Biomimicry in Leadership

How Healthy Leaders Facilitate Healthy Organisational Ecosystems

– Lessons from Keystone Species

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Abstract

This dissertation presents the first empirical study investigating whether patterns of behaviour in keystone species can inform a biomimetic approach to healthy leadership that supports resilience. Keystone species are nature's influencers. They contribute to ecosystem health through their disproportionate impact on their environments. Through an exploratory sequential mixed-methods design, this study analysed 30 keystone species across nine behavioural categories, conducted semi-structured interviews with ten sustainability leaders, and carried out three expert case studies on biomimicry, homeostasis, and human wellbeing.

Four promising connections were found between keystone mechanisms and sustainable leadership practices, which provide a starting point for a keystone-inspired framework: (1) relational infrastructure — leaders seek to build long-term, mutually reinforcing relationships that encourage trust-based resilience; (2) condition creation — leaders construct enabling contexts for systemic flourishing instead of controlling outcomes; (3) dynamic homeostasis — leaders reconcile their need for stability with their demands for change through micro-changes and ongoing recalibration for resilience and repair; and (4) cascade amplification — leaders recognise system interdependencies and design networks strategically that enhance the positive impacts in an organisational ecosystem.

The study presents the beginnings of a keystone-inspired framework that reframes leadership from traditional models to system regulation that sustains health. As well as theoretical contributions to the literature in ecological and leadership scholarship, it offers practical recommendations for leadership development, human resource protocols, organisational architecture, and regenerative practices. It is subject to limitations related to purposive sampling and scope, yet it provides a compelling evidence-informed groundwork for the future development of a keystone approach to healthy, resilient leadership.

List of Abbreviations

CSAT — Customer Satisfaction

RQ — Research Question

TBL — Triple Bottom Line

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Chapter 1: Background Study

1.1 Introduction

Today, organisations are subject to escalating and growing complexity pressures (Uhl-Bien, Marion and McKelvey, 2007). Sustainability leaders face polarised politics, fast-changing AI technology, and mounting climate change challenges (Teece, 2018). Against this background, a growing number of sustainable organisations are searching for systems that can endure change, drive adaptive growth, and promote organisational sustainability (Senge, 1990; Capra, 1996). How leaders enable organisational health — and by what particular practices, behaviours, or relational dynamics they impact systemic outcomes — remains a key area of research with major theoretical and practical relevance.

The Eastgate Centre in Harare, Zimbabwe, made headlines when its developers decided to use termite mounds as inspiration for a ventilation system — instead of using a traditional air conditioning system. According to The Economist (2011), these designers demonstrated a fundamental principle: that solutions discovered in nature, and refined by evolution, can elegantly tackle complex human problems.

This biomimetic strategy of studying and imitating nature's proven patterns (Benyus, 1997) also has implications for organisational leadership, especially for leaders seeking to uphold organisational health and adaptation in the face of complexity (Holling, 1973; Teece, 2018). Keystone species — species with disproportionate influence relative to their numbers (Paine, 1969; Mills, Soulé and Doak, 1993) — are inspiring examples of influence in nature (Power et al., 1996). Through examining keystone species, this study seeks to answer a critical question for today's organisations: how can leaders sustain organisational health more effectively in our changing and volatile world?

1.2 Research Aim and Questions

This study investigates the potential for a keystone-inspired leadership framework by examining the mechanisms of keystone species, how they facilitate ecosystem health, resilience, and recovery (Paine, 1969; Mills, Soulé and Doak, 1993; Power et al., 1996), and whether they can inform healthy practices for sustainability leaders today. The study is exploratory, discovering possible biomimetic coincidences, identifying their relevance to leadership, and further research.

In pursuing these objectives, the research is guided by three preliminary research questions (RQ), not meant to provide causal proof of any phenomenon, but rather to look for and examine theoretical trends and future possibilities:

1. **RQ1.** How do keystone species' behaviours parallel leadership behaviours that enhance organisational health and resilience?
2. **RQ2.** How do these parallels reveal pathways for translating ecological patterns into actionable leadership practices within sustainable organisations?
3. **RQ3.** How does the integration of keystone ecological insights, leadership experiences, and expert perspectives provide a foundation for a keystone-inspired leadership framework that enhances organisational resilience and sustainability?

1.3 Contribution to Knowledge

The theoretical contribution of this study is to bridge a gap between biological systems theory and leadership scholarship (Uhl-Bien, Marion and McKelvey, 2007; Dinh et al., 2014). It provides a conceptual perspective that connects leadership agency with systemic complexity, and advances sustainable leadership theory through ecological parallels (Avery and Bergsteiner, 2012).

Practically, it illuminates evidence-based possibilities for leadership practices grounded in ecological strategies. It directs sustainability-focused organisations towards alternatives to traditional command-and-control approaches and indicates paths for leadership development, and organisational design.

Methodologically, the research demonstrates a useful application of a multidisciplinary approach through utilising a keystone species database, leadership interviews, and expert validation. This lays the groundwork for additional biomimicry-based organisational studies, as well as identifying conceptual deficiencies and gaps that warrant future investigation.

1.4 Significance of the Study

This study is significant because it offers one of the first in-depth explorations of biomimicry principles — applied here through the example of keystone species ecology — within sustainable organisational leadership (Benyus, 1997). This moves beyond metaphorical analogy toward empirical investigation. It is significant for its originality, breadth, ecological foundation, and timeliness.

Academically, while existing scholarship has acknowledged the detriments of organisational toxicity (Einarsen, Aasland and Skogstad, 2007), and the importance of emotional health at the individual level, it has not articulated how leaders actively sustain organisational health at the systemic level. This study reframes healthy leadership not merely as the absence of toxicity or interpersonal competence, but as the capacity to regulate organisational vitality, sustain system health, and create the conditions for resilience and flourishing over time (Boyatzis and McKee, 2005).

Practically, the research identifies evidence-informed potential opportunities for more effective leadership development, organisational design, hiring processes, and regenerative practices (Avery and Bergsteiner, 2012). It contributes to a future-oriented biomimetic framework, for organisations seeking sustainable objectives like environmental stewardship, stakeholder well-being and systemic resilience.

A final benefit of this research is that it addresses the real-world issues leaders are facing. Climate change, widening inequality, disruptive technologies such as artificial intelligence, volatile markets, and mounting political headwinds against sustainability — from tariffs to regulatory rollbacks — require a robust leadership approach that facilitates organisational health based on sustainable values (IPCC, 2023; Teece, 2018).

To situate this research, the next chapter reviews the evolution of leadership theory, the shift from mechanistic to living systems perspectives in organisational theory, and the role of keystone species ecology in biomimicry as a foundation for a keystone-inspired leadership framework.

Chapter 2: Literature Review

As the first step in addressing the RQs in Chapter One, this chapter lays the theoretical foundation for a keystone-inspired leadership framework by considering three essential theoretical fields: the evolution of leadership theory, the development of organisational theory, and biomimicry and keystone species theory. The following sections examine leadership theory in greater detail, tracing the movement from traits to complexity and making the case for a keystone-inspired lens.

2.1 The Evolution of Leadership Theory: Pathways to Healthy Leadership

Understanding of the theoretical underpinnings of leadership is crucial for situating biomimicry within existing debates. Theories of leadership have ranged from early trait-based approaches (Stogdill, 1948), to transformational perspectives (Burns, 1978; Bass, 1990) and, more recently, complexity frameworks which consider dynamic and interdependent environments (Uhl-Bien, Marion and McKelvey, 2007). The trajectory reflects advancements and limitations (Dinh et al., 2014). These limitations accentuate the importance of healthy leadership, and pave the way for keystone-inspired approaches as a potential extension of this field.

2.1.1 From Traits to Context: Early Leadership Theory and Its Limits

Early leadership theory was dominated by a trait-based view and was heavily focused on the personality of a specific individual (Stogdill, 1948), separating the individual from their followers. That view profoundly changed how organisations were run — from companies and governments, to communities and religious groups — success was based on acquiring a born leader. Even so, the trait-driven approach was increasingly questioned, particularly since successful leadership was widely considered contingent and situationally determined (Fiedler, 1967; Graeff, 1997; Bass, 1985, 1990).

Trait and contingency models emerged in the mid-century and propelled a movement toward transformational and relational models. Burns (1978) went on to further develop this idea by introducing transactional and transformational leadership; Bass (1985, 1990) developed its method by presenting empirically testable models. Relational models were already being produced: Leader–Member Exchange theory placed emphasis upon the uniqueness of the leader–follower relationship (Graen and Uhl-Bien, 1995), and Greenleaf (1977) described servant leadership, which characterised leaders as stewards who seek to enable followers to develop and improve well-being. Although these contributions challenged existing leadership theory in terms of being static in attributes, most continued to contribute toward dyadic dynamics, not to larger systemic and ecological perspectives.

2.1.2 Transformative Approaches: Mid-Century Advances in Leadership

From corporate scandals and disruptive innovation to the need to protect the environment and a reconfigured workforce, the 21st century marked an era of extraordinary threats that exposed the inadequacy of traditional models of leadership (Tourish, 2013; Northouse, 2021).

The two trajectories of scholarly responses were ethical renewal and systemic reconceptualisation. The ethical turn also gave rise to frameworks which further emphasised authentic leadership (George, 2003; Avolio and Gardner, 2005; Walumbwa et al., 2008) and ethical leadership (Brown, Treviño and Harrison, 2005) from a moral perspective. At the same time, systemic approaches reconceptualised leadership as a distributed practice (Gronn, 2002; Spillane, 2006), and as an adaptive process embedded within complex systems (Anderson, 1999; Uhl-Bien, Marion and McKelvey, 2007). These contributions redefined leadership not simply as a matter of acting with agency, but increasingly as managing networks.

2.1.3 Systemic and Ethical Shifts: Contemporary Leadership Perspectives

In general, these theoretical advancements showed a progression from leader-centred paradigms to system-based paradigms; from static attributes to dynamic ones; from control-driven patterns to facilitative behaviours. Nonetheless, this development left a conceptual gap in understanding the perception and application of separation between systems and leaders in an organisational context. In fact, even in adaptability and complexity paradigms (Uhl-Bien, Marion and McKelvey, 2007; Dinh et al., 2014) leaders and organisations remain frequently conceptualised as two distinct entities in relation to one another. They are interconnected by influence rather than an interdependent set of processes in an enduring feedback and regulation structure.

Keystone species offer wisdom to this gap. They are more than directional influencers; they demonstrate systemic regulation and maintain the health of the ecosystem that they are part of. The importance of addressing this missing piece is not limited to academic thinking; it plays out in organisational actual practice. A failure to understand leadership as integral to systemic regulation often leads to dysfunction, fragility, and short-termism (Uhl-Bien, Marion and McKelvey, 2007; Keller and Schaninger, 2019).

2.1.4 Healthy Leadership as a Systemic Imperative

The need for healthy organisations has never been more critical. Unhealthy workplace environments impose major costs across the Triple Bottom Line (TBL), which frames organisational outcomes in terms of people, planet, and profit (Elkington, 1997). In terms of the people dimension, toxic environments lead to increased levels of stress and burnout, and in a worst-case scenario, a major burden of depression and anxiety can cost the world economy an estimated US$1 trillion per annum (World Health Organisation, 2024). From the perspective of profits, such cultures have turnover rates roughly 30% above the industry average, and over five years, replacement costs exceed $223 billion (SHRM, 2019). On the planet level, organisations with unhealthy cultures tend to overlook their sustainability commitments and contribute to ecological risks through short-sighted decision making and extractive practices (Eccles, Ioannou, and Serafeim, 2014).

In contrast, companies in the top quartile for health tend to do better than their worst quartile counterparts, sometimes with three times over total shareholders returns (Keller and Schaninger, 2019). They also experience increased productivity, flexibility, and customer satisfaction (CSAT). Good organisational health also correlates with high employee engagement and innovation capacity (Gallup, 2025), and is related to more adaptable sustainability behaviour that optimises environmental performance (Eccles, Ioannou, and Serafeim, 2014). Collectively, this evidence reinforces that organisational health should not be an afterthought but, rather, a foundational factor determining long-term resilience and sustainability.

The role of leadership becomes central in this sense – without an understanding of how leaders affect organisational health, there can be no distinction between superficial effectiveness and leadership that generates sustained resilience over time. The detrimental effects of destructive leadership have been repeatedly reported — dysfunctional teams, ethical lapses, disengaged employees, and stagnation (Padilla et al., 2007). However, it is less clear what signs mark healthy leadership.

Healthy leadership cannot be reduced to avoiding toxicity or developing interpersonal skills. In the long run, emotional and social competences are not enough if they are not linked to systemic effects, such as sustained organisational adaptability and functioning. Therefore, it could be argued that the most powerful indicators of healthy leadership may not be the self-reported characteristics of leaders, but rather the palpable well-being of organisations under their leadership (Quick et al., 2007). Chronic dysfunctions — like conflict, high turnover, and stagnation of innovation — can be systemic evidence of leadership failure, no matter the espoused values (Kelloway and Day, 2005).

This outcome-oriented perspective views healthy leadership as a comprehensive function instead of a collection of individual attributes. It contradicts reductionist perspectives, which emphasise organisational success as driven mainly by leader traits, and redefines leadership as a dynamically emergent process embedded within complex social systems (Uhl-Bien, Marion, and McKelvey, 2007). Therefore, healthy leadership should be seen, at least in part, as organisational health maintenance — the ability to lead in an enabling manner, adapting an organisation to changing environments, and facilitating collective well-being.

Organisational studies support, with evidence, that effective leadership contributes to a sense of trust, adaptability, and well-being (Avolio and Gardner, 2005; Walumbwa et al., 2008), whereas negative forms of leadership inhibit it. In order to understand organisational health as a crucial aspect of long-term sustainability, we must understand the type of leadership that facilitates it. This study argues that a healthy leader preserves the functioning of the organisation, adapts to environmental changes, and creates conditions for organisations and actors to flourish.

To understand how this works in practice, it is essential to look at the organisational systems that support leaders — the systems that have themselves evolved from mechanistic models to living systems concepts — this provides the context for applying ecological insight to leadership.

2.2 The Development of Organisational Theory: Pathways to Living Systems

Along with leadership theory, organisational theory has also progressed, affecting the ways in which scholars and practitioners think about the structures in which leadership is enacted. Early mechanistic models prioritised hierarchy and control, while current perspectives place human issues as essential. It can be argued that these changes represent a progressive shift from organisations designed as machines to be managed, to ones developed as alive, adaptable living systems (Capra, 1996). Such a progression not only highlights the inherent limitations of reductionist models, but also the growing relevance of ecological perspectives for understanding organisational adaptability and resilience.

To apprehend this development, we must start with the classical and neoclassical foundations of organisational theory. These foundations established the mechanistic paradigm and its early critiques.

2.2.1 Mechanistic Foundations: Classical and Neoclassical Theories

Many classical theories of organisation emerged as a consequence of industrialisation; organisations required better mechanisms for coordination and control. It was Taylor (1911) and Weber (1947) who ushered in mechanistic models of standardisation, efficiency, and hierarchical authority. But the mechanistic orientation was soon criticised by neoclassical models citing human factors. Mayo's association with the innovative Hawthorne writings laid bare the way social relationships and personal relationships between workers impacted productivity, and demonstrated that organisation was not simply a mechanical state (Roethlisberger and Dickson, 1939). Simon's (1976) theory of bounded rationality also challenged traditional assumptions, with its contention that decision-making is restricted by cognitive conditions and contextual factors. Taken together, these shifts exposed limitations to mechanistic models and the need for more context-specific, responsive conceptualisations in organisational design.

2.2.2 Contextual Awareness: Contingency and Institutional Perspectives

Contingency approaches represented a sea change in the development of organisational philosophy that questioned universal management principles. Lawrence and Lorsch (1967) showed that an organisation’s effectiveness is determined by whether structural and environmental factors are matched, and that context is more important than uniformity of methodologies. This radically disproved the traditional assumption that one ideal organisational design applies universally. These contextual insights were developed by institutional theorists who demonstrated that organisations were affected by broader social factors as well as the requirements of immediate tasks. DiMaggio and Powell (1983) examined the convergence effect among similar organisations in similar environments through imitation, professional norms, and regulatory pressures.

Meanwhile, Pfeffer and Salancik's (1978) resource dependence theory suggested that an organisation must care for the relationships and dependencies of its environment. However, even though contextual and institutional views tended to be more flexible than classical models, they still emphasised structural alignment instead of dynamic processes. These limiting factors opened up a biological turn in organisational thought and theory.

2.2.3 The Biological Turn in Organisational Theory: From Mechanistic Models to Living Systems

The most radical transformation of organisational theory has been paradigmatic — from mechanistic models towards living systems views (Morgan, 1997; Capra, 1996). Where past organisations were conceptualised as machines to be optimised for efficiency, biological approaches focus on adaptive and emergent processes (Anderson, 1999; Holland, 1998). This conceptualisation took hold as mechanistic forms of organisational life became increasingly insufficient.

The mechanistic theoretical foundations began to shift with von Bertalanffy's (1968) general systems theory and Katz and Kahn's (1966) open systems model. They argued that organisations are systems requiring constant interaction and equilibrium between the environment and the system. Argyris and Schön (1978) further developed this idea, introducing organisational learning frameworks. This continued with Senge's (1990) learning organisation and Beer's (1981) viable system model, which took hold in the 1980s–1990s. These models illustrate the capacity of organisations to self-regulate and to maintain coherence and identity during periods of change..

This biological framework was expanded by contemporary complexity theorists who conceptualised organisations as complex adaptive systems marked by emergence, self-organisation, and non-linear dynamics (Uhl-Bien, Marion, and McKelvey, 2007). A number of scholars, including Morgan (1997), Weick (1995), and Wheatley (2006), have described organisations as more organic than engineered artefacts, characterised by the permeability of boundaries, feedback loops, and an ability to create and maintain themselves (Maturana and Varela, 1980; Capra and Luisi, 2014).

This living systems perspective has critics who argue that biological metaphors obscure the fact that organisations are not naturally evolving organisms but conscious, political, and goal-directed human systems (Astley and Van de Ven, 1983; Donaldson, 2001). However, it is difficult to ignore that organisations exhibit system dynamics similar to living systems (e.g., feedback loops, adaptation, and interdependence). Although controversy surrounding living systems theory remains, the concept is gaining theoretical traction. It is increasingly suggested that human organisational ecosystems can benefit immensely from an understanding of how natural ecosystems sustain resilience (Capra and Luisi, 2014). The table below summarises the differences between the mechanistic and living systems paradigms.

Table 2.2.1: Contrasting Organisational Paradigms

Characteristic	Mechanistic Paradigm	Living Systems Paradigm
Core metaphor	Organisation as machine	Organisation as organism
System boundaries	Closed, rigid	Open, permeable
Change processes	Linear, planned	Non-linear, emergent
Control mechanisms	Hierarchical, centralised	Distributed, self-organising
Environmental stance	Buffering, controlling	Sensing, adapting
Information flow	Top-down, prescribed	Multi-directional, emergent
Leadership function	Command and control	Facilitate and influence
Success metrics	Efficiency, standardisation	Adaptability, resilience
Preferred environments	Stable, predictable	Dynamic, complex
System maintenance	External repair/redesign	Self-regulation/homeostasis

2.2.4 Leadership through a Living Systems Lens

Organisational leaders should reflect deeply on how conceptualising organisations as machines and living systems shapes their effectiveness. A mechanical paradigm views organisations as closed systems designed to produce predetermined results, and enforces strict hierarchies and centralised control (Morgan, 1997). This approach can evoke reactive leadership concerned with designing structures that force change in a linear fashion. These structures rarely have the ability to tackle complex interdependencies.

In contrast, a living systems perspective positions leaders to understand their organisations as open systems marked by emergence, self-organisation, and dynamic stability (Morgan, 1997). Here, goals are directed towards organisational resilience while remaining flexible to change. This paradigm facilitates system-wide cognition, and engagement with environmental complexity (Uhl-Bien, Marion and McKelvey, 2007). Research suggests that while mechanistic practices perform well in stable environments, living systems perform better in uncertain environments (Lawrence and Lorsch, 1967).

2.2.5 Toward Biomimetic Leadership for Healthy Leadership and Organisational Health

The leaning towards living systems provides a theoretical basis for exploring how insight from natural systems can be put to use in organisational practice. However, despite the interest, there has been little effort from organisational scholarship to examine which specific biological processes provide the most useful advice on leadership development and organisational health. This shortfall provides an opportunity for empirically based biomimicry research — especially the study of keystone species — whose interdependent influence renders them especially instructive for understanding how leaders can sustain health within complex organisational ecosystems.

A living-systems perspective is a stepping stone to disciplined biology-to-leadership translation. Now we examine biomimicry — specifically keystone ecology — as the model for this kind of interpretation.

2.3 Biomimicry and Keystone Species: Pathways to Keystone Leadership

2.3.1 Biomimicry as a Conceptual Foundation

Biomimicry, according to Janine Benyus, is a way of accessing “nature's operating instructions” (Benyus, 1997). The lessons learned from over 3.8 billion years of evolutionary testing are observable to be translated into human systems, providing *evolutionary-based* strategies for adaptability and resilience (Benyus, 1997). The formal theoretical framework for biomimicry was introduced in the early 1990s, but the roots of this discipline reach well beyond that.

D'Arcy Wentworth Thompson's mathematical study of biological structures (1917) informed generations of designers and engineers. Velcro was invented in the 1950s, after de Mestral (1955) observed seed burrs attaching to his coat. From these strands, Janine Benyus (1997) synthesised the term biomimicry — from Greek bios (*"life"*) and mimesis (*"imitation"*) — as a systematic way through nature's time-tested strategies to overcome human adversities.

Despite the wide-scale effectiveness of biomimicry across many disciplines, its effective application to organisational leadership remains limited (Somoza-Norton et al., 2022). A few existing principles of biomimetic leadership (e.g., Hutchins and Storm, 2019) have become applicable, however, very few are operationalised into formal and standardised leadership practices (Biomimicry Institute, 2024).

This lacuna invites us to look at ecological examples that have disproportionate effects on ecosystem health, and resilience. Keystone species are one such model: organisms that despite their relative scarcity, maintain ecosystem integrity, through their functional roles, specific behaviours, and ecological relationships.

The following sections explore the theoretical construction, empirical evidence and functional dynamics of keystone species, and consider their translation into biomimetic leadership modes.

2.3.2 Origins of the Keystone Species Concept

The concept of keystone species was established through Paine's (1969) work on intertidal starfish (*Pisaster ochraceus*) when he discovered that species diversity vanished when this one predator was removed. This fundamental realisation — that some species affect ecosystems more strongly relative to their number — profoundly shaped ecological theory.

2.3.3 Evolution and Refinement of Keystone Species Theory

Conceptual Origins and Empirical Foundation

Power et al. (1996) further developed the operational definition of keystone species building on Paine's (1969) initial predation-focused framework. This theoretical evolution revealed that keystones have different function pathways, calling into question the main aspects of predation, first highlighted by Paine (1969). Subsequent research continues to support keystone dynamics in a range of ecological systems, ranging from wolves in Yellowstone (Ripple and Beschta, 2012) to fig trees in tropical forests (Terborgh, 1986), demonstrating that keystones are not limited to a specific environment.

Theoretical Critiques and Conceptual Boundaries

Among ecological scholars, the keystone species theory generates heated debates on its theoretical accuracy as well as its practical feasibility. According to Mills et al. (1993), keystone theory runs the risk of becoming too generalised, reducing ecological dynamics to what may be viewed as the persistence of species action gradients. Hurlbert (1997) similarly challenged the ability of the concept to predict influence, highlighting how much of the effort in keystone identification came after successful removal studies, thus hindering its utility. Additionally, critics have emphasised the vulnerabilities of ecological communities, particularly when keystones are removed, which can trigger cascading failures (Scheffer et al., 2001).

However, these criticisms, I believe, bring the conceptual framework into sharper focus — that is, clarifying what it can achieve, as well as what its limits are. Keystone theory was not designed to include all ecological interactions, instead to identify repeat patterns of disproportionately of species influence (Estes et al., 2011). In addition, the methodological difficulties for prospective identification stem from the intrinsic complexity of the ecological systems, which often reveal causal relationships only post-disruption. As to ecosystem vulnerabilities when keystones are removed, this only further highlights the critical nature of their presence in ecological communities.

2.3.4 Functional Pathways of Keystone Influence

Primary Pathways of Ecosystem Regulation

Based on ecological research, three main mechanisms have been identified through which keystone species regulate ecosystem dynamics: predation control, ecosystem engineering, and symbiotic mutualism (Estes et al., 2011).

Predation Control: Predatory keystones impact at the top level on community composition by protecting the ecosystem from competitive exclusion, enabling diversity through selective predation pressure. For example, sea urchin populations are regulated by sea otters, protecting the kelp forest ecosystem as a whole (Estes and Palmisano, 1974).

Ecosystem Engineering: Ecosystem engineers modify habitats by changing their physical architecture, creating or maintaining niches for other species. As one example of this, beaver dam construction results in wetland habitats that support enhanced biodiversity (Naiman, Johnston, and Kelley, 1988).

Symbiotic Mutualism: Mutualistic keystones serve in the establishment of connections and are critical relational nodes in ecological networks. Used to transfer materials such as seeds, nutrients, organic matter across various levels they maintain connectivity across trophic levels through symbiotic relationships. Fig trees exemplify this mutualistic function, exhibiting asynchronous fruiting to provide food resources for multiple vertebrate species during periods of resource scarcity. (Terborgh, 1986; Janzen, 1979). Their influence in ecosystems arises from their mutualistic symbiotic interactions that benefit multiple species.

Behavioural Pathways of Keystone Influence

Several additional behavioural routes further enhance keystone strength, such as nutrient redistribution, cascade amplification, and competitive mediation. Nutrient redistribution is a critical process of keystone transfer and acts as a keystone inter-territorial mechanism to transfer energy and material across geographical and temporal boundaries. In riparian forests, salmon export food and nutrients from marine to riparian forests through spawning migrations. When they migrate, these organisms nourish terrestrial ecosystems far from ocean sources (Helfield and Naiman, 2001). It is a case of “cross-ecosystem linking” in which keystone species link otherwise isolated habitats, facilitating resource movements which support wider landscape processes.

Cascade amplification is an effect created when keystone actions affect other trophic systems. One well-documented example comes from the reintroduction of wolves to Yellowstone National Park. In this case, wolf predation dramatically decreased elk numbers and helped restore willow and aspen communities, stabilising stream banks, altering hydrological patterns, and providing habitat for many species such as beavers and songbirds (Ripple and Beschta, 2012).

Competitive mediation is another significant function where keystones block the monopolisation of resources by species possessing superior competition and in doing so support community diversity. Paine's first starfish work illustrated such a system (Paine, 1969). Similarly, elephants serve as competitive mediators in African savannas by maintaining grassland habitat for a variety of herbivorous species through their browsing behaviours (Laws, 1970).

What's impressive is that these behaviours and functions of keystones taken together position them as species who facilitate ecosystem homeostasis. This critical role helps their environment remain stable in the face of on-going stress, adapting, changing and renewing continually to remain healthy.

2.3.5 Translating Ecological Principles to Organisational Leadership

Homeostasis as the Conceptual Bridge

Homeostasis, in this study, refers to dynamic regulation — the continual micro-adjustments that preserve function amid change. This regulatory phenomenon — through which keystone species operate in ecosystems — forms a basis for keystone principles in organisational contexts. Homeostasis was first observed as a regulatory process in the human body by French physiologist Claude Bernard (1879) and later formalised by American physiologist Walter Cannon (1929).

Critically, Cannon himself recognised the broader applicability of homeostatic principles beyond human biology, suggesting that mechanisms which highly evolved animals employ to maintain internal stability “may present some general principles for the establishment, regulation and control of steady states, that would be suggestive for other kinds of organisation — even social and industrial" (Cannon, 1929).

However, *ecosystem* homeostasis — and by extension, *organisational* homeostasis — should not be misconstrued as states of static equilibrium. Some social scientists applying homeostasis to family systems therapy or organisational leadership have mistakenly treated it as a quest for balance (Katz and Kahn, 1966). Scott Turner, a leading expert on homeostasis (also one of the case study experts of this study), refutes this, "Life exists not in equilibrium, but in the constant struggle against equilibrium. True equilibrium in biological systems is death" (Turner, 2019). Furthermore, Turner describes authentic homeostasis as a system engaging in "dynamic disequilibrium".

What we find in keystone species is that they enable dynamic stability by continuing to influence mechanisms so that the ecosystem can function, heal, and adapt to fluctuating environmental conditions. The act of maintaining system coherence while also enabling adaptation in the face of constant change — *which is a homeostatic position* — constitutes just the sort of leadership challenge now emerging in modern organisations.

If organisations are understood as living systems (Capra, 1996), then organisational health emerges not from eliminating change but from integrating it productively through continuous adaptive regulation. Keystone species demonstrate how this paradox might be resolved: through facilitative influence that maintains system integrity without imposing rigid control.

From Ecological Influence to Leadership Theory

While keystone species concepts remain largely confined to the ecological literature, emerging scholarship suggests its applicability to organisational theory and leadership studies. A few organisational researchers have adopted keystone terminology to describe entities that wield disproportionate influence in business ecosystems (Iansiti and Levien, 2004), and some network theorists have considered analogous principles for critical nodes in social networks. However, there is still insufficient study of keystone ecological dynamics in relation to leadership theory.

The appeal of keystone species for leadership lies not only in their disproportionate effect but in the health-sustaining outcomes of that influence. These organisms exemplify what may be described as ecologically healthy leadership: influence that systematically produces positive intrinsic outcomes instead of favoring individual constituents at the collective expense.

It is important to consider the shortcomings of any analogy to ecology. Leadership is conscious agency, and an ethical responsibility that goes beyond biological processes. Some might argue that the keystone concept focuses on a single dominant species (Paine 1969; Mills, Soulé and Doak, 1993), noting organisational resilience is rarely anchored in the presence of a leader alone. However, even in ecology, keystone effects are increasingly recognised as emerging from collectives — functional groups, networks, or mutualistic partnerships whose combined interactions sustain ecosystem resilience and health (Power et al., 1996; Jordano, 2000; Lundberg and Moberg, 2003).

This reinforces the leadership parallel: resilience in organisations also depends less on solitary figures and more on distributed roles and interdependent functions.

Some people or teams may indeed represent keystone regulators, but it is through their interconnection that the health of the wider system is maintained (Holling, 1973; Folke et al., 2004).

Toward a Framework of Keystone Leadership

From a biomimetic leadership perspective a healthy leader may be viewed as a homeostatic one — someone who facilitates continual adaptation to changes while maintaining core organisational identity, ensuring system health. Framing leadership in this way highlights how sustaining healthy organisations—particularly under conditions of complexity and change — might draw insight from the regulatory and adaptive capacities demonstrated by keystone species in natural ecosystems.

This chapter has highlighted three underlying principles essential for this study's research: the imperative for healthy leadership, organisations viewed as living systems, and the keystone species' example. These are the foundations to empirically explore how keystones can inform leadership sustainability. The approach to this investigation is addressed in the next research methodology chapter.

Chapter 3: Research Methodology

3.1 Philosophical Foundations of the Study

3.1.1 Ontological Assumptions: The Nature of Organisational Reality

This study takes a largely subjectivist ontological stance, recognising organisational realities as socially constructed through the interpretations and experiences of actors (Bryman and Bell, 2019).

3.1.2 Epistemological Lens: Constructing Knowledge and Meaning

Based on interpretivist epistemology, the research assumes that knowledge is acquired and best understood through lived experiences and perspectives. In this way, this study adopts a phenomenological perspective (Creswell and Poth, 2018), utilising sustainability leaders' experiences from their interactions with healthy leadership and organisational resilience. This aligns with mainstream contemporary approaches to sustainability research, which focuses on social constructs of environmental and organisational problems (Hartz-Karp and Marinova, 2017).

Since the study also uses structured coding of keystone species’ behaviours, it brings a limited post-positivist element. The quantitative phase was not designed to produce generalisable laws but to establish a descriptive baseline informed by the existing literature. This baseline guides subsequent qualitative interpretations. This is indicative of an exploratory sequential mixed methods approach, in which quantitative findings are used as a foundation for deeper qualitative inquiry (Creswell and Plano Clark, 2017).

3.1.3 Mixed Methods Design Overview

The present study adopts an exploratory sequential mixed methods design (Creswell and Plano Clark, 2017) that balances quantitative description and interpretivist orientation. The methodology uses systematic patterns and interpretive depth, and demonstrates the increasing recognition that complex sustainability problems require methodological pluralism (Brannen, 2016). A precise three-phase sequence and the strategy for embedding this information is detailed in Section 3.4.

3.2 Data Collection Methods

3.2.1 Phase 1: Keystone Database – Ecological Baselines

In Phase 1, a quantitative baseline of natural patterns was established. A purposive database of 30 keystone species was produced, drawing on peer-reviewed ecological studies that provided direct empirical evidence of keystone influence. Selection achieved equal coverage of predators, ecosystem engineers, and mutualists (Power et al., 1996).

The sample size balanced representation of keystone mechanisms with feasibility for detailed analysis. Nine behavioral categories, defined in the *Keystone Behavior Codebook* (see Appendix A.3), were operationalised using a binary coding system (1 = documented evidence, 0 = no evidence). Frequency counts identified the most consistently documented behaviors. This phase contributed to RQ1 by establishing ecological baselines for later comparison with leadership practices.

3.2.2 Phase 2: Leadership Interviews – Human Parallels

Phase 2 provided qualitative depth, investigating whether and how leadership behaviours reflected Phase 1 trends. Semi-structured interviews were conducted with ten sustainability leaders across the UK and US, purposely sampled by industry and organisational contexts in order to capture various sectors and the particular contexts that organisations operate in (see Table E.1.1, Appendix E.1). Data collection continued until the thematic saturation point was reached (Guest, Bunce and Johnson, 2006).

Interview sessions lasted 45–60 minutes, and were conducted online to provide a comfortable, participant-enabling environment. The protocol included questions on healthy leadership behaviours, unhealthy leadership patterns, resilience traits, and the relationship between leadership and adaptability (see Table A.1.1, Appendix A.1). The semi-structured approach created consistency between individuals while enabling exploration to find new insights (Galletta, 2013).

Key themes were identified following Braun and Clarke's (2006) six stage thematic analysis and were systematically compared with Phase 1 results to analyse similarities and differences. This phase facilitated RQ1 and RQ2: verifying whether ecological baselines were reflected in leadership behaviours, and developing pathways towards the application of keystone ecological insights to organisational contexts.

3.2.3 Phase 3: Expert Case Studies – Cross-Disciplinary Validation

In Phase 3 I engaged three subject-matter experts (Appendix A.2):

- Biomimicry Expert — specialist in translating natural patterns into organisational applications
- Homeostasis Expert — systems theorist/biologist focused on regulatory mechanisms
- Health & Neuroscience Expert — psychotherapist and wellness coach with expertise in systemic and individual health

Each expert participated in a 60-90 minute exploratory interview, treated as an in-depth case study (Yin, 2018). Experts validated areas of alignment, identified limits of analogy, and highlighted organisational complexities exceeding ecological comparison.

This phase significantly served RQ1 by validating themes in biology. It also contributed to RQ2 by offering expert perspectives on leadership pathways. Furthermore, it informed RQ3 by testing the robustness and limits of ecological-organisational parallels.

3.3 Sequential Integration Strategy

This study comprised three data-collection phases and one synthesis phase, sequenced to build understanding progressively (see section 3.4).

This sequence positioned quantitative results not as an endpoint but as a prompt for deeper qualitative inquiry. The sequencing directly aligned with the research questions: RQ1 through the combination of ecological baselines and leadership interviews, RQ2 through leadership interviews and expert validation of translational pathways, and RQ3 through the cross-comparison and integration of all three phases.

3.4 Analytical Strategy

3.4.1 Sequential Analysis Framework

The analysis was performed sequentially. Phase 1 quantitative coding produced ecological baselines; Phase 2 thematic analysis explored parallels in leadership; Phase 3 case studies validated and refined interpretation; Phase 4 synthesised all phases into parallels, discussion, and future work potential.

3.4.2 Phase 1: Identifying Natural Patterns

Nine behaviours were coded with thirty keystone species in a binary coding system (1 = documented evidence, 0 = no evidence). Frequency counts determined the most recurrent behaviours, seen as ecological benchmarks. In this stage, a descriptive approach was used instead of inferential analysis (see Table A.3.1, Appendix A.3).

3.4.3 Phase 2: Leadership Interviews

Based on Braun and Clarke's (2006) six-phase thematic analysis, the leadership interviews were inductively analysed (see Appendix D). The themes were reviewed against Phase 1 benchmarks. This formed the basis for supporting ecological baselines in leadership practices, while also surfacing pathways of translation into organisational settings.

3.4.4 Phase 3: Expert Case Studies

The individual case studies were evaluated using Yin's (2018) guidelines. Observing patterns and theoretical contributions from the expert participants, I took note of their opinions, strong alignments, contextual limitation suggestions, and refined interpretations of Phase 1 and Phase 2. This provided a process to guide RQ2 by expert validation of pathways and RQ3 for greater elucidation of integrative potential.

3.4.5 Phase 4: Synthesis of Findings

Phase 4 was the sequential synthesis of data and interpretations collected during the three phases of research. The approach facilitated a systematic evaluation of research questions: confirming promising ecological–leadership parallels in RQ1, exploring leadership pathways of RQ2, and integrating insights into a preliminary framework (RQ3). The research didn't prescribe any model; it highlighted possibilities. In this stage I concentrated on evaluating the robustness of parallels, pathways, and incorporating insights into a foundational framework for future research and practice.

3.5 Ethical Commitments

In accordance with prevailing professional ethics standards that organisations must adhere to, I obtained ethical approval for this study from the University of Wales Trinity Saint David.

3.5.1 Informed Consent

Consent was obtained (see Appendix B) from every participant, and withdrawal was permitted at any stage without penalty.

3.5.2 Confidentiality and Data Security

During recording and transcription, all identifying information was de-identified, pseudonyms were used, and sensitive information was omitted. All the information was stored in secure systems such as encrypted, password-protected files.

3.5.3 Power Dynamics and Respect

Participants remained in the familiar spaces of online interviews, which minimised the possibility of any potential imbalances. The framing of expert interviews as collaborative knowledge-sharing demonstrated their specialised expertise.

3.6 Ensuring Research Quality and Rigour

The research reference was Lincoln and Guba (1985)'s framework for trustworthiness in qualitative research.

3.6.1 Trustworthiness

- *Credibility.* Due to systematic coding, cross-phase consistency checks, and triangulation involving multiple methods.
- *Transferability.* Provided by the rich contextual descriptions of species, leaders and experts.
- *Dependability.* Maintained through a documented audit trail
- *Confirmability.* Strengthened through reflexive journaling.

3.6.2 Triangulation

- *Data triangulation.* Keystone database, leadership interviews, expert case studies.
- *Methodological triangulation*. Quantitative coding, thematic analysis, and case studies.

3.7 Limitations and Researcher Positionality

3.7.1 Scope and Sample

The sample sizes in this study are suitable for qualitative research, but inevitably limited generalisability. For example, my leadership interviews were limited to UK and US settings and the keystone species database (n = 30) was intentionally limited to include species only with peer-reviewed empirical evidence. Although this focus added richness to reliability, it did not address sustainability practices in global contexts, and barred species whose keystone status is theorised, but not empirically confirmed. As such, translational pathways (RQ2) and integrative perspectives (RQ3) are suggestive rather than definitive.

3.7.2 Researcher Positionality

As the only researcher leading this MBA project, I conducted all coding and analysis on my own, as is typical at this level of single research. In line with maintaining analytical rigor, I adopted transparent coding practices, wrote a reflexive journal on my work, and externally validated with expert interviews in Phase 3. Such strategies covered the findings from single-researcher analysis but kept methodological integrity. To be clear, I recognised that binary coding reduced ecological complexity and prioritised comparability over intensity. However, I had no reason to use statistical inferences but rather to establish a systematic baseline to guide qualitative exploration.

3.7.3 Integrating Multiple Data Sources

It was challenging and generative to integrate ecological, leadership, and expert data. In order to ensure coherence, I defined explicit criteria across this integration process, such as parallels, modifications, absences, and limits. This method helped me to balance the uniqueness of each and make connections between data sets.

3.8 Chapter Conclusion

This chapter has described the study methodology, the sequential mixed-methods research design, data collection, and data analysis. The keystone species database and leadership interviews addressed RQ1 by highlighting ecological patterns, creating a baseline to explore how these might relate to leadership behaviours in sustainable organisations. The leadership interviews, together with expert case studies, addressed RQ2 by identifying paths to translate ecological understanding into practical leadership application. Finally, the cross-comparison across the three phases, addressed

RQ3 by assessing the potential impact of a keystone-inspired framework as well as possible future works.

The goal of this research is to rigorously examine, (within limits*)*, how the behaviour of keystone species can provide insight for leadership operating within sustainable organisations. The next chapter presents the findings, starting with ecological patterns, followed by leadership themes, expert validation, and integrative insights.

Chapter 4: Presentation and Interpretation of Results

In this chapter, I present the findings of three sequential research components. First, a review of the keystone species database to provide a baseline for comparison, second, a thematic analysis of ten leadership interviews following Braun and Clarke's (2006) six-stage model to find parallels between leadership experience and ecology, and third, an overview of three case studies with experts in the fields of biomimicry, homeostasis, and health and well-being. I present the summary phase-by-phase, followed by a section that synthesises the findings. This integrative analysis will include identifying parallels, assessing their validity, and discussing possible translational pathways into leadership. Table 4.1 below gives an overview of the research phases, what they consist of, and which RQs they address.

Table 4.1 Research Phase Overview

Phase	Focus	Source of Evidence	Research Questions Addressed
1.Natural Patterns	Keystone species behaviours and ecological mechanisms	Keystone Species Database (30 Species)	RQ1
2.Leadership Themes	Perceptions and practices of sustainability leaders	Semi-structured Interviews (10 Sustainability Leaders)	RQ1 & RQ2
3.Expert Validation	Cross-disciplinary perspectives and evaluation of central topics	In-depth Expert Case Studies (3 Experts)	RQ1–RQ3
4. Synthesis	Integration of ecological, organisational, and expert insights	Comparative Analysis across Phases 1–3	RQ1–RQ3

4.1 Natural Patterns: Keystone Species Database Analysis (Phase 1)

In the database (see Appendix C), I examined 30 keystone species. These were evenly distributed between predators, ecosystem engineers, and mutualists (Power et al., 1996) and binary coded against 9 behaviours from peer-reviewed journals. These were analysed to identify patterns of influence and determine whether keystone agencies are consistent across populations. This discipline not only formed an important baseline for Phase 2, but it also helped address some of the long-standing criticisms of the keystone species concept (Mills et al., 1993; Hurlbert, 1997), by testing its relevance across diverse ecological roles.

4.1.1 Condition Creation as the Central Keystone Function

The initial quantitative analysis (see Appendix C) highlighted an intriguing central finding — that keystone species across taxa create the conditions that enable other species *(including themselves)* to thrive. In the natural world, it appears that influence arises from facilitation rather than dominance.

Based on the systematic binary coding method outlined in Section 3.2.1, two behaviours stood out and emerged as almost universal underlying mechanisms: *cascade amplification* (26/30 species in the sample) and *homeostasis regulation* (28/30 species in the sample) (Appendix C.3). Both influences contribute significantly to creating conditions that allow other species to thrive.

Cascade amplification creates ripple effects that extend far beyond direct interactions, opening new ecological opportunities at trophic levels or in system layers. Homeostatic regulation facilitates ecosystem stability through continued adaptation, creating favorable conditions in response to the natural environment. Together, these two meta-mechanisms provide the benchmark against which human leadership themes are compared in Section 4.2.

Interestingly, there are a few exceptions among the species studied: Four species from the sample do not exhibit cascade amplification, and two do not demonstrate precise homeostatic regulation. However, looking deeper qualitatively into what they demonstrate through their behaviours, such as predation control and mutualistic functions, can help us understand these as alternative pathways to achieve the same end.

4.1.2 Functional Specializations Across Keystone Roles

Throughout the ecological sample, we begin to see keystone functional types (predators, engineers, and mutualists) employ a different set of behaviours to achieve the same overarching goal of creating conditions for other species to thrive (Appendix C.2).

For example, predators demonstrate a regulation-focused approach, showing complete predation control (10/10) combined with minimal habitat provisioning (0/10) or seed dispersal (1/10). Their keystone status predominantly reflects homeostatic regulation and may thus have facilitative secondary effects on competition that are indirect by preventing competitive exclusion (Paine, 1969; Terborgh et al., 2001).

Ecosystem engineers, on the other hand, have an infrastructure-centered perspective and are expected to provide habitat (10/10) and dominate nutrient cycling (9/10). They attain keystone agency via direct structural modification and resource redistribution (Jones et al., 1994; Wright et al., 2002).

Mutualists adopt a relationship-focused strategy, performing well as behavioural mediators of competitors (7/10) and engaging in specialised seed dispersal/pollination (6/10). Their keystone impact facilitates connections and minimises competitive exclusion (Olesen et al., 2006).

The qualitative interpretation of the data reveals that condition creation can arise through population regulation (predators), infrastructure development (engineers), and relationship facilitation (mutualists). Varying in form but consistent in function. Predators (regulation), engineers (infrastructure), and mutualists (relationship facilitation) are among the various forms that serve the common purpose of creating environmental conditions for species to thrive.

4.1.3 Homeostatic Regulation as Sustainer of Ecosystem Health

Even more common than cascade amplification is ecosystem homeostasis regulation (28/30 species in the sample). Creating conditions, therefore, does not only involve the opportunities that come with setting off change but also the preservation of standard diversity patterns and re-establishing systems to meet new stability when conditions get distorted.

These homeostatic patterns confirm Turner's (2019) assessment of homeostasis and reinterprets environmental resilience as adaptive regulation (Scheffer et al., 2001; Folke et al., 2004). In this way, keystone species maintain the health of ecosystems not by resisting environmental change, but by enabling continual recalibration and responsive recovery, which preserves vital functions in an environment facing constant flux (Walker et al., 2004).

4.1.4 Relational Foundations of Keystone Influence

Under all categories, keystone species are candidates for what might be called relational competence. This is their ability to promote system-level flourishing through interaction among other species rather than through self-mastery. The study shows that the most powerful behaviour in a multi-ecosystem world is that of enabling, symbiosis, and augmenting others' capabilities — a move against traditional top-down approaches.

4.1.5 Boundaries of the Sample and Generalizability

Despite repeated examples of these patterns emerging from the database, studies on larger, more diverse samples and overall assurance of these results would be advantageous. The emerging behaviour patterns here provide initial empirical evidence of keystone influence that merit more widespread ecological validation in a range of ecosystems and geographic regions.

These constraints place bounds on the extent of claims in this chapter and motivate the triangulation with human data (Sections 4.2–4.3).

4.2 Human Patterns: Leadership Interview Themes (Phase 2)

I interviewed ten sustainability leaders within the UK and the United States (see Appendix A.1) to explore whether the ecological dynamics revealed in Phase 1 manifest in human organisational contexts (Appendix E).

Based on Braun and Clarke's (2006) six stages of thematic analysis (Appendix D), the study revealed four most common themes: relational infrastructure, condition creation, organisational homeostasis, and systemic interdependence. Table 4.2.1 below provides an overview of the themes, their frequency in the interviews, and their potential alignment with Phase 1 keystone ecology findings.

(Table 4.2.1 Leadership Interview Themes Summary)

Theme	Description	Leaders Adopting (n=10)	Ecological Parallel
1	People as organisational foundation	8 out of 10	Relational competence
2	Creating conditions for thriving	7 out of 10	Condition creation
3	Interplay of stability and change	6 out of 10	Homeostatic regulation

4	Systemic interdependence	5 out of 10	Cascade amplification

4.2.1 Theme 1: People Are an Organisation's Biggest Resource

In the interviews, the most prominent theme centered around relationships within an organisation. Eight out of ten leaders explicitly discussed trust, integrity, and relational care as means of achieving long-term organisational resilience. This theme significantly mirrors the relational behaviour priorities of keystone species as a means of influence and system-wide flourishing.

Interviewee 1 made this explicit: “Relationships for me are the building block of any organisation… if you’ve got people that you can trust, they’re going to be resilient to change.” Interviewee 2 reinforced this through ecological imagery, comparing resilient organisations to geese rotating at the front of a formation: “Having an abundance of deep, diverse and trusting relationships… Being able to shift who can be out front and take on headwinds and who can allow for rest is like an amazing asset.” Interviewee 8 viewed this systemically: “All organisms are resilient when they’re healthy. And an organisation… is an organism in its own way… relationship is probably the first lens through which I view everything.”

Several leaders, however, made some insightful comments challenging the reality of relational dynamics within organisations. Interviewee 6 observed that resilience at the organisational level does not always equate to well-being for individuals: “Organisations can take much more from individuals than is healthy, and they can still be resilient.” Other leaders cautioned that a relationship-centric approach may be insufficient in crises that require rapid, unilateral decision-making or in highly regulated environments where procedural compliance takes precedence over relational dynamics.

This theme of relationships aligns strongly with ecological relational competence among keystones, demonstrating a promising parallel in organisational contexts and thereby addressing RQ1.

4.2.2 Theme 2: Great Leaders Create Conditions for Others to Thrive

Seven out of ten leaders described their role, or the role of healthy leaders they've seen, as shaping conditions that sustain organisational health and resilience rather than dictating fixed outcomes. This theme points precisely to the central finding of condition creation found in Phase 1 and presents a remarkable leadership avenue for healthy leadership.

Interviewee 2 shared, "My job is to make sure the soil is really healthy so that… the conditions for flourishing are there." The response of Interviewee 5 buttressed this point from a people-centred perspective: "If you nurture the people and support the people, then they will get the work done." Interviewee 9 also contributed a cultural aspect, because he observed, "Resilience is more of an emergent property of a healthy organisational culture… You can't just say, well, you know, be more resilient. But you can encourage your senior leadership team to be more open and vulnerable."

Although two of the leaders didn't reference condition creation, one explicitly raised issues about the validity of the theme. Interviewee 6 reflected: "We need to actually do what we say we're going to do. We need to deliver what we identified in clarity." This comment highlights the struggle between enabling emergence and satisfying stakeholder interests in tangible deliverables, particularly the pressure on publicly traded companies to meet quarterly earnings targets.

This second most prominent theme directly aligns with the core ecological principle of condition creation identified in Section 4.1.1.

4.2.3 Theme 3: Organisational Health Lives in the Interplay of Stability and Change

Six in ten leaders framed resilience as the ability to hold stability and change in ongoing tension. This shared observation directly mirrors the homeostatic regulation seen among 28 out of 30 keystone species. It is also consistent with Turner's (2017) ecological concept that "life exists not in equilibrium, but in the constant struggle against equilibrium."

In the words of interviewee 7: "We need stability. But then if stability becomes stuckness, then it's not really stability." Interviewee 6 highlighted strategic humility: "You need to know your purpose… but also a willingness at every step to consider maybe I'm wrong." Recursive resilience was expressed by Interviewee 8 in the form of iterative recovery: "I'm not confident in my organisational prowess, but I'm confident in my ability to get back up again."

Some leaders pointed to practical challenges. Interviewee 7 warned of "whiplash leadership," in which constant shifts undermine trust, and Interviewee 3 stated that rigid bureaucracies collapse under pressure if they cannot adapt. These comments highlight that an inexperienced workforce may require more structure than this method of organisation allows, and industries with a high level of regulation may have little room for continuous rebalancing.

This theme describing the dynamic relationship between stability and change features the ecological value of homeostatic regulation found in Section 4.1.3. It suggests a compelling parallel that warrants exploration.

4.2.4 Theme 4: Healthy Leadership Knows That Everything Is Connected to Everything

The final theme that emerged, observed in five of the ten interviews, centered on the interconnectedness of organisations and industries. Closely aligning with the high report of cascade amplification seen in 26 out of 30 keystones of the sample, this theme describes the power of distributed networks of interdependence.

Interviewee 10 shared this dynamic within their organisation, "There's been a team response that has felt… we're sharing the responsibility, we're working together on the outcomes." Interviewee 2 discussed the importance of connections within industries: "Organisations who are being hit by federal changes are forming alliances… because they are based on trusting relationships." Interviewee 6 emphasised how cohesion often operates beneath formal structures, describing the "true org chart" as the web of invisible relationships that are not often reflected in official diagrams.

A few leaders emphasised that building interdependence requires conscious effort and comes with its vulnerabilities. Interviewee 9 for example, cautioned that the disconnection between leaders — whether in misalignment or weak communication — can lead to "gaping holes" that erode interdependence. This can be observed in highly competitive environments, where cooperation is challenging to maintain because it contradicts the need to protect a proprietary advantage. Additionally, when interdependence becomes highly developed, failures in one area can cascade across the whole system, amplifying vulnerabilities rather than resilience.

This final theme of connectivity aligns strongly with cascade amplification of keystones observed in Section 4.1.2, demonstrating systemic interdependence as an encouraging leadership focus.

4.3 Expert Perspectives: Validating the Biomimetic Lens (Phase 3)

The third part of the research involved case studies with three experts, whose research and professional work brought scientific validation and wisdom to the analysis. The expert case studies were designed to support the ecological–organisational parallels, as well as to justify the specificity and the limitations they have. Together, the case studies affirm the parallels (RQ1), provide wisdom to translation pathways into leadership practice (RQ2), and detail the contexts in which a keystone-inspired leadership framework is feasible (RQ3).

4.3.1 Case Study 1: Toby Herzlich – Biomimicry

Toby Herzlich brings two decades of leadership development experience with the Rockwood Leadership Institute and over 15 years of advancing biomimicry applications for social innovation. Her work focuses on translating life’s principles into organisational practice in partnership with Biomimicry 3.8.

In the interview, the first topic that she emphasised was "relationship before task”. Relational importance is prominent in nature according to Herzlich. She affirmed that thriving ecosystems sustain themselves through species working together for mutual benefit.

She went on to share the importance of leaders attuning themselves to the environmental context before imposing solutions. Leaders, according to Herzlich, should begin by understanding systemic conditions—such as selection pressures, stakeholder relationships, and interconnections — before applying pre-formed strategies.

Next she expanded on the primacy function in nature of condition creation. She explained: "As a leader, you can't force change. None of us can force change. But what we can do is shift the context, create conditions that are conducive to trust, to partnership, to other people stepping up and taking responsibility." She illustrated this principle by explaining ecological succession, describing how aspens prepare the soil for conifers and create conditions that enable the species that eventually replace them.

She also addressed resilience, noting the tension between efficiency and resilience: "A very efficient system is not always very resilient...Resilience requires diversity, decentralisation, and redundancy." These were her "three D's". Herzlich's concern was that leaders operating in predictable environments prioritise efficiency over resilience, exposing organisations to increased risk during periods of disruption. According to Herzlich, in natural systems, redundancy is valued as a source of resilience, and efficiency is viewed less as an imperative.

Finally, she cautioned against using biomimicry superficially or metaphorically — a wise word for this study. She emphasised that "It's really critical to not focus only on one species… What are the deep principles that could then be applied … to human leadership?"

Herzlich's evident experience in biomimicry and its relation to social innovation significantly contributed to the themes emerging from Phase 2. She confirms that relational infrastructure and condition creation are key features of nature's resilience. She also gives weight to the ecological findings from Phase 1, particularly regarding facilitation, resilience, and interdependence. Her advice presents a challenging discipline when it comes to translating biomimicry into leadership practice, ensuring it is grounded in ecological considerations rather than metaphor.

4.3.2 Case Study 2: Scott Turner – Homeostasis

Scott Turner is a retired professor of physiology at the State University of New York College of Environmental Science and Forestry. He is internationally recognised for his pioneering research on social insect physiology and for developing the concept of extended organismal regulation. He is the author of *Purpose and Desire: What Makes Something "Alive" and Why Modern Darwinism Has Failed to Explain It (*2017), among other published works.

In the interview, Turner recast homeostasis less as constancy and more as the mobilisation of matter and energy flows to sustain disequilibrium. "Equilibrium in biological systems is death," he said. The resilience of a system of living things is the ability to maintain, adapt, and restore function once it becomes disturbed. Referring to Théophile de Bordeu's eighteenth-century work, he elaborated that organisms develop as a result of "ongoing communication and mutual accommodation" between semi-autonomous subunits, as he described "many little lives" (Turner, 2018).

Turner also reflected on his work with termites from the 1990s that epitomise this principle: most termites are dormant until the conditions demand action, at which time some will mobilise the group. This is bottom-up, distributed leadership, not centralised command. He went on to discuss extended homeostasis, whereby organisms maintain environments through their metabolic activity, thus establishing feedback loops that enable regulatory mechanisms beyond the body. At the level of organisations, he compared this to cash and capital, which must flow around for the organisational health of the system to survive.

Turner warned against over-emphasising leadership in organisational situations, stating that inflexible bureaucracies create what he called the “perfect corporation is dead” situation. Leaders ought to refrain from using mechanistic “knob-twisting” and maintain a light regulatory hand, allowing a free rein, permitting creativity, and bottom-up adaptability. Purpose, or a system’s “knowledge of what it is supposed to be,” is needed to ground this dynamic disequilibrium.

Turner’s fascinating interview with me adds considerable depth and understanding to three of the four leadership themes: dynamic homeostasis (Theme 3), relational infrastructure (many little lives) (Theme 1), and systemic interdependence (extended homeostasis) (Theme 4). By placing leadership in dynamic disequilibrium, rather than equilibrium, his advice profoundly shapes RQ2 as well as guiding RQ3.

4.3.3 Case Study 3: Tom Pals – Human Wellness

As a psychotherapist, clinician, and wellness coach with over 30 years’ experience in trauma recovery and human well-being, Tom Pals is the developer of Autonomic Homeostasis Activation (AHA), a somatic approach designed to restore the body’s natural homeostatic mechanisms through the engagement of interoception (Autonomic Homeostasis Activation, n.d.).

In his interview, he explained how he understood health not as the absence of disease but *optimised homeostasis*—thriving not as balance, but as always-rebalancing.

He borrowed the notion of "many little lives" to describe human physiology: trillions of microorganisms, cells, and organ systems that require coordination. The brain, he proposed, works like executive leadership, coordinating communication in semi-autonomous subsystems to support adaptive functioning.

From clinical observation, Pals observed collective nervous-system states in groups: "You can feel when a system is in fight-or-flight — tight, defensive, reactive. And you can feel when it's in rest-and-digest — open, creative, collaborative." Most importantly, leaders' own physiological states can embed such climates: dysregulated leaders perpetuate dysregulation; well-regulated leaders magnify room for collaboration and creativity.

He also stressed that leader wellbeing, or sustained personal homeostasis, is a necessary condition for reliable organisational regulation rather than an add-on. Based on Billman (2020), he asserted that leadership should operate in accordance with natural processes as opposed to opposing them – "working with nature, rather than against it" – so that human and organisational systems can govern themselves effectively.

Pals's contribution significantly supported three leadership themes: dynamic homeostasis (Theme 3), condition creation associated with rhythms of nature (Theme 2), and relational infrastructure associated with co-regulation and psychological safety that is supported by intrapersonal regulation (Theme 1). By situating leader wellbeing as a precondition of system regulation, his guidance focused the translation pathways relevant to RQ2 and pointed to a clear boundary condition for the keystone-inspired framework suggested under RQ3.

4.4 Chapter Synthesis: Systematic Parallels, Expert Validation, and Implementation Boundaries (Phase 4)

4.4.1 Research Questions 1 & 2: Systematic Parallels and Translation Pathways

This section answers RQ1: *How do keystone species' behaviours parallel leadership behaviours that enhance organisational health and resilience?* and RQ2: *How do these parallels reveal pathways for translating ecological patterns into actionable leadership practices within sustainable organisations?*

Using the sequential integration method described in Chapter 3, this chapter develops the parallels — identifying the links, establishing their strength based on experts, and exploring its translation into organisational practice.

Parallel 1: Relational Foundations of Keystone Leadership

Ecological Parallel. Both keystone species and effective leaders gain disproportionate influence by shaping relationships and interactions as opposed to controlling them (Paine, 1969; Mills, Doak and Soulé, 1993; Power et al., 1996). The occurrence of trust networks in sustainability leaders reflects ecological structures of relational facilitation (Bascompte and Jordano, 2007; Olesen et al., 2006), further establishing this parallel as a logical entry point to a keystone-inspired leadership framework.

Expert Validation. All three experts validated this parallel from complementary perspectives: Herzlich emphasised "relationship before task" as a core biomimetic principle, Turner's "many little lives" comment emphasised resilience through distributed relational coordination, and Pals carried those arguments through the intrapersonal dimension, contending that a leader's relationship with self — sustained personal homeostasis and self-regulation — predisposed the quality of all other relationships. Collectively, these perspectives support that relational infrastructure constitutes a critical mechanism across biological scales — intrapersonal, interpersonal, and organisational ecosystems (Gronn, 2002; Spillane, 2006).

Translation to Practice. The translational pathway focuses on embedding relationships as a foundational leadership practice. Ecological and interview evidence highlighted that resilience is built on relationships that are mutualistic rather than transactional, and supported by trust and reciprocity (Avolio and Gardner, 2005; Walumbwa et al., 2008).

As applied to leadership practice, this necessitates a conscious move away from transactional management and toward the stewardship of relational infrastructure. For leaders, this means that the bedrock of resilience requires investment in relationships, and the development of symbiosis across teams, inter-organisational alliances, and stakeholder ecosystems. As a paramount design principle, leaders should protect personal well-being and the regulation of personal homeostasis (e.g., rest and recovery rhythms, clear role boundaries, and workload pacing, reflective/ interoceptive check-ins, as well as practices aimed at reducing chronic threat signalling).

In this framing, resilience hinges on the long-term system-wide interdependence, not short-term performance. This demands a rethinking of governance, culture, communication channels, and incentive structures: the embedding of transparent dialogue, continuous feedback loops, and multidirectional flows of information, as well as anti-extractive guardrails (rotation of responsibilities, buffer capacity, and well-being metrics as leading indicators) that celebrate collaboration, trust-building, and shared flourishing, over efficiency and competition.

Parallel 2: Designing Conditions for Organisational Thriving

Ecological Parallel. Leaders who “ensure that the soil is really healthy” (Interviewee two) act as keystone species that alter ecological landscapes so everyone can flourish (Jones, Lawton and Shachak, 1994; Wright, Jones and Flecker, 2002; Naiman, Johnston and Kelley, 1988). The process of creating conditions was identified as the dominant environmental process across all keystone species sampled, and was a highly prominent talking point among leaders (seven out of ten), thereby making it one of the core translational pathways.

Expert Validation. Experts agreed with this parallel. Herzlich stressed that leaders can’t force change, but they can “shift the context, create conditions that lead to trust,” providing a direct analogy with ecological succession (Bruno, Stachowicz and Bertness, 2003). Turner stressed that the creation of conditions should avoid mechanistic “knob-twisting,” which requires a light regulatory touch and emergent adaptation. Pals also said leaders set the parameters for collective well-being, creating “reactivity or generativity within organisations.”

Translation to Practice. Implications for leadership practice include promoting well-being, facilitating work–life harmony, and creating opportunities within environments for people to grow and develop (Avolio and Gardner, 2005; Walumbwa et al., 2008). It will require leaders and team members alike to resist competitive silos, and instead intentionally create avenues for resource flow that benefit all people instead of just a few. In this framing, leaders become stewards of organisational habitats —

constantly renewing the conditions that facilitate flourishing of others internally and externally across industries.

Parallel 3: Homeostatic Regulation and Adaptive Leadership

Ecological Parallel. The ability to reconcile stability and change in creative tension — theme three of the leaders' interviews — can be directly compared to homeostatic regulation that was initially described in physiology (Cannon, 1929), and found as a facilitative mechanism of 28 out of 30 keystone species in Phase 1. This observation illustrates system health through constant modification, not stalemate. Interestingly, it appears that this is a somewhat neglected pathway of leadership — appearing in only six out of ten leadership interviews — a potential gap of opportunity for sustainability leaders.

Expert Validation. Two of the expert views united, emphasising the dynamic phenomenon of homeostasis, as well as clarifying its interpretation. Turner stressed that "equilibrium is death," re-conceptualising homeostasis here as the active mobilisation of flows in the maintenance of dynamic disequilibrium. His theory of extended homeostasis showed that adaptive regulation should not be confined to the host organism: it should also take place at the environmental level (Walker et al., 2004; Folke et al., 2004). Optimised homeostasis, for Pals, was the line that separates survival and thriving: when resiliency in individual and group life depends largely on continual recalibration.

Translation to Practice. It will take a number of shifts in perceptions for leaders to translate this parallel into leadership practice: instead of holding down the fort in times of volatility, hoping for balance, it will be necessary to embrace change as a norm — mastering adaptability skills that allow them to repurpose change (Uhl-Bien, Marion and McKelvey, 2007). Additionally, recovery cycles must be normalised as integral to organisational health — reframing mistakes or industry downturns as potential learning phases of organisational life. Developing feedback systems to spot disruptions early, and respond in a timely manner, will benefit these leaders. This parallel frames leaders as facilitators of dynamic stability within organisations, maintaining resilience through iterative modification (Teece, 2018).

Parallel 4: Cascade Amplification and Organisational Interdependence

Ecological Parallel. The leaders who develop “true org charts” (Interviewee six) of relationship webs operate in the same fashion as observed in 26 out of 30 keystone species from our sample. This noted behaviour from leaders — of extending influence beyond direct interactions, and that has the capacity to generate cascading effects across companies and industries — is an intriguing parallel to explore. Interestingly, this was the least prominent of the four leadership themes, with only half of the leaders highlighting it as a means of organisational health and resilience. Nevertheless, this may reveal a capability gap in systemic orientation and literacy.

Expert Validation. Expert perspectives endorsed this parallel. Turner’s notion of extended homeostasis showed that regulatory processes flow beyond the organism into wider ecological networks. Organisational health requires interactions that extend beyond formal boundaries. Furthermore, Pals stressed that groups frequently exhibit collective nervous system states, which increase resilience and vulnerability. If systems are healthy, they produce collective creative capacity; otherwise, dysfunction spreads quickly throughout the whole (Scheffer et al., 2001).

Translation to Practice. The ecological insight is that cascade amplification is a test of systemic design. When underlying relationships are healthy, cascades stabilise and enrich the whole system. When relationships are extractive or fragile, cascades accelerate dysfunction and collapse. This duality is a well-documented phenomenon in ecosystems: trophic cascades (Paine, 1969; Terborgh and Estes, 2010) can either stabilise biodiversity when predator–prey relationships are balanced, or trigger ecological collapse when these relationships break down.

For this to be enacted in leadership contexts, leaders will need to create a systemic design that dispenses resilience rather than fragility. The kinds of things that are actually transmitted matter: strong relational infrastructure (Parallel 1), thriving conditions (Parallel 2), and adaptive recalibration processes (Parallel 3), allow networks to grow resilience, creativity, and innovation; transactional relationships, extractive conditions, or lack of recalibration spread dysfunction and risk. To maximise the benefits of amplification across networks, organisations must strengthen their frameworks, including structures, norms, and communication systems that allow information, trust, and resources to cross boundaries. In this conceptualisation, leaders are the builders of beneficial amplification.

4.4.2 Critical Boundaries and Implementation Cautions

The case studies reveal limitations which implicate how keystone comparisons are to be implemented in a responsible manner. Herzlich warned against reducing biomimicry to just a metaphoric description, and insisted on a solid ecological basis of practice. Turner warned that an overuse of leadership theory is stifling, stressing the importance of light regulation and adaptive capacity. Pals stressed that leader health cannot be separated from organisational health, and the dangers of disregarding individual well-being in systemic solutions. These warnings set the conditions for a keystone-inspired leadership framework: it must be informed by ecological principles rather than analogy, be applied with sensitivity to emergent adaptation, and integrated with leader wellness.

These boundaries guide the lines of inquiry that are explored in the next chapter. Four complementary parallels create a promising basis that supports the relationship between keystone species behaviours and successful organisational leadership. Chapter 5 moves from empirical to conceptual development, offering hypothetical outcomes and potential opportunities for forming a keystone-inspired leadership framework.

Chapter 5: Toward a Keystone Leadership Framework - Future Directions

5.1 From Parallels to Possibilities

There are five possible transformational results that organisations can expect from keystone-inspired leadership.

Relational Infrastructure → Better Stakeholder Trust and Collaboration. The relationship-first parallel explains how organisations might earn greater trust, collaborate more effectively, and have the potential to create a more integrated problem-solving culture across their organisation (Avolio and Gardner, 2005; Walumbwa et al., 2008). If long-term relationships based on symbiotic relationships replace short-term transactional forms of interactions, and if leadership well-being continues to be part of a central strategy for success in organisation, then groups should expect relational resilience to be the underpinning of organisational health.

Condition Creation → Organisational Thriving. Leaders who create enabling conditions rather than outcomes will design organisations where people and teams not only survive but thrive. This will be reflected in the enhanced well-being of team members, improved engagement across levels, resource accessibility, and sustainable patterns of performance that can prevent boom-bust cycles (Holling, 1973, Kelloway and Day, 2005; Quick et al., 2007).

Homeostatic Regulation → Dynamic Resilience. Organisations that embrace ongoing recalibration should have a higher capacity to navigate uncertainty with an unaltered core personality or purpose (Holling, 1973; Scheffer et al., 2001; Walker et al., 2004). This dynamic resilience — *or organisational homeostasis* — allows higher bounce back rates from outside volatility, and proactive manoeuvres to make the most of change — positioning keystone organisations ones that stand the test of time.

Cascade Amplification → Systemic Innovation. Leaders who intentionally generate network influence — *internally and externally* — will create synergistic creative capacity within their organisations, and set industry standards for innovation across their industries (Uhl-Bien, Marion, and McKelvey, 2007).

Integrated Organisational Health. If all four principles are present and work together, organisations will be healthy. Staff turnover will be reduced, stakeholders will be more engaged, and regenerative rather than extractive organisational practices will be followed (SHRM, 2019; Gallup, 2025).

5.2 Future Research Pathways: Bringing the Framework to Life

In order for keystone-inspired leadership to become a reality, it needs to move beyond theory into transformative applications. This may be accomplished through the following three future research avenues:

1. Field validation. Longitudinal experiments monitoring organisational outcomes across heterogeneous settings may be effective in identifying causative relationships on biomimetic leadership practices and resilience, adaptability, and stakeholder outcomes.

2. Capability development. The prevalence gaps notably occurred in homeostatic regulation (93% ecological vs. 60% leadership adoption) and cascade amplification (87% vs. 50%) (Tables 4.1 and 4.2), indicate a strong latent field. How leaders use homeostatic regulation in their personal life, as well as in the interpersonal arena, and the influence of interconnectivity within systems should be further considered. Equally critical is a thorough understanding of current strengths, such as symbiotic relationships and long-term condition creation. Finding ways to build into these areas should improve leadership and organisational health.

3. The idea of the keystone leader archetype. Functional specialisation in keystone species (predators, engineers, mutualists) suggests different types of leadership archetypes in which disproportionate positive influence is captured; this might represent an example of a shared set of characteristics. Instead of a keystone leader archetype consistent across contexts, these archetypes would be able to identify leaders who work along different channels (to fit organisational needs, cultural contexts, and individual capabilities). This could result in designing archetype assessment tools, competency frameworks, and application protocols, which would bring further practical relevance and theoretical robustness to all types of leadership styles and organisational contexts (Paine, 1969; Janzen, 1979; Mills, Doak and Soulé, 1993; Power et al., 1996; Terborgh, 1986).

5.3 Conclusion: 3.8 Billion Years of Evolutionary Learning

This study explored whether behavioural templates of keystone species — whose influence on their environment exerts health and resilience — are indicative of what leadership could entail in sustainable organisations. The empirical evidence is compelling: four systematic parallels create a theory-driven groundwork for a biomimetic keystone-inspired leadership framework. More empirical testing, capability building, and pilots need to happen — but these results suggest a legitimate alternative to the more traditional top-down models of organisational leadership. They position leadership as a disproportionate, health-sustaining influence, practised through relational stewardship, creation of conditions, dynamic homeostatic regulation, and systemic amplification. This is what it is like when organisations and leaders work with nature rather than against it (Billman, 2020). The next step is empirical expansion and practical application — turning ecological wisdom into measurable organisational advantage.

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Appendices

Appendix A: Instruments

A.1 Research Questions for Semi-Structured Interviews

(Table A.1.1 Interview Questions)

Theme	Key Questions
1. Organisational Resilience in a VUCA World	How would you describe a resilient organisation? What enables an organisation to maintain stability while constantly adapting to changing conditions? *Sub-questions:* ● How does a sustainable organisation's ability to stay resilient connect to its success in achieving long-term sustainability goals? ● Do you think resilience is part of organisational health? Are there other ways an organisation is healthy beyond resilience? ● What interdependencies have you observed between different parts of your organisation that contribute to overall resilience?
2. Leadership Traits and Their Impact	In your career as a leader in sustainable organisations, what traits have you noticed in a healthy leader? *Sub-questions:* ● Can you share a specific example of how these healthy leadership traits positively influenced your organisation? ● What traits characterise unhealthy or toxic leadership, and how have you seen these impact organisational health? ● Why do you think people become healthy or unhealthy leaders? What factors contribute to these different leadership styles?
3. The Importance and Impact of Healthy Leadership	In a world that appears to reward unhealthy leadership, why do you think healthy leadership is important? What impact does healthy leadership have on organisations? *Sub-questions:* ● What tangible outcomes or results have you seen from healthy leadership in sustainable organisations? ● How do you balance healthy leadership principles with external pressures and demands for short-term results?

A.2 Expert Interview Guides

(Table A.2.1 Toby Herzlich – Biomimicry Expert)

Theme	Key Questions
1. Authenticity vs. Metaphor	How do we differentiate authentic biomimicry in leadership from superficial metaphors? What is required to gain true wisdom from nature's patterns?

2. Resilience	Which natural resilience mechanisms should leaders embrace during disruption to maintain organisational health?
3. Evolutionary Strategies	Which evolutionary strategies in nature ensure system longevity? How do you think these strategies inform sustainable leadership?
4. Efficiency & Resilience	Can you share your thoughts on efficiency and resilience?
5. Emerging Research	What areas of biomimicry are advancing for leadership?
6. Global Challenges	Could you share your thoughts on how biomimicry can impact global challenges?

(Table A.2.2 Scott Turner – Homeostasis Expert)

Theme	Key Questions
1. Homeostasis & Dynamic Regulation	In biological systems can you share how homeostasis is maintained as continuous adjustment? Do you think the biological principles of homeostasis can apply to organisations? Can you share your thoughts on the definition of homeostasis?
2. Organisational Ecosystem Applications	What mechanisms help maintain or restore steady states in human systems? How do you think biological and organisational regulatory processes differ?
3. Extended Homeostasis & Collective Intelligence	Can you talk more about extended homeostasis beyond individual organisms? How does collective cognition and distributed regulation emerge? In the context of homeostasis, what do you think are the implications for organisational resilience and systemic health?
4. Keystone Species & Ecosystem Engineering	Can you share more on your termite research - what role do termites play in maintaining ecosystem homeostasis?

(Table A.2.3 Tom Pals – Human Wellness Expert)

Theme	**Key Questions**
1. Health in Living Systems	How would you describe health (body, mind, spirit)? Can you talk about the differences between surviving and thriving?
2. Challenges & Disruption	What do you think shifts people from health to ill-health? Can you talk about stress and trauma - how does it disrupt homeostasis?
3. Neurobiology & Regulation	Can you share the neurobiology that is behind being dysregulated? Talk more about fight-or-flight states - do they parallel organisational reactions?
4. Applying Health Principles	How can leaders facilitate healthy organisations? Do you think there's a connection between leader health impact organisational wellbeing? What does it mean for leaders to be “ecosystem engineers”?

5. Working With Nature	How do wellbeing, organisational health, and sustainability connect?

A.3 Keystone Species Behaviour Codebook with Operational Definitions

(Table A.3.1 Keystone Species Codebook)

Behaviour and Description	**Mechanism**	**Ecosystem Impact**	**Supporting Research**
1. Predation Control Direct regulation of prey populations	Top-down control via consumption of prey species. Predators keep prey populations below carrying capacity in order to prevent overexploitation of resources and maintain diversity	Prevents competitive exclusion, maintains prey diversity, regulates herbivore pressure on vegetation, balances predator-prey dynamics.	(Paine, 1966, 1969; Estes et al., 1998; Power et al., 1996)
2. Cascade Amplification Triggering indirect effects through trophic webs	Indirect effects that cascade through multiple trophic levels, often 2+ levels removed from the keystone species. These amplified impacts redefine whole food webs in ways that go beyond direct interactions.	Alters community assembly at different trophic levels, changes primary productivity, modifies habitat structure, creates unexpected ecological linkages.	(Paine, 1969; Estes et al., 1998; Ripple et al., 2014)
3. Ecosystem Engineering Physical modification of habitats or abiotic conditions	By non-trophic activities (physical alteration, creation, or destruction of habitats). Changes in the environment such as hydrology, soil structure, and microclimate.	Creates new habitats, alters water flow and retention, modifies soil properties, changes landscape heterogeneity, influences microclimate	(Jones et al., 1994; Wright et al., 2002)
4. Nutrient Cycling Redistribution of nutrients across system boundaries	Transfer and transformation of nutrients between ecosystem compartments or across ecosystem boundaries. Includes vertical and horizontal nutrient movement through biological vectors.	Enriches nutrient-poor systems, links marine-terrestrial systems, enhances primary productivity, maintains soil fertility, supports food web productivity	(Helfield and Naiman, 2001)
5. Seed Dispersal/ Pollination Facilitating plant reproduction and gene flow	Movement of pollen between flowers or dispersal of seeds across landscapes. Maintains plant genetic	Maintains plant diversity, enables plant reproduction, facilitates gene flow, supports agricultural systems,	(Fleming and Sosa, 1994; Jordano, 2000; Power et al., 1996)

	diversity and enables colonization of new habitats.	maintains forest regeneration	
6. Habitat Provisioning Creating microhabitats or shelter for other species	Providing physical structure that other species depend on for shelter, breeding sites, feeding areas, or protection from environmental stressors.	Increases species richness, provides critical breeding habitat, offers predator refugia, creates thermal refuges, supports commensal relationships	(Dayton, 1972; Jones et al., 1994; Wright et al., 2002)
7. Cross-Ecosystem Linking Connecting different habitat types or systems	Species that move between ecosystems, creating biological links between otherwise disconnected habitats. Transfers energy, nutrients, and genetic material across ecosystem boundaries.	Maintains landscape connectivity, enables meta-population dynamics, transfers resources between systems, maintains genetic diversity across landscapes	(Helfield and Naiman, 2001; Lundberg and Moberg, 2003)
8. Behavioural Mediation Modifying behaviour of other species beyond predation	Non-consumptive effects that alter behavior, habitat use, foraging patterns, or life history traits of other species through fear, competition, or facilitation.	Alters spatial distribution of species, modifies foraging efficiency, changes activity patterns, influences habitat selection, affects reproductive behavior	(Brown et al., 1999; Creel and Christianson, 2008; Ripple et al., 2014)
9. Homeostasis Regulation Contributing to system stability, self-regulation and repair	Maintaining ecosystem stability through negative feedback loops, buffering against perturbations, and promoting resilience to environmental changes.	Dampens population fluctuations, maintains ecosystem biodiversity, increases resilience to disturbance, prevents phase shifts, maintains ecosystem services	(Holling, 1973; Scheffer et al., 2001; Folke et al., 2004)

Appendix B: Ethics

B.1 Participant Consent Form Template

Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Participant Name ___________________________________

Interviewer Name __________________________________

Interviewer Programme of Study _______________________________________

Research Learning Tutor ________ *Dr Roisin Mullins, UWTSD* _______________

Participation Agreement to be interviewed:

I agree to participate in the research concerning Biomimicry in Leadership: ***How Healthy Leaders Facilitate Healthy Organisational Ecosystems - Lessons from Keystone Species.*** I understand that the purpose of this study is to examine my experiences of ***Sustainability Leadership*** (for Leadership Interviews) of ***Biomimicry/Homeostasis/Health and Wellbeing*** (for expert case study interviews). I understand that this will involve me in a short *30–40*-minute interview.

I understand that this interview will be recorded and transcribed for use only in Ruth Lorensson's postgraduate Masters dissertation at the University of Wales Trinity Saint David.

I understand that my name or any reference to my identity will be kept anonymous in this study and for any subsequent publications I will be asked again for my consent. I understand that use storage of the recordings and transcriptions relating to this interview will be anonymous; not be used for any other purpose than this study and will be subsequently destroyed after the use intended here.

I understand that I may withdraw from the study at any point with all records of my contribution removed without having to provide a reason.

Interviewee Signature:

Interviewer Signature:

Date of Interview:

Appendix C: Database

C.1 Keystone Database

Note: To maintain A4 portrait orientation and ensure readability, the Keystone Species Database has been split into two consecutive tables for each group of species. The first half contains species' details and initial functional roles, while the second half contains the remaining functional roles and references. Species numbering is repeated to align both halves.

(Table C.1 Predators (1–10): Primary Functions)

No.	Species	Type	Location	Predation Control	Cascade Amplification	Ecosystem Engineering
1	**(Pisaster ochraceus)** Purple Sea Star	Predator	Rocky intertidal zones, Pacific coast of North America (Alaska to Baja California).	1	1	0
2	**(Enhydra lutris)** Sea Otter	Predator	Kelp forests, North Pacific coasts (California, Alaska, Russia, Japan).	1	1	0
3	**(Canis lupus)** Gray Wolf	Predator	Forests, tundra, grasslands, mountains (North America, Europe, Asia).	1	1	0
4	**(Galeocerdo cuvier)** Tiger Shark	Predator	Tropical and subtropical oceans worldwide, especially seagrass beds and reefs.	1	1	0
5	**(Orcinus orca)** Killer Whale	Predator	All oceans, especially productive cold-water coasts (North Pacific, North Atlantic, Southern Ocean).	1	0	0
6	**(Ursus arctos)** Brown Bear	Predator	Forests, tundra, mountains, riparian zones (North America, Europe, Asia).	1	0	0
7	**(Lynx canadensis)** Canada Lynx	Predator	Boreal forests of North America (Canada, Alaska, northern U.S.).	1	1	0
8	**(Crocodylus niloticus)** Nile crocodile	Predator	Freshwater rivers, lakes, wetlands across sub-Saharan Africa.	1	0	0

9	**(Pisaster spp.)** Other Sea Stars	Predator	Rocky intertidal zones of Pacific coasts worldwide (e.g., Pisaster giganteus in California).	1	1	0
10	**(Solenopsis spp.)** Fire Ants	Predator	Tropical/ subtropical Americas (esp. South America; invasive in southern U.S., Asia, Australia).	1	1	1

(Table C.1.2 Predators: Secondary Functions & References)

No.	Nutrient Cycling	Seed Dispersal	Habitat Provisioning	Cross-Ecosystem Linking	Behavioral Mediation	Homeostasis Regulation	References
1	0	0	0	0	0	1	(Paine, 1969; Paine, 1995)
2	0	0	1	0	0	1	(Estes and Palmisano, 1974; Estes et al., 2011)
3	1	0	1	0	0	1	(Smith et al., 2003; Ripple and Beschta, 2012)
4	1	0	1	0	1	1	(Heithaus et al., 2008; Atwood et al., 2015)
5	0	0	0	0	0	0	(Estes et al., 1998; Williams et al., 2004)
6	1	1	0	0	1	1	(Hilderbrand et al., 1999; Levi et al., 2012)
7	0	0	1	0	0	1	(O'Donoghue et al., 1998; Krebs et al., 2001)
8	0	0	0	0	0	0	(Cott, 1961; Combrink et al., 2017)
9	0	0	0	0	0	1	(Paine et al., 1985; Menge et al., 1994)
10	1	0	0	0	0	1	(Porter and Savignano, 1990; Helms and Vinson, 2002)

Total (Predators): Predation Control: 7 | Cascade Amplification: 7 | Ecosystem Engineering: 2 | Nutrient Cycling: 4 | Seed Dispersal: 1 | Habitat Provisioning: 4 | Cross-Ecosystem Linking: 0 | Behavioural Mediation: 2 | Homeostasis Regulation: 8

(Table C.1.3 Engineers (11–20): Primary Functions)

No.	Species	Type	Location	Predation Control	Cascade Amplification	Ecosystem Engineering
11	**(Castor canadensis)** North American Beaver	Engineer	Rivers, streams, wetlands of North America.	0	1	1
12	**(Castor fiber)** Eurasian Beaver	Engineer	Rivers and wetlands of Europe and Asia.	0	1	1
13	**(Loxodonta africana)** African Elephant	Engineer	Savannas, grasslands, woodlands across sub-Saharan Africa.	0	1	1
14	**(Elephas maximus)** Asian Elephant	Engineer	Forests and grasslands across South and Southeast Asia.	0	1	1
15	**(Cynomys spp.)** Prairie Dogs	Engineer	Grasslands of North America.	0	1	1
16	**(Macrotermes spp.)** African Mound-building Termites	Engineer	Savannas and drylands of Africa.	0	1	1
17	**(Nitrospira spp.)** Nitrogen-cycling bacteria	Engineer	Soils worldwide, particularly temperate regions.	0	0	1
18	**(Acropora spp.)** Reef-building Corals	Engineer	Tropical coral reefs worldwide.	0	1	1
19	**(Perumytilus purpuratus)** Mussels	Engineer	Rocky shores of South America (Chile, Argentina).	0	1	1
20	**(Zostera marina)** Eelgrass	Engineer	Temperate coastal waters of the Northern Hemisphere.	0	1	1

(Table C.1.4 Engineers: Secondary Functions & References)

No.	Nutrient Cycling	Seed Dispersal	Habitat Provisioning	Cross-Ecosystem Linking	Behavioral Mediation	Homeostasis Regulation	References
11	1	0	1	0	1	1	(Naiman et al., 1988; Wright et al., 2002)
12	1	0	1	0	1	1	(Halley and Rosell, 2002; Rosell et al., 2005)

13	1	1	1	0	1	1	(Western, 1989; Asner et al., 2009)
14	1	1	1	0	1	1	(*Sukumar, 1989*; Campos-Arceiz and Blake, 2011)
15	0	0	1	0	1	1	(Davidson and Lightfoot, 2006)
16	1	0	1	1	1	1	(*Turner, 2000*; Jouquet et al., 2011)
17	1	0	0	0	1	1	(Attard et al., 2010; Daims et al., 2016)
18	1	0	1	0	1	1	(Knowlton, 2001; Bellwood et al., 2004)
19	0	0	1	0	0	1	(Navarrete, 1996; Bazterrica et al., 2007)
20	1	1	1	0	1	1	(Orth et al., 2006; Waycott et al., 2009)

Total (Engineers): Predation Control: 0 | Cascade Amplification: 10 | Ecosystem Engineering: 10 | Nutrient Cycling: 8 | Seed Dispersal: 3 | Habitat Provisioning: 9 | Cross-Ecosystem Linking: 1 | Behavioural Mediation: 8 | Homeostasis Regulation: 10

(Table C.2.5 Mutualists (21–30): Primary Functions)

No.	Species	Type	Location	Predation Control	Cascade Amplification	Ecosystem Engineering
21	**(Ficus spp.)** Fig Trees	Mutualist	Tropical forests worldwide, especially Asia, Africa, Central/South America.	0	1	0
22	**(Dipterocarpus spp.)** Dipterocarp Trees	Mutualist	Tropical forests of Southeast Asia.	0	1	0
23	**(Acacia spp.)** Acacia Trees	Mutualist	Tropical/ subtropical Africa, Central/South America.	0	1	0

24	**(Yucca spp.)** Yucca Plants	Mutualist	Arid/semi-arid regions of North/Central America.	0	0	0
25	**(Labroides spp.)** Cleaner Fish	Mutualist	Coral reefs of the Indo-Pacific.	0	1	0
26	**(Mycorrhizae)**Mycorrhizal Fungi	Mutualist	Soils worldwide in symbiosis with most plants.	0	1	0
27	**(Rhizobium spp.)** Nitrogen-fixing Bacteria	Mutualist	Soils worldwide, symbiotic with legumes.	0	1	0
28	**(Pteropodidae)** Frugivorous Bats	Mutualist	Tropical/ subtropical regions worldwide.	0	1	0
29	**(Apis mellifera)** Honeybee	Mutualist	Native to Europe, Africa, Middle East; now worldwide through domestication.	0	1	0
30	**(Trochilidae)** Hummingbirds	Mutualist	Americas, especially Central and South America.	0	1	0

(Table C.1.6 Mutualists: Secondary Functions & References)

No.	Nutrient Cycling	Seed Dispersal	Habitat Provisioning	Cross-Ecosystem Linking	Behavioral Mediation	Homeostasis Regulation	References
21	0	1	0	0	0	1	(Lambert and Marshall, 1991; Shanahan et al., 2001)
22	0	1	0	0	0	1	(Ashton, 1988; Corlett, 1998)
23	0	1	0	0	0	1	(Janzen, 1966; Palmer et al., 2008)
24	0	1	0	0	0	1	(Addicott, 1986; Pellmyr and Huth, 1994)

25	0	1	0	0	0	1	(Grutter, 1999; Bshary and Schäffer, 2002)
26	0	1	0	0	0	1	(van der Heijden et al., 1998)
27	0	1	0	0	0	1	(Oldroyd et al., 2011)
28	0	1	0	0	0	1	(Muscarella and Fleming, 2007; Kunz et al., 2011)
29	0	1	0	0	0	1	(Aizen and Harder, 2009)
30	0	1	0	0	0	1	(Temeles and Kress, 2003)

While the majority of sources are peer-reviewed journal articles, two authoritative monographs — Sukumar (1989) on elephants and Turner (2000) on ecosystem engineering — were retained as foundational works that continue to shape ecological scholarship.

Total (Mutualists): Predation Control: 0 | Cascade Amplification: 9 | Ecosystem Engineering: 0 | Nutrient Cycling: 0 | Seed Dispersal: 10 | Habitat Provisioning: 0 | Cross-Ecosystem Linking: 0 | Behavioural Mediation: 0 | Homeostasis Regulation: 10

C.2 Results Summary – Functional Patterns

(Table C.2.1 Functional Role Totals Across All Keystone Species Groups)

Group	**Predation Control**	**Cascade Amplification**	**Ecosystem Engineering**
Predators (1–10)	10	7	1
Engineers (11–20)	0	10	10
Mutualists (21–30)	0	9	0
Grand Total (All 30 Species)	10	26	11

(Table C.2.2 Functional Role Totals Across All Keystone Species Groups)

Group	Nutrient Cycling	Seed Dispersal	Habitat Provisioning	Cross-Ecosystem Linking	Behavioral Mediation	Homeostasis Regulation
Predators (1–10)	4	1	4	0	2	8
Engineers (11–20)	8	3	9	1	9	10
Mutualists (21–30)	0	10	0	0	0	10
Grand Total (All 30 Species)	12	14	13	1	11	28

Appendix D: Thematic Analysis

D.1: Codebook

(Table D.1.1 Thematic Code Book)

Code	Definition / Criteria	Illustrative Extracts (Interview #)
People Investment	Recognition that people are the central resource of an organisation; attention to their value, wellbeing, and contribution is key to resilience.	"If you don't invest in the people and care for your people, you don't actually have a business." (Int. 3)
Relational Trust	Building resilience and organisational health through relationships of trust, reciprocity, and mutual reliance.	"Organisations hit by federal changes are forming alliances based on trusting relationships… the communities of Hurricane Katrina with deep relationships fared the best." (Int. 2)
Clarity & Communication	Leaders provide a clear sense of direction, transparency, and communication that builds trust and engagement.	"Actual change that keeps people with you is much more about visibility… do people actually understand where we're going?" (Int. 7)
Collaboration & Cohesion	The health of organisations is sustained through collaboration, teamwork, and cohesion across roles and levels.	"Cohesion is how the organisation really works – the true org chart." (Int. 6)
Leadership Stability	Leaders maintain consistency and direction during change, anchoring the organisation.	"Steady leadership is really important. Like a calm person at the helm who can anticipate problems." (Int. 5)
Agility & Adaptability	The ability to pivot and adjust strategies without losing identity or focus.	"Resilience for me is being able to pivot the basic business model when conditions change." (Int. 1)
Core Values as Anchors	Values provide stability and guide organisations through uncertainty, ensuring coherence across interconnected systems.	"What doesn't change is our core values. How we deliver those values can change." (Int. 8)
Long-termism	Commitment to future-oriented goals and sustainability, recognising that short-term actions have long-term systemic consequences.	"If you focus only on short-term results you lose resilience… healthy long-termism connects resilience to sustainability goals." (Int. 9)
System Stress & External Pressures	Awareness of how external political, economic, and ecological pressures cascade into internal organisational dynamics.	"The system can't cope with the stress… political, cultural, and financial systems are all shaken." (Int. 4)
Cascade	Acknowledgement that leadership decisions	"One change in leadership behaviour

Orientation	amplify through teams and systems, creating feedback effects.	can ripple right across the organisation, for better or worse.” (Int. 7)

All interview extracts are drawn from primary data (semi-structured interviews conducted by the author, April–June 2025). See Appendix E for participant profile.

D.2: Worked Examples

(Table D.2.1 Example 1)

Transcript Extract (Anonymised)	**Initial Codes Applied**	**Final Theme**
“The most important asset we can ever have in an organisation is people. Sometimes we forget that… everybody has a role to play, their values, and they’re cared for and understood.” (Interviewee 1, April 2025)	- People as asset- Everyone has a role- Being valued and cared for	**Theme 1: People Are an Organisation’s Biggest Resource**

(Table D.2.2 Example 2)

Transcript Extract (Anonymised)	**Initial Codes Applied**	**Final Theme**
“Organisations need to prioritise the development of their staff and create a space for growth and coaching, where people feel comfortable to say, I don’t know the answers and I need help.” (Interviewee 5, May 2025)	- Staff development - Coaching - Safe space for growth	**Theme 2: Great Leaders Create Conditions for Others to Thrive**

(Table D.2.3 Example 3)

Transcript Extract (Anonymised)	**Initial Codes Applied**	**Final Theme**
“Steady leadership is really important. Like a calm person at the helm or group of people that are able to look out into the future, anticipate problems, and be prepared for them versus being reactionary to everything.” (Interviewee 5, May 2025)	- Steady leadership- Calm leader- Anticipating problems- Not reactionary	**Theme 3: Organisational Health Lives in the Interplay of Stability and Change**

(Table D.2.4 Example 4)

Transcript Extract (Anonymised)	Initial Codes Applied	Final Theme
"The system can't cope with the stress… political, cultural, and financial systems are all shaken." (Interviewee 4, April 2025)	- System stress- Interconnected pressures- External ↔ internal linkages	**Theme 4: Healthy Leadership Knows That Everything Is Connected to Everything**

D.3: Theme Development

(Table D.3.1 Theme Development)

Codes	Sub-theme	Final Theme
People Investment, Relational Trust	People as Core Resource	**Theme 1: People Are an Organization's Biggest Resource**
Clarity & Communication, Collaboration & Cohesion	Enabling Conditions for Thriving	**Theme 2: Great Leadership Enables Thriving Through Clarity and Collaboration**
Leadership Stability, Agility & Adaptability, System Stress & External Pressures	Balancing Stability and Change	**Theme 3: Organisational Health Lives in the Interplay of Stability and Change**
Core Values as Anchors, Long-termism, Cascade Orientation	Systemic Interconnectedness & Amplification	**Theme 4: Healthy Leadership Recognises Systemic Interconnectedness**

D.4: Thematic Analysis Evidence (Framework + Transcript Extracts)

(Table D.4.1 Complete Thematic Analysis Framework)

Theme	Sub-Themes	Codes (Illustrative Labels)	Frequency (Coverage)
Theme 1: People Are an Organization's Biggest Resource	People, Relationships, Cohesion	Investing in people = organisational resilience; Trusting relationships = resilience asset; Culture + morale = survival during crisis; Cohesion > formal structures	Appears in 8–10 interviews
Theme 2: Great Leaders Create Conditions for Others to Thrive	Leadership Health, Vision, Clarity, Empowerment	Steady leadership = stability; Healthy leader → healthy organisation; Clarity of direction = stability; Visionary leaders buffer instability	Appears in 7–10 interviews

Theme 3: Organisational Health Lives in the Interplay of Stability and Change	Agility, Balance, Pivoting	Adaptability = resilience; Pivoting without chaos; Agility + foresight; Balance between agility and stability	Appears in 6–10 interviews
Theme 4: Healthy Leadership Knows That Everything Is Connected to Everything	Core Values, Long-Termism, Structural Constraints	Values as anchors; Long-term thinking; Awareness of system stress and external pressures	Appears in 5–10 interviews

(Table D.4.2: Sample Transcript Extracts with Coding in Action)

Transcript Extract (Anonymised)	Codes Applied	Emerging Theme
"The most important asset we can ever have in an organisation is people. Sometimes we forget that… everybody has a role to play, their values, and they're cared for and understood." (Interviewee 1, April 2025)	- People as asset- Everyone has a role- Being valued and cared for	Theme 1: People Are an Organisation's Biggest Resource
"Organisations need to prioritise the development of their staff and create a space for growth and coaching, where people feel comfortable to say, I don't know the answers and I need help." (Interviewee 5, May 2025)	- Staff development- Coaching- Safe space for growth	Theme 2: Great Leadership Enables Thriving Through Clarity and Collaboration
"Steady leadership is really important. Like a calm person at the helm or group of people that are able to look out into the future, anticipate problems, and be prepared for them versus being reactionary to everything." (Interviewee 5, May 2025)	- Steady leadership- Calm leader- Anticipating problems- Not reactionary	Theme 3: Organisational Health Lives in the Interplay of Stability and Change
"The system can't cope with the stress… political, cultural, and financial systems are all shaken." (Interviewee 4, April 2025)	- System stress- Interconnected pressures- External ↔ internal linkages	Theme 4: Healthy Leadership Recognises Systemic Interconnectedness

Appendix E: Profiles

E.1 Leader Interview Profiles

(Table E.1.1 Primary Research Participants)

Interview	Date	Location	Role	Industry
Interview 1	April 7, 2025	UK Based	Founding Director	Sustainability Environmental Consulting
Interview 2	April 17, 2025	US Based	Senior Programme Director	Climate Solutions
Interview 3	April 25, 2025	UK Based	Technical Advisor	Government Sustainability
Interview 4	April 30, 2025	US Based	Director	Higher Ed Sustainability
Interview 5	May 2, 2025	US Based	Volunteer Coordinator	City Leadership
Interview 6	May 7, 2025	UK Based	Stewardship Director	Sustainable Finance
Interview 7	May 15, 2025	UK Based	Coach	Sustainable Leadership
Interview 8	May 20, 2025	US Based	Small Business Owner	Local Sustainable Business
Interview 9	May 23, 2025	US Based	Founding Director	Leadership Consulting
Interview 10	June 6, 2025	UK Based	Church Leader	Community Leadership

Participant Demographics Summary:

Total Participants: 10

Geographic Distribution: 5 UK-based, 5 US-based

Sector Representation: **Public (3), Private (4), Non-profit (3)**

Interview Duration: Average 58 minutes (range: 45–72 minutes)

Interview Format: All conducted via video conference (Google Meet)

E.2 Expert Interview Profiles

(Table E.2.1 Specialist Expert Participants)

Expert	Interview Date	Role / Profession	Expertise & Contributions	Relevance to Study
Toby Herzlich	May 14, 2025	Leadership coach, facilitator, biomimicry practitioner	Founder of Biomimicry for Social Innovation; specialises in applying nature's patterns to leadership and organisational design.	Provides insights into biomimetic leadership principles and the distinction between authentic biomimicry vs. superficial metaphors.

Scott Turner	March 26, 2025	Physiologist and systems theorist	Internationally recognized researcher on social insect physiology, thermoregulation, and extended organismal regulation.	Contributes theoretical grounding on homeostasis as dynamic regulation and parallels between living systems and organisations.
Tom Pals	May 13, 2025	Psychotherapist and wellness clinician	30+ years in trauma recovery and wellbeing; developer of Autonomic Homeostasis Activation (AHA), a therapeutic approach to restoring systemic health.	Offers translation of homeostatic regulation from neurobiology and human health into organisational contexts.