBC systems and expanding carbon emissions.

Carbon markets represent a violent abstraction of ATBC natures through the extension of capital accumulation regimes to disembodied conceptualisations of carbon natures. Within Australia's carbon markets, as elsewhere, carbon units representing emissions reductions are sold in markets created and regulated by peak-state ensembles. Those required, or voluntarily seeking, to 'reduce' their carbon emissions can purchase carbon credits through the market, with credits created through a range of activities including carbon offset and storage projects (Hemming et al., 2022). Activities that are eligible for carbon credits (and thus held to represent a reduction in carbon emissions) vary between programs. For example, the CFI, as part of the Federal peak-state ensemble, subsidised voluntary carbon reductions through carbon farming, which included revegetation, environmental planting and capturing landfill gas (Carbon Market Institute, 2021). The ERF then extended these activities to include carbon credit methods for industrial activities such as Carbon capture and storage (CCS), industrial energy efficiency and capture and combustion of biogas from wastewater (Hemming et al., 2022). In Australia, 'carbon offset projects need to guarantee permanence of emissions reductions for just 25 years or at most 100 years' (CER, 2023), a relatively short time frame compared to the eons required to produce the endemic ATBC systems of natures in the web of life. In this way, the carbon market can be seen as an attempted sunekdokhḗ project from the Federal Government, in that private accumulation shares the peak-state project of emissions reduction. Yet, given the assessment of the strategic orientation of the Australian carbon market, this in fact arguably reflects an oligarkhia project, one that has produced little achievement for the state in terms of emissions reduction, but has maintained levels of private accumulation.

The many iterations of Australia's carbon markets have not resulted in carbon drawdown through the expansion of Australia's terrestrial biocarbon, as per the stated intent, but have instead enabled an increase in emissions (Hemming, 2023). This is largely due to fundamental flaws in the programs' methodology. For example, measurements to calculate rates of carbon drawdown are often taken as discrete measurements in dry and wet seasons, which ignores highly variable carbon fluctuations across the biomass between seasons and can conflate short-term fluctuations with longer term rates of sequestration (Macintosh & Butler, 2023). In addition, carbon credits can be issued for technologies that lack any substantial evidence base regarding their effectiveness. As mentioned above, following lobbying by Santos, the largest natural gas supplier in Australia, the ERF was able to include creditable projects including CCS (Hemming et al., 2022). CCS is a convenient tool for emissions intensive regimes, such as the North-West Shelf mentioned in Chapter Five, who do not wish to cease the flow of appropriation but can continue to receive subsidies by the peak-state ensemble. On top of the capitalisation of carbon storage, there is limited evidence as to its effectiveness, with research indicating that the stored carbon inevitably leaks back into the atmosphere, and while small reductions in emissions are visible over the short to medium term, over the long term, CCS may actually lead to higher levels of carbon emissions (Stone et al., 2009). Effectively, Australia's carbon market can be identified as a project with highly corrosive relations linked to the abstraction of carbon drawdown and capture, validating a toxic process that further enables the appropriation and capitalisation of emissions intensive regimes as part of a broader continuation of oligarkhia relations.

One of the primary issues with Australia's carbon markets is the reliance on offsets to create carbon credits. The Australia Institute has found that up to 75% of ACCUs do not represent real emissions reductions because carbon offsets are not 'additional'; for example, credits have been awarded for 'avoided deforestation' in areas where no deforestation had been planned (Macintosh & Butler, 2023). Researchers from the Australian National University and Canberra University labelled the ERF 'environmental and taxpayer fraud' given that their analysis found that up to 80% of carbon credits issued to projects under the most common methods of human-induced regeneration, avoided deforestation, and landfill gas lacked integrity and did not represent genuine emissions reduction (Macintosh et al., 2022). Further research in 2024 confirmed that human-induced regeneration had largely failed to increase tree cover, which represents a 'globally significant problem' given that Australian forest regeneration constitutes the world's fifth biggest nature-offsets program (Macintosh et al., 2024). These flaws mean that the purchase of carbon credits through Australian carbon markets in no way represents any neutralisation or reduction in carbon emissions, and while the same credits have enabled further emissions.

The methodological issues with Australia's carbon markets are compounded by neoliberal management approaches to regulation and oversight; that is, minimal oversight in favour of ongoing accumulation by private capital. The Chubb Review into Australia's Carbon Credit

Units, although finding in favour of the integrity of Australia's carbon markets overall, noted that governance processes lacked transparency and, in some instances, lacked sufficient rigour (Chubb et al., 2022). In some instances, the market regulator has directly enabled outcomes that go against the stated intent of carbon market schemes; an analysis of contracts entered into by the market regulator found that the regulator had allowed '57 industrial sites to increase emissions above their previous highest level' (Morton, 2018). In addition, and as noted in Section 6.2.1, the Federal peak-state ensemble has actively intervened to sustain the market and hence private accumulation regimes. The Australian Government represents the main purchaser of carbon credits (Conifer, 2020), meaning that the Federal peak-state ensemble is enabling the maintenance or increase of emissions, and hence the continuation of accumulation regimes, by providing funding to industries through carbon markets that it has created and regulates.

The consequences of these myriad limitations is that, paradoxically, carbon markets enable the continuation of carbon-intensive regimes under the guise of emissions reduction. In its stated attempts to reorient the dynamics of ATBC accumulation regimes, Australian peak-state ensembles have provided capital flow to heavy emissions producers to continue their exhaustion of the Australian oikeios; as a pertinent example, Australia is the only developed country that allows climate change funding to be used to upgrade coal-fired power plants (Conifer, 2020). Carbon markets, exchanges and offset schemes formed around the processes of ATBC have in fact increased the emissions-intensive accumulation processes and land management practices that in turn exhaust ATBC natures. These schemes are based on a peripheral understanding of ATBC that only tangentially address the full suite of interrelated ATBC systems, linking short-term human regeneration to natures which have developed over millions of years, and create a reductive carbon capital loop that worsens or limits the effectiveness of other emissions strategies. In effect, Australia's carbon markets are an example of state projects that co-opt restoration strategies to enable further capitalisation in the midst of an epochal crisis.

Amidst an era of growing concern over the impacts of carbon emissions, Australia's carbon markets purport to offset carbon-intensive accumulation regimes as part of peak-state ensembles' commitments to reach net zero emissions. Rather than being understood in their full complexity, ATBC natures are treated as a carbon dump to enable and justify the ongoing exhaustion of these very natures. In this way, Australia's peak-state ensembles have violently abstracted ATBC via a market-led approach that is incapable of fully comprehending ATBC natures or of ensuring genuinely enhanced carbon drawdown and associated emissions reduction. Paradoxically, the current peak-state carbon project amplifies socio-ecological tension, bowing to the influence of private capital across the substantial state-ensemble and prioritising ineffective emissions reduction mechanisms at the expense of methods that may genuinely contribute to the ongoing reproduction of the Australian oikeios.

6.3 Contest and crisis of the Australian terrestrial biocarbon state

6.3.1. Assessing the relations of Australian terrestrial biocarbon crises

This chapter has explored the many ways in which the ongoing reproduction of ATBC natures is critical to the reproduction of life in the Australian oikeios. However, the SSER framework has also revealed the ways in which ongoing capitalisation and appropriation places these fundamental processes at risk, with historic accumulation strategies setting the foundation for contemporary strategies which have continued to misunderstand and misappropriate ATBC natures. While this chapter has already touched on myriad points of exhaustion within ATBC relations, this section will outline the key points of exhaustion and their profound consequences within and through the web of life. In assessing the three unique, interrelated terrestrial biocarbon relational systems that co-produce Australia's carbon drawdown and complex long term storage, the extent of socio-ecological degradation, particularly through capitalisation, should be understood as chaotically compounding the risks of irreplaceable relational exhaustion across ATBC relations

The appropriation of ATBC natures to secure flows and flows of unpaid energy/work now presents limits and points of exhaustion to socio-ecological reproduction through the Australian oikeios. The vast and shifting ways in which the carbon axis intersects and co-produces life across the oikeios means that the exhaustion of carbon natures engenders a huge range of consequences: the exhaustion of ATBC relations threatens highly unique, endemic relational systems that support biodiversity, biosphere integrity, biochemical flows of energy, and the drawdown of carbon emissions (Richardson et al., 2023). In effect, as the terrestrial biocarbon systems are so old and complex, the biocarbon bundles are ‘irreplaceable’ (Sanderman et al., 2017; Williams et al., 2021), particularly within the time-frame of the worsening effects of the epochal crisis. Australia’s disappearing forests are unable to drawdown carbon, support the formation of sub-surface ATBC natures or provide effective habitat, while varying spatial conditions including soil properties, nutrients and water storage, habitat provisioning and biodiversity all impact the ‘soil organic carbon stabilisation and dynamics across the Australian continent’ (Román Dobarco et al., 2023, p. 1559). Despite appropriating carbon for a far shorter time relative to other countries, Australia has the third highest SOC loss in the world (Borrett, 2024), an indication of the rapid pace and scale of Australian accumulation regimes that erode the very natures on which they depend.

These impacts of the sustained exhaustion of ATBC natures are also visible well beyond the interrelated systems of ATBC natures considered in this chapter. Through their extensive web of carbon and nutrient exchange, complex biocarbons and nutrients and life both above and below the surface, the interrelated ATBC natures assessed in this dissertation significantly contribute to ‘effective habitat’ for non-human life over significant distances (Love et al., 2020).

Unsurprisingly, the on-going appropriation of these natures has meant Australia has lost more mammal species than any other continent and continues to have one of the highest rates of species decline among countries in the OECD (SOE, 2021; Foley, 2020). By 2013, NSW only had 33% of natural habitat rated as effective, with degradation in biodiversity visible across all Australian States and Territories (DPIE, 2020). Biodiversity hotspots have been identified on both the east and west coasts of Australia, demonstrating the sheer geographic extent to which a) unique endemic species can be found in Australia and b) the extent to which irreplaceable ATBC natures have been corroded (The Western Australian Biodiversity Science Institute, 2021; Williams et al., 2011; Vernes & Barrett, 2011). While there is a fragmented focus on key high profile species, such as the koala, (Long & Bennett, 2024), Australia's natural restoration efforts tend to ignore vital organisms such as fungi (Williams et al., 2021), and overlook the vital interaction of ATBC systems, not only in carbon drawdown but in reproducing the web of life more broadly.

Terrestrial biocarbon complexes as co-produced through the web of life are highly responsive to atmospheric shifts across the oikeios, in particular changes to water flows and temperature changes, in addition to any relational exhaustion resulting from either agricultural, forestry and carbon market regimes. This means the impacts of climate change are likely to exacerbate the risk of corrosive impacts on ATBC bundles. The breadth of cascading feedback loops from global warming in the pipeline deepens the risk of exhaustion, collapse or overall diminishing of critical ATBC relations in the oikeios. Australia's *State of the Environment Report 2021* acknowledges that 'non-native species may become even more impactful as they benefit from changing climatic regimes and establishment opportunities following bushfires and other disturbances' (Williams et al., 2021). Indeed, non-native species are predicted to increase by 36% between 2005 and 2050', while eastern Australia is among 5 global regions considered most vulnerable to establishment of new invasive species (Bellard et al., 2016). An increase in invasive species risks further accelerating the extinction of native Australian animals (Kearney et al., 2019). The criticality of ATBC natures to the reproduction of life means that the genuine exhaustion of these natures may have profound, cascading socio-ecological consequences; for example, the destabilisation of soil and mycorrhizal features will likely impact future food production (Borrett, 2024). Using the SSER framework, the outcome of privileged socio-ecological accumulation regimes and strategic peak-state ensemble projects can be seen to reflect the fundamental contradictions in the historic and contemporary appropriation of ATBC natures, as well as the capitalisation and abstraction of carbon drawdown and storage. The outcome of these is both increasing depletion and unpredictability throughout the Australian web of life, signalling the approach of negative value limits.

Using the SSER framework to assess the condition, effectiveness and potential of ATBC systems reveals that any limits to effective habitat and carbon drawdown reflect the damage and exhaustion of complexes from past and on-going frontier accumulation regimes. Amidst a

climate crisis that is in large part attributable to excessive carbon emissions, the degradation of ATBC natures has significant implications for the future global climate. As noted through this chapter, the degradation, or in some cases complete exhaustion, of the unique native eucalyptus forests, top soil, mycorrhizal systems and the insects and animals they support provides a direct limit to the capacity for future drawdown (Mackey et al., 2008b; Richardson et al., 2023; Román Dobarco et al., 2023). A warmer and degraded ecosystem threatens the ongoing reproduction of ATBC natures, with the stability of huge carbon stores at risk if warming increases unabated. This is a poignant threat given that the socio-ecological processes that developed these critical ATBC natures cannot be repeated, particularly as epochal and periodic, non-linear crises alter the face of the Australian continent and the globe. Although attitudes to Australian natures and our understanding of ATBC may have shifted since initial European settlement, ATBC bundles continue to provide the foundation for capital accumulation across the Australian oikeios, to the detriment of these very bundles and to the ongoing reproduction of life. As a result, the cascading exhaustion of ATBC natures presents a significant threat to human and extra-human natures alike, and a range of crisis points that are likely to increase socio-ecological contestation within Australia and beyond.

6.3.2. The strategic variation of ATBC contestation across the Australian State

The following section explores the strategic points of contestation around attempts to restore and protect ATBC bundles across the peak- and substantial-state ensembles. In employing the SSER framework, significant parts of the substantial-state ensemble can be seen to contest those regimes that rest on the appropriation of ATBC natures, while those same regimes continue to seek a privileged position within the peak-state ensemble. The continuation of highly fragmented and violated abstraction of ATBC natures undermines the effectiveness of any restoration strategy and accelerates fragmentation and corrosion of large interconnected, intersecting spatial terrestrial biocarbon frontiers. As a result, socio-ecological contestation is growing, with increasing tension between different parts of state ensembles over the desired strategic orientation of ATBC accumulation regimes.

Resistance and public contestation of degradation of ATBC has grown within the substantial-state ensemble, with non-government institutions, social groups, and scientists increasingly concerned about deforestation, land-clearing and climate change. Investigations into land clearing and soil degradation have proliferated across the substantial state (Wilderness Society, 2024), as have protests against accumulation activities enabled by the peak-state ensemble. Rallies have been held across Australian capital cities calling for an end to native forest logging (Rachwani, 2024), and a legal challenge has been launched in NSW seeking to halt logging by the NSW Forestry Corporation (EDO, 2024). In Victoria, after decades of conflict, the State Government elected to end native logging six years earlier than planned, citing the environmental degradation caused by prior bushfires (Morton et al., 2023). Concern over

Australia's management of its ATBC natures is not only limited to the domestic sphere - Australia represents the sole 'developed country' to be a deforestation hotspot in 2024 (Wilderness Society, 2024). A deepening culture of concern for environmental sustainability underpins this concern for the management of Australian landscapes and ATBC, and heightens the tensions between broader public expectations and the peak-state ensemble's orientation towards facilitating ongoing accumulation.

That said, there is ongoing pressure on the peak-state ensemble to continue to enable the ongoing 'development of the land' in line with the Eurocentric ideals that have long characterised Australia's accumulation regimes. The Australian Farm Institute, an agriculture industry body, has labelled moves to increase the regulation of tree clearing on private land 'policy insanity', framing the move as imposing a cost on small landholders (Australian Farm Institute, 2016), while farmers have rallied against changes to clearing regulations in Queensland (Smee, 2018). More broadly, powerful mining bodies like BHP have pushed the Albanese Federal Government to use proposed environmental reform to streamline mining approvals to allow businesses to appropriate Australian natures in support of emissions reduction technology, and thus benefit from 'one of the greatest industrial shifts in history' (Greber, 2024b). In other words, there is no set consensus on the need to reform and reduce the appropriation and exhaustion of Australian natures, and no policy mandate that might enable peak-state bodies to overhaul accumulation regimes premised on the exhaustion of ATBC natures.

The language of peak-state ensembles reflects the tension that exists within the substantial-state ensemble and beyond. When pitching their Native Positive Bill, an attempt to create a Federal biodiversity offsets market, the Albanese Labor Government consistently framed the introduction of the market as 'good for the environment' and 'good for business' (DCCEEW, 2024). However, restoration strategies under the Bill remain market based and have fundamentally failed to offer any meaningfully new methods to enhance carbon drawdown. Similarly, regarding the proposed reforms of the EPBC Act, messaging from the Environment Minister Tanya Plibersek consistently focussed on the legislative amendments as being 'good for business', and enabling 'faster approvals' (DCCEEW, 2024), which casts doubt on the idea that the changes will result in a more stringent regulatory regime. Environmental groups have voiced their concern over the tranched reform (Wilderness Society, 2024b), particularly given that a proposed National Environmental Protection Agency (EPA), promoted as a win for environmental interests, will be required to enforce the previous iteration of the Act which has already been found to be ineffective (Cox, 2020). Indeed, the contentious passage of the Albanese Government's environmental reform exposes the tensions not only across the substantial-state but also between elements of peak-state ensembles.

The contestation over the Albanese Federal Government's proposed environmental reforms highlights the tensions across Federal and State peak-ensembles, and in turn the difficulties

arising from Australia's Constitutional mechanisms. Most recently, the West Australian Government directly - and publicly - lobbied the Albanese Government to kill off the proposed Nature Positive Bill (Greber, 2024a). West Australian Premier Roger Cook said his efforts were in support of WA's business and mining industry, citing the need for more time to 'work with industry… to resolve any difficulties' (Greber, 2024a). As explored in previous chapters, the West Australian economy is highly dependent on extractive industries such as mining and LNG extraction, and clearly strategically oriented towards facilitating ongoing accumulation by these industries over environmental reform that may undermine rates of appropriation. Once again, this highlights the difficulties imposed by Section 51 of the Australian Constitution, given that the Commonwealth Government's attempt to engage in a cohesive national project is complicated by the fact that it is discrete State and Territory Governments that hold jurisdiction over environmental regulation. Essentially, Australia's primary legislative instrument once again proves its ineffectiveness in preserving already damaged ATBC bundles.

Even when the restoration of ATBC natures is an agreed goal across peak-state ensembles, there is a high level of fragmentation across these ensembles' attempts at strategic restoration. The implementation of nature-based markets and broader environmental reform across Federal, State and Territory Governments has been poorly coordinated, increasing the complexity of environmental regulation across the country. For example, in 2023, the Queensland Government has introduced a Reef Credit Scheme, which it describes as functioning 'in a similar way to Carbon Credits' in relation to reducing nutrient or sediment flow onto the Great Barrier Reef (Queensland Government, 2023). There is no clear indication as to how these Credits would operate with the offsets credits proposed under the Albanese Federal Government's Nature Positive Bill. Elsewhere, in NSW, the NSW Government has been accused of delaying the establishment of the Great Koala National Park in order to use the establishment of the Park to procure carbon credits; critics argue these credits would fail to meet additionality criteria and hence enabled increased emissions under Australia's faulty carbon markets (Long and Bennett, 2024). The lack of coordination and collaboration across Australia's peak-state ensembles results in secondary market creations and increasing complexity, and redirects time, attention and capital that could otherwise be committed to genuinely effective projects improving the reproduction of ATBC natures.

Using the SSER framework highlights the lack of cohesion in the regulation of ATBC across the peak- and substantial-state ensembles. Exhausted ATBC complexes continue to provide the foundation for the capitalisation of 'restoration'-based state projects and a reliance on ineffective market-based offset schemes, which are fundamentally ineffective and only serve to allow the continuation of carbon-intensive accumulation regimes. More broadly, a carbon-centric framework limited only to emissions accounting neglects the wide range of socio-ecological exhaustion and risk points in other planetary boundaries. This ongoing appropriation and exhaustion of ATBC relations will continue to increase contestation across the peak- and

substantial-state ensembles, with the need for effective strategic orientation becoming only more pressing as time goes on.

6.4 Conclusion

This chapter has focused on the assessment of the unique relations of interlinked ATBC natures across native forests, soils and mycorrhizal fungi systems. Given the huge range of the foundational exchange of nutrients and resources supporting microbial processes and biointegrity mechanisms, bundles of terrestrial biocarbon should be considered as highly dense and complex socio-ecological webs within the web of life. However, these webs are facing threats of exhaustion on multiple fronts. Contemporary land clearing and modification has continued the legacy of the initial colonial civilising project in Australia, albeit under a new range of human natures particular to contemporary neoliberal hegemonic relations, reflecting the enduring privileged socio-ecological class of pastoral owners and those involved in broader extractive industries. These historic and contemporary strategies have dramatically reduced the effectiveness of residual terrestrial-biocarbon complexes, which are becoming increasingly fragmented and degraded as complex carbon arrangements. Such complex terrestrial biocarbon relations, which are critical to the re/production of life, are irreplaceable, and the unique genetic arrangements they've co-produced cannot be restored.

While each system is critical to the oikeios, the interrelated systems are not embedded in a cohesive socio-ecological strategy of the peak-state ensemble. Given the scale of emissions intensive fossil fuels and grazing accumulation, ATBC natures are highly contested, with strategic state projects confused and contested in the face of the worsening climate crisis. As of 2024, the peak-state ensembles of Australian Federal, State and Territory Governments have no coherent national mechanism through which to coordinate long-term carbon drawdown or any ATBC restoration. Instead, the capitalisation of terrestrial biocarbon restoration has spread throughout the substantial-state ensemble in an attempted sunekdokhḗ project, yet private accumulation capitalising carbon credits have failed to lead meaningful drawdown. In fact, the current strategic orientation of ATBC-related projects arguably reflects an oligarkhia project, one that privileges the interests of those benefiting from immediate capital accumulation at the expense of the broader reproduction of the web of life. As explored throughout this chapter, the peak-state ensembles have directed funding to reduce emissions and restore ATBC natures to facilitate further legal emissions from carbon-intensive projects, thus directly contributing to the onset of non-linear turning points.

Historically, while forests and plantations as a historical Nature have been capitalised, fungi have not received equal attention from the peak-state or researchers, but have continued to be exhausted through unrecognised appropriation. The extinction of these overlooked regimes risks undermining strategic options in the future. The success of any reorientation for the Australian

State therefore rests on the successful acknowledgement of the interconnected condition of relational systems that support key roles in the carbon drawdown process, including native forests, soils and fungi. Without this shift, the strategic priorities of past socio-ecological regimes in Australia will continue to degrade ATBC relations, through the loss of the critical systems in native forests, soil and mycorrhizal networks. Continuing in this manner will further limit attempts to protect, restore (where possible) and enhance irreplaceable and complex carbon drawdown systems.

Chapter Seven: Conclusion and Crisis

7.1 A review of the contributions of SSER

7.1.1 Introduction to theoretical findings and contributions

This final chapter of the dissertation provides a conclusion to, and discussion of, this work, which introduced and demonstrated the use of the SSER framework in examining Australian capital regimes during an epochal crisis. It proposed, and then utilised the SSER framework to examine the strategic projects, classes and relations that have attempted to organise, appropriate and capitalise nature throughout the socio-ecological peak-and-substantial-state ensemble. In the following section the theoretical foundations and contributions of SSER are discussed, as well as the work's contributions towards assessing Australia as a southern frontier for particular appropriation regimes. Section 7.2 then outlines the implications of the work's findings, before the chapter concludes with section 7.3, which outlines the work's limitations and concludes with commentary on the possible further applications of the SSER framework.

In the face of escalating climate crisis and increasing socio-ecological tension, this work has sought to develop a theoretical and analytical framework that further encapsulates the wide range of socio-ecological regimes and processes that have shaped the historical and contemporary web of life, the oikeios. Specifically, it has introduced the Strategic Socio-Ecological Relational framework, which draws on the foundational work of Moore and Jessop to propose a method for assessing socio-ecological territorial-power ensembles. This includes the relationship between different peak-and-substantial-state ensembles, as well as competing accumulation regimes, analysed along the axes of the oikeios. This work has offered a framework that can be re-deployed across the sprawling and shifting axes of the oikeios to provide a critical understanding of specific arrangements of socio-ecological states and regimes that produce and are co-produced by the on-going and worsening disruption and collapse in planetary processes, systems and feedback loops.

As this work has shown, there is much to be gained in assessing the web of life, particularly through a focus on state-ensembles and the unique socio-ecological relations influencing the co-production and reproduction of the processes that constitute the shifting relations of the oikeios. The SSER framework, while assessing the unique socio-ecological relations of Australian water bodies, energy systems and terrestrial biocarbon, retains the acknowledgment of these relational axes as firmly co-producing, and co-produced, by the web of life. This has allowed the analysis of particular appropriation regimes, as well as systemic trends and patterns across contemporary axes. Given the unique sociological relations of different processes and spaces across the oikeios, socio-ecological relational analysis becomes increasingly necessary when examining impacts of non-linear turning points, geopolitical tensions and the identification of both general and specific points of risk across life creating and sustaining processes.

This dissertation has proposed furthering the conceptualisation of the oikeios to include an understanding of its axes: planetary significant relational bodies that exhibit unique, universal, fundamental and critical relational positions within the oikeios' reproduction of the web of life on earth. SSER provides this function through a framework to distinguish significant axes of the oikeios, and to assess specific intersections within and between these unique axes as they are co-produced through spatially linked, socio-ecological power ensembles. The concept of axes of the oikeios enables particular 'strands' of the web life to be assessed, while firmly retaining the relational analysis' positioning of the part-of-the-whole web, and interactions with other axes. In this way, axes are not conceptualised as violent abstractions intending to separate any proposed 'sphere' of society, nature or the economy, but instead constitute a full relational composition of socio-ecological bundles that capture both system-wide relations, and specific, unique spatial variations within the web of life.

This dissertation has proposed that socio-ecological territorial power ensembles represent a unique strand within the web of life. While identifying the state as the contemporary height of socio-ecological territorial power, socio-ecological power structures are equally identifiable in historic forms of socio-ecological power including regional clans, migratory tribes, and feudal monarchies. This conceptualisation of socio-ecological territorial power as an axis of the oikeios in itself has enabled the consideration of unique relations of natures when assessing particular accumulation regimes, as well as hegemonic projects, which further supports the ability to identify increasing points of corrosion, tension and contradictions with the peak-and-substantial-state-ensembles.

One of the core advantages of employing a SSER analysis is the ability to assess the base relations of accumulation strategies, such as capitalisation, appropriation and exploitation in regards to specific natures, while retaining acknowledgement of the broader planetary web of life. As such, applying SSER to the consideration of the axes of the oikeios contributes to understanding the extent of multifrontal threats on specific systems posed by accelerating nonlinear events, and the cascading impacts on the broader oikeios. As raised in Chapter Two, and expanded on in the following chapters, assessing the axis of the peak of socio-ecological power, the state, provides fundamental insights into capitalism as a way of trying to organise nature. The dynamics between and within state-ensemble territorial socio-ecological power structures and relations are fundamental to assessing the web of life, as they co-constitute the oikeios along with the other axes of natures.

The framework of this work also expands the scope within which to analyse hegemonic projects. Built on the work of Jessop (1990), this dissertation has developed the conception of hegemonic projects to include the assessment of socio-ecological class forces. These socio-ecological classes hold privileged positions in the ownership, decision-making and accumulation of natures, and can be identified as the beneficiaries of two-nation hegemonic projects. This opens the lens through which to assess the lasting impact and influences of historic accumulation regimes and

hegemonic projects, encompassing the interaction of an array of forces across numerous state ensembles and the assessment of international hegemonic state projects. The work has shown that hegemonic projects are socio-ecological, with the British-linked civilisation project and the American-led Pacific Rim and broader neoliberal projects each involving a vast reorganisation, and appropriation of natures across the Australian continent.

SSER is a framework that allows the strategic assessment of the vast intersections, appropriation regimes and interactions that co-produce, and are co-produced by, the web of life. Through its continual acknowledgment of anticipated accelerated disruptions within its strategic relational assessments, the use of SSER not only highlights points of exhaustion for capital accumulation regimes and the state ensemble, it assists in demonstrating non-linear climate tipping crisis points and non-capitalist limits across state-specific spatial processes. In doing so, the SSER framework provides relational assessment of shifting state relations that not only co-produce the crisis, but enables the proposal of alternative strategic orientations of relations. It allows the simultaneous assessment of social and biophysical relations, by treating them as the part of the same socio-ecological ensemble in examining their bundling.

7.1.2 The application of the SSER framework to the Australian oikeios

In addition to the theoretical framework proposed in this dissertation, this work has aimed to provide a socio-ecological assessment of the contemporary Australian state amidst the onset of an epochal crisis to capitalism. To do so, it first assessed historic accumulation regimes and the appropriation of nature following British colonisation. Subsequently, the work assessed the pivot of the peak-state-ensemble towards an American hegemonic project post-WWII, noting the extension of Cheap Energy and Cheap Nature to benefit south-east Asian capital regimes in line with the strategic orientation of the Pacific Rim project. This initial assessment of Australia's historic accumulation regimes identifies the foundations of the power, exhaustion and contestation present in Australia's contemporary regimes, and the way in which these historical regimes continue to present limits, obstacles and opportunities for contemporary regimes. The following section notes the findings of the chapters, underscoring the points of contradiction, risk and exhaustion.

In using the SSER framework, this work has explored some of the ways in which, following British colonisation in 1788, Australian natures have been violently abstracted and appropriated, and co-produced through both the peak-and-substantial-state-ensemble. Chapter Three demonstrated the rapid pace of the historic expansion of Australian capitalisation, showing how the early colonial state-ensemble, as the pinnacle of socio-ecological power, played an integral role in facilitating the appropriation and capitalist reorganisation of Australia's historic natures. Colonial laws mandated a eurocentric development of land, and facilitated the mass culling of native animals, while state-owned grain elevators, marketing boards and railways firmly linked

the appropriation of Australian natures to the international circuits of capital in service of global capital's incessant search for Cheap Nature. Reinforced by rhetoric of racial categorisation, the Anglo-Australian civilisation project employed state mechanisms of child removal and dispossession to support mass spatial and territorial reorganisation of Australian human and extra-human natures. In doing so, the British and Australian state ensembles implemented a 'two nation' hegemonic project, which, while securing relative prosperity for many of the white population of Australia, saw Australian First Nations people dispossessed, disenfranchised, killed, and Country degraded.

While initially, the strategic orientation of the British and Australian state ensembles were closely linked, the relative strategic divergence of post-WWII south-east Asia and the growing independence of the Australian state ensemble accelerated the shift of state strategy towards America, who shared Australia's strategic interest in South East Asia. While continuing to coordinate with Britain, the Australian state ensemble began to organise socio-ecological accumulation regimes beyond the immediate concerns of the UK, as part of the reorientation of accumulation regimes to align with the American-led Pacific Rim project. Australian natures were extracted to support the expansion of US-aligned, south-east Asian capitalism, which relied - and in many cases continue to rely - on the appropriation and exhaustion of the reorganisation of Australia's Cheap Energy and Cheap Material regimes, and the related historic natures within these key axes. In particular, certain parts of the peak-state-ensemble, such as Western Australia and Queensland governments, repositioned Australian energy regimes to provide Cheap Energy to foreign firms through coal-fired generators, cheap contracts, and then Cheap LNG. Neoliberal pro-market rhetoric, state-financial mechanisms and the international expansion of US and allied defensive bases were all critical in the bundling of strategic historic natures. These historic accumulation regimes were spatially unequal, highly capitalised and characterised by contradictions, and all co-produced through the Australian-state-ensemble

The SSER framework was then applied to contemporary Australian regimes, commencing with an analysis of the Australian water axis in Chapter Four. As a transitory system, made up of rivers, floodplains and wetlands, the frequency and scale of the movement of water impacts a vast number of vital processes throughout the oikeios. Socio-ecological regimes resting on flow modification through water infrastructure for appropriation in one space cause direct impacts on the conditions and stability of other spaces, with significant consequences for the spatial inequality of socio-ecological systems. In particular, Chapter Four focussed on the Murray-Darling Basin, given its significance as Australia's largest and most appropriated inland water system. In the case of the Murray-Darling, over-extraction in the northern basin's flood plains is linked to the collapse of southern lakes and wetlands, and a significant degree of contestation across both the peak-and-sustainable-state-ensemble.

The response to increasing concern about the overuse of water in both the substantial-and-peak–state-ensembles was the extension of a neoliberal hegemonic project of 'economic efficiency' to produce Cheap Water in the Murray-Darling Basin, which then justified the creation of water markets. As part of this abstraction, the strategic project of the peak-state-ensemble reinforces the rhetorical and arbitrary division between environmental water, and the rest of the water flows. Efforts to restore the Basin have resulted in further appropriation and capitalisation, with highly capitalised extraction methods such as floodplain harvesting further accelerating points of exhaustion within and beyond the system. The chapter demonstrates that within the Basin, capitalised agricultural export regimes from cotton to almonds rely on a regime of Cheap Water, and are being directly enabled by the peak-state ensemble in the face of escalating points of exhaustion and climate crisis. The work also noted that the continued appropriation of Cheap Water rests on a degree of opacity that serves to contain, although not eliminate entirely, significant contestation within the substantial-state-ensemble.

Chapter Five then applied the SSER Framework to Australia's energy axis. In particular, the chapter focussed on the capitalisation of fossil fuels including coal and LNG, which constitute the largest of Australia's energy exports. The chapter showed that past experiences of Cheap Energy regimes oriented towards domestic interests has increased tension with contemporary international Cheap Energy regimes in Australia, given parts of the peak-and-substantial-state enduring attachment to cheap and efficient (and, ultimately, fossil fuel-based) energy. In addition, Australia's constitutional mechanisms represent a significant impediment towards the development of a coherent national energy transition project in the face of climate crisis, given the fragmentation of energy law, production and transmission across diverse State and Territory Governments.

Ultimately, Chapter Five demonstrates that Australia has struggled in moving beyond the appropriation of fossil fuels due to a wide range of complex socio-ecological factors, with a significant and ongoing degree of fragmentation and contestation across the Australian energy axis. Today, the appropriation of Australian energy natures is directly oriented towards the broader energy relations of south-east Asia, facilitated by a fundamentally neoliberal NEM project that privileges the interests of fossil-fuel based socio-ecological classes seeking further capitalist appropriation despite growing emissions and points of crisis. Coal continues to play a central role in Australia's strategic energy orientation, directly facilitated by the peak-state-ensemble, while the framing of energy transition as simply a consumer-led transition has enabled the engineering of an LNG extraction regime based on dislocated and high capitalised appropriation of Australian natures. Escalating points of crisis and contestation present growing challenges for Australia's contested and fragmented energy accumulation regimes.

Finally, Chapter Six applied the SSER Framework to Australia's carbon axis, with a particular focus on terrestrial biocarbon relations including forests, soil and mycorrhizal features. Although in contemporary accumulation regimes, ATBC are generally only considered through a carbon-centric lens, this chapter deliberately encompasses the wide range of interconnections between ATBC complexes and the foundational processes of life, including the exchange of nutrients and resources, biodiversity and biointegrity. ATBC natures are highly unique, shaped by millions of years of geological processes, but have been undergoing a rapid rate of appropriation and exhaustion following British colonisation in 1788. These historic accumulation regimes became a foundational base of accumulation based on the ignorance, disruption and exhaustion of ATBC complexes, with the imposition of land management practices that eroded the capacity for carbon drawdown and the broader reproduction of ATBC natures.

Today, contemporary accumulation regimes continue to impact on on ATBC relations in an detrimental manner, with the loss of the critical systems in native forests, soil and mycorrhizal networks further limiting any attempt to contribute towards restoring, protecting and expanding 'irreplaceable' and 'complex' carbon drawdown systems. The neoliberal hegemonic project enabled through the peak-and-substantial-state-ensemble continues to facilitate land clearing and mismanagement, with regulatory regimes characterised by ineffective oversight. Australia's carbon markets are fundamentally flawed, and paradoxically direct 'climate capital' towards the continuation of carbon emissions-intensive regimes. Growing concern in relation to the degradation of ATBC natures and the climate crisis more broadly is clashing with the privileged interests of capital accumulation, as peak-state ensembles struggle to mount a cohesive project of reform and reproduction. While there is a critical need for the repair and adaptation of ATBC complexes to support carbon drawdown and the reproduction of life, the current formation and strategic orientation of Australia's socio-ecological regimes is largely ill-equipped for this monumental task.

The examination of each of these core axes has identified the influence of particular privileged socio-ecological classes. Through the state, these classes utilise socio-ecological socio-ecological power over specific spaces of the web of life to appropriate natures and expand capitalisation regimes. The privileged classes identified in this thesis include the cotton and water entitlement holders of the Northern Basin, the corporate elite directing off-shore LNG capitalisation, and oligarchical land holders that own (and clear) vast swathes of private land. The foundations of these classes can all be traced back through the historical expansion of the Australian state, and the prevailing focus on capital accumulation that has characterised peak-state-ensembles and their accumulation regimes since British colonisations. As the climate crisis amplifies tension across vulnerable socio-ecological arrangements, the position of these classes may come under increasing pressure, but as yet their influence over the strategic orientation of Australian peak-and-substantial-state-ensembles shows little sign of abating.

The overarching finding of this work is that Australian capitalism, as a way of organising nature, has great significance to global appropriation and capitalisation regimes, but the reorganisation of these natures has caused a vast scale of exhaustion and extinction in a relatively short space of time. Through the mechanisms of the peak-state-ensemble, contemporary neoliberal-inspired, market-oriented strategic projects designed to either restore, protect or enhance particular natures, have in fact worsened the likelihood of collapse and exhaustion of vital processes throughout the oikeios. Across the core axes, the project of capitalisation has dramatically increased the severity of climate destabilisation, species extinction, and the collapse of critical water, energy and carbon bundles to the point of negative value limits forming. The unequal distribution and impact of exhaustion points are increasing tension across peak-and-substantial-state-ensembles, even as escalating points of crisis require a unified and cohesive strategic response across the oikeios.

7.2 The implications of this work

7.2.1 Theoretical implications

It has been the intention of this work to take up Moore's (2015, p. ix) effort to inspire young people of all ages to 'see the web of life in its mosaic of connectivity and creativity', and to further add to the conceptual toolkit of those engaging with the oikeios. To do so, this work has set out a socio-ecological understanding of the state-ensemble, and a proposed framework to assess socio-ecological relations through the shifting peak-and-substantial-state ensemble. This endeavour has a number of further theoretical implications. Firstly, this approach has significant implications for assessing what Jessop (2015) refers to as non-state relations or relations beyond the state. As argued in this work, these 'non-state relations' are in fact relations that are inherently interconnected and intricately involved in the co-production of the formal peak-state-ensemble. The SSER framework has therefore proposed, rather, that human organisation outside the formal space, mechanisms and institutions of the peak-state-ensemble should be considered the substantial-state ensemble, upon which the peak-state ensemble is embedded. This enables the complex dynamics of formal and informal socio-ecological projects to be considered together, expanding the analytical capacity to identify points of tension, opportunity and resistance in socio-ecological hegemonic projects.

In other words, a significant implication of this work is the ability to consider counter-hegemonic socio-ecological movements, groups and projects in relation to the hegemonic peak-state project. This allows the expansion of analysis into strategic projects of social movements, non-government organisations, self-identified environmental groups and unions, engaging both the peak-state ensemble, as well as other parts of the substantial state about projects as diverse as the protection of vulnerable water systems, renewable energy transition, and the repair of complex, irreplaceable terrestrial biocarbon systems. Within this expanded focus is the analysis

of class relations, which are treated as inherently socio-ecological, and the position of privileged groups in relation to accumulation. The work has shown how specific, privileged socio-ecological class relations can be identified in the appropriation and capitalisation of particular natures, to the detriment to the majority of the human population and web of life. On this basis, this work has demonstrated the utility of assessing axes of the oikeios to find vulnerabilities, risks and opportunities in specific socio-ecological systems as they're positioned in the broader web of life. The implications of tipping points in core planetary processes identified throughout this analysis underscores the need to urgently evaluate current accumulation strategies and climate change responses.

7.2.3 Implications for the reproduction of the Australian oikeios - assessing exhaustion and corrosion

The core findings of this work are that the capitalisation and appropriation of Australian natures has been an on-going historical project since colonisation. In doing so, the SSER framework has extended the analysis of historic Australian capitalism beyond orthodox Marxist accounts of Australia's imperial links, and instead reassessed the colonisation of Australia through the oikeios. The primary implications of the findings generated by this approach are that any assessment of contemporary strategic projects throughout south-east Asia needs to account for the immense role of the Australian frontier, and the resulting precarity of these accumulation regimes as the impacts of climate change worsen in Australia and beyond. Likewise, any evaluation of Australian natures, whether historic or contemporary, must acknowledge the global significance of Australian appropriation in providing fixes to overseas capital regimes, and the role of international hegemonic projects in facilitating appropriation.

Overall, this work has shown that the web of life in Australia has been increasingly capitalised, exhausted, and contested. In the three unique axes of the oikeios examined, the peak-state ensemble's strategic project to restore and protect natures is to purchase them, whether through purchasing carbon credits, paying private energy generators, or funding environmental water holdings. Given these 'restoration' or 'efficiency' market projects in fact accelerate the capitalisation of natures to the point of increasing risk, a major implication of this work is the need for a vast reorientation of Australia's approach to the climate crisis. However, the other significant implication of this work is that reorientation will not be easy, as poly-centric state ensembles, both within Australia and internationally, attempt to implement differing strategic orientations of the core axes of the oikeios. Again, this has meant that the bundles of human and non-human natures that make up those regimes are increasingly placed under pressure or exhausted completely, creating limits for future generations in what they can.

The onset of non-linear tipping points in planetary socio-ecological processes, combined with the fragility of Australia's market restoration projects, highlights that capitalism, as a way of

organising relations in the web of life, will face an epochal crisis in Australia without fundamental changes to current regimes. Whereas initial accumulation regimes generated relative wealth for white Australians across socio-ecological classes, contemporary accumulation regimes in coal, gas and broader extractive industries such as agriculture and logging continue to generate wealth for a minority of private-shareholders of multinational corporations. As a result, the scale of degradation and exhaustion across Australian natures continues to expand, and points of contestation are only increasing as crisis conditions worsen. Major environmental protests continue across Australia, including coal port blockades and school strikes, with Australia having the highest arrest rate of climate protestors in the world (Hutchens, 2024). This alone is a clear indication of the level of contestation across the peak-and-substantial-state ensembles of Australia, given the significant divergence in strategic intentions over the access, ownership, knowledge and protection of Australian natures.

7.3 Reflections and future application

7.3.1 Reflecting on the scope and limitations of this work

Due to the expanse of the subjects that can be analysed as part of the SSER framework, this dissertation has necessarily entailed a number of limitations. The work did not have the scope to detail the full strategic orientation of the British Imperial State over hundreds of years, but it was able to outline the colonisation of Australia and its relevance to British capitalism in the 18th and 19th centuries. However, it is worth noting that the experiences of British colonies vary drastically - while much has been written about Victorian and Edwardian constructs of racial hierarchy used to justify and expand the ‘civilising’ processes of the British empire, the Australian experience examined in this work cannot be extrapolated to other colonies. Likewise, expanding the SSER assessment to incorporate the full dynamics of the American state-ensemble was beyond the scope of this particular work. Instead, the work has focussed on the specific interaction between the American hegemonic project within the specific time period following WWII to present day with the appropriation of Australian natures, demonstrating the resulting reorientations of accumulation regimes based on Australian natures.

More broadly, the breadth of the potential examination of the oikeios - which necessarily includes every aspect of and interaction between all elements of the web of life - required some clear limitations throughout every aspect of this work. This work centred on the peak socio-ecological power ensembles (the state), water, energy, and carbon, but also employed a relatively narrow focus within these axes in order to undertake analysis of sufficient depth. The breadth and complexity of the oikeios prevented this dissertation from engaging with other parts of these axes such as coastal water relations, solar energy, and atmospheric carbon dioxide, to name only a few of the potential further points of analysis. Beyond this, there is scope to better understand the interaction of outer space as part of the web of life on earth, particularly given the

growing expansion of competing world powers into space, which was beyond the focus of this work. However, the overall intention of this paper was to provide a contribution to furthering engagement with the oikeiosis by identifying axes of unique relations.

7.3.2 Future applications and uses

There are many potential extensions of the SSER framework's focus on understanding the socio-ecological relations that form accumulation regimes. In continuing the analysis of socio-ecological power, assessing the education provided to school-children, both within the peak-and-substantial-state ensemble, would provide further insights in the socio-ecological reproduction of nature abstractions and interactions in the web of life. The SSER framework's concept of the state axis enables assessment of the formal curriculum, as well as household, community and religious socio-ecological practices. In addition, while this work focused on three interlinked spatial systems of terrestrial biocarbon, there is further scope to explore the processes of domestication, renewal, and relations of dependency, risk and exhaustion across all extra-human life in the carbon axis. In this vein, there is scope to further analyse interactions across the core axes; for example, the unique relations of water and carbon could be applied to an assessment of 'blue carbon' given the significance of marine carbon drawdown. More broadly, the axis of outer-space and extraterrestrial space could be evaluated, given the interaction between space and planetary relations. In effect, there is an almost boundless application of the SSER framework across the web of life.

At the time of writing, at the end of 2024, the world looks certain to pass 1.5°C, if not 2°C of warming before 2050 (Hansen et al., 2023). This embedded rate of warming underscores the need to continue to develop a theoretical framework that is able to assess points of risk and exhaustion across the axes, human and non-human natures. In addition, as conditions continue to worsen, it is expected that geoengineering attempts seeking to fundamentally transform global natures, such as reflecting the sun or pumping freezing sea ice, will continue to proliferate. The core concepts of the SSER framework, particularly in relation to the peak-and-substantial-state ensembles and hegemonic projects, will be valuable in understanding the power relations behind these future attempts at the reorganisation of natures, and identifying the points of exhaustion and crisis inherent to capitalisation, accumulation and appropriation. Ultimately, it is almost certain that in the future both the web of life, and socio-ecological power ensembles will become more precarious, and vulnerable to collapse or violent pivots. As such, a cohesive and effective approach to assessing power within the web of life is required now and into the future, and it is hoped that the SSER framework has made a positive contribution to this end.

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