What Should Conservation Aim For?

Values and Objectivity in The Aims of Conservation

Daniel Merton Davis

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Abstract

The question of what conservation should aim for is of increasing importance as the planetary ecological crisis deepens and greater amounts of resources are invested into conservation science. This thesis seeks to aid in addressing this question through providing a detailed analysis of what I take to be the three most significant concepts used to frame the aims of conservation science: naturalness, ecosystem health, and biodiversity. Each of these concepts has been taken to point to some objectively existing natural property which should be the focus of conservation efforts. I argue, however, that the application of each of these concepts is partly dependent on evaluative judgements, and as such, purely empirical scientific criteria will be insufficient to determine their application, which requires reference to inherently normative criteria. In the case of naturalness, I argue that the use of this concept has radically different implications depending on whether we value 'historical fidelity' or 'non-intervention'. In the case of ecosystem health and degradation, I argue that our criteria for the measurement of these properties depends on evaluative judgements regarding the selection of an appropriate 'reference class' for comparison, as well as the 'identity conditions' of the ecosystem. In the case of biodiversity, I argue that the selection of a measure of biodiversity depends on judgements regarding which types of biological difference are most valuable that can't be made without considering non-epistemic factors. Finally, I discuss what the value-dependence of these terms implies for the objectivity of conservation science. By distinguishing values from mere preferences, I argue that value-dependence needn't result in a problematic subjectivism or relativism. I conclude by arguing for a procedural conception of objectivity in conservation science which provides strategies

for reducing subjectivity and bias by subjecting underlying values to critique and scrutiny from diverse perspectives through inclusive deliberative procedures.

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“Science proposes, morality disposes,” they say by common agreement,

patting themselves on the back, scientists and moralists alike,

the former with false modesty and the latter with false pride.

(Bruno Latour, The Politics of Nature, 2004, p.98)

Chapter 1

Introduction

What should conservation aim for? How should these aims be determined? To what extent can these aims be objective? Such questions are hugely important; the growing recognition of the scale and severity of the planetary ecological crisis has meant that conservation has developed into a globally influential scientific-political institution with extensive resources at its disposal. Given this, it is vital that there be a clear conception of how the aims of conservation should be determined in order for conservation organisations to allocate and prioritize resources effectively.

This thesis will proceed by considering how philosophers and conservationists have sought to develop a conceptual basis for conservation aims through proposing some significant property or properties which should be taken to constitute the focus of conservation efforts. I will consider three such 'aims', which are broadly termed: naturalness, ecosystem health and biodiversity. Firstly, I shall consider the view that conservationists should aim to conserve nature – a concept which attempts to capture an opposition with human influence and agency. Secondly, I will consider the view that conservationists should aim to conserve the ecological functional and structural properties referred to as ecosystem health. Finally, I will consider the view that conservationists should aim to conserve the variety of biological entities at different levels such as genes, populations, species and so on - referred to as biodiversity.

In each case, philosophers have sought to understand these aims as objective or mind-independent properties which 'carve nature at the joints' and are therefore best identified and measured through purely empirical scientific criteria. Establishing this has been seen as important in putting the claims produced by conservationists on a more scientific footing, showing that such claims are capable of belonging to the class of impartial and universal scientific facts. However, as I will show throughout this thesis, the concepts of naturalness, ecosystem health and biodiversity have been understood in radically different ways depending on the evaluative context of their use. These concepts therefore, I will argue, are value-dependent. Conflicts over how best to define and measure them are the result of normative conflicts regarding underlying value-claims. As such, different evaluative stances will lead to differing interpretations of these concepts and, therefore, conflicting approaches to the aims of conservation.

I will then go on to consider what this means for the objectivity of conservation science. We might worry that if definitions of conservation aims such as naturalness, biodiversity and ecosystem health are value-dependent then these aims become relativistic, lacking the legitimacy of objective science and acting as mere containers for subjective preferences and ideological projections. The legitimacy of this worry, I will argue, depends upon the acceptance of a conception of values as merely subjective or culturally relative and a conception of scientific objectivity according to which it consists in the freedom of scientific justification from values, known as the 'value-free ideal' (VFI). This account of values and objectivity of course rules out the possibility of objective claims being made regarding the value-dependent aims of conservation. In response, I will present some

objections to the VFI and instead argue for a 'procedural' account of objectivity which places conditions on the constitution and structure of a knowledge-producing community which act to facilitate the objectivity of the claims which are produced. Rather than the 'view from nowhere' sense of objectivity which requires the complete absence of values, my account of objectivity will be more concerned with the inclusion of and deliberation between multiple perspectives or 'views'.

In writing this thesis, I intend to bring together insights from disparate literatures such as philosophy of medicine, feminist philosophy of science, and contemporary environmental writing and journalism, bringing them to bear on questions more commonly thought to be within the purview of environmental ethics and philosophy of conservation. Philosophy of medicine provides a vast literature on the value-ladenness and objectivity of the health and disease concepts (Boorse 1977, Wakefield 1992, Cooper 2002, Broadbent 2019) which will prove incredibly useful for thinking about normative concepts in conservation - most obviously the concept of ecosystem health. Feminist philosophers of science have constructed compelling critiques of the value-free ideal of scientific objectivity as well as developing accounts of objectivity which are friendly to value-ladenness (Longino 2004, Harding 2015, Alexandrova 2018) – this will aid in my own development of an account of objectivity which is appropriate for normative claims in conservation science. Finally, contemporary environmental writing and journalism (Marris 2011, Monbiot 2013, Kimmerer 2013, Macdonald 2019) provides a wealth of revealing real-world examples of value-conflicts in conservation which will be hugely helpful to both motivate our philosophical investigations as well as illustrate the relationship between more abstract points of argumentation and the realities of conservation.

§1. Normative Concepts in Conservation Science

Conservation science is a goal-oriented discipline (Soulé 1985). This means it does not just seek only to describe the world, but also to change it. Like medicine or engineering, conservation science is founded upon certain aims or outcomes that it seeks to bring about. Take, for example, Soulé's 'postulate': "diversity of organisms is good" (Soulé 1985, p.730) which he takes to be a founding principle of the field of 'conservation biology'. Rather than just describing the diversity of organisms, conservationists seek to retain this diversity or perhaps increase it in places where it has been lost. As such, biodiversity, as it has come to be known, is one of several 'normative concepts' that exist in conservation science. These are concepts which, like health in medicine, pick out a state which is inherently good or desirable by definition.

This does not mean that these concepts are necessarily aligned with what is all-things-considered good – they should be understood as defeasible goods which may be outweighed by other goods. Again, the analogy with health is useful – health is inherently desirable and the mission of medicine is built upon the idea that health is a good which medical practitioners should aim to bring about in patients – however this does not mean that the health of an individual is always, all-things-considered, good - we may on occasion individually prioritise other goods over one's own health, for example the enjoyment of a drunken evening or particularly indulgent meal. Similarly, the goodness which is represented by biodiversity and other normative concepts in conservation is defeasible and

may be outweighed by other considerations. For example, the biological diversity of a deadly virus or infection is clearly not all-things-considered good, since the normative force of this diversity is outweighed by the increased suffering resulting from the capacity of the more diverse virus or infection to evade immunity and treatment.

In a 1999 paper by Callicott, Crowder and Mumford titled "Current Normative Concepts in Conservation" the authors list several such 'normative concepts' which are at use in the conservation literature: "biological diversity, biological integrity, ecological restoration, ecological services, ecological rehabilitation, ecological sustainability, sustainable development, ecosystem health, ecosystem management, adaptive management, and keystone species" (Callicott et al. 1999, p.23). These concepts, they claim, "set the agenda for conservation" and yet they are "nakedly value-laden" (Callicott et al. 1999, p.23). Callicott, Crowder and Mumford take a pluralistic approach to these differing aims, arguing that different normative concepts are appropriate in different contexts and that it is wrong to think that conservation should focus on a "single preferred goal" (Callicott et al. 1999, p.23). This pluralistic approach is one I shall also adopt in this thesis – it is clear that conservation is too heterogenous in practice for a single goal to suffice for all situations. The differing aims that I consider in this thesis are therefore meant to form part of a broader framework in which different normative concepts will be called upon depending on the context.

In this thesis, I will focus on three such 'normative concepts': naturalness, biodiversity, and ecosystem health - which I take to be both the most prolific as well as the most fundamental, since several of the other concepts mentioned by Callicott et al. are

dependent upon these concepts for their definition (for example, ecological restoration depends on naturalness for its meaning; and sustainable development may be defined as development without compromising ecosystem health). Naturalness, biodiversity and ecosystem health, I shall argue, act as interfaces between values and science, places where normativity – how (we believe) the world should be – influences the way we describe how the world is.

§2. Conflicting Conservation Aims

The variety of normative concepts used to conceive of the aims of conservation reflects the many debates in the conservation literature as well as in the philosophical literature over the fundamental aims and foundational principles according to which conservation should operate. Conflicts exist between new conservationists (Marris 2011, Kaveira & Marvier 2012) and neo-protectionists (Wuerthner et al. 2015, Wilson 2016); between restorationists (Hettinger 2002, Light 2005) and non-interventionists (Katz 1997, Maier 2012); between rewilding initiatives and local communities (Wyne-Jones et al. 2018, Schofield 2022, Monbiot 2013) ; global conservation organisations and Indigenous Peoples (Brockington 2002, Mbaria and Odaga 2016, Sarkar 2019); as well as between differing approaches to invasive species control (Pearce 2015, Lean 2021). I will argue that at the heart of many of these conflicts lie disagreements over value-claims - differences in ethical, aesthetic, ideological, and cultural beliefs which pervade conservation discourse.

In order to make this argument, I will refer throughout this thesis to specific examples of conflicting conservation aims. I will often provide examples taken from a U.K.

context since this is the context with which I am most familiar and in some cases have a more personal understanding of. However, I will also make use of examples from across the globe in order to illustrate the different contexts in which conservation conflicts arise. One specific example of such a conflict from the U.K. context which I shall return to throughout the thesis is disagreements between rewilding organisations and local communities. Specifically, I will consider an instance of this more general conflict in which Rewilding Britain clashed with local communities in mid-Wales over the Summit-to-Sea landscape-scale conservation project. I will go into this conflict in much greater detail in Chapter 3 on ecosystem health, however I think it will be useful to provide an initial brief sketch here in order to illustrate more concretely what I mean by "conflict" over the aims of conservation.

The Summit-to-Sea project faced difficulties as a result of conflicting views over the state of the upland ecosystems and the appropriate aims of the project in relation to them. While the upland moors which are the result of (at least) a thousand years of livestock grazing are valued by the local people as a working and cultural landscape often revered for its beauty, Rewilding Britain have described the very same moorlands as sheep-wrecked and desolate. Although there is broad agreement over the negative impacts of the intensification of farming practices and the resulting declines in insect and bird populations, Rewilding Britain and local farming communities from the area had very different visions for the future of the moors. Rewilding Britain ultimately sought to remove grazing sheep from large areas of the moorlands in order to allow for afforestation, a prospect which local farmers argued would deeply impact their livelihoods and communities. They instead argued for the use of traditional farming practices to restore the pastoral ecology of the uplands. Ultimately, Rewilding Britain had to step down from the Summit-to-Sea project

because they failed to engage and include the local community in devising their aims, causing a lack of trust and a feeling that the project was being done to local people rather than with them.

I shall argue that this case and other similar conflicts ultimately result from the differing values held by stakeholders. Rewilding Britain and the local farming community have very different ways of valuing these upland ecosystems. Rewilders value a more natural landscape and so look deeper into the past for their ideal by which to judge the ecological state of the uplands. Local communities however argue for the cultural and heritage value of the moorland ecosystem and so aim to restore the moorlands to a more recent agriculturally-influenced baseline.

How might such conflicts be resolved in a legitimate way? Is it possible for there to be an objective resolution regarding the appropriate aims for the conservation of the Cambrian uplands? These are the types of question with which this thesis will be concerned.

§3. Values and Objectivity

There exists a vast and long-established literature on values in science which I believe could be hugely helpful for conceptualising the way in which values are involved in determining conservation aims and what this means for objectivity in conservation science. However, despite this potential fruitfulness, very little work has been published connecting

the literature on values in science to questions in environmental philosophy.[1] One of the aims of this thesis therefore will be to begin to connect these two fields in a way which will hopefully prove to be insightful to researchers from both philosophy of science and environmental philosophy backgrounds.

Traditional philosophical accounts of scientific objectivity see values as a corrupting influence on scientific reasoning and justification. Such accounts are often classified as proposing a "value-free ideal" (VFI) for scientific knowledge (Lacey 1999, Reiss and Sprenger 2020) which advocates purifying scientific claims as much as possible from what are seen as the distortions and biases created by the influence of social values. A couple of qualifications are usually provided alongside this account – firstly, a distinction is made between 'epistemic' values and 'non-epistemic' values. According to this distinction, epistemic values are "indicative of truth or knowledge" (Elliott 2022, p.4), typically values such as: empirical adequacy, explanatory power, simplicity and internal coherence – these are norms which are considered by defenders of the VFI to be internal and essential to the justificatory apparatus of science. Non-epistemic values on the other hand are understood as the ethical, socio-cultural, ideological and aesthetic norms which form the social context in which scientists operate. Defenders of the value-free ideal (VFI) accept that epistemic values are required for closing the gap between evidence and theory referred to as underdetermination – it is rather non-epistemic values which they argue should be excluded from the scientific method. Secondly, defenders of the VFI accept that non-epistemic values inevitably have an influence on science in practice, for example in setting the agenda for

[1] Other than a few recent examples such as Jones (2021) and Sarkar (2019).

which questions are deemed worthy of research or the way in which research is published and disseminated. It is specifically scientific *justification* - the ways in which we acquire evidence and justify our acceptance of a hypothesis on the basis of this evidence - that they believe must be free from non-epistemic values (Reiss and Springer 2020). The VFI can therefore be defined as the claim: scientific justification should ideally be free of non-epistemic values.

As I will show in greater detail later in this thesis, the VFI has faced a great deal of criticism from philosophers increasingly willing to recognise the necessary and positive role that non-epistemic values can play in scientific justification and reasoning. Ludwig (2015) cites four main arguments given against the VFI: 1) Underdetermination leaves room for non-epistemic values, 2) evaluation of 'inductive risk' requires non-epistemic values, 3) the distinction between epistemic and non-epistemic values doesn't hold up to scrutiny, and 4) scientists employ 'thick' concepts in which factual and normative components are entangled (Ludwig 2015, p.1254); to which he adds his own fifth argument that ontological choices in science require non-epistemic values. (Ludwig 2015, p.1265) Ludwig suggests that the result of these sorts of critiques has been the establishment of a "new orthodoxy of value-laden science" (Ludwig 2023, p.1). Rather than aiming for an unachievable standard of value-freedom, this 'new orthodoxy' seeks to give accounts of how science can be more socially legitimate and trustworthy in light of this value-ladenness.

I will argue that the development of this 'new orthodoxy' is particularly pertinent in the context of applied sciences like conservation which is founded upon normative aims and is often used in public policy, having far-reaching social implications. Although I will touch

on several of the five critiques of the VFI mentioned by Ludwig, the most important in the context of this thesis is a development of argument (4) which points to the use of normative concepts such as those I described in §1 of this introduction. In light of the usage of these normative concepts, I will argue that conservation science is value-laden in a distinctive and more involved way than most other sciences. To capture this specific variety of value-dependence I will borrow the term 'mixed', coined by Alexandrova (2018) in the context of the science of well-being, to refer to such concepts and claims in conservation science which possess this special status of value-dependence.

I will argue that such 'mixed' concepts and claims require a 'procedural' account of objectivity which can provide strategies for detecting and making explicit underlying value claims and subjecting them to critical scrutiny from diverse perspectives. In providing such an account, I will attempt to apply Alexandrova's rules for procedural objectivity to the context of conservation science. I will find that there are some specific challenges presented to the account in the conservation context, and proceed to offer some responses to these challenges.

§4. Chapter Outline

In Chapter 2, I will consider how values are involved in constructing differing notions of naturalness and how opposing conservation ethics can be derived by appeal to these differing conceptions. I will focus on two opposing accounts of naturalness: 1) 'historical fidelity' and 2) 'non-intervention', showing how understandings of naturalness in terms of

'historical fidelity' provide the normative basis for many conservation interventions such as species reintroductions, eradication of invasive species and even de-extinction, while understandings of naturalness in terms of 'non-intervention' would caution against these same actions. I will then go on to consider how broader value-judgements and worldviews shape these different conceptions of naturalness, examining the relationship between human/nature dualism and Katz's argument for non-intervention (Katz 1997), as well as how human/nature dualism has played a role in restorationist philosophies. I will argue, through a closer examination of dualism and paying particular attention to the work of Plumwood (1993, 1997, 2005), that both senses of naturalness have a dualistic evaluative underpinning. I conclude by offering an alternative conception of naturalness based on the value of 'autonomy' which I argue may present a less dualistic way to conceive of the aim.

Chapter 3 will look at the role of values in constructing ecosystem health. I will look to the literature in philosophy of medicine on human health and the debate between 'normativists' and 'naturalists' (Boorse 1977, Wakefield 1992, Cooper 2002, Broadbent 2019) arguing that naturalist accounts of health in terms of both Boorseian 'normal functioning' and 'organisational self-maintenance' fail in their application to ecosystems to provide truly value-free accounts of ecosystem health. Values are required to delimit what and where an ecosystem is, to identify which functional states and systemic capacities are thought to be of value, and to construct a 'reference class' or 'baseline' to provide an account of normal functioning for a given type of ecosystem. I will conclude by providing the foundations for a normativist account of ecosystem health.

In Chapter 4, I will consider the concept of biodiversity. I will show how values are involved in conceptualising three broad categories of biodiversity accounts: species richness, phylogenetic diversity and functional diversity. I will argue that which of these accounts we choose when measuring biodiversity, as well as how we define each account, is dependent upon value-judgements. As such, biodiversity prioritization rankings of the type regularly used for conservation decision-making are value-laden. I will respond to an argument made by Lean (2017) that the use of a phylogenetic measure of biodiversity can be justified for epistemic reasons, arguing that these reasons either fail to support a specifically phylogenetic conception, or else are not really epistemic reasons. I will conclude by arguing that this value-dependence doesn't necessarily result in 'biodiversity deflation' – the view that biodiversity simply reflects our normative reasoning regarding what should be conserved. Biodiversity should be able to provide a reason for conserving something rather than merely reflecting our pre-established normative reasoning, even if the selection of a specific biodiversity metric is value-dependent. Furthermore, rather than enshrining all our normative reasoning within the biodiversity concept, as the deflationist advocates, I argue that biodiversity should be understood as a defeasible good, which can be outweighed by other considerations.

Chapter 5 will consider what the value-dependence of the conservation aims discussed in previous chapters means for their objectivity. I will consider some difficulties for the use of 'mixed' concepts as conservation aims such as accusations of relativism as well as the dangers of value 'imposition' and 'inattention'. In responding to these issues, I will look to the ways in which objectivity has been reconciled with value-ladenness in both the philosophy of medicine and feminist philosophy of science and argue that these

literatures can provide the resources for an account of objectivity applicable to the aims of conservation. I will examine Alexandrova's (2018) account of 'procedural' objectivity in the science of well-being and further develop this account in its application to conservation science. In doing so, I will argue that extra attention must be paid within the conservation context to the question of who to include in deliberative procedures, as well as to addressing power imbalances within procedures. I will also consider and respond to the accusation that such a procedural account is inherently anthropocentric.

Chapter 2

Should We Conserve Nature?

Naturalness As a Conservation Aim

§1. Introduction

One of the most common conceptions of conservation is that it aims to conserve the natural world. Naturalness has acted as an important interface between science and normativity within conservation biology since its disciplinary origins. It plays a key role by acting as a normative yardstick to guide conservation targets and aims in ecological restoration, invasive species control and rewilding, among other conservation strategies. However, as is often remarked in the philosophical literature on the topic, nature and naturalness can have different and conflicting meanings and therefore their invocation can result in ambiguous or even contradictory implications for the aims of conservation. In this chapter, I will consider what I take to be the two most significant interpretations of naturalness in the context of conservation biology and environmental philosophy, which I term 'historical continuity' and 'non-intervention', showing how these different ways of understanding naturalness can result in opposing conservation aims. I will argue that rather than acting as an objective or value-free approach to determining conservation aims, naturalness must always be defined in a way that presupposes some value-claim regarding

what it is that is of value that the naturalness concept is capturing. Therefore, I shall argue, the use of the naturalness concept as a conservation aim is always value-laden.

After uncovering the value-claims which underpin the two main conceptions of naturalness at use in conservation, I will consider the relationship between these value-claims and human/nature dualism. I will examine Plumwood's (1993) account of dualism in terms of the division of the world into two "radically different orders or kinds" (Plumwood 1993, p.48), and argue that human/nature dualism provides the broader conceptual background for supporting the two differing conceptions of naturalness which I describe and their respective underlying value-claims. I will then consider the arguments of some philosophers and conservationists that, given this dependence on human/nature dualism, it would be best to abandon naturalness as a conservation aim. I will argue however for the possibility of a less dualistic conception of naturalness which I suggest should still play a role in determining conservation aims in some contexts. I will then conclude by giving some preliminary considerations (which shall be taken up in more detail in chapter 5) about how the value-ladenness of the naturalness concept might impact on its objectivity, arguing that the use of concepts like nature, naturalness and wildness in conservation can be made more legitimate by making underlying value-claims explicit and exposing them to critique through inclusive deliberative procedures.

§2. Conservation as Saving Nature

The concepts of nature and natural are baked into the foundations of conservation science – the question of what it is that conservationists are conserving is often intuitively

answered with, nature. “Conservationists conserve nature” one might argue. Perhaps the largest conservation organisation on earth calls itself, The Nature Conservancy; and The RSPB, the largest conservation organisation in the UK, begins its mission statement: “Nature is in crisis, together we can save it” (RSPB website, 2023). Nature is therefore commonly invoked by conservationists and conservation organisations as a domain opposed to or outside of the human social world which constitutes the primary target of conservation efforts.

This idea of conservation as saving nature goes right to the very origins of the discipline, with many of the first and most famous national parks such as Yellowstone National Park being founded on just this principle of preserving areas of wilderness. According to the United States government’s wilderness act of 1964 (despite these parks having in fact been populated by Indigenous People, who were expelled in their creation), “wilderness” is a place where, “the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain” (Wilderness Act, 1964).

This idea of wilderness went hand-in-hand with the notion of a ‘balance of nature’ according to which ecosystems, when left to their own devices without the influence of humanity, will achieve a balanced self-maintaining state. Although such notions of the ‘balance of nature’ are rarely explicitly advocated these days, the ideal of nature in the absence of humanity remains a hugely important implicit normative principle within a great deal of conservation discourse.

Philosophically, there is an intuitive appeal in using the naturalness concept to ground the normative assertions of conservation. Those who employ the concept argue it is able to function as an objective reference point for ecological comparison, allowing us to judge the extent to which ecosystems are degraded and in need of conservation efforts. According to such a view, the natural can provide a normative yardstick by which to gauge how ecosystems should be that can help conservationists determine the aims and targets of ecological restoration and judge what ecological change is to be accepted and what is to be resisted. Much of the intuitive appeal of this idea stems from the supposition that this norm is given by the world itself rather than being a product of the values of human beings – all we need do, it is thought, is look to the natural condition of an ecosystem and in doing so we can discover how an ecosystem should be.

However, as I shall argue in section §2.1, understanding the aim of conservation in terms of 'saving nature' can mean different and contradictory things. For example, what does it mean to 'save nature' when keeping some parts of the planet as similar as possible to how they would be without human influence in fact entails extensive human intervention in and control of those ecosystems, as is increasingly the case in a warming climate and vastly altered biosphere? Furthermore, what should conservationists do if allowing for 'natural processes' to proceed is likely to alter the historical character of an ecosystem, such as in the case of species invasions and novel ecosystems? Understanding conservation in terms of 'saving nature', it turns out, is fraught with conceptual ambiguity and contradiction. In the following sections §2.1 - §2.3 I will explore two opposing ways in which naturalness can be used as a conservation aim, which I term 'non-intervention' and

'historical continuity', arguing that they are based on differing underlying value-claims and result in opposing implications for conservationists in practice.

§2.1 Differing Conceptions of Naturalness

Natural is one of the most polysemic words in the English language. The philosophical literature is rife with different meanings and senses which may be given to the word. As early as 1874, JS Mill recognised two "principal meanings" which can be given to the terms nature or natural: 1) everything in the universe that takes place according to causal 'powers' (in contrast to the supernatural); and 2) the absence of human agency or influence (in contrast to human artefacts) (Mill 1874, p.8). This dual-definition immediately looks problematic however when applied to conservation. The first sense obviously won't help as it would make everything natural – a coal mine just as much as a rainforest – and so offers no normative guidance to conservationists. In the second sense however, anything that humans do, including our attempts to conserve nature, in fact destroy it, since ex hypothesi it is carried out through the agency of humans. It is this second sense of nature which McKibben famously argued in 1989 had "ended" (McKibben 1989) because there was in fact no longer any pristine ecosystem or landscape on the planet which had not been influenced by humans.

Furthermore, as Vogel (2015) argues, 'the end of nature' may be something that "has always-already happened" (Vogel 2015, p.8) since "our position in the world is fundamentally active and transformative… so the 'nature'… we inhabit is always one we have already helped form" (Vogel 2015, p.43). Humans have been 'ending nature' in this

sense from our very origins as a species, since in doing anything at all we transform and shape the world around us. If this is the case, then by definition there is nothing we can do to conserve nature since all human agency – all doing – is a priori unnatural. Such a conception can't help in providing the sort of norms that are needed for conservation. As Vogel argues regarding this dual-way of conceptualising the natural, "either we violate it all the time or violations of it are logically impossible" (Vogel 2002, p.27).

If naturalness is to be of any use as a conservation aim therefore, neither of these definitions will suffice – some other ways of understanding the concept must be given. To do this, it will be helpful to consider the role that the naturalness concept has actually played in conservation discourse and its use in determining conservation aims. One of the most significant functions of the concept is its use in ecological restoration. For example, take this passage from Macdonald's (2019) book 'Rebirding':

> … the early Holocene, dating from 12,000 years ago, has become most ecologists benchmark of 'natural'. It is to the assemblage of animals at this time we must turn to discover how the landscape would have looked… This seemingly 'historical' point actually affects any kind of vision for the future of Britain's nature: what our landscape should look like and how our birds could prosper. (Macdonald 2019, p.10-11)

On this account then, naturalness is equated with the state of an ecosystem or landscape at a specific historical point in time. Conservation efforts then orient their aims in relation to this 'natural' state, intervening so as to restore ecosystems to resemble, as closely as

possible, this state. This may be done through, for example, recreating lost habitat, reintroducing native species and eradicating non-native or invasive species, as well as more extreme technological interventions such as de-extinction and assisted evolution feasibly being understood as an extension of this project. I shall refer to such an account of naturalness as 'historical continuity'.

However, naturalness has also been used to describe the absence of human control and management of ecosystems. Advocates of this conception of naturalness argue that conservationists should refrain from intervening in ecosystems and instead allow for the uninterrupted occurrence of evolutionary and ecological processes, even in cases where ecosystems diverge significantly from their historical state. This conception of naturalness has been espoused in environmental philosophy through the anti-restoration arguments of Katz (1997) as well as the 'modally robust letting things be' argued for by Maier (2012). It can also be seen in some of the conservation literature on 'passive rewilding'. According to this conception, the natural isn't defined by looking back to some pristine state but rather by a commitment to non-intervention in ecosystems in the present and future – rather than humans managing ecosystems to recreate a historical ecosystem-state, conservationists should recognise the value of allowing novel ecosystems to develop in response to past and ongoing human influence. I will term this account of naturalness, 'non-intervention'.

Marris (2011) labels the tension between these two accounts of naturalness – which I have termed 'historical continuity' and 'non-intervention' – "the paradox of pristine wilderness", stating that "a historically faithful ecosystem is necessarily a heavily managed one" and that therefore, "the ecosystems that look the most pristine are perhaps the least

likely to be truly wild" (Maris 2011, p.12). Given the extensive anthropogenic changes to the planet's biosphere, maintaining ecosystems in anything like their historical state increasingly requires extensive technological intervention in those systems by humans. So, when conservationists speak of 'saving nature', which nature should they wish to save? Nature as the historical characteristics of ecosystems and the processes which produced them prior to human influence? Or nature as independence from human intention and control?

In the next sections §2.2 and §2.3, I will show in more detail how these opposing accounts of naturalness are supported by appeal to differing value claims. Whether we describe a given ecosystem as natural or not, or a given conservation project as conducive to naturalness or not, is dependent upon a prior value judgement about what it is that is of value or importance that should be captured by the naturalness concept.

§2.2 Naturalness as Non-Intervention

The most prominent philosophical argument making use of the naturalness concept to argue for a non-interventionist conservation ethic comes from Katz (1997). Katz puts forward an argument against ecological restoration as constituting the "irredeemably anthropocentric" domination of nature (Katz 1997, p.99). His argument is well summarised in the following quote:

> The attempt to redesign, re-create, and restore natural areas and objects is a radical intervention in natural processes... all of these projects involve the manipulation and

> domination of natural areas. All of these projects involve the creation of artefactual realities, the imposition of anthropocentric interests on the processes and objects of value. Nature is not permitted to be free, to pursue its own independent course of development. (Katz 1997, p.105)

Katz's argument hinges on his interpretation of naturalness in terms of independence from human control and management, which he contrasts to artefacts which "stand in a necessary ontological relationship with human purpose" (Katz 1997, p.122). Accordingly, for Katz, we can distinguish artefacts from natural objects because artefacts have 'intrinsic function' assigned by their human creators, while natural objects lack any such 'intrinsic function'. Attempts to re-create supposedly natural historical ecosystem states therefore can only result in the creation of artefacts according to Katz's view since these ecosystems become imbued with the purpose and functions assigned by their human creators, rather than possessing the intrinsically functionless state of truly natural systems.

Furthermore, given artefacts have a necessary relationship to human purpose, Katz thinks this means they are "essentially anthropocentric" (Katz 1997, p.98). That is, given artefacts are assigned their function by human creators, Katz argues that this function must be anthropocentric - aimed only at fulfilling the desires and preferences of humans. Katz states, "it would be impossible to imagine an artefact not designed to meet a human purpose" (Katz 1997, p.98). This conceivability claim indicates that he takes artefacts to be anthropocentric by necessity, as a matter of analytic truth. According to Katz then, the imposition of anthropocentric purpose onto ecosystems undermines their intrinsic value,

which Katz understands as deriving from their independence "from external design, purpose and control" (Katz 1997, p.129). Katz therefore concludes:

> When humans intervene in nature, when we create artefacts or attempt to manage environmental systems, we destroy that natural autonomy by imposing a system of domination. (Katz 1997, p.129)

A similar argument is made by Maier (2016). In his paper "Taking Nature Seriously in The Anthropocene", Maier examines common arguments used to justify conservation projects which "actively manage or manipulate nature to improve its quality or quantity" (Maier 2016, p.1) finding these arguments wanting and therefore arguing that such projects are often undertaken "for no good reason" (Maier 2016, p.1). Maier offers his own alternative vision for the value of nature which he argues 'takes nature seriously' and is in many ways similar to Katz's arguments. According to Maier, nature's value is "unique" in:

> its relative indifference to the state that it happens to be in; the absence of benefit and, not infrequently, costs to people; the absence of reciprocity (such as typifies friendship) in any non-metaphorical sense; and the impossibility of serving nature's interests (because nature has no interests). (Maier 2016, p.28)

The only way to appreciate this 'unique' value, Maier argues, is by "adopting… steadfast attitudes and behaviours of 'letting this place be' as it is, independent of its state and functional properties and independent of its costs and benefits to us" (Maier 2016 p.29). According to Maier, only this attitude values nature *as nature*. Any project which seeks to

rearrange or change nature in order to preserve or increase its value will in fact “corrupt or diminish an ecosystem’s central value as nature, rather than conserve nature” (Maier 2016 p.29).

Both Katz’s and Maier’s arguments seek to reject the influence of human values, preferences and purposes onto nature, arguing that allowing ecosystems to develop regardless of how they conform to such values constitutes the only way of normatively grounding the aims of conservation in the world itself rather than in the ‘subjective’ preferences of human beings. However, in both cases their arguments depend on asserting their own value-claim regarding what makes an ecosystem valuable. This value-claim can be stated as:

V1: Natural value derives from the independence of an ecosystem from human purpose and intention.

It is this value-claim which underpins the conception of naturalness as human non-intervention in ecosystems.

In practice, V1 and the conception of naturalness it supports has been implemented through a conservation approach known as ‘passive rewilding’ referring to “abandoned post-agricultural landscapes that are no longer actively managed” (Pettorelli et al. 2019). This approach is most common in Europe where a great deal of agricultural land has been abandoned due to a variety of social drivers and as a result the land has been left to develop

in the absence of any human management. Carver (2019) describes the process of passive rewilding as follows:

> … abandoned land rarely remains unused for long as various species of flora and fauna soon move in to colonise the space left behind by cessation of agricultural use… While not all the species colonising abandoned land may be considered wild or native, in the absence of direct human management, the process of colonisation of abandoned land *is in itself natural*... This may be termed 'passive rewilding', as the rewilding process happens unaided and without direct human intervention or influence… Thus, passive rewilding in the absence of domestic plants and animals may be regarded as the purest form of rewilding because human intervention, influence, and management is effectively zero. (Carver 2019, p.100-101, my emphasis)

One example of 'passive rewilding' which Carver cites is Scar Close, a nature reserve in the Yorkshire Dales National Park, U.K.. The reserve has excluded grazing livestock since 1974 and almost no management has taken place on the reserve except some limited cutting/removal of invasive sycamore trees.[2] Carver contrasts the development of Scar Close with a neighboring nature reserve named Southerscales which has been subject to greater levels of management, including 'conservation grazing' to encourage the creation and maintenance of certain types of habitats – calcareous grassland, limestone pavement, blanket bog, and upland flushes. (Carver 2019, p.114) Interestingly, Scar Close has a much

[2] It is difficult to find any examples of conservation projects that are completely passive.

greater level of plant diversity, with one species of particular conservation interest known as the globeflower (*Trollius europaeus*) being common at Scar Close and absent at Southerscales, as well as Scar Close producing greater overall biomass (Carver 2019, p.114).

As Carver points out however, the results of the passive rewilding approach on biodiversity will generally be mixed, stating that "there will be both winners and losers when land is abandoned" and therefore it depends on "exactly what kind of biodiversity we are talking about, as the species mix inhabiting an ecosystem will vary according to the land management systems involved" (Carver 2019, p.107). Furthermore, Delibes-Mateos et al. (2019) cite several detrimental effects of land-abandonment on species which thrive in semi-natural agricultural landscapes in Europe, claiming that 'passive rewilding' is implicated in: the decline of endemic Primula scandinavica plants in Sweden and Norway, the extinction of six open habitat gastropod species in Collserola Natural Park (north-east Spain), the loss of several ground spider species in Greece, the decline of many farmland bird species across several European regions and Asia, the decline of European hare, and the decline of several lizard species in Greece (Delibes-Mateos et al. 2019, p.363-364).

In any case however, a staunch commitment to V1 should mean that one is not particularly concerned about the impacts of non-intervention on biodiversity, since according to V1, ecological value, rather than being tied to biodiversity or any particular ecological outcome, is derived through independence from human management and the natural development of ecosystems regardless of the desirability of the results. This is why Maier argues that human non-intervention must be "modally robust" (Maier 2013, p.427) - human restraint from intervention must extend over a wide-range of possible worlds, not

just worlds where such an attitude is congenial to human interests but also to worlds in which it may be opposed to such interests and preferences (although as I argue, non-intervention actually is just such an interest/preference and therefore must be weighed against others, rather than being the objective criteria which Maier/Katz claim).

In Section §3., I will argue that V1 can only be justified in the context of a broader commitment to human/nature dualism – a radical dichotomy which conceives of humans and nature as opposed to one another by their very definition. There are good arguments for rejecting human/nature dualism and therefore for questioning the legitimacy of V1. I will ultimately argue that V1 is in need of modification as a result of the rejection of human/nature dualism, although non-intervention can still remain an important normative principle for conservationists in its modified form. First however, let us look in more detail at accounts of naturalness in terms of 'historical continuity' to uncover the value claims upon which such accounts depend as well as the conservation implications of such an account.

§2.3 Naturalness as 'Historical Continuity'

Although the non-interventionist view of naturalness described above has played an important role in informing the aims of what has been termed 'passive rewilding', the more prolific use of the naturalness concept in conservation science is in designating some historical reference point to act as a normative yardstick for guiding conservation interventions. As Corlett (2016) points out, the English prefix 're-', meaning back or again, "appears in many terms used for active interventions in conservation biology" such as:

"reconnect, recover, recreate, reforest, rehabilitate, reinforce, reintroduce, remediate, repair, restock, restore, revegetate, and rewild" (Corlett 2016, p.453). All of these terms depend upon a historical conception of naturalness to act as a reference point for guiding what state we should be '*re'*creating or going back to. Take ecological restoration for example, which has traditionally been understood as aiming "to return an ecosystem to its historic trajectory" (Society for Ecological Restoration 2004, p.1). As Higgs et al. (2014) state, the justification for this lies in the perceived value of the natural state of an ecosystem:

> The motivation to seek historical references as goals for restoration projects is straightforward in the classical model: the integrity of the ecosystem in question is considered to have been greater before modern human disturbance than it is now. Thus, historical information, or reference conditions, become the primary source of ideas for what an ecosystem should be like in the future, following restoration. (Higgs et al. 2014, p.500)

Accordingly, in deploying this conception of naturalness as a conservation aim, conservationists look back to the historical state of an ecosystem in order to construct what is called a 'baseline'. This baseline can then be used as a guide for conservation interventions – which species to protect or reintroduce, which species to eradicate or control and the type of habitat which should be recreated. These historical baselines are therefore imbued with normative force, as Marris (2011) writes in her book *Rambunctious Garden*:

> For many conservationists, restoration to a prehuman or pre-European baseline is seen as healing a wounded or sick nature. For others, it is an ethical duty. We broke it; therefore we must fix it. Baselines thus typically don't just act as a scientific *before* to compare with an *after*. They become the good, the goal, the one correct state. (Marris 2011, p.9)

This ability to provide normatively forceful goals or aims means that historical reference points have been used to guide all manner of different conservation decisions. Even basic assessments of the extent of species declines which form the basis for decisions about which species should be given priority in conservation efforts require historical baselines. The IUCN Red List which classifies species according to their risk of extinction looks back just ten years (or three generations of the species depending which is larger). The Living Planet Index, which seeks to aggregate local population trends of different species, takes 1970 as its baseline for the pragmatic reason of data availability. Another approach is represented by the IUCN Green List which seeks to go further than just avoiding extinctions by ensuring "viable and ecologically functional populations across species' indigenous range" pushes historical baselines back further to either pre-industrial or pre-colonisation dates (Rodrigues et al. 2019, p.2).

Rodrigues et al. (2019) however argue that the use of these relatively recent baselines can lead to 'shifting baseline syndrome' since in each case, the baseline still contains extensive human influence, meaning that what is considered natural or normal is continuously downgraded as ecological change slips out of cultural memory. They therefore argue for the use of truly pre-human baselines to measure population change, forming their

own framework which they call ‘EPOCH’ (Evaluation of Population Change) assessments, arguing that doing so will “broaden our ambitions regarding what are possible as future goals for the sustainable exploitation, conservation and recovery of species and ecosystems” (Rodrigues et al. 2019, p.2).

Beyond their use in gauging levels of anthropogenic species decline, conceptions of naturalness in terms of historical continuity are also used to determine which species are considered to be native and which should be considered as non-native or invasive – forming the basis for decisions about the reintroduction as well as the eradication and control of species. An interesting example here is the cobra-preta of the Sao Tomé Island in the Gulf of Guinea. Initially, it was thought that the cobra-preta had been introduced by Portuguese settlers and it was therefore assessed as an ‘invasive species’ by conservationists and considered for eradication. However more recently, historical and phylogenetic evidence has revealed that the cobra-preta of Sao Tomé is in fact a native endemic species distinct from its Portuguese sister and potentially vital for controlling invasive rodent species on the Island. (Ceriaco et al 2017) This example clearly shows how historical information regarding what is natural can determine the conservation status of a given species and therefore the aims that conservationists have in relation to it.

This historical conception of naturalness has also been advocated by philosophers objecting to non-interventionist arguments like those made by Katz and Maier. For example, Light (2005) argues that Katz’s charge that restoration constitutes the domination of nature to fit human purposes is misleading since, in the case of restoration:

> … anything does not go… we cannot restore a landscape just any way we wish and still have a good restoration in scientific terms. We are also bound in the context of restoration… of restoring to some preexisting state… the broadly construed historical and scientific boundaries of restoration limit the purposes to which we can put a restoration… because a restored landscape can never necessarily be tied only to our own desires (since our desires are not historically and scientifically determined in the same way as the parameters of a restoration), those desires cannot actually be the direct cause of any restriction on the self-realization of nature. (Light 2005, p.160-161)

The point that Light is emphasizing here is that, because the aims of restoration are determined by the natural, understood as historical, condition of an ecosystem, these aims are given by the world itself rather than being the product of human preferences as Katz and Maier accuse. Light is arguing that this gives these aims legitimacy and objectivity in representing what is good for an ecosystem or landscape, since their natural condition is thought to be a fact of how the world itself was and as such not susceptible to influence from human values and preferences.

Rolston (1990) makes a similar point when writing about conservation aims in Yellowstone National Park (USA). The National Park Service's stated aim is to restore the Yellowstone ecosystem to "as nearly pristine a condition as possible" (Rolston 1990, p.243). Rolston defends this aim in his paper, arguing that it is the natural history of the park which is valuable: 'Much natural history is still there - no illusion but objective biology that I, with the park biologists, value philosophically' (Rolston 1990, p.246).

Crucially, Rolston also argues for a sense of the natural that is "consistent with human management", according to which, "some human interventions are more, others less natural, depending on the degree to which they fit in with, mimic, or restore spontaneous nature" (Rolston 1990 p.245). For this reason, Rolston argues that, for example, reintroducing wolves contributes to a *more* natural Yellowstone ecosystem than one in which elk populations are controlled by hunting or where elk populations are left to multiply as they will in the absence of any predation or human control. As such, Rolston "values natural history, even when the historical genesis has been culturally interrupted and restored" (Rolston 1990, p.248). Here again, we can see how naturalness functions in Rolston's argument as an 'objective' historical reference point to guide conservation interventions.

A major problem for this view however is the question of which particular historical time-period should act as the appropriate reference point. Here lies a significant role for values in any such account. Take again Rolston's example of Yellowstone National Park – here the supposedly 'pristine' natural state which the Park Authority was trying to restore was in fact the pre-colonisation ecosystem of the 15th century. However, by the 15th century there had of course already been extensive human influence on the Yellowstone ecosystem, leading some conservationists to accuse those using such a baseline of possessing a "post-Columbian bias" (Donlan et al. 2006, p.661). Donlan et al. instead argue for what they call 'Pleistocene rewilding' which pushes the historical reference for guiding conservation interventions back to the late Pleistocene (13,000 years ago), before the so-called 'Pleistocene overkill' in which over fifty species of megafauna became extinct in North

America (probably for anthropogenic reasons, although this is debated), including: mammoths, mastodons, horses, giant ground sloths, American camels, lions, and the sabretooth cats; which of course lead to further extinctions and vastly altered ecosystemic functioning over the subsequent millennia (Keulartz 2016, p.13).

Such a shift in baseline would of course have significant impacts on conservation aims. Although many of the species lost in the Pleistocene overkill may now be extinct, so-called 'proxy species' – species which are phylogenetically and functionally very similar to the extinct species - may be considered as an option for reintroduction. An interesting example of a lost Pleistocene species that has arguably been reintroduced to N. America, albeit unintentionally, is the wild horse. The horse went extinct in N. America at the end of the Pleistocene and therefore was absent from the landscape when European settlers first arrived towards the end of the 15th century - bringing with them their horses. These European horses then became the ancestors of the populations of wild horse existing in America today. Although not descended from the original American horse lineages, these European horses may be close enough to be considered as 'proxies' from a conservation perspective. So depending on whether we select the Pleistocene baseline or the pre-colonisation baseline, we may see the wild horse in N. America as either a reintroduced native or an invasive non-native.

Additionally, the de-extinction of lost Pleistocene species is quickly becoming an option for the future. For example, work is ongoing on the possibility of woolly-mammoth de-extinction. Novak (2018) describes how woolly-mammoth de-extinction could contribute to more historically natural ecosystems in both N. America and Europe:

> Mammoth grazing stimulated the competitive advantage of grasses over other plants, keeping grasslands maintained and productive. In the absence of grazing megafauna, the former Pleistocene mammoth steppes of Eurasia and North America have been overtaken by Holocene tundra and taiga… Among the grazing species that can recolonize and convert tundra to grasslands (deer, bovine, antelope, horses) none can assume the supermegafaunal role of elephantids, which have different grazing/browsing impacts, different nutrient transport effects and are the only animals large enough to open up taiga forests for grassland conversion by toppling trees. (Novak 2018, p.18)

This displays how the de-extinction of lost Pleistocene species contributes to the broader project of restoring Pleistocene ecological structure and function to ecosystems, which of course depends on asserting the value of Pleistocene rather than Holocene baselines for describing the natural state of ecosystems.

Despite such evaluative differences in the selection of baselines however, all accounts which conceive of naturalness in terms of 'historical continuity' are united by the following underlying value-claim:

V2: Natural value derives from the continuity of an ecosystem with its past state prior to significant human disturbance.

Disagreements over which 'reference point' is chosen reflect different understandings of what should constitute 'significant' human disturbance. However, despite such disagreements, the fundamental value-claim that is expressed by the historical conception of naturalness at use in conservation science is V2. Even in cases where quite recent human-influenced baselines are chosen, the value of these baselines is still often understood in terms of being *more* continuous with the past prior to significant human disturbance than current ecosystem-states. As such, in order to promote this value, conservationists aim to recover historical continuity by restoring ecosystems to resemble aspects of their pre-disturbance past in terms of both species composition and abundance as well as ecological structure and function.

V1 and V2 represent two opposing value-claims which may be encoded within the naturalness concept in its use as a conservation aim. In the next section §3, I will argue that although they articulate opposing and often contradictory value-claims, V1 and V2 are both founded upon the conceptual structuring of human/nature dualism. Given there are strong reasons to reject human/nature dualism, I will consider what this might mean for V1 and V2 and more generally for naturalness as a conservation aim. While some philosophers have argued that we should abandon naturalness as a legitimate conservation aim given its reliance on dualism, I will argue for the continuing importance of less dualistic conceptions of naturalness which are willing to compromise on V1 and V2, resulting in a more balanced view which recognises the value of both non-intervention and historical continuity without demanding total adherence to either.

Conception of 'Naturalness'	Underlying Value Claim	Implied Conservation Approach	Example of Implementation
Non-Intervention	V1: 'Natural value derives from the independence of an ecosystem from human purpose and intention'.	Passive rewilding; Land-abandonment; Protected Areas	Scar Close Nature Reserve, Yorkshire Dales National Park, exclusion of all grazing animals to allow for 'natural' plant succession.
Historical Continuity	V2: 'Natural value derives from the continuity of an ecosystem with its past state prior to significant human disturbance.'	Ecological restoration; Trophic rewilding; Reintroduction of native species; Control/eradication of invasive species	Yellowstone National Park, USA, Reintroduction of wolves to restore 'natural' trophic dynamics of the ecosystem.

Fig 1. Summary of differing conceptions of naturalness and their use as conservation aims.

§3. Dualism and Naturalness in Conservation

In this section, I will investigate the relationship between the differing conceptions of naturalness identified in the previous section and human/nature dualism. I will begin by giving a brief account of human/nature dualism, paying close attention to Plumwood's (1993) account of dualism as a form of conceptual structuring which strictly opposes concepts against one another, citing her five features which distinguish dualism from mere distinction. I will then examine how conceptions of naturalness as both non-intervention and historical continuity are liable to exhibit the five features of dualistic conceptual structuring described by Plumwood. I will agree with Plumwood that dualistic conceptual structuring acts to justify domination and othering and as such, we would be wise to avoid justifying our conservation aims with value-claims that are based in human/nature dualism.

I will then to go on to examine how the rejection of dualism has led some philosophers and conservationists to argue we should abandon naturalness as a conservation aim, both in terms of non-intervention and historical continuity. In environmental philosophy, several arguments have been made for the abandonment of the naturalness concept as a source of normativity in conservation and ecological ethics generally (Vogel 2002, Morton 2007). In the conservation literature, there has also been a shift away from use of the naturalness concept represented by the 'New Conservation' movement (Marris 2012, Kareiva and Marvier 2012). I will argue to the contrary, that naturalness should retain an important role in determining conservation aims in certain contexts, however this should proceed from an acknowledgment of the dualistic underpinnings of the concept as it has traditionally been understood.

§3.1 Human/Nature Dualism

Plumwood, who wrote extensively on the topic of dualism, defines it as the division of the world into two "radically different orders or kinds" (Plumwood 1993, p.48) which makes "equality and mutuality literally unthinkable" (Plumwood 1993, p.47). Plumwood argues that human/nature dualism can only be understood as part of a "set of interrelated and mutually reinforcing dualisms which permeate Western culture forming a fault line which runs through its entire conceptual system" (Plumwood 1993, p.42). This set includes (but is not limited to): culture/nature, reason/nature, masculine/feminine, civilized/primitive, mind/body, subject/object, self/other and fact/value.

According to Plumwood, a gendered reason/nature dualism is the "overarching, most general, basic and connecting form of these dualisms" (Plumwood 1993, p.44) and can be connected to all the others through 'linking postulates' which map the various different dualisms onto one another. For example, the postulate 'only humans have reason' maps reason/nature dualism onto human/nature dualism. These 'linking postulates' function as cultural assumptions which allow one to pass easily from one dualism to another via "well-travelled pathways" (Plumwood 1993, p.45). Plumwood argues that anthropocentricism is in this way connected to other 'hegemonic centrisms' such as androcentrism and ethnocentrism which Plumwood thinks are always built upon a foundation of dualism (in these cases, masculine/feminine dualism and civilized/primitive dualism respectively).

Dualism, so understood, is a way of structuring concepts. Those who endorse such dualisms might posit 'ontological' or 'substance' dualisms (as Descartes did in the case of mind/body dualism for example) but this isn't a necessary condition for Plumwood's definition of dualism which is more concerned with how our concepts and the logic underlying them are structured:

> a dualism… results from a certain kind of denied dependency on a subordinated other. This relationship of denied dependency determines a certain kind of logical structure, in which the denial and the relation of domination/subordination shape the identity of both relata. (Plumwood 1993, p.41)

This 'logical structure' involves the use of the negation of classical logic to define the 'underside' of a dualistic pair as simply not-the 'upperside'. As such, the underside, '¬p', can

only be understood as an absence of ‘p’ rather than as an independent presence, making such a definition “p-centred” (Plumwood 1993, p.56). So, in the case of classic human/nature dualism, nature is defined as simply anything that is not-human. By doing so, the dependency of the human social world on the subordinated realm of nature, which is seen as completely opposed to and separate from this human social world, can be denied or ‘backgrounded’, creating the basis for the anthropocentricism which justifies the domination of nature and has caused the ecological crisis in which we find ourselves today.

Plumwood also describes however what she terms ‘reversed dualism’ which occurs when, in an effort to overcome the negative effects of an established dualism, the value-claims of a dualistic pair are reversed whilst still retaining the dualistic identities of the concepts themselves. She points to ‘the feminism of uncritical reversal’ as an example of such a reversed dualism. This, Plumwood argues, is a flawed feminist strategy according to which the evaluative claim of ‘classic’ masculine/feminine dualism is reversed whilst remaining uncritical of the identities of the concepts themselves. Accordingly, the positive value of the feminine identity is asserted (the value reversal), however this identity brings with it its problematic dualistic features according to which women are still defined in relation to men, conceived of homogenously as ‘closer to nature’ or ‘in touch with emotion’, and radically separated from the masculine identity which remains aligned with the opposing categories of ‘culture’ and ‘rationality’. As such, merely reversing the value-claims of ‘classic’ dualism is not enough to overcome the influence of dualistic conceptual structuring, since the identities of the concepts being valued or disvalued are themselves formed through such dualistic structuring – as Plumwood puts it: “dualism is a process in which power forms identity” (Plumwood 1993, p.32).

In the following sections, I shall argue that both V1 and V2 are expressions of such a 'reversed dualism' – call it 'the environmentalism of uncritical reversal' to parallel Plumwood's feminist case. Both V1 and V2 attempt to reverse the evaluative claim of 'classic' human/nature dualism by asserting the value of the natural whilst retaining many of the dualistic features which have been enshrined into the naturalness concept. In order to argue for this claim, it will be helpful to make use of Plumwood's five features by which she distinguishes dualism from mere distinction. I will then be able to consider to what extent the differing conceptions of naturalness I have described and their underlying value-claims exhibit these five features, which are as follows:

1) **Backgrounding: -** The denial of the agency and contribution of the subordinated other upon which the dominant category in the dualistic pair depends (Plumwood 1993, p.48).

2) **Hyperseparation: -** The separation of the dualistic pair so that the two categories appear to be radically different from one another. Whereas a mere distinction requires that only one property is different (according to Leibniz's law), a dualism requires "maximal separation" where the number and importance of differences is emphasized and any shared qualities are eliminated or downplayed as inessential (Plumwood 1993, p.49).

3) **Incorporation: -** The relational definition of the underside of a dualistic pair as a lack of the upperside (Plumwood 1993, p.52).

4) **Instrumentalism: -** The lower side of the dualistic pair is seen as only instrumentally valuable (Plumwood 1993, p.53).

5) **Homogenization: -** Any differences within the dualized groups are disregarded so that they appear internally similar. This, along with hyperseparation, produces "binarism" – "a division of the world into two orders" (Plumwood 1993, p.54).

The following sections §3.2 and §3.3 will discuss to what extent conceptions of naturalness as 'non-intervention' and 'historical continuity', and the value-claims V1 and V2 which underpin them, exhibit these five features and can therefore be accurately regarded as expressions of human/nature dualism.

§3.2 Dualism and Non-Intervention

In order to assess the relationship between the non-interventionist conception of naturalness and human/nature dualism, I will show how this conception of naturalness and its underlying value-claim exhibits Plumwood's five features of human/nature dualism:

1) Backgrounding: - By focusing on the value of the absence of human purpose, intention and control of ecosystems, V1 ignores or 'backgrounds' the effects of past and present *unintentional* human influence on ecosystems, which will continue regardless of, or even because of, attempts to reduce management and control. Such human influence on nature can't be prevented by simply isolating ecosystems

from human management and 'leaving nature alone', since the ecological impacts of humanity are often non-local – a fence can't keep out climate change.

2) Hyperseparation: - V1 is dependent on a radical separation between entities which are dependent on human purpose and intention and all other entities which aren't. The importance of this dependence/independence is amplified and given ontological and ethical significance, marking out natural entities as entirely functionless ends-in-themselves while artefacts are purely functional means-to-an-ends. In this way, artefacts and natural entities are made out to be radically different from one another. The reality of continuity between artificial and natural entities, and the fact that a vast amount of entities sit somewhere in between these two categories, is therefore skewed to present the two categories as radically opposed to and discontinuous with one another.

3) Incorporation: - V1 assigns natural value according to the *absence* of human intention and purpose rather than the positive *presence* of some property. Accordingly, naturalness is defined in terms of the negation of human artefacts – simply as non-artefacts.

4) Instrumentalism: - According to V1, ecosystems which are independent of human intention and purpose are seen as possessing intrinsic natural value, while the value of an artefact is seen as entirely dependent on its ability to fulfil the human purpose for which it was made. This is what makes the non-interventionist view a 'reversed' dualism, since the value claim of 'classic' human/nature dualism is reversed by

designating natural entities as intrinsically valuable while artefacts are only instrumentally valuable to human purposes. Such a view however appears to disregard the importance of the instrumental value of natural entities to humans in terms of ecosystem services. It also ignores the fact that artificial entities can be of instrumental value to non-humans, for example in cases where artificial structures are used to aid the ability of organisms to survive and replicate, such as the installation of wooden pre-piers in a river to aid the ability of fish to migrate upstream to spawn, or the use of 'swift bricks' to provide a place for nesting swifts within artificial structures and buildings.

5) Homogenization: - The non-interventionist argument depends on seeing natural objects as homogenously functionless, while artefacts are seen as all being functionally dependent on human purposes and intention. This homogenization of the two categories ignores the possibility that natural entities might have functions assigned through their evolutionary history as well as through the capacity of some natural systems to self-regulate and persist through disturbance; while artificial entities can acquire new functions independently of human intentions - an old wooden table may become the ideal habitat for moss and woodlice. Because of this homogenization, V1 sees all natural objects as being indistinguishable in their possession of intrinsic natural value – an asteroid, abandoned land and an unexplored deep sea ecosystem all exist independently of human control and as such are homogenously functionless and therefore intrinsically valuable. Similarly, artefacts are seen as indistinguishable in being of only instrumental value to humans – a coal mine just as much as a restored ecosystem.

Given this dependence of V1 on these five features of dualistic conceptual structuring, we may question whether V1 forms a good evaluative basis for our conception of naturalness in its use as a conservation aim. Within environmental philosophy, there have been several notable objections against Katz's non-interventionism which proceed along such lines, arguing that Katz's view of natural value and his conception of nature rests upon an untenable human/nature dualism. For example, Lo (1999) argues that Katz's argument rests on a "moral dualism" according to which artefacts and natural entities "involve two radically separated domains of moral concern" (Lo 1999, p.260), leading to a moral view according to which, "artefacts are universally thought to be devoid of moral standing, [and] hence… morally inferior to natural entities" (Lo 1999, p.261).

Another example is Ouderkirk (2002) who argues that Katz's dualism results in an absurd position according to which "no human actions which influence nature are morally permissible" (Ouderkirk 2002, p.130) and therefore it is:

> … difficult to see how we and the natural world form a moral community. If the activity of one major constituent of a community is by definition negative and destructive of community value, there can be no inclusive community. Rather, there is an opposition. (Ouderkirk 2002, p.130)

Similarly, Hettinger (2002) claims that Katz's view results in a form of "human/nature apartheid" (Hettinger 2002, p.121), arguing that:

> Katz's suggestion that nature's autonomy consists in its self-unfolding totally separate from any human involvement severely limits the possibility of a positive role for humans in the natural world. (Hettinger 2002, p.121)

What these objections point to is how the dualistic features I have identified within the non-interventionist conception of the artificial/natural categories has led to the conceptual impossibility of beneficial human interventions in nature. Human interests are cast as intrinsically opposed to the value of nature, meaning that the best conservationists can hope for is to protect sites from being shaped by such human interests. This disguises the reality of a diversity of human values and interests, some of which might overlap with the interests of natural entities and conflict with one another; as well as the heterogeneity of non-human interests which can also overlap or conflict with one another. Given this diversity of values, the value of an ecosystem's independence from human purpose and intention (V1) becomes just one among many values which we might want to consider in determining conservation aims, rather than constituting *the* objective value of nature.

§3.3 Dualism and Historical Continuity

Historical continuity is sometimes cast as a less dualistic approach than non-interventionism, offering as it does the possibility of beneficial human interactions with nature in the restoration of historical continuity to ecosystems. For example, Hettinger, in making his objections against Katz, states:

> A nonanthropocentric outlook seeks to cultivate the human purpose of healing our relationship with nature and living in partnership with it. One way to begin this healing process is to practice appropriate nature restoration. (Hettinger 2002, p.117)

Whilst I broadly agree with Hettinger's point here, I think it is important to focus in on his qualification, '*appropriate'.* We may think that certain instances and types of restoration are not appropriate. For example, if restoring a historical state requires particularly extensive manipulation and technological intervention, as would be the case for some novel ecosystems which are difficult or even impossible to revert to a fully natural state. Furthermore, aiming to restore naturalness understood as historical continuity can result in unjust social consequences if the adherence to pre-disturbance baselines results in the erasure of traditional ways of life and even the forced removal of Indigenous Peoples from their lands.

I argue that such 'inappropriate' uses of the naturalness concept to guide conservation aims are the result of a strict adherence to the value-claim V2 which replicates the structure of 'reversed dualism' and its problematic features. V2 and the conception of naturalness as historical continuity which it supports exhibit the five features of dualism described by Plumwood in the following ways:

1. Backgrounding: - By focusing on the value of continuity with the pre-disturbance past, V2 backgrounds the many human-disturbed novel ecosystems as potential sources of value. Novel ecosystems have passed critical thresholds making anthropogenic changes to them irreversible (in a broad sense which includes

economic and social as well as ecological barriers) (Perring and Ellis 2013, p.67). Such novel ecosystems have been shown to cover “between 28% and 36% of ice-free land surface” and to have had a “long-term” presence in many areas (Perring and Ellis 2013, p.78). As such, understanding the aim of conservation in terms of the historical conception of naturalness constitutes the neglect and backgrounding of a sizable proportion of the earth’s ecosystems. Additionally, given the long-term presence of novel ecosystems, this conception is liable to background the human agency of Indigenous Peoples in shaping and maintaining many of the ecosystems we think of as natural in this historical sense.

2. Hyperseparation: - The historical conception of naturalness depends on the establishment of a radical separation and discontinuity between ‘pristine’ historically faithful ecosystems and novel human-influenced ecosystems. While ‘pristine’ ecosystems are thought of as ‘balanced’ and ‘stable’ through the result of extended periods of co-evolution, novel ecosystems are thought of as random and unstable assemblages of species, lacking in cohesive community structure. This hides the fact that many ‘pristine’ ecosystems have been subjected to continuous disturbances and cycling of species composition over the course of their natural history - nature generally doesn’t exist in a static and stable state but is characterized by disturbance and chaos. As such, novel ecosystems aren’t radically discontinuous with more historically faithful ecosystems – human influence is just another disturbance not fundamentally different in kind from others which all ecosystems have faced. Furthermore, there is a literal continuity between novel ecosystems and natural ecosystems which of course are contiguous and interdependent with one another.

The possibility of maintaining and restoring natural ecosystems depends on how we act within human-dominated ecosystems and landscapes. This is especially true given the accelerating pace of global heating. There is therefore no great discontinuity or separation between historically faithful 'pristine' ecosystems and novel ecosystems. However, the differences that do exist must be emphasized through hyperseparation in order to justify the ethical significance that is attributed to the opposition by the value claim V2.

3. Incorporation: - According to V2, natural value is derived from continuity with the past prior to significant *human* disturbance. As such, the natural is still defined in terms of its opposition to human influence and activity in ecosystems, rather than as an independent presence and agency in and of itself.

4. Instrumentalism: - According to V2, intrinsic natural value derives from the historical continuity of ecosystems, while novel human-influenced ecosystems are seen as only capable of possessing instrumental value. We can see here how the value-claim of 'classic' human/nature dualism is 'reversed' by assigning intrinsic value to the nature poll of the dualistic pair. However, this reversed value claim still retains the dualistic features of the concepts themselves (see 1,2,3 and 5).

5. Homogenization: - V2 homogenizes all novel ecosystems and so has no way to distinguish between novel ecosystems that are thriving and those that are disintegrating. Since all such ecosystems are discontinuous with their pre-disturbance past, they are all thought of as homogenously unnatural and lacking in

> the intrinsic value of natural historically faithful ecosystems. Additionally, natural ecosystems are homogenized with regards to the extent to which they require human intervention for their restoration and maintenance – so long as the historical state is maintained then natural value is warranted regardless of the magnitude of technological intervention required. Recall our example of Pleistocene rewilding and woolly mammoth de-extinction. A great deal of technological human intervention is required in this example for the creation of a 'natural ecosystem', yet according to V2 there is no evaluative differentiation between this and a historically faithful ecosystem which does not require, or requires much less, human intervention for its creation and maintenance.

These five features result in an exclusive reverence for 'pristine' ecosystems at the cost of discounting the potential value and importance of human-influenced and novel ecosystems. Such dualistic structuring works to justify extensive human intervention in and control of ecosystems in order to restore and maintain an ideal 'pristine' historically continuous state. In many cases however, despite the huge quantities of resources invested, ecosystems themselves resist attempts to restore their natural conditions. Take for example Pearce's (2015) reflections on attempts to restore the historical species composition of the Galapagos Islands by controlling the many invasives which have been introduced since Europeans arrived in the seventeenth century. The Galapagos contains many distinctive endemic species, however it is also host to a vast array on introduced species, consisting of "more than five hundred… introduced plant species—almost as many as there are native plants—along with five hundred invertebrates and thirty-six vertebrates" (Pearce 2015, p.234). As Pearce writes,

> In 2000, a ten-year project, funded with $19 million from the World Bank's Global Environment Facility, set a goal of the "total control of invasive species" on Galapagos... Altogether there were forty-three projects targeting thirty-five species of invasive plants, animals, and invertebrates. But a decade later, just nine of the projects had achieved their targets. Restoration of native plant cover had been achieved on less than five hundred acres... And even those successes were "not stable" and would "require continued high-level intervention" to keep the invaders from returning. (Pearce 2015, p.234)

Given these difficulties in restoring the Galapagos to a natural state, Pearce claims that conservationists had to "haul up the white flag" (Pearce 2015, p.233) as far as invasive species are concerned. Interestingly however, according to Pearce, "despite the invasions, the Galapagos Islands have lost very few species" (Pearce 2015, p.234) and as such conservationists are realising that although historical continuity is unachievable, we may still come to "an accommodation with the aliens by working out how they might fit in while still protecting what is most worthwhile about the old guard" (Pearce 2015, p.234).

This more balanced approach however is prohibited by a strict adherence to V2 which, because of it dualistic features, makes no room for compromise. In this way, the historical conception of naturalness can therefore be seen to further enshrine a relationship of domination rather than partnership between humans and nature – humans must take on an increasingly managerial role, constantly tinkering to ensure ecosystems retain their

historical characteristics, inevitably fighting a losing battle to stabilise what is in fact a chaotic and changing planet.

Furthermore, the dualistic structuring of the historical conception of naturalness and its underlying value claim V2 has also led conservationists to neglect the importance of the cultural contributions of Indigenous Peoples to many supposedly 'natural' historical ecosystems and landscapes. In the context of lands that were colonised by Europeans, the use of pre-settlement baselines as a reference point for the 'natural' state of an ecosystem clearly hides the fact that such ecosystems were in fact significantly shaped by human cultural forces prior to European settlement. The use of pre-colonisation baselines in these contexts therefore carries a problematic corollary that the management practices of Indigenous Peoples were in some sense 'natural', thereby erasing their cultural agency and reinforcing a deeply troubling dualism between 'civilised' and 'primitive' people. However, the use of older pre-human baselines is in danger of ruling out the possibility of beneficial cultural contributions to ecosystems at all and therefore of leading to the cessation of traditional management techniques and ways of life and even the eviction of local and Indigenous people whose presence doesn't conform to the ideal of a 'pristine' pre-human ecosystem.

The combined awareness of the scale of human-influenced novel ecosystems as well as the fact that many of the historical ecosystems we think of as natural were in fact partly-produced by human cultural forces should force us to rethink the appropriateness of basing conservation aims in a value-claim like V2. As Perring and Ellis state:

> Such awareness of the broad spatial distribution and long temporal presence of these human-created and altered systems questions current conservation and restoration norms of bemoaning the loss of wilderness and returning to some historical baseline of a state 'unaltered by humans'. Over large parts of the globe, the 'wilderness' that people refer back to never existed; setting a historical baseline is therefore problematic… As the desired results of nature conservation and management will depend on the goals and aspirations of the managers and the context within which they operate, accepting a permanent role for humans as stewards of the biosphere opens up possibilities for adaptive management of novel ecosystems based on more flexible interpretations of historical reference. (Perring and Ellis 2013, p.78)

§4 Should Conservation Abandon The 'Naturalness' Concept?

The implicit dualism of the naturalness concept established in sections §3.3 and §3.4 should lead us to question whether it can act as an appropriate and useful source of normativity for determining conservation aims. Both non-interventionist and historical interpretations of the concept rest upon value-claims which exhibit the features of backgrounding, hyperseparation, incorporation, instrumentalism and homogenization, which are characteristic of dualistic conceptual structuring. Because of this, basing conservation norms in the naturalness concept is in danger of further entrenching the attitudes of othering and domination which result from such dualistic thinking.

Some philosophers have argued along these lines, claiming that the dualistic conceptual structure of the nature and naturalness concepts mean that they should be abandoned as the normative focus of conservation and the green movement generally. For example, Plumwood cites Haraway as arguing that "nature is now old hat, that we have moved past the time when the concept is useful" (Plumwood 2005, p,34 citing Haraway 1997). A more recent example of such postnaturalism is Morton (2007, 2018) who argues for an "ecology without nature" (Morton 2007). Morton has argued that what we think of as natural is actually a cultural construction born out of what he terms 'agrilogistics' - the agricultural model of human society that has been the basis of civilization for the last twelve-thousand or so years and has coincided with the gradual and stable warming of the Holocene:

> A 12,500-year-long social, philosophical and psychic logistics is now showing its colours and they are disastrous. And for the longest time these logistics were called Nature. Nature is just agricultural logistics in slow motion, the nice-seeming build up to the Anthropocene, the gentle slope of the upwardly moving rollercoaster that you didn't even expect to be a rollercoaster. (Morton 2018, p.65)

For Morton, nature is a concept that has been constructed to denote the necessary stable background to the development of modern human civilisation. The concept is therefore 'backgrounded' and 'homogenized' by its very essence. According to Morton, this understanding of nature as the inert stage on which human culture plays out lies at the root of our ecological crisis and as such utilising such a concept to ground the normative assertions of conservation can only act to further entrench the conceptual roots of the

current crisis. Morton therefore argues that in order to understand and begin to work towards solutions for our ecological crises we must leave behind this nature concept and the dualistic value-system which is represents:

> Thinking in an ecological way means letting go of this idea of nature – it sounds incredible but only because we're so habituated to certain ways of accessing and executing and otherwise 'interpreting' things such as lakes, trees, cows, snow, sunshine and wheat. (Morton 2018, p.27)

Such a nature-critical stance has also been adopted in a different form by proponents of the 'New Conservation' movement (Marris 2011, Kareiva and Marvier 2012). Keulartz (2016) describes how 'new conservation' has:

> abandoned history altogether, shifting the focus from the past to the future, and from 'restoration ecology' to 'intervention ecology', under the invocation of the emerging Anthropocene, the 'age of man'. (Keulartz 2016, p.3)

In an attempt to overcome human/nature dualism, new conservationists embrace human control of nature, seeing the anthropocene as an opportunity for humanity to consciously take the reins and fully utilise our technological capacity to manipulate ecosystems. Such an approach is of course anathema to both non-interventionist and historical conceptions of naturalness as the aim of conservation. New conservationists reject the need for strict adherence to historical baselines and assert the value of novel ecosystems, as well as encouraging active intervention and management rather than the passive strategies of non-

interventionism. Rather than seeing conservation as aiming to protect and restore nature or natural systems, new conservationists aim to manage ecosystems to promote their instrumental benefits to human beings or what has been termed 'ecosystem services'. According to Marvier et al. (2012), in order to reorient the aims of conservation in such a way:

> … conservation cannot promise a return to pristine, prehuman landscapes. Humankind has already profoundly transformed the planet and will continue to do so… conservationists will have to jettison their idealized notions of nature, parks, and wilderness -- ideas that have never been supported by good conservation science -- and forge a more optimistic, human-friendly vision. (Marvier et al. 2012)

However, this explicitly anthropocentric vision of new conservation means it is in danger of embracing the very dualism between humans and nature that it sought to overcome. In criticising the 'reversed' dualism of the naturalness concept for its reverence for the 'pristine' and the 'wild', new conservationism has the propensity to revert back to a 'classic' human/nature dualism in which humanity stands outside of nature, intervening in and controlling a separate lower realm which is malleable to humanity's mastery. This sort of attitude is expressed by Ellis (2011) when, speaking of the Anthropocene, he writes:

> This is an amazing opportunity -- humanity has now made the leap to an entirely new level of planetary importance. As Stewart Brand said in 1968: 'We are as gods and might as well get good at it'. (Ellis 2011)

For new conservationists like Ellis and Marvier, 'embracing the Anthropocene' essentially equates to accepting human supremacy and its underlying dualistic philosophy - not a rejection of dualism. Although correct to recognise the value of novel ecosystems and ecosystems that have undergone active intervention which were backgrounded by historical and non-interventionist conceptions of naturalness, new conservation denies naturalness any significant role in informing conservation aims and in doing so is liable to background the agency of nature as a partner in conservation efforts and focus only on the ability and agency of humanity to shape conservation outcomes.

Whilst much of the critique of our concepts of nature and natural posed by nature-critical philosophers and conservationists may be justified then, I am less inclined to think that conservation can simply dispense with historical and non-interventionist conceptions of naturalness entirely. Abandoning naturalness as a focus and aim of conservation is in danger of further entrenching anthropocentric attitudes, giving humanity carte blanche to shape and control ecosystems as they wish without the ecological and conceptual restraints imposed by the naturalness concept. At a time where humanity is already shaping such a large proportion of the planet and pushing so many ecological limits, one must wonder if completely abandoning our concept of nature is really the best strategy. Plumwood agrees:

'Without some distinction between nature and culture, or between humans and nature, it becomes very difficult to present any defense against the total humanization of the world.' (Plumwood 1998, p.676)

§5. Reconceiving 'Naturalness'

Rather than abandoning naturalness as a conservation aim entirely, I argue that conservation needs to rethink the concept. This must begin by making explicit the dualistic value claims which underlie the concept as it has been understood up till now and subjecting them to critique, as I have done above. Conservationists and philosophers should then work towards a less dualistic evaluative basis for the naturalness concept in its use as a conservation aim. I suggest that a good place to start is with the concept of autonomy. Rather than defining naturalness as a negative concept, through its relation to humanity (in terms of the absence of human intention or the continuity of ecosystems with the past prior to significant human disturbance), naturalness might be conceived in a more positive and substantive way as the autonomy of ecosystems.

Autonomy can act as a useful counterpoint to both non-intervention and historical continuity since it calls on elements of each whilst able to temper their more extreme dualistic tendencies. In relation to non-intervention, the autonomy of an entity doesn't demand total non-intervention, rather it requires interaction with an entity in a way that respects and encourages its distinctive characteristics and identity. When we think of the autonomy of a patient in a healthcare context or a student in an education context, we of course don't see this as demanding total non-intervention, rather respecting autonomy demands a balanced approach between intervening when necessary whilst allowing a subject to develop according to their own trajectory. When a patient presents a broken arm to a doctor, the doctor doesn't just do nothing (non-intervention) rather they apply a cast which allows the arm to heal itself, restoring the patient's autonomy to pursue their own

distinctive trajectory and identity. However, autonomy still places some restraints on what a doctor can do - if the doctor at the same time as fitting the cast unknowingly gave the patient plastic surgery to create the 'ideal' arm, or following the fitting of the cast decided to micromanage the life of the patient to minimize the risk of future arm-breaking - this would be a contravention of the patient's autonomy.

Similarly in a conservation context, the aim of conserving and restoring naturalness can be understood through the prism of autonomy. Valuing the autonomy of an ecosystem shouldn't mean a policy of complete non-intervention. Some invasive species may need to be controlled or native species reintroduced for example, to allow for the ecosystem to regain its distinctive natural characteristics and identity. At the same time, aiming for naturalness understood as autonomy does place some limits on what interventions may be carried out – interventions should be aimed at reducing the need for repeated future interventions and must be tied to the specific characteristics and identity of the system concerned, we shouldn't be able to design ecosystems completely at will and still call them natural.

In order to respect the autonomy of a particular ecosystem therefore, we have to understand how it functions and know what is needed in terms of human activity to preserve this function. Jordan (2005) gives the example of a tallgrass prairie stating:

> Thus it turns out the best way to respect the autonomy of a tallgrass prairie is to burn it at irregular intervals, and this is a lesson we owe in large part to the work of restorationists. (Jordan 2005, p.199)

This is where ‘historical continuity’ comes in, in relation to which autonomy again presents a more balanced approach. In aiming for naturalness understood as autonomy, history must still play an important role. Although history can’t act as a precise template for how ecosystems should be, it none the less provides essential insights into the different potential trajectories a system might take, as well as the processes which have shaped the system’s distinctive characteristics and identity which we wish to maintain if the system is to retain its autonomy. At the same time, autonomy doesn’t demand complete historical fidelity and is able to accept some level of change and novelty whilst still recognising the naturalness of a system - ecosystems possess their own inherent agency in responding to human influence, rather than just being passively shaped by human influence. Valuing autonomy therefore encourages this agency rather than suppressing it through over-management and control in pursuit of a ‘pristine’ state.

This more balanced approach to historical continuity is expressed in some recent work published by restorationists. For example, Higgs et al. (2014) argue for the need to reform restorationist thinking, shifting to what the authors call ‘Restoration V2.0’ which:

> engages historical knowledge as a guide rather than a template, identifies multiple ecological trajectories, recognizes that ecological processes may take priority over structure and composition, and acknowledges that pragmatic approaches are required to address human livelihoods and cultural needs. (Higgs et al. 2014, p.500)

Each of these shifts can be seen as representing a move away from the dualistic ideal of a strict commitment to historical continuity to the more balanced approach I have been describing as the value of autonomy. For Higgs, history should act as a guide rather than a template thereby recognising that there are several possible trajectories that may be considered natural, history can help us to understand these different trajectories however it can't provide us with a single objective reference point which management must aim towards. So, although history "does not bind the restorationist to a particular course of action" (Higgs 2014, p.501), it remains vital in explaining "the distinctive characteristics of a place" and indicating "constraints or challenges in shaping the ecosystem in the future" (Higgs 2014, p.502). As such, an understanding of the history of an ecosystem is vital if we are to restore it to a more natural state, however this doesn't mean restoration should have to aim to create 'pristine' historical ecosystems.

Aiming for naturalness, so understood, should involve a balance between maintaining an ecosystem's distinctive characteristics and identity whilst not engaging in over-management and unnecessary interventions which suffocate natural processes in pursuit of a completely 'pristine' state. I suggest that such a role for the naturalness concept is best supported by the underlying value of 'autonomy'. Therefore I think that a reworked conception of naturalness as a conservation aim should reject 'V1' and 'V2' in favour of the following value- claim:

V3: Natural value derives from the autonomy of ecosystems

V3 represents a less dualistic alternative to both V1 and V2 allowing for a conception of naturalness as a conservation aim which doesn't depend on dualistic conceptual structuring. This conception of naturalness can still act a useful ethical restraint on the extent to which intervention is desirable without demanding a policy of total non-intervention, as well as reinforcing the importance of history without demanding a complete dismissal of novelty.

§6. Naturalness and Objectivity

It should be clear from what I've written that the naturalness concept can't act as an objective and singular normative foundation for conservation. The meaning and implications of naturalness in its use as a conservation aim are heavily dependent upon prior value-judgements regarding what constitutes natural value. As I argued in section §2., one interpretation of naturalness depends on a conception of natural value which focuses on the absence of human intention and control over ecosystems, while another interpretation depends upon a recognition of the value of continuity with the past prior to significant human disturbance. These different values often come into conflict with one another, leading to opposing conceptions of naturalness as a conservation aim. As such, what is considered natural and what precisely it entails when we aim to manage ecosystems for a more natural state, is not given by the way the world is, or mind-independent, but is in fact entangled with our values and cultural perspective.

In this chapter, I have given three different broad underlying value-claims which may be endorsed when naturalness is aimed for in conservation – V1, V2 and V3. However, even

agreement on any one of these broad value claims doesn't guarantee a lack of conflict when employing the naturalness concept, since each is subject to further interpretation according to more fine-grained levels of value. For example, there may be broad agreement on the value of historical continuity yet conflicting views over the precise nature of the historical reference point that is to be used. No single value can lay claim to be *the* objective value of nature, as for example Katz argued in the case of the value of the absence of human intervention; each value-claim must be considered alongside others and subjected to critique. Much of the current problem regarding the use of the naturalness concept in conservation discourse is that the values that are expressed by the concept are rarely made explicit and it is therefore used as if it referred to a completely 'objective' or 'mind-independent' property of the world, rather than the normatively contentious concept that it is.

In the final chapter of this thesis, I will go into much greater detail about what objectivity might mean in the context of such normative concepts and how discourse about the aims of conservation can be made more objective and legitimate. However, here I simply want to make it clear that pointing out the value-ladenness of the naturalness concept as a conservation aim shouldn't necessarily undermine the legitimate use of the concept. As I will show in subsequent chapters on biodiversity and ecosystem health, scientific concepts for expressing conservation aims are always value-laden. What is vital therefore in terms of their objectivity and legitimacy is making these values explicit and deliberating between them through fair and inclusive procedures (I will argue this point in greater depth in Chapter 5). Within such deliberations regarding a given conservation project, some of the value-claims underlying the naturalness concept may also act as

important restraints on the extent to which we should pursue the value that is encapsulated by other normative concepts such as biodiversity or ecosystem health; alternatively we may find that the value-claims underlying biodiversity are sufficient to outweigh the values encapsulated by naturalness. In any case, I will argue that such decisions regarding the aims of conservation have an irreducibly normative or evaluative element and so shouldn't be settled through purely empirical and scientific methods.

§7. Conclusion

In conclusion, I considered two of the most popular interpretations of naturalness in its use as a conservation aim – 'non-intervention' and 'historical continuity'. I argued that each of these interpretations are underpinned by differing value-claims leading to conflicting implications when employing the naturalness concept as a conservation aim. I therefore claimed that naturalness is a value-laden concept, the meaning of which depends upon prior evaluative judgement regarding what constitutes natural value. I then went on to argue that the value-claims which underlie the two conceptions of naturalness I considered can only be justified in the context of human/nature dualism. I gave an account of Plumwood's five features of dualistic conceptual structuring and showed how conceptions of naturalness as both non-intervention and historical continuity exhibit these features and are expressions of what Plumwood calls 'reversed dualism'. I argued that the reliance of these conceptions of naturalness and their underlying value claims on reversed dualism mean that we must reconsider them as appropriate evaluative bases for the aim of conservation. Rather than abandoning the naturalness concept entirely however, I argue that we can reorient the concept around the notion of autonomy, which can act as a less

dualistic value upon which to found naturalness as conservation aim. Finally, I ended the chapter with some preliminary remarks about what the value-ladenness of the naturalness concept means for its objectivity, a topic I will come back to later in the thesis. For now, it sufficed to say that the value-ladenness of the concept should not undermine its use as a conservation aim.

Chapter 3

The Role of Value in Constructing Ecosystem Health

In this chapter, I will consider the role of value in ascribing health and degradation states to ecosystems. I will begin in section §1 by briefly outlining the origins of the ecosystem health concept, as well as the reasons why the ecosystem health continues to be a useful normative framework for making conservation decisions. In section §2, I will provide two cases of ecosystem health and degradation ascriptions in a U.K. context, one case in which there is broad consensus and another in which the ascription is disputed, these cases will prove helpful in illustrating the argumentation of subsequent sections. In section §3, I will provide some broader context on the debate in the philosophy of medicine over health and disease ascriptions, providing brief explanations of the dialectic between 'naturalists' and 'normativists', as well as some concerns and clarifications related to this distinction. I will then, in section §4, look at the prospects for attempts to modify naturalist approaches to human and organismic health and disease to provide an account of the ascription of health and degradation to ecosystems. I consider what I take to be the two strongest such accounts, the 'Boorseian' account and the 'Organisational' account, however I will argue that both ultimately fail to ground ecosystem health and degradation ascriptions in purely naturalist value-free terms. I will therefore argue in section §5 for a normativist approach to ascriptions of health and degradation to ecosystems which involves explicit reference to the *value* of the functional and structural arrangement of an ecosystem.

§1. The Origins and Usefulness of The Ecosystem Health Concept

The concept of ecosystem health is often asserted to have originated in the 1980's and 90's with authors such as Rapport (1989) and Costanza (1997) who saw the need for a framework which can recognise the normative value to the structural and functional properties of ecological systems (Yang et al. 2019, Sfara and El-Hani 2023). Rapport, for example, argues that we can assess the health of ecosystems by identifying "systemic indicators of ecosystem functional and structural integrity" (Rapport 1989, p.122), while Costanza advocates a similar conception according to which a healthy system is able "to maintain its structure and function over time in the face of external stress" (Costanza 1997 p.240). Furthermore, these initial working definitions of ecosystem health have their deeper philosophical roots in Leopold's land ethic which emphasised respect for "the integrity, stability and beauty of the biotic community" (Leopold 1949) and as Callicott states, "extends the concept of health to land" (Callicott 1995, p.351).

However, it is important to supplement this fairly standard account of the origins of the ecosystem health concept with the fact of an extensive history of Indigenous application of health and disease concepts beyond the individual organism to broader socio-ecological systems. Indigenous worldviews and cosmologies are often described as regarding the ecosystems with which they interact and depend upon as kin which can be healthy or sick and whose health is intimately related to human health and well-being. For example, Kimmerer (2013) in her book *Braiding Sweetgrass* explains that:

> In the indigenous worldview, a healthy landscape is understood to be whole and generous enough to be able to sustain its partners. It engages land not as a machine but as a community of respected nonhuman persons to whom we humans have a responsibility. (Kimmerer 2013, p.407)

According to this view, the health of an ecosystem entails more than just functional and structural integrity but also the instantiation of reciprocal responsibilities and relationships between humans, non-human organisms and ecosystems. Accordingly, human health depends on and is interrelated with the health of ecological systems. This passage from a 1994 statement from the Indigenous Environmental Network also makes a similar point:

> Cultural survival depends on healthy land and a healthy, responsible relationship between humans and the land. (IEN Statement 1994, cited in Kimmerer 2013, p.405)

This statement again emphasizes the importance of the reciprocal responsibilities and mutually beneficial relationships between ecosystems and their human and non-human constituents which underpin Indigenous conceptions of ecological health.

Despite this long and diverse history of the use of the ecosystem health concept however, the concept has also faced a great deal of criticism by philosophers who argue that it is inappropriate to apply concepts meant for the level of individual organisms to the higher organisational level of ecological systems. These philosophers argue that the salient health-conducive properties possessed by organisms, such as unity, goal-directedness and being the units of natural selection and evolution, are lacking at the level of the ecosystem

and that therefore application of health and disease concepts to ecosystems is at best a loose metaphor and at worst a bad and misleading metaphor. For example, Calow (1992) argues that the differences between organisms and ecosystems means that the application of health to ecosystems involves “different principles” to its application to organisms, for which it is far more easily and objectively definable (Calow 1992, p.4). Other critics go further such as Lancaster (2000) who argues that ecosystem health is a “ridiculous” notion which should be “expunged from the vocabulary” (Lancaster 2000, p.214).

Regardless of these critics however, ecosystem health remains an important and highly prominent normative concept in conservation science and policy. Yang et al. (2019) in their review of ecosystem health research show that the number of publications on ecosystem health has increased rapidly since 2006, with over 350 publications on the topic in 2018 alone, and that therefore, “achieving a condition that can reflect a healthy ecosystem is an ongoing global priority for governments, scientists, and managers” (Yang et al. 2019, p. 4).

The growing use of the ecosystem health concept reflects the fact that there is a clear need for such a concept in current conservation discourse for a number of reasons. Firstly, it allows conservationists to assess the state of novel ecosystems in a way that doesn’t depend on their comparison with a natural or ‘pristine’ historical baseline which would make them degraded by definition. This is vital given the prevalence of such novel ecosystems which have been shown to cover “between 28% and 36% of ice-free land surface” (Perring and Ellis 2013, p.78), as well as the fact that climate change is making historical baselines increasingly inappropriate for determining how ecosystems should be,

with, for example, only 8% of protected areas expected to retain the same climactic conditions by 2100 (Loarie et al. 2009). The prevalence of novel ecosystems combined with the accelerating pace of climactic change means that conservationists require a forward-looking non-historical way of assessing the value of ecosystem states as well as determining the appropriateness of conservation interventions. The ecosystem health framework can provide this to conservationists since a healthy ecosystem need not be identical to how that ecosystem looked historically.

Secondly, by shifting emphasis from composition to function, ecosystem health can provide a strong normative basis for assessing the introduction of non-native proxy species to ecosystems, which has become an increasingly important conservation strategy. A proxy species is a species which is able to replicate important ecological functions which were lost when a native species or population became extinct. The introduction of proxy species has become an important tool for ecological restoration and rewilding where for example, a non-native herbivore species may be introduced to an ecosystem in order to replicate the ecological function of extinct herbivore populations in shaping plant succession and distribution through their grazing activities. An ecosystem health framework allows us to justify and assess the success of such proxy introductions in restoring healthy functioning to an ecosystem, whereas such introductions may be more difficult to justify through a naturalness framework.

Finally, ecosystem health forms a useful counterpoint to thinking of conservation as primarily concerned with saving species or biodiversity which is especially important in the consideration of unconventional conservation techniques such as assisted migration.

Assisted migration attempts to conserve unique species or populations in the face of climate change by translocating them to ecosystems where climactic conditions are more suitable. Take for example the whitebark pine which has been suggested as a strong candidate for assisted migration (Palmer and Larson 2014). The whitebark pine is widespread in the subalpine ecosystems of Western North America and considered a keystone species, however it faces a number of threats - disease and pests are currently the greatest concerns, however these threats will be exacerbated by climate change which in itself also presents a grave threat to the future of the species since the temperature range which is needed for the tree to flourish is moving rapidly northwards (Palmer and Larson 2014, p.5). One proposed solution is to assist the migration of the tree northwards by planting it in ecosystems which are beyond its historic range but will in fact become increasingly suitable as the climate warms. However, if this is to be done, a concept such as ecosystem health will be required in order to assess the impact of the migrant species on the new ecosystem in which it finds itself. The translocation of any species to a new ecosystem is liable to have effects on the structure and functioning of that system and as such, a normative concept is needed to assess whether such effects are in fact damaging to the ecosystem. The most suitable concept to play this role is ecosystem health.

For these reasons, it seems clear that ecosystem health will continue to play an important role as a normative framework for guiding conservation decisions. Accordingly, rather than engaging in debates with critics over whether health and disease concepts can or should be applied to ecosystems, or whether their application is metaphorical or literal, I will take the pragmatic stance that the usefulness of the ecosystem health framework merits its continued development and implementation. Instead therefore, I will focus on the

question of how ascriptions of health or ill-health to ecosystems can appropriately be made by conservationists - how should knowledge be generated regarding the health of an ecosystem? Which criteria should be used to ascribe ecosystem health, and who should have a say in deciding this criteria?

Answers to these questions can be broadly divided into what are termed naturalist value-free approaches and normativist value-laden approaches. I will go into more detail in §3 regarding these different approaches. First however, in the following section, I will introduce two cases from the U.K. context in which health and disease (or degradation as it is more commonly described in the ecosystemic context) ascriptions have been made regarding an ecosystem. One is an easy case in which there is broad consensus and one a difficult case which involves conflicting views over the health of the ecosystem.

§2. Conflict and Consensus Over Ascriptions of Ecosystem Health and Degradation

Ascriptions of health or degradation to ecosystems, as with humans, can be put on a scale from easy to difficult. In regards to human health, easy cases are those conditions about which everyone agrees on their health/disease status. Cancer and dementia, for example, are indisputably conditions which should be classified as diseases. ADHD, on the other hand, is more controversial. Some argue that ADHD is a disease while others argue that it should be understood as neurodiversity – people with ADHD may function differently from what is considered 'normal', but they are not necessarily diseased. Cooper (2002) gives

the additional example of sterility, which may be a disease in some cases when it is unwanted, however in other cases the individual may see the condition as unproblematic or even desirable. Whether sterility is a disease therefore seems to be case-dependent, making it another instance of difficult disease ascription.

Similarly in the case of ecosystems, some ecosystems are easily identifiable as healthy or degraded while in other more difficult cases there exists substantial disagreement over the extent to which a given ecosystem is healthy or degraded. Hobbs (2016) similarly remarks on this contrast between cases of consensus and cases of conflict:

> Some changes undoubtedly have negative impacts on ecosystem characteristics. Where these altered characteristics have clear effects on human society as a whole (for instance flood mitigation or fire risk), then it is clear that the system can be relatively unambiguously labelled as degraded... In other cases, however, the effects may be mixed or neutral, impacting characteristics that are valued by some members of human society but not by others, or altering the suite of characteristics in ways that subtract from some values but add to others... For some members of society, changes such as increased abundances of non-native species may be perceived as entirely negative. However, the same change may be perceived differently or even go unnoticed by other members of society. (Hobbs 2016, p.156)

Hobbs gives the example of Mt. Sutro in California where some local residents have argued against attempts to eradicate non-native eucalyptus plants from its forests despite

conservationist's insistence that eucalyptus is an invasive species which should be controlled or eradicated in order to restore health to the ecosystem (Hobbs 2016, p.156).

In this section, I will provide two cases of health and degradation ascriptions from a U.K. context, one easy case in which there exists broad consensus and one difficult case in which there is conflict over the ascription. These cases will help to clarify and support my subsequent argumentation regarding the role of value in ascribing states of ecosystem health and degradation.

§2.1 Easy case – The River Wye

Beginning with the easy case, take the eutrophication of the river Wye. Eutrophication is a process whereby nutrients such as phosphorus, orthophosphate, and nitrogen build up in a body of water causing changes to its ecology. In the river Wye, eutrophication has been increasing as the result of a variety of anthropogenic factors. Nutrient run-off, caused by a huge growth in the abundance of chicken farms in the catchment, combined with changes in land-usage from pasture grasslands and hedgerows to the production of arable crops such as maize which reduce the ability of soil to store water and nutrients, have led to a large increase in nutrient-availability in the river. This encourages the growth of algal blooms over the surface of the river, the prevalence of which have also been significantly increased by elevated temperatures resulting from climate change and reduced tree coverage on the river's banks. These algal blooms reduce the amount of sunlight available to macrophytes (aquatic plants) living in the river as well as smothering them and causing them to die, which, in turn, means less oxygen in the river as

bacteria break down the dead macrophytes. This decrease in oxygen availability, as well as the reduction in macrophytes which provide crucial habitat, interplay with elevated temperatures and have led to a decline in salmonid and trout populations, which is likely to subsequently have a negative impact on insect and bird populations (Environment Agency, 2022).

There is broad consensus amongst experts, policy makers and the public that such a condition constitutes the degradation and ill-health of the river Wye. This broad consensus is evidenced by the recent decision by Natural England to downgrade the "health" status of the river from "unfavourable-recovering" to the worst category, "unfavourable-declining" (Natural England 2023), a decision which was preceded by a huge public campaign by organisations such as 'Save The Wye Coalition' as well as a great deal of media attention including a notable documentary by journalist George Monbiot titled *Rivercide* which, as the title suggests, compares eutrophication to a disease which is leading to the death, or perhaps more accurately murder, of the river Wye. This consensus over the ill-health of the Wye ecosystem is accompanied by a consensus over what recovery towards a healthier state would look like and the indicators that can be used for its measurement. The Natural England report measures four "indicators" – "water quality", "Atlantic salmon", "native white clawed crayfish" and "macrophytes" (Natural England 2023). Everyone agrees that improved water quality, which means a decrease in the level of nutrients such as phosphates, and increasing populations of salmon, crayfish and macrophytes would constitute a healthier river. There is also a good chance that aspects of health that aren't measured directly by those indicators would at least be captured indirectly. Different groups

will likely have different standards for a truly healthy river, but there is at least broad consensus on the direction of travel towards a healthier river.

§2.2 Difficult case – The Uplands of Mid-Wales

Contrast this with the more difficult case of the uplands of mid-Wales and the controversies over the 'Summit to Sea' project which occurred there, which I briefly introduced in chapter 1 (§2). This project, which is set to manage 10,000 hectares of land in mid-Wales from Machynlleth to Llanidloes and Aberystwyth as well as 30,000 hectares of sea around Cardigan Bay, led to a conflict in which Rewilding Britain were forced to step down as partners of the project after provoking the contempt of local farming communities. Much of the controversy revolved around differing conceptions of the condition of upland ecosystems - essentially vast hilly plains of heather, blanket bogs and grass created through the impacts of grazing livestock over (at least) the last thousand or so years. While the landscape is appreciated by some for its rugged beauty as well as valued socially as a working landscape vital to the livelihoods and culture of local farming communities, many of those within Rewilding Britain see it as a degraded landscape, describing it as baron, desolate and 'sheep-wrecked'. These opposing views are described explicitly in the language of health by Monbiot, who is one of the founders of Rewilding Britain, when in his book *Feral*, he writes, "I do not see heather moor as an indicator of the health of the upland environment, as many do, but as a product of ecological destruction" (Monbiot 2014, p.68).

Although most stakeholders agree that an intensification of farming practices caused largely by market pressures for cheaper meat have led to worrying declines in the health of

the landscape, causing ecosystems to be degraded, they disagree on how a healthy upland ecosystem should look. Rewilding Britain ideally wanted to remove as many grazing animals as possible to allow for plant succession to go unchecked, leading ultimately to the afforestation of the ecosystem. On the other hand, locals and more moderate conservation organisations have argued for the use of less intensive farming practices, such as the seasonal cycling of grazing patterns, to restore the health of the traditional rural ecology of the moorland ecosystem. Ultimately, these represent two very different visions for the uplands of mid-Wales – the removal of grazing livestock and forest regeneration sought by Rewilding Britain is quite opposed to the seasonal reductions in grazing intensity and maintenance of a traditional rural moorland ecology envisioned by local people. In this case then, unlike the river Wye, there are conflicting views over what a healthy ecosystem would look like and the indicators that should be used to measure improvements or declines in ecosystem health.

Cases of conflict such as this raise an important set of questions – How can conflict over the ascription of health or degradation to ecosystems be resolved? Can there be a scientific resolution as to how, for example, a healthy Welsh upland ecosystem should look? To what extent is the health of an ecosystem a scientifically determinable, natural property of that ecosystem, or alternatively to what extent is ecosystemic health a value-laden construction? And how does this question weigh on the objectivity and validity of claims regarding ecosystem health? These are the questions with which the rest of this chapter will be occupied.

In attempting to answer these questions, it will be useful to first consider the ways in which philosophers of medicine have understood health and disease ascriptions in the more standard case of organisms, which have traditionally been divided into naturalist value-free approaches and normativist value-laden approaches. I will describe these in the following section §3.

§3. Health and Values

Accounts of human and organismic health and disease have traditionally been split into two contrasting camps: 'naturalism' and 'normativism'. Naturalists, it is claimed, are motivated by the conviction that health and disease are real natural classes that 'carve the world at the joints' without requiring evaluative judgements. As Conley and Glackin put it, naturalists claim that "the boundaries of the class of diseases map onto the contours and distinctions of natural science" (Conley and Glackin 2021, p.3). Ascriptions of health and disease should therefore be made by the application of some generalisable scientific criteria of health, which crucially must be describable without reference to normative value-laden concepts and language. Normativists on the other hand, think that ascriptions of health and disease don't constitute natural classes of conditions but rather are messy and vague categories which are best captured by social and evaluative criteria. As such, normativists argue that health and disease are value-laden and require explicitly evaluative criteria for their ascription. In order to flesh out this distinction further, sections §3.1 and §3.2 will give more detailed accounts of what may be taken as paradigmatic statements of naturalism and normativism.

§3.1 Naturalism

The paradigmatic naturalist view is stated by Boorse (1977) who argues that health can be understood as the absence of disease, and that disease can be analysed in a "value-neutral" way as "internal states that depress a functional ability below species-typical levels" (Boorse 1977, p.542). Health then, according to Boorse, is "normality of functioning, where the normality is statistical and the functions biological" (Boorse 1977, p.542).

The non-normative nature of this account depends on two crucial features: Firstly, a biological account of function which allows us to draw teleological conclusions about the goals of various sub-systems without having to draw on the specific values of the patient; and secondly, the ability to give a statistical and therefore value-free account of normality. With regards to function, Boorse conceives of function as causal contribution to a goal. He argues that the organism as a whole has the goal of survival and reproduction while different sub-systems of the organism have their own lower-level goals which function to contribute towards this higher-level goal of the whole organism. Importantly for Boorse, he thinks that we can understand this teleological notion of goal without any recourse to values by defining goal-directed systems as those that are, "disposed to adjust their behaviour to environmental change in ways appropriate to a constant result, the goal" (Boorse 1977, p.555-556). Boorse argues that this allows him to give an account of the functions of the various sub-systems of an organism without being concerned about the specific values and interests of an individual patient.

Boorse combines this biological account of function with a statistical account of normality which compares the functioning of the sub-system to a suitable 'reference class' consisting of organisms of the same species, sex, and age. This notion of statistical normality forms what Boorse calls the 'species design' – a statistical idealization which represents "the typical hierarchy of interlocking functional systems that supports the life of organisms of that type" (Boorse 1977, p.557). Health consists in conformity to this species design, while diseased organisms are those which possess a sub-system with lower than statistically average contribution to its goal when compared to organisms of the same species, sex, and age - and so do not conform to the 'species design'. Cooper (2002) gives the following illustrations in her summary of Boorse's view:

> Thus [for Boorse] amnesia is a disease because it is a dysfunction of the memory system. H.I.V. is a disease because it causes a dysfunction in the immune system. Eczema makes the skin marginally more permeable to pathogens. (Cooper 2002, p.264)

In each case here the disease is understood as statistically lower than average contribution of a sub-system to its goal – the goal of the memory system is to remember information and since in cases of amnesia the patient's memory system contributes to that goal far less than the statistically average level for people of the same sex and age, we can say that this patient has a disease. Boorse argues that this ascription of disease would be both value-free and objective since we do not need to make any value-judgements to see this person as diseased, the facts alone regarding the typical biology of a person of this sex and age suffice.

§3.2 Normativism

There are a number of different normativist accounts available, however I will here give a brief sketch of Rachel Cooper's (2002) account as a paradigmatic statement of normativism. For our purposes here, we may accept Boorse's claim that health is simply the absence of disease, making the pertinent question to be one of defining disease. Cooper argues that a condition's being a biological dysfunction is neither necessary nor sufficient for it being a disease – some dysfunctions are not necessarily diseases, for example sterility may in fact be desirable and actively chosen on the part of some individuals; while some diseases are in fact not dysfunctional, for example anxiety may have played an important evolutionary function in terms of group survival, despite it still typically being considered a disease (Cooper 2002, p.270-271).

Cooper believes that it is not possible to provide a "neat" biological account of disease since the concept does not correspond to any "natural class of conditions in the world" (Cooper 2002, p.271). She therefore offers three social-normative criteria for a condition to be a disease: 1) it must be a bad thing to have; 2) we should consider the afflicted person to be unlucky; 3) it must be potentially medically treatable (Cooper 2002, p.271).

Of these three conditions, the first is most salient in its clear and direct reference to normativity. This condition is required, Cooper argues, in order to distinguish the diseased from the biologically different. The classic example here is homosexuality, which although feasibly understood as a 'statistically abnormal' condition of the subsystem constituting an

individual's sexuality, is of course rightly considered as a mere difference rather than a disease.

How then should it be determined whether a condition is bad for an individual patient? Cooper thinks it appropriate to put answers to this question on a scale – on one end lie 'subjectivist' methods that rely on asking people what they think is good for them; and at the other end of the scale lie 'objectivist' methods that claim that something is good for an individual if it helps that individual to meet some ideal standard of flourishing. In between these two extremes lie methods that claim that something is good for an individual if that individual would judge it to be good in ideal circumstances (Cooper 2002, p.273).

The problem with the subjectivist method Cooper argues is that often people's own preferences are clearly wrong regarding what is good for them as well as being easily swayed by manipulation and cultural biases. However, the opposite end of the spectrum seems "disturbingly anti-naturalistic"[3] according to Cooper (Cooper 2002, p.273). It is not clear how these ideal standards of human flourishing are fixed or how we could know about them. Regardless of which answer is given to the question of how to decide if a condition is bad for an individual, Cooper thinks it is certainly the case that it will be possible for one and the same condition to be a bad thing for one person but a good thing for another since "people have different aims, different abilities and different preferences" (Cooper 2002,

[3] It seems Cooper means "naturalistic" in the general ontological sense here of the claim that "reality involves nothing more than the entities studied in the natural sciences and contains no supernatural or transcendent realm" (Papineau 2009, p.2), rather than the more specific naturalism in philosophy of medicine that we have been discussing. The distinction between these two types of 'naturalism' is pointed to in Conley and Glackin (2021, p.4)

p.274). Cooper sums up this view with an analogy (which seems particularly pertinent to the topic of this thesis):

> We should think about diseases in a way analogous to the way in which we think about weeds. A plant is only a weed if it is not wanted. Thus a daisy can be a weed in one garden but a flower in another, depending on whether or not it is a good thing in a particular garden. (Cooper 2002, p.274)

§3.3 Issues With The Naturalist/Normativist Distinction

Recent contributions to the philosophy of medicine have been increasingly critical of the naturalist/normativist distinction as obscuring and polarizing the debate over the relationship between values and health (Broadbent 2019, Conley and Glackin 2021). Firstly, as Conley and Glackin point out, the primary positions in the current debate over health and disease are best described as 'hybrid views', with Wakefield's (1992) 'harmful dysfunction theory' combining a biological and normative criteria to produce his account, and Boorse's theory also adding a 'harmfulness' criteria to his naturalistic conception of disease to define 'illness', (although Boorse maintains his account is purely naturalistic) (Conley and Glackin 2021, p.3). For this reason, it may be better to think of the naturalism/normativism distinction as more of a scale rather than two strictly contrasting camps.

A second issue pointed to by Conley and Glackin is the idea that the 'value-freedom' of health and disease hinges on their susceptibility to purely 'scientific' or 'biological' analysis. This assumes that natural science is itself value-free, which as Conley and Glackin

state, “will raise eyebrows amongst most philosophers of science” (Conley and Glackin 2021, p.3). The reason for this is that the value-free ideal (VFI) of scientific justification has faced substantial criticisms over several decades within the philosophy of science (Longino 2004, Latour 2004, Ludwig 2015, Harding 2015). As such, it would seem that naturalism regarding health, so stated, depends upon the truth of the VFI which has been heavily disputed.

However, it seems that the disagreement between naturalists and normativists regarding health and disease should be over something more than just a dispute regarding the value-laden nature of scientific inquiry, otherwise why should there be a separate debate in the philosophy of medicine at all? I think this is because not only are normativists claiming that health is value-laden in the way that all scientific concepts have been thought of as value-laden by the critics of the VFI, but also in an additional and more pervasive way whereby the concepts themselves are irreducibly evaluative, understood as ‘thick’ or ‘mixed’ concepts (Putnam 2003, Alexandrova 2018) which entangle factual and normative elements. Such concepts depend upon a prior value-judgement for their meaning and so can’t be captured by scientific language alone. As such, the naturalist may be able to accept some level of value-ladenness in their account of scientific inquiry whilst still disagreeing with the normativist on this stronger claim, insisting that health and disease are best defined in purely scientific, non-normative terminology - thereby retaining a substantial and distinctive disagreement with the normativist.

A further issue is the confusing nature of the naturalist and normativist terminology, particularly the term ‘naturalism’, which has many philosophical meanings which interplay with each other on the issue of health in nuanced ways. As Conley and Glackin write:

> …there are, after all, moral naturalists. Aristotelian naturalists, for instance, hold both that judgements of health or disease concern objective biological facts about species-teleological functioning and that, just as such, they are inherently evaluative. (Conley and Glackin 2021, p.3)

Furthermore, Conley and Glackin also point out that the value-ladenness of health and disease is in fact consistent with naturalism “in the important sense” (Conley and Glackin 2021, p.4) – which they take to be constituted by the more common philosophical usage of the term which claims, “reality is constituted entirely by the entities postulated by natural science and there is no transcendent realm” (Conley and Glackin 2021, p.4). As such, Conley and Glackin argue, the dependence of health ascriptions on evaluative judgement entails nothing “ontologically or methodologically problematic, naturalistically speaking” (Conley and Glackin 2021, p.17).

A final and important issue pointed to by Broadbent (2019) is that the distinction between naturalism and normativism disguises the reality of two separate dimensions of debate – value-ladenness and objectivity. It has been traditionally assumed that value-free accounts will necessarily be objective and value-laden accounts subjective. Take this quote from Boorse:

> If diseases are deviations from the species biological design, their recognition is a matter of natural science, not evaluative decision. (Boorse 1977, p.453)

Here Boorse clearly ties together the two dimensions – if disease constitutes an objective natural class of conditions then its recognition is a matter of purely scientific or biological analysis rather than requiring any inherently evaluative judgements. Broadbent however argues against this common assumption of a logical connection between the value-ladenness and objectivity of health and disease ascriptions and as such, opens up the possibility for cross-over positions. For example, Broadbent states:

> One might hold a species of moral realism according to which moral facts have a character that means they cannot be discovered by empirical inquiry, but, nevertheless, that they are objective facts. (Broadbent 2019, p.614)

Such an ethical view would produce a position according to which health and disease are both value-laden and objective. Broadbent attributes such a view to Stempsey (2000) who defends a position called 'value-dependent realism' which holds that "medical facts, even though they are built upon values, reflect an objective reality" (Stempsey 2000, p.34). Even the coherence of such a view indicates the lack of a logical entailment between value-ladenness and subjectivity. In fact, as I shall argue in section §5.1, one need not even be a moral realist to endorse such a combination of value-ladenness and objectivity, at least on some feasible understandings of objectivity. Furthermore, Broadbent's own position combines value-freedom with subjectivity, arguing that health is a 'secondary property',

meaning that ascriptions of health are dependent on subjective judgements but these judgements are not evaluative in nature.

Broadbent's view therefore results in a conceptual space which can be mapped by the following graph:

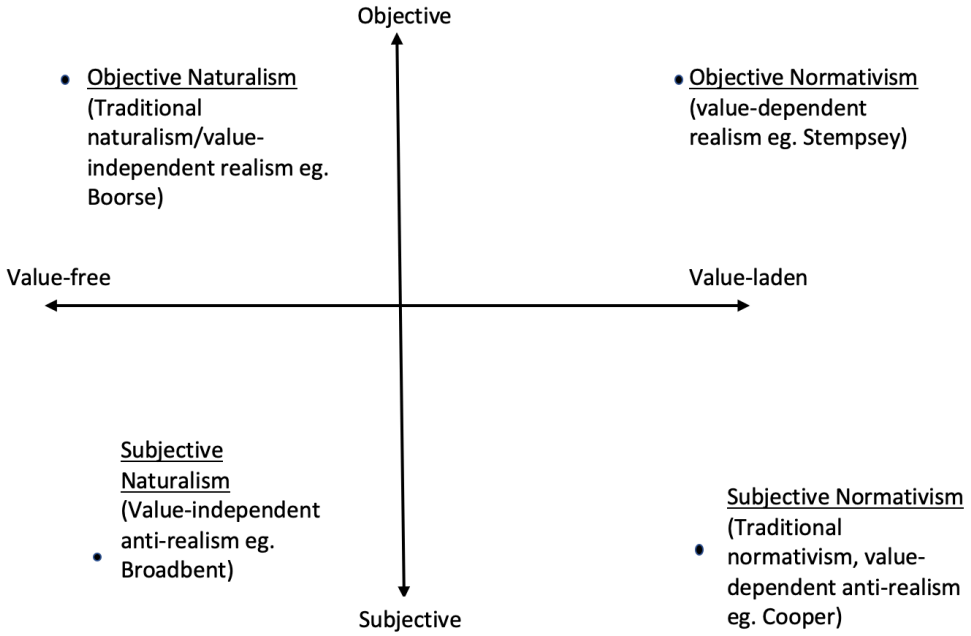


Fig 2. Map of the conceptual terrain in the debate between naturalists and normativists taking into account Broadbent's analysis.

Despite the issues with the naturalist/normativist distinction and terminology, I think they can still be used to draw attention to a substantive debate regarding the appropriate role for values in setting the conditions for the ascription of ecosystemic health and degradation states. Naturalists will maintain that ecosystem health represents a class of conditions which have some essential similarity and can therefore be said to pick out a natural class which 'carves the world at the joints'. They therefore aim to provide an

account in normatively-neutral scientific language of what this essential similarity is – the natural properties that all healthy ecosystems share in virtue of which they are healthy. Normativists will instead maintain that no such account can be given since ecosystem health does not constitute such a natural class, instead ascriptions are contingent on social and normative value-judgments. Note that such a characterisation of the debate leaves the objectivity question open, since there is no reason that the value-judgements involved in the normativist account must be considered as non-objective or purely subjective, a point I will return to in section §5. First however, I will consider and provide objections to what I take to be the two strongest contenders for a naturalist account of ecosystem health.

§4. Is a Naturalist Account of Ecosystem Health Possible?

A naturalistic account of ecosystem health and degradation, if one were possible, might make life easier for the conservationist. Providing an assessment of the health of a given ecosystem would simply be a matter of the application of some generalised non-normative criteria of health – for example, on a Boorseian-style account, all one need do is measure the relevant ecosystemic functions and then compare them to a suitable reference class. There would be no need to consider the more thorny question of the value of different ecosystemic states, since health could be determined purely through analysis of the inherent properties of the ecosystem itself without requiring any evaluative judgements of those properties. This would put the ascription of ecosystem health and degradation firmly in the hands of scientific ecologists, since they are best suited to assess the state of an ecosystem and apply the established health criteria, with the existence of conflicting evaluative attitudes being of little import to the objectivity or legitimacy of such ascriptions.

However, as I shall argue, it is not possible to provide such a naturalist account, or at least, no naturalist account given thus far is able to completely expunge dependence on values. Instead, naturalists tend to smuggle values implicitly within their accounts, costumed in the language of science but nonetheless concealing irreducibly normative assertions. In order to illustrate this, I shall provide what I take to be the two best contenders for a naturalistic account of ecosystem health - one broadly 'Boorseian' account, and a more recent account put in terms of 'organisational functions' – and show that both are in fact value-dependent.

§4.1 Problems For A Boorseian Account of Ecosystem Health

A fairly straightforward parallel to Boorse's naturalist account of health can be found for ecosystems in Callicott (1995). He argues that ecosystem health can be defined as, "the normal occurrence of ecological processes and functions" (Callicott 1995, p.345). Here we see the two central aspects of Boorse's account – 'statistical normality' and 'functions' – playing a central role for Callicott. Although Callicott allows "some room for personal or social determination or construction" (Callicott 1995, p.345) meaning that his position on the above graph perhaps shifts slightly further right along the value-ladenness axis, it remains that on his account it is ecologists who ultimately determine "the objective parameters of healthy ecosystems" (Callicott 1995, p.345). Callicott's account can therefore be best classified as traditional naturalism, appropriating the key features of Boorse's account of organismic health.

How might such an account conceive of the eutrophication of the river Wye? The naturalist will argue that the process of eutrophication in the river constitutes a statistically abnormal pattern of nutrient flow when compared to ecosystems in the same 'reference class'. They may claim that this is interfering with the statistically normal functioning of various sub-systems within the ecosystem, for example reducing the functioning of macrophytes in oxygenating the river and providing habitat for fish, or leading to the dysfunctional proliferation of algal blooms. The naturalist may also claim that other sub-systems are dysfunctional and so further contributing to abnormal ecosystemic processes, for example the soil in the catchment area may be thought of as dysfunctional in its ability to store excess nutrients, or the deforested banks dysfunctional through their lack of shade provision in regulating the temperature of the river – again this would have to involve a comparison to the functioning of these sub-systems in ecosystems belonging to the same 'reference class'.

The naturalist character of this account, just as in the case of organismic health, depends crucially on being able to provide accounts of both 'functioning' and 'statistical normality' which don't rely on social or normative evaluations. For the naturalist, the function of some part of an ecosystem must not depend on our interests or values regarding that ecosystem but on some naturally existing teleology or goal for that part of the system. Additionally, the selection of a suitable 'reference class' for the attribution of statistical normality must somehow be done in a value-neutral way. These criteria are challenging enough for the naturalist in the case of organismic health, however I would argue that they are fatal for a naturalist account of ecosystemic health.

First, take the problem of devising an account of function that is both applicable to ecosystems and able to provide normative conclusions regarding the (proper) function of the various sub-systems of an ecosystem. In Boorse's account of organismic health, the notion 'function' was analysed in terms of the causal contribution of a sub-system to its goal, where 'goal' was understood as a state which is actively maintained by the sub-system in the face of environmental changes. For Boorse, the goals of these specific sub-systems in turn causally contribute to the higher-level goal of the whole organism, which is to survive and reproduce. This goal-oriented analysis of function is problematic in the case of organisms, however its prospects are surely worse in the case of ecosystems which have no higher-level goals comparable to survival and reproduction that they can be said to pursue.

In order for the naturalist in the ecosystemic case to make a parallel claim to Boorse regarding the functions of various sub-systems, for example the claim that the function of macrophytes in the ecosystem of the river Wye is to oxygenate the river, they must show that this can be plausibly seen as the 'goal' of the macrophyte sub-system and that this 'goal' contributes to some overall 'goal' for the river ecosystem itself. However, since ecosystems do not have any inherent 'goal' of survival and reproduction like organisms do, it is hard to see how the naturalist can make such claims – without, that is, invoking valuing subjects who judge the continued oxygenation of the river as valuable and thereby recognise it as the 'function' of the macrophytes within the ecosystem.

A further problem for the Boorseian naturalist lies in devising a value-free account of 'statistical normality'. Boorse's method for doing this in the case of organismic health is to compare the functioning of some sub-system to a suitable reference class – which he takes

to be organisms of the same species, sex and age. This strategy has been problematic in the case of organismic health. For example, Cooper argues that Boorse's reference classes will have to become "more fine-grained" since what is normal for a person is dependent not just on sex and age but also various other factors like ethnicity, cultural background, level of athletic training and so on (Cooper 2002, p.266). However, the smaller the reference class, the more difficult it is to distinguish the normal from the abnormal. Some reference classes may only contain one member, in which case everything is normal. There is therefore no obvious, value-neutral solution to how fine-grained references classes should be in the case of organisms.

The same problem may be raised with regards to ecosystem health. In order to judge the normal occurrence of ecological functions and processes we will need to devise reference classes for comparison – obviously we can't compare a desert to a rainforest. However, the size and constituents of these reference classes is unclear. It seems there is no non-normative reason for selecting one reference class rather than another. Why, for example, should we compare the river Wye to a reference class of rivers that are not undergoing eutrophication against which it will appear abnormal, rather than a reference class containing rivers that are undergoing eutrophication against which it would appear more normal - other than because we perceive eutrophication to be a bad thing. Only our values can guide us in the selection of one reference class rather than another.

Elis Jones (2021) makes a similar point with regards to deciding on an appropriate baseline against which to compare algal-reefs in determining whether they are degraded. The perception that algal-dominated reefs are degraded emerges from the selection of

coral-dominated reefs as the appropriate baseline. However, this choice, Jones argues, is clearly a result of the value we place on those coral-dominated reefs. His reasoning for this turns on the fact that any contrary arguments made for algal-dominated baselines are always based on asserting the *value* of algal-dominated reefs. Jones cites three such arguments: that the ecological role of algae is underappreciated, that algal-reefs may support a variety of organisms, and that algal-reefs sometimes come about naturally. (Jones 2021, p.5236) Each of these arguments attribute value to algal-dominated reefs, suggesting that it is this *value* that is ultimately playing the role of determining whether or not algal-dominated baselines are appropriate, rather than any natural facts about the state of the reef itself. There is nothing wrong or degraded about algal-dominated reefs in themselves Jones argues, but rather the appropriate baseline for any given reef ecosystem ultimately depends on what is most valuable.

Clearly, the same can be said of eutrophication in fresh water ecosystems. The facts alone regarding the eutrophication of a river underdetermine ascriptions of health and disease since we could simply construct a 'reference class' of other eutrophicated rivers against which we might judge the Wye as healthy. The reason that we don't do this however, as I shall argue, is because of the value of certain aspects of a less eutrophicated river. This point is even clearer in the difficult case of the Welsh uplands. How can we decide on an appropriate 'reference class' or baseline for the Welsh upland system without addressing questions of value? One option for the naturalist may be to attempt to look back historically at what is normal for these particular ecosystems – what has been their structural and functional state in the past? However selecting the appropriate time-frame is always a question of values and can't be determined through purely naturalistic means (as I

discussed in Chapter 1 §2.3). Another approach may be comparing the ecosystem to other currently existing comparable upland ecosystems. But again, it is difficult to see what could ground a choice of forested ecosystems rather than moorland ecosystems to constitute this reference class, other than values.

Not only are there problems with the value-free selection of a reference class for judging what is normal – there also problems for the naturalist in telling us why what is normal should coincide with what is valuable. Hacking (1990) writes eloquently about statistical normality, calling it "one of the most powerful ideological tools of the twentieth century" (Hacking 1990, p.169):

> The normal stands indifferently for what is typical, the unenthusiastic objective average, but it also stands for what has been, good health, and for what shall be, our chosen destiny. (Hacking 1990, p.169)

This quote displays the essential tension in the concept of normality between what is merely statistically average within a group which could be improved upon, and some ideal state which should be strived towards. Being statistically average, although a fairly value-free matter once we've specified the reference class (ignoring the choice between different types of average), doesn't seem to have any particular bearing on what is good – for example the average score in a group of exam results is not the best result. However the other meaning of normality - some ideal norm or perfect state to be worked towards - is clearly heavily value-laden and should not be understood by merely invoking the average within a group.

The ambiguity between these two senses of normal is clearly where the rhetorical power of the concept lies, as Hacking states:

> The word became indispensable because it created a way to be 'objective' about human beings. The word is also like a faithful retainer, a voice from the past. It uses a power as old as Aristotle to bridge the fact/value distinction, whispering in your ear that what is normal is also all right. (Hacking 1990, p.160)

However, I think we must be suspicious of this whispering voice. By conflating the statistical notion of normality as average with the normative Aristotelian notion of normality as ideal, we create a profoundly regressive situation in which what is good is merely reduced to the way things have tended to be in the past. This short-circuits all political and ethical discussion about the way things *should* be in the future.

§4.2 Problems For An 'Organisational' Account of Ecosystem Health

A more recent naturalistic approach to ecosystem health is the 'organisational' account provided by Sfara and El-Hani (2023). This account builds on recent attempts to provide an 'organisational' account of organismic health, arguing that ecosystems and organisms both "share a non-metaphorical, but objective characteristic, namely organisational closure" (Sfara and El-Hani 2023, p.37) and that health and disease/degradation can therefore be attributed to both on the basis of this shared characteristic.

‘Organisational closure’ is a mutual interaction between two or more parts of a system whereby each part both ‘enables’ and ‘depends’ upon the other part(s) for their self-maintenance and the self-maintenance of the whole system. Sfara and El-Hani give the example of the stomach and the heart:

> A stomach could not perform any digestive function without the cardiac function of a heart, which, in turn, in order to pump blood, cannot do without the digestive function of the stomach. (Sfara and El-Hani 2023, p.4)

This type of ‘organisational closure’ they argue, creates the basis for a naturalised conception of the function of the heart:

> The heart has the function of pumping blood insofar as this pumping ability contributes to the maintenance of a living organism by making blood circulate… enabling in this manner the activity of any other organismic function, such as, say, the stomach digestive function, as well as other functions exerted by the liver, lungs, brain, and so on. At the same time, an organism’s heart is produced and maintained by every single functional part of the organism. (Sfara and El-Hani 2023, p.6)

Crucially, Sfara and El-Hani argue, this organisational approach allows them to distinguish between the proper functions of a part and its mere coincidental non-functional properties by considering the contribution of the activity to the self-maintenance of the whole system. For example, the ‘whump-whump’ sound made by the heart is not one of its functions since

the sound itself does not play any role in the self-maintenance of the organism (Sfara and El-Hani 2023, p.6).

Sfara and El-Hani argue that such an account of function can also be applied to ecosystems since they too exhibit 'organisational closure'. They give the example of the relationship between plants, herbivores and decomposers in moderating the flow of carbon atoms through an ecosystem - carbon is first captured from the atmosphere by plants, becoming part of plant biomass, some of which is then consumed by herbivores thereby becoming part of herbivore bodies; then, once herbivores and plants die they are processed by decomposers which convert this matter into nutrients available for take-up by plants, thereby closing the organisational relationship. In this example, Sfara and El-Hani argue, plants, herbivores and decomposers each enable and are dependent upon each other – for example, plants enable the existence of decomposers by providing them with dead matter to decompose, while also depending on decomposers to recycle and make available the nutrients necessary for life. Furthermore they argue, each part, by playing its functional role, contributes to the self-maintenance of the whole system.

This 'organisational' account of function then forms the basis for Sfara and El-Hani's account of ecosystem health:

> An ecosystem is healthy when the biotic elements composing it are themselves sufficiently healthy such that they can satisfactorily carry out the functions allowing the ecosystem to maintain itself.' (Sfara and El-Hani 2023, p.19)

So to take the example above, when plants, herbivores and decomposers are each healthy enough to play their functional roles in contributing to the self-maintenance of the ecosystem, the ecosystem itself is healthy. In turn, the individual biotic elements are healthy when they possess no internal parts malfunctioning in such a way so as to threaten their own self-maintenance. An ecosystem is unhealthy then, when a part of the system is malfunctional meaning that the activity of that part threatens the self-maintenance of the system as a whole.

This conception of malfunction is different to Boorse's since it involves no comparison to a 'reference class' of other systems, rather it considers malfunction as a condition which threatens the self-maintenance of that individual system. This has the benefit of allowing that one and the same function or component may be malfunctional in one ecosystem but not in another similar ecosystem. Sfara and El-Hani provide the example of the bumble bee, *B. terrestris,* whose pollination function contributes to the self-maintenance of various New Zealand ecosystems, despite its status as a human-introduced species, therefore making it an important contributor to ecosystem health in these ecosystems. However, in different geographical regions such as China, Australia and others where it has been introduced, *B. terrestris* has been shown to threaten ecosystem self-maintenance due to the impact it has on the capacity of local bee species to play their own functional roles as pollinators, making *B. terrestris* malfunctional in these contexts (Sfara and El-Hani 2023, p.16). The organisational approach therefore seems better able to handle the idiosyncrasies of individual token cases than a Boorseian account.

Although perhaps in some ways an improvement on the Boorseian account then, the organisational approach can however be subjected to some damning objections. Firstly, Lean (2020) questions whether organisational functions can in fact be attributed to most ecosystems. He argues that "equating ecological systems with closed self-maintaining units requires a strong commitment to equilibrium ecology" (Lean 2020, p.12). 'Equilibrium ecology' however, the idea that ecosystems exist in a balanced state, always tending to return to a stable equilibrium in response to external disturbance, has been thoroughly critiqued to the point of refutation and is unlikely to be held by any present-day ecologists. The more common view in modern ecological science, Lean claims, sees ecosystems as, "casually open collections of species… the product of path-dependent historical processes and the random dispersal of populations from other local communities" (Lean 2020, p.13). If this is the case, Lean argues:

> … we will see a change in not just the populations playing a functional role but also the overall causal structure of the system. This will change the organisation of the system so there is no longer the functional maintenance of the ecological system by a population. (Lean 2020, p.13)

The proponent of the organisational approach may be able to respond that the assignment of organisational closure to ecosystems doesn't require a strong commitment to the naive equilibrium ecology of the early twentieth century, only that parts of an ecosystem interact with other parts to maintain both themselves and the system as a whole. In this sense, even if the composition or causal structure of an ecosystem are dynamic and subject to regular

change, organisational closure might still be said to exist within a given causal-structural arrangement in a particular time-frame.

Even if we were to grant that organisational closure is a widely shared trait of ecosystems though, I shall argue that the organisational approach still fails to present a truly naturalistic, value-free account of ecosystem health ascriptions since it requires reference to irreducibly normative value-judgements in two different ways or at two different levels, both of which are related to the concept of 'self-maintenance'. Firstly, an understanding of the self-maintenance of an ecosystem requires one to be able to distinguish at what point an ecosystem is no longer its 'self'. Lean also makes this point, stating that an understanding of self-maintenance, "requires a principled and objective distinction between the persistence of an ecological system and its replacement by a new system" (Lean 2020, p.9). To do this requires identity conditions for the ecosystem, however it is unclear how these should be provided. For example, Sfara and El-Hani define the stability or maintenance of an ecosystem as "referring to the capacity of an ecosystem to absorb variations that could potentially change its *fundamental characteristics* and, thus, to remain in certain dynamic regimes" (Sfara and El-Hani 2023, p.14 my emphasis). However, it is unclear how to pick out the 'fundamental characteristics' of an ecosystem in a value-neutral way since it seems that the provision of such characteristics must involve a normative judgement about what is important or valuable about that ecosystem.

Given this, the proponent of the organisational approach will struggle to distinguish between self-maintenance and degradation without making a judgement regarding the identity conditions or 'fundamental characteristics' of an ecosystem. Although such a

judgement may be obvious in some cases, making the appropriate identity conditions seem like an inherent feature of the system itself, in other cases, particularly those difficult cases where conflict exists, it is less clear what the identity conditions should be. Take the case of the Welsh uplands that I discussed earlier – from one perspective, the activity of sheep in grazing upon moorlands and preventing forestation might be seen as playing a functional role in maintaining the moorland ecosystem; sheep and heather (*calluna vulgaris*) could be thought of as in a relationship of organisational closure, each enabling and depending on the other and maintaining the characteristics of the system as a whole. From a different perspective however, sheep are a malfunctional part of the upland ecosystem, preventing the self-maintenance of a forest ecosystem and disrupting the various organisational relationships which would establish themselves in the absence of their grazing activities. The difference between these two perspectives is their answer to the question of what should be taken to constitute the 'fundamental characteristics' of a Welsh upland ecosystem. If those characteristics are taken to include a high degree of forestation, then the current moorland ecosystem is clearly degraded. However, if the 'fundamental characteristics' are taken to be that of a moorland, then we may see the currently existing moorland as a distinct system from the Pleistocene forest which preceded it, with its own relationships of organisational closure which contribute to its self-maintenance. Which of these identity conditions should pertain is clearly an evaluative question.

The second level at which the organisational approach depends on values is in its assertion of the significance of 'self-maintenance'. It seems that justification for the organisational approach to ecosystem health requires a pre-existing normative judgement regarding the value of self-maintenance. However, it is difficult to give a naturalistic reason

for why stability should always be preferred over change. The naturalist might again appeal to ‘equilibrium ecology’ to argue that a tendency for stability is somehow inherent in nature, however as discussed above, it seems that such an appeal would not be based on our best science. Instead, it seems that a preference for self-maintenance and stability, as well as the ideas of ‘equilibrium ecology’ in which those concepts are rooted, are reflective of deeply ingrained social values. Rapport touches on this in an early paper on ecosystem health:

> … the idea that a healthy system is a stable one arises naturally enough in a technocratic society where the importance of control and dependability is paramount. (Rapport 1989, p.127)

This is not to say that stability and self-maintenance aren’t in many cases important aspects of ecosystemic health ascriptions, however their recognition as such is always a matter of evaluative judgement, of prioritizing some functional and structural regime above others.

This is evident from discussions of eutrophication. For Sfara and El-Hani and their organisational approach, eutrophication, even when it occurs naturally, is intrinsically an unhealthy state since:

> …the recursive relationship between primary producers, such as plants, algae and fish is disrupted, leading to the death of the latter and to a consequent threat to the self-maintenance of the ecosystem, which is therefore unhealthy. (Sfara and El-Hani 2023, p.18)

However, if we take a broader temporal perspective, we see that eutrophication is a natural processes which has occurred in many fresh-water ecosystems and is a key contributor to the standard succession pattern of lakes. Several wet-lands and bogs that we might consider to be valuable habitat today were once lakes, with eutrophication being one of the key drivers of change from one type of system to another. It is not the case therefore that eutrophication and other dynamic ecological processes which threaten stability and undermine self-maintenance are inherently unhealthy; rather, these processes, especially when hastened by human activities like in the case of the river Wye I describe above, undermine many of the valuable features of an ecosystem, and it is because of this that we should determine them to be states of ill-health. As such, conservation projects that aim to restore health to an ecosystem, in the sense of a stable or balanced state, must be justified by arguments regarding the *value* of such stability rather than by any intrinsic ecological tendency for self-maintenance.

Kimmerer acknowledges this idea eloquently in *Braiding Sweetgrass* when describing her attempts to undo the natural eutrophication that had occurred in her garden pond to make it clean enough for swimming. She describes finding bullfrog tadpoles and several other organisms while raking algae from the top of the pond:

> A whole food web was dangling from my rake, and those were just the critters I could see, just the tip of the iceberg, the top of the food chain. Under my microscope, I had seen the web of algae teeming with invertebrates— copepods, daphnia, whirling rotifers, and creatures so much smaller: threadlike worms, globes

> of green algae, protozoans with cilia beating in unison. I knew they were there, but I couldn't possibly pick them out. So I bargained with myself over the chain of responsibility and tried to convince myself that their demise served a greater good... With every rake I knew that I was prioritizing. Short, single-cell lives were ended because I wanted a clear pond… restoring a habitat, no matter how well intentioned, produces casualties. We set ourselves up as arbiters of what is good when often our standards of goodness are driven by narrow interests, by what we want. (Kimmerer 2013, p.115-118)

§5. A Normativist Account of Ecosystem Health

A normativist account of ecosystem health will argue that the crucial factor in determining whether a given functional or structural state of an ecosystem is healthy or not is the *value* of that state. According to the normativist, a scientific description of the condition of the ecosystem alone is insufficient for determining ascriptions of health or disease states to that ecosystem. In order to do so, these descriptions must be accompanied by value claims – claims about the goodness or badness of specific structural and functional arrangements - which will ultimately determine whether the ecosystem in question is healthy. Such an account allows us to retain the functionalist character of the health concept whilst forcing conservationists to be more explicit about the value claims which underlie assertions regarding the function or dysfunction of parts of an ecosystem.

An explicitly normativist account of ecosystem health has as of yet never been provided in the philosophical literature. There are however a few authors which have

remarked on the value-dependence of ecosystem health and/or degradation ascriptions which a normativist account could take inspiration from. For example, McShane (2004) provides the following account:

> …we can see ecosystem health as a matter of maintaining the structure and functions that are good for the ecosystem. In order to determine which structure and functions are good for the ecosystem, we should ask what it would make sense for someone who cared for the ecosystem to want for it for its sake. (McShane 2004, p.245)

McShane's reference to the normative property of what is *good* for an ecosystem means that her account could appropriately be described as normativist. However, her criteria for determining such goodness may be seen as overly-subjective and vague, as well as unable to account for cases of conflict where people who care for an ecosystem have different evaluative stances regarding which structural and functional arrangements are good.

Other accounts which have a normativist tinge, although not explicitly self-described as normativist, are: Hobbs, who states that "degradation is in the eye of the beholder" because "people can have quite different perceptions of the same landscape" (Hobbs 2016, p.154); and Jones, who argues that "considering the value of an ecosystem is a necessity when describing processes like regeneration and degradation" (Jones 2021, p.5225) – neither of which explicitly refer to 'normativism' or 'ecosystem health'.

My normativist account will propose that an ecosystem is healthy iff

1. It can maintain a valuable structural and functional arrangement.
2. The value of this structural and functional arrangement has been assigned through an inclusive deliberative procedure.

Ill-health or degradation can then be defined as the lack of a capacity to maintain a given valuable structural and functional arrangement, where this value has been assigned by an inclusive deliberative.

The first condition is essentially the defining statement of any normativist account – health and degradation ascriptions are value-dependent. This condition also seeks to retain the functional emphasis of health. Such an account can employ here a minimal account of function such as 'causal-role functions' which are described by Lean as the "systemic capacities" and "structural organisation" of a part or trait which "explain the capacities of the system it belongs to" (Lean 2020, p.13). These functions are strictly explanatory and so cannot distinguish between functional and dysfunctional parts, rather they simply explain the causal effect of a part of a system on the whole system. Using such an analysis we can identify the 'systemic capacities' of the various parts of an ecosystem. This can then be combined with value-claims regarding the value or disvalue of such capacities, allowing us to restore the fully normative conception of function but now with the essential inclusion of explicit value-claims: those parts of an ecosystem whose systemic capacities negatively impact the value of the system are dysfunctional while parts that have valuable capacities are functional. This first condition therefore provides a way of, as Lean puts it, "injecting normativity into the causal nodes of ecosystem structure" (Lean 2020, p.16). The second

condition (2) is related to the objectivity of health and degradation ascriptions. A common misconception is that the value-dependence of health ascriptions would necessarily make them subjective. However, I will argue that objectivity is compatible with value-dependence so long as underlying value-claims are made explicit and subjected to critical scrutiny from diverse perspectives. I will go into more detail on this point in Chapter 5, where I shall argue that inclusive deliberative procedures can provide excellent strategies for providing such scrutiny and thereby achieving greater objectivity in the ascription of ecosystem health and degradation.

This normativist account has all the benefits of the equivalent position on human and organismic health, whilst, as I shall argue in chapter 5, being able to avoid the common objection that normativism leads to a problematic relativism. It makes ascriptions of health and disease dependent upon the context and specific situation of the ecosystem in question, allowing for one and the same condition to be seen as either health or degradation depending on the specific values that are at stake in each case. Furthermore, through forcing conservationists to make their values more explicit, it brings the value-laden nature of conservation to the forefront (in the same way that the value-laden nature of medicine is exposed by the normativist account of human health) and therefore requires that in order to increase the legitimacy of conservation decisions, a greater diversity of people and perspectives should be included in making conservation decisions so that a plurality of different values are represented (as I shall argue more extensively in Chapter 5).

I think it will be useful at this point to return to our two earlier examples – easy and difficult - in order to show how this normativist account may deal with them. Doing so will

illustrate that in cases where there is conflict over ascriptions of health and disease this can be explained by conflicting values; whereas in cases of consensus, this will be due to a widespread agreement over the values which underlie the ascription of health or degradation.

Taking first the easy case of the eutrophication of the river Wye. Here, the normativist will argue that in addition to the facts describing the eutrophication of the river, certain values must be deployed in order to ascribe a state of ill-health to the river. These value claims will range from ethical to aesthetic to prudential to socio-cultural. For example, we may make the ethical claim that the decline in fish, bird, insect and macrophyte populations which are linked to eutrophication constitute a loss of intrinsically valuable populations. We may also make aesthetic value claims – the river is uglier and smellier because of eutrophication. Pragmatic and economic values will also come to play – the river is becoming unsafe for people to swim in, this combined with the aesthetic concerns could lead to a loss of tourism revenue to the area. Socio-cultural values could also be important with people judging changes in the river to be a cultural loss for the region, maybe pointing to a rich history of social relations between people and the river and its wildlife as something which is valuable in itself and being damaged by eutrophication. Importantly, these value-claims are, on the whole, very widely shared. Everyone agrees that eutrophication in the river Wye is leading to negative consequences – we all agree that declines in fish populations and fowl-smelling algae-coated portions of the river are bad. As Monbiot states in his *Rivercide* documentary:

> No one is saying, actually it's alright to dump raw sewage in the river, it's alright to have millions of chicken in the catchment pooping and all that dung going in the river… who's saying this? We all agree it's wrong and yet it's happening. (Monbiot Rivercide documentary 45 mins)

It is this widespread agreement which provides the illusion that the ill-health of the river is intrinsic to the condition of eutrophication itself and can therefore be captured in purely naturalistic terms – as being 'statistically abnormal' or 'organisationally malfunctional'. The values underpinning the ascription of disease to the river are so widely shared as to be almost invisible. These values are never in doubt, no one is arguing in favour of the eutrophication of the river Wye (besides perhaps the large agri-businesses who profit from it, although they are more like to deny rather than explicitly endorse). This example is similar to the easy cases of disease ascription in humans. No one is arguing that cancer is actually good for the patient who has it, the values underlying the ascription of disease are universally shared. It is not that the disease ascription isn't value-laden in these easy cases, it is simply that the values which are involved are beyond question.

However, ascriptions of health and disease to ecosystems are not always uncontroversial. Take the difficult case of conflict over the health status of the uplands of mid-Wales. At the heart of this is a disagreement about the value of the ecosystemic function of grazing animals, primarily sheep. Rewilding Britain argued that sheep should be mostly removed from the uplands so that their grazing function can give way to the alternative ecosystemic functions which would establish themselves in their absence. The rewilders in many ways reasoned as naturalists, appealing to concepts like normal

functioning as justification. However, as I have shown, such naturalist accounts ultimately can't avoid value-dependence, and in this case could act as a way to disguise the specific value-claims of Rewilding Britain. As such, many local people argued that Rewilding Britain were deploying their own specific value-system to determine how the ecosystem should function, attempting to create what one farmer described in a BBC radio 4 interview as a 'Pleistocene park'. They argued that other values could and should be bought to bear on the situation, that grazing livestock could have important positive systemic capacities, playing their part in the restoration of a traditional rural ecology, capturing carbon in the soil, relating people to the land, producing food and conserving the Welsh language which is particularly prevalent amongst sheep-farming communities.

It should be clear from what I've argued above that a naturalistic approach can't settle this dispute. What is at issue here are different value-claims regarding the upland ecosystems of mid-Wales and the systemic capacities of grazing sheep within these systems. The values at stake in the debate over the uplands of mid-Wales are more contested than the values that were at play in the question of the health of the river Wye, which is why the value-laden nature of ecosystem health is more readily apparent in this case - depending on our values we may perceive the upland ecosystems of mid-Wales as more or less healthy. As I shall argue in Chapter 5, this does not mean that ascriptions of ecosystem health and degradation will be purely subjective or relativistic, rather, when there exists a conflict between differing ways of valuing ecosystemic functional capacities, this requires arbitration through inclusive deliberative procedures in order to produce a more objective evaluation.

§6. Conclusion

This chapter has argued that ecosystem health, like the concept of naturalness which I considered in the previous chapter, is value-dependent. Ascriptions of ecosystem health and degradation are inherently and irreducibly evaluative. I began the chapter by considering the origins of the concept and giving some reasons as to why having a notion of ecosystem health is useful for conservation science. I then introduced two examples of ecosystem health ascriptions, one easy case over which there is broad agreement and one difficult case in which there is conflict over the health of an ecosystem. I suggested that the presence of difficult cases raises the question of how best to decide on the criteria of ecosystem health and, in particular, whether ascriptions of ecosystem health can be determined based on purely empirical scientific criteria or whether such criteria had to be inherently normative or evaluative.

In order to explore this question, I considered a parallel debate in the philosophy of medicine over ascriptions of health and disease to humans and other organisms. This debate exhibits a divide between so-called 'naturalists' and 'normativists' over whether health and disease are objective natural kinds, ascriptions of which can be determined in a value-neutral way, or rather, they are messy social categories which can only be ascribed according to normative criteria. This division between 'naturalists' and 'normativists' is also present in debates over ecosystem health. I considered two possible naturalist accounts of ecosystem health, arguing that neither succeeded in giving a value-free account of ecosystem health because both accounts ultimately contained reference to irreducibly

normative terms. The Boorseian-style account referred to ‘statistical normality’ which, I argued, could only be defined in relation to a reference class or baseline, the constitution of which is value-dependent. The alternative naturalist account, which views ecosystem health in terms of organisational self-maintenance, also ends up being dependent on evaluative judgements, firstly in order to determine the ‘identity conditions’ of an ecosystem, and secondly in order to establish the value of self-maintenance.

As a result of the failure to establish a naturalist account of ecosystem health, I argue that we should instead accept that ecosystem health is a value-dependent concept and embrace a normativist account which understands the health of an ecosystem in terms of the maintenance of a valuable structural and functional arrangement, where this value has been decided by an inclusive deliberative procedure. I will go into more detail on the significance of deliberative procedures for this account in chapter 5, but first I will move on to the final conservation aim to be considered in this thesis, biodiversity.

Chapter 4

Biodiversity and Normativity:

The Relationship Between Science and Values in Defining and Measuring Biodiversity

The view that biodiversity is the aim or goal of conservation may be thought of as the dominant 'paradigm' under which many conservationists operate, with biodiversity often compared to the concept of health in medical science as the ultimate aim of conservation efforts. (Soulé 1985, Sarkar 2001, Lean 2017) Despite this fundamental role the concept has acquired within conservation science, there remains a great deal of controversy and lack of clarity over how to define and measure biodiversity. Philosophers have pointed to a tension between biodiversity as a *scientific* concept and biodiversity as a *normative* concept. (Lean 2017, Sarkar 2019) As a scientific concept, biodiversity should 'carve nature at the joints' and provide a clear measurement of some natural feature of the world; whereas, as a normative concept, biodiversity must closely track biological value in order for it to provide guidance in decisions about prioritizing that which is most worthy of conservation efforts. This tension has resulted in the establishment of two contrasting camps which are remarkably similar to the opposing views regarding health that I examined in the previous chapter - with 'naturalists' arguing that biodiversity is a value-free concept which can be captured by a single or closely related set of scientific metrics; and

'normativists' arguing that there is little reason to suppose that a single, or closely related collection of, quantifiable metrics should track biological value in all contexts.

A number of different scientific biodiversity metrics have been suggested and developed. In section §3, I will consider in detail the three most prominent metrics: species richness, phylogenetic distance, and functional diversity - arguing that these metrics often conflict with one another, as well as each being subject to internal ambiguity and differences in interpretation. In section §4. I will argue that this conflict within and between the different scientific metrics presents a challenge to the biodiversity naturalist, since it means that prioritization rankings are dependent upon which metric is taken to be the best or most important measure of biodiversity, which can only be determined by recourse to non-epistemic values. I will then consider a response to this problem given by Lean (2017), who argues that a naturalistic justification can be given for the selection of phylogenetic distance as the primary biodiversity metric. However, I will object that any justification for the use of phylogenetic diversity ultimately still depends on non-epistemic value-judgements. I will then, in section §5, go on to argue that the differing scales at which biodiversity is measured must also be justified by non-epistemic values and consider what this value-ladenness means in the context of a common argument against the control of invasive species.

Finally, in section §6, I shall argue that, although non-epistemic values play a necessary role within biodiversity conservation as determining factors in choices about which biodiversity metric(s) should be used within a given context, the stronger deflationist claim made by normativists such as Sarkar (2019), that biodiversity must always align with

what should be conserved, should be rejected. Biodiversity should not merely reflect normative judgements of what is worthy of conservation but should be able to provide a reason, albeit a defeasible one, for conservation. On my view then, biodiversity should still be explicated in terms of some scientific metric, even though values are required in the selection of the appropriate metric for a given context. I conclude that this account can act as a middle way between the naturalist and normativist positions on biodiversity, allowing for a more constructive engagement on the relationship between values and science in defining and measuring biodiversity.

§1. The Biodiversity Paradigm

The biodiversity concept emerged from the need to describe the staggering loss of biological entities at several different levels. According to a 2019 Intergovernmental report, one million species are at risk of extinction, one hundred million hectares of tropical forest have been lost between 1980 to 2000, and there has been a 68% average decline in the population sizes of mammals, birds, amphibians, reptiles, and fish between 1970 and 2016 (IPBES 2019). Biodiversity therefore functions in one way as a catch-all label for describing the variety of different biological entities which are at risk of being lost as human activity (the activity of some humans far more than others) continues to destroy habitat, change the climate and introduce exotic species to ecosystems.

Alongside this very general usage of the term, the concept has also come to serve a crucial and more specific role within conservation science itself by providing a quantifiable measure which can aid in decision-making regarding what to prioritize in the allocation of

limited resources, which biological entities are most valuable, and what counts as success for a given project. Soulé's 1985 paper 'What is Conservation Biology?' has acted as a foundational text for what I call, 'the biodiversity paradigm', laying out several key principles which have guided biodiversity conservation ever since. In this text he entrenches the preservation of biodiversity as the aim of conservation, stating in the opening paragraph that conservation biology's "goal is to provide principles and tools for preserving biological diversity" (Soulé 1985, p.727). Soulé goes on to state further key 'postulates' which have acted as background assumptions and shared values amongst researchers within biodiversity conservation, such as: "diversity of organisms is good" (Soulé 1985, p.730); "The value of a population… depends on its genetic uniqueness, its ecological position, and the number of extant populations" (Soulé 1985, p.731); "ecological complexity is good" (Soulé 1985, p.731) and several others.

I think it appropriate here to utilise Kuhn's notion of 'paradigm' to describe the work of Soulé and other early 'conservation biologists', with the disciplinary move from a focus on wilderness to a focus on biodiversity meeting both of Kuhn's conditions for the establishment of a new 'paradigm' – it was both "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity" whilst also being "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (Kuhn 1962, p.10). It was 'unprecedented' in that for the first time, it allowed conservation to become established as a quantitative science, with biodiversity acting as a measurable target. As Lean notes, "previous notions of 'wilderness' and vague demarcations between the natural world and humanity could not provide clear targets for conservation" (Lean 2017, p.1083-4) - a point which I went into more detail on in Chapter 2

of this thesis. Biodiversity therefore, for these early conservation biologists, presented a novel approach. It also met Kuhn's second requirement for paradigm status - it posed a series of novel questions for practitioners to solve. These questions included how biodiversity is to be measured, how it is related to other biological and ecological concepts and properties such as stability, productivity and integrity, and how it is likely to respond to various threats such as climate change or invasive species.

More recently, Soulé's specific framework of 'Conservation Biology' has come under fire from the so-called 'New Conservation' movement (eg. Kareiva & Marvier 2012) for what they see as "a damaging inattention to human well-being" (Holmes et al. 2016, p.354 paraphrasing Kareiva and Marvier). These 'new conservationists' place a greater emphasis on the instrumental value of biodiversity to human well-being rather than Soulé's emphasis on intrinsic value, as well as moving away from Soulé's dualistic preference "for nature over artifice" (Soulé 1985 p.731) and paying increasing attention to biodiversity in urban and human-dominated landscapes (Holmes et al. 2016 p.354). Despite this critique of 'Conservation Biology', the biodiversity concept has retained its critical importance as the primary target of conservation and one of the key measures by which conservation impacts are evaluated.

In the next section §2, I will go into more detail on debates over defining and measuring biodiversity. I will first give some background on the standard account of the concept as it is often used by policy-makers, illustrating how, in practice, biodiversity is measured using 'surrogates' which stand in for the 'constituents' of biodiversity themselves.

I will then give some background on the debate over the role of values in assessing biodiversity and the established positions of 'normativism' and 'naturalism'.

§2. Defining and Measuring Biodiversity

> 'Biological diversity' means the variability among living organisms… and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. (United Nations Environment Programme 1992, p.4)

> Biodiversity is the variety of all life on Earth: genes, species and ecosystems. (Department for Environment, Food and Rural Affairs 2022, p.2)

The above quotations, the first taken from the UN Convention on Biological Diversity and the second from a U.K. government policy booklet, are representative of a set of very general and permissive conceptions of biodiversity which are often used in the context of policy initiatives. These conceptions of biodiversity are useful for policy makers because they can generate broad assent as a result of their generality and ambiguity. However, as it is consistently noted in the philosophical literature, such accounts provide little guidance to conservationists in practice, since they are, as Lean puts it, "synonymous with all of biology" (Lean 2017, p.1084) A commitment to protect 'the variety of all life on Earth', whilst admirable, is not a helpful directive for prioritizing those types of biological variety which are most valuable and should therefore hold the most weight when assessing biodiversity.

Furthermore, it is not clear how we could consistently measure such a broad conception of biodiversity across a variety of different contexts in a way that would allow conservationists to make comparative assessments and decisions - which is the role assigned to the concept according to 'the biodiversity paradigm'.

When assessing or measuring biodiversity in practice therefore, conservationists introduce a distinction between biodiversity 'constituents' and biodiversity 'surrogates'. Biodiversity constituents are "those features of biota that are taken to define what biodiversity is" whilst biodiversity surrogates are the "features that can be measured in the field that may be used in place of the constituents during planning" (Sarkar 2012, p.115). Surrogacy, according to Sarkar, is "a relation between… an indicator variable and a target variable" in which "the indicator variable represents the target variable in the sense that it stands in for the target variable" (Sarkar 2002, p.16). So while biodiversity 'constituents' are the actually existing differences between biological entities, conservationists may in practice use various different metrics as 'true surrogates' to indicate or track this biological variety, such as: species richness, phylogenetic distance and functional diversity.

In turn, these 'true surrogates' will also have 'estimator surrogates' which are more easily measurable in the field – so for example total species richness may be indicated by the presence of a set of key indicator species, perhaps endemic species, saving the conservationist the task of having to count *every* species in the area which would be an arduous task (and perhaps impossible in practice if one hopes to include microbes). Similarly, phylogenetic diversity is sometimes estimated by considering taxonomic diversity at levels higher than species, for example the amount of different families, orders or classes

present in an area. Although such a Linnaean taxonomic classification system will likely differ from a true phylogenetic tree, an accurate phylogeny (derived from genetic sequencing) is not always available and can be complex and expensive to construct – it is therefore sometimes assumed that phylogenetic diversity covaries with diversity at these higher taxonomic levels and this taxonomic diversity may be used as a surrogate for phylogenetic diversity. (Maclaurin and Sterelny 2008, p.29) Additionally, as noted by Santana (2014), the biodiversity constituents themselves must act as a sort of surrogate for 'biological value' - since, for biodiversity to be useful for decision-making in conservation it must act as a reliable indicator of the presence of biological value more broadly, so that those decisions which maximize biodiversity are generally aligned with those which maximize 'biological value' (Santana 2014).

Despite making biodiversity more practical and measurable, the surrogacy relation can't however solve the question of what biodiversity constituents in fact are and therefore what the best 'true surrogate' is to use as a metric for tracking biological difference. The answers to these more fundamental questions have been approached in broadly two different ways in the philosophical literature, which are split between their views on the role of values.

§2.1 The Role of Values in Defining and Measuring Biodiversity – The Debate So Far

As with the philosophical debate over health ascriptions covered in Chapter 3 of this thesis, approaches to defining and measuring biodiversity have become polarised between those which emphasise the scientific and value-free character of biodiversity, and those that

emphasis its normative, value-laden character. Lean (2017) sums this up nicely, stating that there are “two different methodologies for identifying biodiversity”:

> One starts from our normative values towards nature and works from there to identify the particular different biological features we desire. The other starts with the biology, attempting to find the best account of biological difference and connecting it to normativity through prudential reasoning. (Lean 2017, p.1084)

The first stance Lean describes here I’ll refer to as ‘normativism’ and is associated with Sarkar and explicitly defended in his 2019 paper *What Should Biodiversity Be?*. The second stance is what Lean calls ‘realism’, although Sarkar somewhat pejoratively labels it “scientism” (Sarkar 2019, p.377). To attempt to keep the language more neutral (as well as to allow for the possibility that normativism could be compatible with realism in some meaningful way) I will refer to this second stance as ‘naturalism’. This also retains the terminology from the debate over the value-ladenness of health in the philosophy of medicine which I covered in Chapter 3, where the terminology originated.

The normativist argues that biodiversity is a normative property which can only be defined by making evaluative judgements as to which biological differences are most worthy of conservation. Sarkar, for instance, defines normativism as the view that, “normative discussion of what merits conservation determines what constitutes biodiversity” (Sarkar 2019, p.379). Sarkar argues that given its normative role in conservation science, the biodiversity concept must always align with “those aspects of biotic variety that should be conserved” (Sarkar 2019, p.380). This makes his conception of

biodiversity 'deflationary' in the sense that it is reflective of normative attitudes regarding what to conserve, rather than acting as a positive reason for conserving something. For example, take Sarkar's argument that bacterial pathogens should not be included as biodiversity constituents because their diversity is in fact harmful rather than valuable:

> Bacterial pathogens are rapidly evolving diversity to generate resistance in response to innovation in antibiotics designed to contain them. Other pathogens have shown similar, if less spectacular, responses to drugs. Should such diversity also merit active conservation? (Sarkar 2019, p.380)

Clearly then for Sarkar, it is evaluative attitudes regarding what is worthy of conservation that determine an entity's inclusion or exclusion as a constituent of biodiversity, rather than the presence of diversity itself driving our evaluative judgements as to what should be conserved. This is what makes Sarkar's normativism distinctively deflationary.

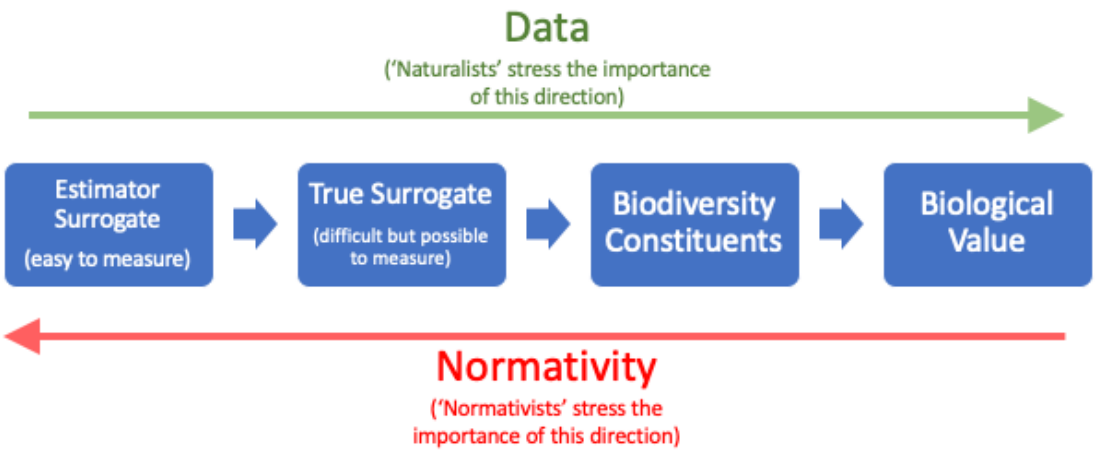
The naturalist on the other hand, argues that biodiversity is a really existing natural property (or closely related collection of properties) which can be identified and measured on the basis of scientific criteria - as Lean says, "starting with the biology" (Lean 2017, p.1084). According to Lean, naturalists believe that:

> …biodiversity is a natural quantity and that there are better and worse ways of identifying the diversity of mind-independent biological features. (Lean 2017, p.1084)

As such, the naturalist argues that the specific metric we choose in measuring the 'natural quantity' of biodiversity can be determined on purely epistemic grounds as simply the metric which most accurately and coherently tracks this 'mind-independent' diversity. Furthermore, this metric is to be used as a guide to what is of biological value, rather than being a reflection of independent normative considerations as to what is worthy of conservation as Sarkar argues. As such, for the naturalist, finding that ecosystem A is more biodiverse than ecosystem B is a reason to conserve A over B, rather than reflective of our pre-existing normative attitudes towards A and B.

The resulting conceptual framework for how biodiversity is assessed can therefore be depicted as so:

Fig. 3



A visual representation of how biodiversity is assessed, showing the contrasting views of naturalists and normativists. The blue arrows represent surrogacy relations, the green arrow

represents the flow of data and measurements through the chain of surrogacy, and the red arrow represents the input of values in determining surrogates.

As we shall see in the following section §3, there are a variety of different metrics which the naturalist may identify as best-suited for use as a 'true surrogate' for biological difference – species richness, phylogenetic distance and functional diversity - being the three which I will cover in greater detail. I will argue that the presence of conflict both within and between these different metrics presents a problem for the naturalist, since it appears that the choice of which metric to use in a given context can only be made through the adjudication of values.

§3. Conflicting Scientific Accounts of Biodiversity

In Maclaurin and Sterelny's *What is Biodiversity?* they argue that a definition of biodiversity must answer what they call "the units and difference problem":

> the diversity of a system will depend both on the number of distinct elements in the system and on their degree of differentiation. Once we know what to count and how to compare, we can take both factors into account in a conceptualization of biodiversity. (Maclaurin and Sterelny 2008, p.9)

The fundamental problem for a naturalist account of biodiversity is that there are numerous different ways scientists may carve up and compare biological entities, each of which will produce different answers to the units and difference problem and therefore differing

accounts of just what the constituents of biodiversity are and how best to quantify over surrogates and measure their differences.

In order to get clearer on the different scientific options available to the naturalist, in this section I will go into greater detail on three different varieties of biodiversity: *species richness*, *phylogenetic distance* and *functional diversity*. This is not meant to be an exhaustive list of all the different ways conservation scientists have measured biodiversity, however I take these to be three of the most common measures used. By examining these accounts of biodiversity in more detail, I hope to illustrate that there is a genuine conflict, both within each account – there is no singular way to understand and measure any one account; as well as between each account – different accounts pull in different directions and will produce different conservation decisions and priorities depending on how we rank their relative importance.

§3.1 Species Richness

The most common way conservationists measure the biodiversity of an area is to count the number of species present there – this is referred to as species richness. This method is intuitive since species are phenomenologically accessible as "recognizable, reidentifiable clusters of organisms" (Maclaurin and Sterelny 2008, p.40) – making them appealing for both the practical ease with which we may discern them and their ability to act as a hallmark of significant difference between organisms. This intuitive appeal and plausibility has led Macalurin and Sterelny to see it as, "common biological wisdom that phenomenological species richness captures a crucial dimension of biodiversity" (Maclaurin

and Sterelny 2008, p.40). Furthermore, Macalurin and Sterelny argue that distinctions between species represent real and causally significant distinctions between biological entities. Although there are numerous different ways in which speciation may occur, in each case they argue, a population becomes evolutionarily independent of its parent population – making species units of evolution and therefore , they argue, units of biodiversity. Species richness, they claim, can act as "a catalogue both of phenotypic variety and of the potential evolutionary resources available in a region" (Maclaurin and Sterelny 2008, p.40). As such, more species should mean more ways for life in a region to adapt to environmental change.

However, a major problem for advocates of species richness is that there are a multitude of conflicting species concepts with no clear way of choosing which is the correct conception to act as the units of biodiversity. Macalurin and Sterelny list seven different species concepts: typological species, phenetic species, biological species, ecological species, cohesion species, phylogenetic and evolutionary species, and cladistic species (Maclaurin and Sterelny 2008, p.32-33). Importantly, these different species concepts are more or less appropriate for different kingdoms of taxa. For example, the biological species concept which is dependent upon the ability of populations to interbreed is most appropriate for animals but less so for plants since in some cases even distantly related plant species can hybridize to form fertile offspring, and some plant species reproduce asexually or self-fertilize – making the biological species concept inapplicable. It would seem therefore that different types of ecosystem may require different species concepts to best classify their species richness depending on which type of taxa we take to be most important in our measurement for that particular system. This would entail that no one

conception of species could act as a “common currency” (Maclaurin and Sterelny 2008, p.31) for biodiversity comparisons.

Maclaurin and Sterelny argue that this diversity of species concepts is the result of the varying processes through which speciation may occur. However, despite this diversity in the causes of speciation, they take the effect to be the same – a lineage with an “independent evolutionary trajectory” (Maclaurin and Sterelny 2008, p.37). They therefore argue for the use of an evolutionary species concept which identifies species with lineages that have acquired this evolutionary independence, arguing that such a conception is “something like a natural kind” allowing conservationists to “roughly, compare like with like” (Maclaurin and Sterelny 2008, p.40).

However, the question of just how to identify an independent evolutionary lineage is left open, and one can’t help the feeling that there must be an element of convention involved here – especially given the fundamental continuity of the evolutionary process which underlies the species concept. As Zachos et al. (2013) note:

> Just when the status of separate evolution is reached and how this is to be inferred… is a matter of contention... the existence of species in statu nascendi [the state of being born] is a direct consequence of evolution, and exactly when or where the static taxonomic line should be drawn and a species name should be given, is a question of convention. (Zachos et al. 2013, p.4)

Given that speciation is gradual process, there is an essential vagueness as to where one species ends and another begins. As such, values are required in determining at just what point an evolutionary lineage should be considered to have gained sufficient independence to constitute a new species and be counted as a unit of species richness.

This aside, it is not clear that Maclaurin and Sterelny's endorsement of the evolutionary species concept sufficiently stands up to the pluralistic challenge that differing species concepts are required for different cases. For instance, as they themselves note, the evolutionary species concept is not suited for microbes. (Maclaurin and Sterelny 2008, p.40) Microbes can exchange genetic material between different lineages through a variety of different processes making it impossible to identify independent evolutionary lineages. This casts doubt once again on the ability to use any one species concept as a common currency of biodiversity.

Furthermore, in some cases it has been suggested there may be good reason for conservationists to prefer the biological species concept, at least in the domain of mammalian species. Zachos et al. argue that the switch from a biological to a phylogenetic (evolutionary) species concept has led to what they call "species inflation" which risks putting an unnecessary burden on the conservationist (Zachos et al. 2013, p.1). Take the example of the tiger, *P. tigris*, which some have argued can be split into three separate species through phylogenetic analysis - *P. tigris*; the Sumatran tiger *P.sumatrae*; and the Javan tiger *P. sondaica* (Zachos et al. 2013, p.3). The conservation of the single tiger species has proved challenging enough, increasing the number of tiger species threefold would clearly increase this burden on the conservationist. Although we may of course think that

the intraspecific diversity between the three populations is valuable, thinking of them as three separate species is likely to complicate matters. As Zachos et al state:

> Development of conservation plans and legal listings of non-existent species is a waste of resources. Acceptance of invalid species may hinder conservation and management plans, or lead to inappropriate translocation or captive breeding decisions (Zachos et al. 2013, p.5)

Despite the problem of 'species inflation' however, in other cases, the evolutionary concept may in fact be preferable for conservation purposes. Take the case of the Alabama sturgeon whose existence as a species was at the centre of a significant conservation dispute. The various corporate leaders and politicians who opposed the conservation of the fish on economic grounds attempted to prove in court that the Alabama sturgeon was not an independent species but in fact a population or sub-species of the common shovelnose sturgeon (Scharpf 2000). The biological species concept may have worked in their favour as it is likely that interbreeding would still be possible between the Alabama sturgeon and the common sturgeon. However phylogenetic analysis clearly showed the Alabama sturgeon to have been evolutionarily independent for a significant length of time and therefore, on the evolutionary species concept, to be a separate species. What both cases (the tiger and the sturgeon) have in common is that it is not necessarily scientific concerns but social, political and ethical concerns which play a significant role in determining the appropriate species concept to utilise in each case. As Ludwig (2015) argues:

> The case of the Alabama sturgeon is a helpful reminder that biological taxa often become agents in complex networks that include diverse entities such as the US Fish and Wildlife Service, industrial lobby groups, legal documents and laws, environmental activists, conservation policies and budgets, and so on. The introduction or elimination of taxa as well as reconsiderations of their boundaries can have considerable effects on these networks. (Ludwig 2015, p.1264)

Another case in which conflicting species classification systems might require the arbitration of non-epistemic values is in the use of Indigenous taxonomic systems for conservation purposes. Ethnotaxonomy has revealed the extent of differing taxonomic classification systems used throughout the world, often with some significant discrepancies when compared to the Linnaean system. For example, one study of the taxonomic system of the Kichwa people indigenous to the Ecuadorian Amazon found that:

> From the Linnaean taxonomic perspective, 86 taxa were identified, included in 26 families, and corresponded with 16 Kichwa ethnofamilies and 58 ethnospecies… one-to-one correspondence was registered between 35 Kichwa ethnospecies and Linnaean species, along with one case of over-differentiation and 21 cases of subdifferentiation. (Tobes et al. 2022, p.1)

Of particular interest here is the case of 'over-differentiation' in which the Kichwa taxonomic system distinguishes three separate fish species - *Muru shikitu*, *Hatun shikitu*, and *Yana shikitu* - where the Linnaean system only finds one - *Chaetostoma microps*. As Tobes et al. note:

> over-differentiation in local classifications generally occurs with organisms that are culturally important and highlights the awareness and sensibility that deep-rooted cultures have in recognizing subtle attributes in their environment. (Tobes et al. 2022, p.14)

In such cases, it is likely that recognizing the additional species classified by the Indigenous taxonomic systems will aid conservation efforts by ensuring that the types of biological diversity and difference that are valuable to people local to the area being conserved will be included as part of any biodiversity conservation strategy. This will in turn increase the engagement and trust of local people which is vital for the success of any conservation policy. Additionally, these Indigenous taxonomic systems are valuable and worthy of conservation in themselves, and their use in conservation policy can help to ensure the continuing existence and transmission of traditional ecological knowledge. The importance of this is reinforced by the emergence of a large body of literature on 'biocultural diversity' which links biological diversity with diversity of culture, and in particular language, showing how they are mutually reinforcing (Maffi 2001, Loh and Harmon 2005). This is not to say that in some cases the Linnaean taxonomic system won't in fact point out salient biological differences that have gone unnoticed by Indigenous taxonomic systems (the study of course also points to a significant level of 'subdifferentiation'), however I think it is clear that assessments of species richness can be enhanced through a constructive dialogue with Indigenous taxonomic systems in the area being assessed.

Putting aside the problem that differing species classification systems make for an account of species richness, there is an even more serious challenge to the use of species richness which has forced conservationists to look for other accounts of biodiversity. This is the claim that each species does not represent an equivalent amount of biodiversity. That is, even if we agree on a single conception of species to act as the unit of biodiversity, we still have not addressed the difference aspect of the units and difference problem. Or more accurately, using species richness alone to measure biodiversity assumes an egalitarian answer to the difference aspect of the problem. Species richness simply counts species and each species counts for one.

However, there are several commonly cited reasons for thinking different species represent different quantities of biodiversity. Firstly, while some species are young and have several similar sister-species belonging to the same genus; other species are far older, more geographically isolated, and have either very few or no sister-species in the same genus. These older, more distinctive species, represent a greater amount of evolutionary history and therefore, it is argued, make a greater contribution to biodiversity. Secondly, while some species have particularly distinctive traits, morphologies and behavioral characteristics (sometimes grouped together as 'functions'); others are very similar to several other species in their traits, appearance, behavior and other functional capacities. Once again, it is often argued that these functionally distinctive species represent more biodiversity than less distinctive ones. To illustrate both these points, consider the platypus - *Ornithorhynchus anatinus*. Located in Eastern Australia, it is the only surviving species in its family '*Ornithorhynchidae'*, a lineage which diverged from its most closely related mammalian ancestors around 166 million years ago, therefore representing a huge amount of

evolutionary history. They are also functionally distinctive - to say the least. So bizarre that after a specimen was first sent to Britain in the 18th century, some scientists initially thought it must be a hoax. It has a duck-like beak and webbed feet attached to a body and tail which resemble a beaver and is one of only five living mammal species that lays eggs. For these reasons, it is common to argue that a species like the platypus represents more biodiversity than, for example, the common fruit fly, *Drosophila melanogaster*, which belongs to a genus with over 1,500 described species.

§3.2 Phylogenetic Distance

The intuition that biodiversity should take into account differences between the amount of unique evolutionary history and divergence represented by a given species or lineage has resulted in the development of various different measures of phylogenetic distance. Such measures proceed through phylogenetics – a methodology which utilises genetic molecular data to reconstruct the genealogical structure of lineages, often depicted in tree-like diagrams called dendrograms in which diverging lineages are represented by splitting branches and branch length represents either time or evolutionary change. Mathematical operations can then be performed to quantify in various differing ways over this tree-like structure in order to produce biodiversity metrics. For example, a common measure is to calculate the branch length of the whole tree or the 'total phylogenetic distance'. If the branch length represents time, such a calculation will produce a result given in units of time, usually millions of years; whereas if it represents evolutionary change, branch length is constructed by quantifying over change in molecular characters. The greater the total branch distance, the greater the amount of evolutionary time/change

represented by a collection of taxa, and therefore one might argue, the more diverse this group of taxa is.

However, just as in the case of species richness, there are a variety of different ways one may quantify phylogenetic distance, producing slightly varying metrics which may conflict with one another. One study on the phylogenetic diversity of Amazonian tree communities utilized six different metrics for phylogenetic diversity:

'(1) the total phylogenetic branch length of all species occurring in a given community… (2) mean pairwise phylogenetic distance between species in terms of branch length… (3) mean nearest taxon distance and (4, 5 & 6) their equivalents, standardized for species richness.' (Coronado et al. 2015, p.1299)

An interesting issue raised by this study was that measure (1), the total branch length, covaried with species richness, simply because more species means more branches and a bigger overall tree – however this doesn't necessarily tell us much about the sort of phylogenetic diversity which conservationists are interested in. Once this measure was standardized for species richness (i.e. producing a measure which showed whether there was more or less phylogenetic distance than expected given the species richness of the area) we in fact get very different results compared to the total branch length in the non-standardized sense. On the non-standardized measure, the central Amazon had the greatest phylogenetic diversity since it is the most species rich, whereas once standardized for species richness, it was the Western Amazon which proved to be most phylogenetically diverse, and in fact the central Amazon was much less phylogenetically diverse than

expected given its species richness. The study therefore concluded that “the Western Amazon basin may hold a higher value for the conservation of lineage diversity” (Coronado et al. 2015, p.1304), illustrating how the values and interests of the researchers play an important role in determining which metric is the most appropriate for the measurement of phylogenetic distance.

Furthermore, even if a specific metric could be settled on as the best measurement of phylogenetic distance, there is still a clear conflict between maximizing phylogenetic distance and maximizing species richness which must be settled in order to determine assessments of overall biodiversity. This is because the sorts of conditions which produce phylogenetically distinctive lineages are generally the opposite to those which admit an abundance of species. Stressful conditions mean that lineages must adapt to survive and therefore are more likely to diverge significantly from their evolutionary ancestors as well as remain geographically isolated from them for longer periods of time. However, these same stressful and isolated conditions are likely to preclude the ability for large numbers of species to settle in such a location. Take for example the Devil’s Hole pupfish discussed by Kolbert (2021). Located in Death Valley National Park, Devil’s Hole is a small body of water amidst a vast desert. The pupfish is believed to have been washed into the pool at a time when the area was still submerged under water and as such has been geographically isolated - the only fish in this small pond - for millennia. As Kolbert writes:

> That harsh conditions should beget diversity is textbook Darwinism. In a desert, populations become physically and then reproductively isolated, much as they do on archipelagoes. The fish of the Mojave and the neighboring Great Basin Desert are, in

> this sense, like the finches of the Galapagos; each inhabits its own little island of water in a sea of sand. (Kolbert 2021, p.85)

The Devils' Hole pupfish would be represented by a fairly long branch on a dendrogram and therefore would contribute more significantly than many other species to a measure of phylogenetic distance, illustrating the conflict with species richness metrics according to which the pupfish would simply count as one species, the same as any other. The use of the phylogenetic metric therefore depends on the perceived value of evolutionary distinctiveness over mere species richness – a value which is manifest in the employment of a whole team of conservationists and security personnel to ensure the protection and future survival of the Devil's hole pupfish.

§3.3 Functional Diversity

Measurements of functional diversity attempt to represent diversity in functionally significant traits - "the range of things that organisms do in communities and ecosystems" (Petchey and Gaston 2006, p.741). It has been viewed as important in providing "a link between organisms and ecosystems" (Petchey and Gaston 2006, p.741) by explaining how the amount of different functional traits possessed by a community impacts on various ecosystemic processes. The focus of functional diversity is therefore on what it is organisms do – their behaviors and the impact of their physical characteristics or morphology on their surroundings - rather than the evolutionary history of lineages which is the focus of phylogenetic diversity.

Like species richness and phylogenetic diversity however, there are multiple different and often conflicting ways to understand and measure functional diversity. One of the main sources of contention in devising a measure of functional diversity is the question of which functional traits should be included and which excluded. Petchey and Gaston (2006) argue that the appropriateness of traits will depend on which ecosystemic processes one is interested in understanding – making measures of functional diversity dependent on the specific explanatory and practical interests of those researching it. As Petchey as Gaston state:

> one could produce a functional classification of organisms based on one set of traits (resource-use traits) and another classification with a different set of traits (e.g. pollinator traits) in mind. The two independently produced classifications would be produced for different reasons and not necessarily correspond well or nest within each other. (Petchey and Gaston 2006, p.743)

Petchey and Gaston also point to controversy over how many different traits should be used to produce functional classifications. They argue however that since functional diversity is used to "explain and predict variation in ecosystem level properties" the best way to select traits is to "pick ones that maximize the explanatory power of functional diversity" (Petchey and Gaston 2006, p.744). However, as I shall argue in §4, explanatory power is dependent upon our specific explanatory interests, and our explanatory interests can't be insulated from non-epistemic values.

A further controversy Petchey and Gaston point to is how to weight the value of each functional trait. They state : “different weightings can produce very different classifications and have important implications for relationships between taxonomic and functional diversity” (Petchey and Gaston 2006, p.744). The options for weighting functional diversity vary between egalitarian which according to Petchey and Gaston is fairly ubiquitous “for want of any alternative” (Petchey and Gaston 2006, p.744) or else somewhat ad hoc, such as in the case described by the authors where physiological trait of nitrogen-fixing ability was “given double the weight of all other traits’ because of its perceived importance” (Petchey and Gaston 2006, p.745).

Functional diversity is also liable to conflict with the other two varieties of diversity described above. It will conflict with species richness for many of the same reasons phylogenetic diversity did – stressful environments which encourage the development of novel traits will also prevent the establishment of a large number of species. The relationship between functional diversity and phylogenetic diversity is more complex, and often researchers have used phylogenetic diversity as a more ‘scientific’ way to capture functional diversity since phylogeny is considered to be less reliant on convention to quantify than selecting and prioritizing functional traits. This move has been described as “the phylogenetic gambit” by Mazel et al. (2018). They argue that it is functional diversity that conservationists should be focused on, “to keep humanity’s options open, and our common legacy as rich as possible” (Mazel et al 2018, p.2). However, since:

> we have imperfect knowledge about which, and how many traits and functions are important in a given context... Many researchers have… advocated for a hypothesis

> that we name the 'phylogenetic gambit'; that is, if species traits reflect their shared evolutionary history, then the pattern of that evolutionary history—their phylogeny—should serve as a useful stand-in for unmeasured and unmeasurable traits. (Mazel et al 2018, p.2)

The study finds that although the phylogenetic gambit "generally holds" (Mazel et al 2018, p.5) it is "a bet with associated risk, not a sure thing" (Mazel et al 2018, p.6) since maximizing phylogenetic diversity only results in an average of 18% gain in functional diversity compared to random selection and in fact, "in over one third of the comparisons, maximum PD [phylogenetically diverse] sets contain less FD [functional diversity] than randomly chosen sets" (Mazel et al 2018, p.1). They also state that, "a large body of literature has shown that maximizing PD does not maximize FD empirically or even in simple theoretical cases" (Mazel et al 2018, p.1).

Mazel et al. give the examples of contexts in which large carnivores co-exist with a close relative with distinct functional traits, such as a desert cat with a cheetah. In such cases, a prioritization scheme which maximizes phylogenetic diversity is likely to only select one of these carnivores despite the significant contribution to functional diversity of the other carnivore; and secondly, contexts in which lineages have evolved very slowly, such as the bats of New Guinea which diverged from one another long ago but all have similar traits. Maximizing phylogenetic diversity may mean prioritizing several or all of these bat species because of their lengthy evolutionary history, despite their functional similarity (Mazel et al 2018, p.5). Similarly, thinking back to our previous example of the devil's hole pupfish - despite its long evolutionary history, this pupfish can essentially only be

distinguished from other pupfish because of the absence of its pelvic fins (Kolbert 2021, p.65), again showing the tension between phylogenetic and functional diversity.

§3.4 Conflict Over Biodiversity Prioritization Rankings

The last sections §3.1-3.3 showed that there are significant tensions both within and between the different scientific conceptions of biodiversity. Even if consensus could be reached regarding how to classify species, or how best to conceive of and measure phylogenetic distance or functional diversity, each conception of biodiversity will pull in different directions, making it difficult to give overall biodiversity rankings and prioritize sites for the allocation of limited resources. In order to illustrate this, consider the following table which has been compiled using information found in a study comparing the coral diversity of various reefs surrounding the Keppel Bay Islands in Australia (Jones et al. 2011):

Reef Name	Characteristics	Ranking - species richness	Ranking - phylogenetic distance[5]	Ranking - functional diversity[6]
Pelican Island	Prone to frequent freshwater influx, sediment accumulation and warmer than average temperatures. Low abundance of species from the *Acropora* genus (common throughout every other reef in study) indicates conditions here prevent the proliferation of anything but the most stress-tolerant species.	4th	1st	1st
Humpy Island	Largest reef area in the study. Adequate tidal flushing prevents high water temperature and turbidity from reaching stressful levels and encourages exchange of coral propagules with surrounding reefs, including ones of lower diversity – therefore acting as a 'refugia'.	1st	3rd	2nd/3rd
Passage Rocks	Similarly to Humpy, this reef has adequate tidal flushing preventing stressful conditions and encouraging genetic exchange with surrounding reefs, thus acting as a 'refugia'. It is however 15 times smaller than Humpy despite still being very species rich – the 3rd smallest reef out of the 19 studied, yet the 2nd most species rich.	2nd	4th	4th
Halfway Island	Shallow reef prone to disturbance from high temperature and flood impacts. Although dominated by fast growing *Acropora* species, stressful conditions here have led to it being the 2nd highest for taxonomic distinctness because of the presence of stress-tolerant species. It is also connected to other lower diversity reefs through surface currents therefore acting as a 'refugia'.	3rd	2nd	2nd/3rd

Fig.4

Table comparing different biodiversity metrics in their application to ranking coral reef biodiversity (Constructed from information found in: Jones, Berkelmans and Houston 2011 329-355; doi:10.3390/d3030329).[45]

This table clearly displays the kinds of conflicts between the differing dimensions of biodiversity that a conservationist is likely to face. Pelican Island is the least species rich -

[4] I have assumed 'taxonomic distinctness' which is what is specifically measured in the study acts as a surrogate for phylogenetic diversity – this seems a reasonable assumption (i.e. greater diversity of taxonomic families represented at a site is likely to mean a larger distance covered in the phylogenetic tree)

[5] Functional diversity isn't specifically measured in the study so I have presumed rankings based on employing 'the phylogenetic gambit' while also trying to take into account information on each reef contained within the study. These functional rankings are therefore highly speculative but serve to show the sorts of conflicts between differing types of diversity which conservationists may face – from what I have said so far, it should be clear these conflicts are likely to arise.

stressful conditions on this reef such as turbidity and warmer temperatures mean the reef can't support large numbers of species. In particular species from the *Acropora* genus which is by far the most abundant and species rich genus in the study were notable for their relative absence here. However, these same stressful conditions led to the evolution of two stress-tolerant species from a genus *Echinophyllia* not found on any other reef in the study, meaning it is ranked first for phylogenetic diversity. Humpy Island on the other hand is by far the most species rich reef in the whole study but ranks third for phylogenetic diversity. How should conservationists prioritize between Pelican and Humpy? It seems the only answer can lie in the explanatory and evaluative context in which the research is being carried out. In this case, the stress tolerant species found at Pelican was of particular conservation value, given their tolerance to warmer temperatures which may be seen as functionally very significant for reef stability in the face of global warming. Given this evaluative context, it is likely that phylogenetic and/or functional measures should be taken as primary in this case. As I shall argue in the next section §4, allowing for these sorts of contextual considerations to play a role in determining biodiversity prioritization rankings is the only way to settle the conflicting implications of differing biodiversity metrics, posing a problem for the naturalist.

§4. Conflicting Metrics as a Problem for Biodiversity Naturalism

The presence of conflict within and between different scientific biodiversity metrics poses a problem for the naturalist since they must be able to offer a value-free reason for the selection of one metric over another as best-suited for capturing the actually existing diversity between biological entities. The biological world can be carved up in multiple

different ways depending on which units and differences we decide to pick out in quantifying biodiversity. This means that in order to prioritize different sites, species or populations as contributing more or less biodiversity than others, which is the practical role of the concept within 'the biodiversity paradigm' of conservation, conservationists and researchers must be able to decide which of these different ways of carving up the world is best or most appropriate. However, it seems that any such decision must depend on what is taken to be the most *valuable* type of diversity and difference in that context. This appears to be inconsistent with the naturalist picture of biodiversity as a value-free scientific concept. Sarkar makes a similar argument, stating:

> … efforts to decide between scientific definitions of biodiversity inevitably end up requiring the use of extra-scientific criteria. (Sarkar 2019, p.377)

Maclaurin and Sterelny also express similar concerns when it comes to selecting one metric over another:

> measurement requires us to identify the explanatorily salient dimensions of diversity, because there will always be some way of comparing (say) one wetland to another that will count the first as the more diverse, and another procedure that will reverse the result. (Maclaurin and Sterelny 2008, p.133)

They argue that such decisions can be made through considering our explanatory interests in an attempt to insulate these decisions from broader social and ethical non-epistemic concerns:

> Species richness, supplemented in various ways, is a good multipurpose measure of biodiversity… So we supplement it phylogenetically if our interest is in the ecological processes that build a biota; genetically and demographically, if we are interested in the conservation biology of the species in the system; phenotypically if our interest is in the way richness buffers disturbance. (Maclaurin and Sterelny 2008, p.173)

The issue with this however, is that our explanatory interests are ultimately driven by non-epistemic factors. Ludwig (2016) also make this point, arguing that in the case of conservation biology "it is almost trivial that non-epistemic concerns shape the explanatory interests of researchers", and that therefore, "biologists in a society with different non-epistemic interests would have different explanatory interests and would therefore end up with different ontologies" (Ludwig 2016, p.1261), and we might add here – different conceptions of biodiversity. Maclaurin and Sterelny ultimately come to concede this towards the end of their book when they state:

> We cannot choose what properties to conserve without an account of conservation aims… we finally have to move beyond purely empirical issues about the driving properties of systems to claims about the goals of conservation biology. (Maclaurin and Sterelny 2008, p.148)

§4.1 A Naturalist Response

The strongest available naturalist response to this problem comes from Lean (2017) who argues that a scientific explication of the biodiversity concept can be evaluated in the same way as explications of other scientific concepts, pointing to the criteria provided by Sober (2000) for a successful explication of the species concept as a blueprint which could be followed. In effect, Sober's criteria function as epistemic values or virtues which any good species concept should possess – the values referred to are constitutive of good scientific explication rather than being external to science in the way that social and ethical values are supposed to be. Lean produces his own list of epistemic values for a good explication of the biodiversity concept, which he argues are possessed by the phylogenetic account. These criteria and his arguments regarding their application to phylogenetic diversity can be summarized as follows:

1) *Tractability* - In order for a biodiversity measure to be 'tractable' it must "be able to consistently identify features across multiple biological systems" (Lean 2017, p.1087). Lean argues that phylogenetic measures are tractable in this sense because DNA is "ubiquitous to everything we conventionally call living" allowing for "the comparison of differences between species with very few features seemingly in common" (Lean 2017, p.1092). Lean argues that it is also "resistant to gerrymandering" (Lean 2017, p.1092) since one cannot arbitrarily add further features or characters into the equation in order to alter the resulting measure of biodiversity (as one could with a morphological or functional character set).

2) *Representativeness* - For a measure to be representative it must be able to successfully incorporate or correlate with the variation in units identified by other measures. According to Lean, "regions or species which are described as biodiverse under other measures tend to also appear biodiverse under phylogenetic measures" (Lean 2017, p.1093).
3) *Theoretical Fundamentality* - Lean argues that lineage structure is more fundamental than species since it is lineage relations that ground taxonomic inferences, making species a sub-set of lineages within the larger phylogenetic structure. Basing biodiversity in the more fundamental property of lineage relations, Lean argues, enables us to capture *diversity* within species and between species.
4) *Normatively Demanding* – Lean argues that "given its role in conservation", biodiversity must be "desirable for prudentially rational agents" (Lean 2017, p.1088). He connects phylogenetic diversity to normativity through "a general bet-hedging strategy in which we preserve the best range of biological features for the future" (Lean 2017 p.1094). Lean refers to this value as "option value" and suggests that it is valuable "to agents who prudentially account for risk in the future" and that it is "distinct from the various immediate instrumental values we have for the environment" (Lean 2017, p.1095).

Of these criteria, the first three appear to be epistemic considerations, whilst the fourth, given its explicit reference to normativity, must surely be considered a non-epistemic reason for preferring one account of biodiversity to another. At first glance then, we might wonder whether Lean is really defending a form 'naturalism' here. However, given his own set-up of the naturalist (or realist) position as, "attempting to find the best account

of biological difference and connecting it to normativity through prudential reasoning" (Lean 2017, p.1084), we can perhaps understand the first three criteria as justifying phylogenetic diversity as "the best account of biological difference", and this fourth criteria to be "connecting it to normativity through prudential reasoning".

In the case of the first of Lean's criteria then, the 'tractability' of phylogenetic measures over species and functional measures is, I would agree, one of its key advantages. As we saw in the case of species richness and functional diversity, different contexts will require different species concepts to be used or different functional traits to be included. Evolutionary history however is possessed by all life, giving it more plausibility as a common currency to measure across different contexts. However, despite this, phylogenetic diversity may not be *as* 'tractable' as Lean argues. As I showed in section §3.2, there are a variety of different ways to quantify over phylogeny which can produce quite different results – in particular we may question to what extent phylogenetic measures should be standardized for species richness.

Furthermore, 'tractability' appears to me to be mostly of pragmatic rather than epistemic concern. The tractability of phylogenetic measures may make them *convenient,* however presumably the naturalist would want to question the importance of such a practical concern in finding the best *scientific* account of biodiversity. As Maclaurin and Sterelny state: "There are reasons to do with time, resources and commensurability to prefer a one size fits all measure", however, "political will, ease of measurement and availability of data cannot trump the facts about the forms of diversity that have driven a system in the past, and that drive it now" (Maclaurin and Sterelny 2008, p.173-174).

In the case of criteria (2) and (3), there are clear objections to Lean's reasoning. Firstly, in the case of (2) 'representativeness', we have extensively shown throughout this chapter that phylogenetic diversity is not representative of other measures – there are clear cases of conflict with both species richness and functional diversity. As for (3) 'theoretical fundamentality', this criteria reflects a preference for reductionism which, without additional argumentation, is unjustified. There is simply no good reason to think that reductionistic theories are epistemically more virtuous.

Given these issues, I argue that Lean has not successfully shown us that phylogenetic diversity is "the best account of biological difference" on purely epistemic grounds. In fact, there are alternative epistemic virtues we might list which would support utilizing alternative biodiversity measures, and it seems there is little reason to prefer one set of epistemic virtues over another. For example, rather than 'tractability' we may think that context-sensitivity is important. We may think it is important to have different measures of biodiversity which are tailormade to be appropriate for different contexts and questions. Another example might be that instead of 'theoretical fundamentality' we may value 'ontological heterogeneity', to appropriate one of Longino's (1996) feminist theoretical virtues. This, "grants parity to different kinds of entities", rather than treating, "differences as eliminable through decomposition of entities into a single basic kind" (Longino 1996, p.46). This would entail a preference for an account of biodiversity that recognizes not only the diversity of lineages – seeing lineage as a fundamental level which captures all other differences – but also recognizes diversity at other levels, such as species, functional traits, habitats and ecosystems.

An additional issue for the naturalist credentials of Lean's account is his reliance on 'option value' as a reason to prefer phylogenetic over other measures. Although, as Lean describes it, he is simply connecting the best biological account of difference "to normativity through prudential reasoning" (Lean 2017, p.1084), 'option value' still acts as a non-epistemic reason for the selection of phylogenetic diversity over other measures, and as such option value is prioritized over values which might be best captured by other measures of diversity. As such, even Lean's purported naturalist (or as he calls it 'realist') conception of biodiversity seems to ultimately depend on value-claims. As I will show in the next section §5, the prioritization of option value over other values related to ecosystem services and productivity has a significant impact over the appropriate scale at which biodiversity should be measured and ultimately over the appropriate aims for conservationists to have regarding invasive species.

§5. Values and Scale

A common distinction which is made when measuring biodiversity regards the scale at which biodiversity should be measured, according to which biodiversity measures are distinguished into 'alpha', 'beta' and 'gamma' diversity (Hill et al. 2019). Whereas 'alpha' measures of diversity are local, taking into account only one site, 'beta' diversity is intended to measure the variation between sites, or what Sarkar calls 'complementarity' (Sarkar 2001). So for example, imagine three hypothetical sites being considered for conservation, site A is the most species rich, followed by B, then C. However, suppose A and B share many of the same species, whereas C, despite having less total species, contains some species

which neither A nor B has. Taking beta diversity into consideration could lead us to prioritize A and C rather than A and B – despite B being more species rich than C, perhaps considerably so. Additionally, gamma diversity measures diversity over a whole landscape – so for example it might measure species richness across all of A, B and C, or could also be used to refer to global measures which measure the contribution of a site or species to diversity across the whole planet.

In this section, I will consider how one common argument against the control of invasive species hinges on a conflict over the scale at which biodiversity should be measured. In turn, I will argue that reasons for measuring at any one scale rather than others hinge on conflicting claims regarding the values that the biodiversity concept should be capturing.

The argument against invasive species control is reconstructed by Lean (2021) (who presents objections to the argument in his paper), as follows:

> 1. We should not control populations if they promote ecosystem services (more than any readily available alternative).
> 2. Invasion often increases biodiversity.
> 3. More biodiversity results in more ecosystem services.
> 4. Invasive species often promote ecosystem services (2, 3).
> Conclusion: We should not control invasive species as they often promote ecosystem services (1, 4). (Lean 2021, p.2)

The argument depends on connecting an 'alpha' or local measure of species richness to a conception of ecosystem services which focuses primarily on measures of biomass productivity and resource cycling – which Lean refers to as the biodiversity-ecosystem services (BES) framework. The BES framework appears to support the conclusion that we should not control invasive species since "invasive species can increase the number of species locally" (Lean 2021, p.3) which, according to the BES framework, will result in increased levels of resource cycling and biomass production - functions that underpin many of the crucial services which ecosystems provide to human beings.

Lean objects to the argument in his paper on the grounds that the argument depends on untenable conceptions of both biodiversity and ecosystem services. In the case of biodiversity, Lean argues that the argument depends on understanding biodiversity only in terms of local or alpha species richness - increases in which are presented as sufficient for claiming increases in biodiversity generally. For example, Lean quotes Pearce (2015) as an example of an advocate of this stance:

> Rather than reducing biodiversity, the novel new worlds that result (from invasives) are usually richer in species than what went before. (Pearce 2015 in Lean 2021, p.3)

However, as Lean argues, this conception of biodiversity as local species richness deployed in the arguments of invasive species sceptics is only part of the picture:

> Local increase in species richness has been coupled with global species loss… if you add many common nonindigenous species to an area but lose fewer endemic or rare

> native species there will be increasing local species counts and global species loss. Australia (and the world) has lost the desert bandicoot (Perameles eremiana) but gained the red fox, cat, black rat, and common pigeon; a triumph! (Lean 2021, p.3)

The reason for the BES framework's insistence on the significance of alpha measures of species richness is due to its potential connection with ecosystem services, since local diversity is the only scale at which diversity could feasibly impact on ecosystem functioning (Vellend 2017). However, Lean argues once again here that the invasive species sceptic must rely on a narrow understanding of ecosystem services in order to justify their argument. Despite there being a vast array of services which ecosystems provide to people, some of which are particularly difficult to quantify, "empirical research on such services historically has narrowed its focus to predominantly the relationship between species richness and biomass or net primary production" (Lean 2021, p.4). Such a focus on productivity "stacks the deck towards invasive species" (Lean 2021, p.4) since the very properties which make invasive species invasive also make them efficient cyclers of nutrients and producers of biomass. At the same time, the emphasis on productivity is particularly inept at assigning value to rare, threatened and endangered species which, due to their lack of abundance, are often functionally extinct meaning "they are not able to have strong effects on the ecosystem they reside within" (Lean 2021, p.4). The argument against invasive species control and its insistence on local-scale biodiversity measures is therefore dependant on an evaluative stance which emphasises the value of ecosystemic productivity and nutrient cycling above other commonly held environmental or ecological values.

In order to illustrate that the conflict over the correct scale at which to measure biodiversity is a conflict over *values*, consider that in objecting to the argument and advocating for the importance of beta and gamma measures of biodiversity, Lean points to other values which are neglected by the invasive species sceptic's normative emphasis on biomass production and nutrient cycling. Firstly, he points to aspects of ecosystem services which are not captured by productivity, such as the "cultural services" provided by rare and endemic species which are often important focal points for cultural traditions and recreational activities (Lean 2021, p.6). Secondly, Lean points to values which aren't captured by the ecosystem services normative framework at all but could and should be captured by the biodiversity concept directly. Lean points to both heritage value and option value as examples of values which can be captured by measures of biodiversity which go beyond local species richness to include uniqueness ('beta' diversity) and global diversity ('gamma' diversity).

Heritage value, Lean states, "is created by local people interacting with their local ecological systems over time" (Lean 2021, p.6). According to Lean, this local heritage value is dependent upon the uniqueness and distinctiveness of the species and ecosystems with which local people interact and is therefore best captured by 'beta' biodiversity which measures such uniqueness. At the global scale, Lean argues global species richness has global heritage value, "comparable to the collection of human sites like the pyramids of Giza or Stonehenge" (Lean 2021, p.7). The conservation of such global species richness is, Lean claims, "the archetypal commitment of environmentalism" (Lean 2021, p.7).

Additionally, Lean claims that the option value of species which may become useful in the future clearly can't be tracked by local richness and is best captured by 'beta' and 'gamma' diversity measures. Lean therefore argues that the prioritization of heritage value and option value supports the adoption of a broader biodiversity concept than is adopted by invasive species sceptics. Such a conception of biodiversity would in fact be negatively impacted by species invasions and is therefore unable to carry the argument against controlling invasive species presented above.

Establishing the truth of premise (2), 'invasion often increases biodiversity' of the argument against invasive species control therefore depends on the resolution of a value-conflict. If the invasive species sceptic is correct to prioritise productivity as a key indicator of ecosystem services and ecological value generally, then the biodiversity concept should be defined and measured in such a way as to (at least potentially) have a statistical relationship with productivity – i.e. as local species richness. Whereas, if the proponent of invasive species control is correct to insist on the significance of heritage and option value, then biodiversity should be defined and measured so as to track these values instead. As such, the conflict over the appropriate aims for conservationists to adopt regarding invasive species is most appropriately understood as a conflict over values: invasive species sceptics prioritise the value of the ecological functions performed by invasives in producing biomass and cycling resources; while proponents of invasive species control prioritise the heritage and option values of the rare, unique and endemic species which are threatened by invasions.

Lean in fact recognises this value-ladenness in his paper, stating: “Now one could argue that this dispute is about differing values rather than equivocation. It is, in one sense” (Lean 2021, p.7). However as Lean rightly notes, by disguising their own particular values within the general concepts of biodiversity and ecosystem services, the invasive species sceptic could be accused of “a rhetorical decision to equivocate for the means of engagement with conservations aims” (Lean 2021, p.7). As Lean states:

> What is required of such critics is a direct argument we should narrow the goals of conservation for there to be an honest debate about values in conservation. (Lean 2021, p.7-8)

On this point, I certainly agree with Lean. As I shall go on to argue in Chapter 5 of this thesis, ‘explicitness’ regarding the values which underlie the concepts used to state the aims of conservation is one of the vital conditions for their objectivity. Any use of value-laden concepts such as biodiversity must be accompanied by open and inclusive deliberation regarding the values that are encoded by that concept.

§6. Value-Ladenness and Biodiversity Deflation

Accepting the inherent value-ladenness of biodiversity has led some philosophers to embrace a deflationary view according to which biodiversity should simply function as a “placeholder” (Santana 2014, p.765) for whatever biological features are deemed worthy of conservation. Take Sarkar’s position that “normative discussion of what merits conservation determines what constitutes biodiversity” (Sarkar 2019 p.379) which deflates biodiversity to

the point of merely reflecting, rather than guiding, our normative reasoning regarding what we ought to conserve. As a result of his acceptance of value-ladenness, Sarkar argues that the most salient question becomes *whose* values are given weight in determining what constitutes biodiversity. He goes on to oppose global values with local values arguing that it is local values which must determine what constitutes biodiversity in any given context, since, "what one community… values should not be transferred without consent to the habitats of other communities" (Sarkar 2019 p.384).

This stance ultimately leads Sarkar to suggest that, for example, in the case of some Indian villages where tigers are disvalued, often for legitimate reasons after the human rights violations and evictions carried out under the banner of the 'Project Tiger' conservation project, "tigers would not necessarily be enshrined as a component of biodiversity" (Sarkar 2019 p.388). I suspect this is the sort of statement that makes naturalists uneasy and, the naturalist would argue, is the exact sort of relativistic conclusion they warned an acceptance of value-ladenness would inevitably lead to. However, might there not be a better path for the normativist?

I agree that Sarkar is right to shift the emphasis on to whose values are represented in conceptions and measures of biodiversity. He is likewise correct to highlight how the notion of biodiversity as a "global heritage" (Sarkar 2019 p.381) has led to instances of the mass displacement of Indigenous Peoples for the creation of protected areas with increasingly militarized security, sometimes referred to as "fortress conservation" (Brockington 2002). However, these considerations need not lead to Sarkar's deflationary

conclusion that species which present a conflict with local values should be excluded from measures of biodiversity.

To take Sarkar's example, in cases where local people disvalue tigers because of the accumulated lack of trust created by the poor conservation policies of the past, this should not lead us to exclude tigers as a component of biodiversity. Such an exclusion is ad hoc since it does not depend on the selection of a specific measure of biological difference according to which tigers would not feature as a priority, but rather singles out one specific species for exclusion regardless of any measure of its biological distinctiveness. Sarkar himself provides "adequacy conditions" (Sarkar 2019 p.393) which would seem to rule out the disqualification of tigers proposed by his own example. In particular, the condition he terms "embrace taxonomic spread" states: "It is particularly important that the definition does not… place arbitrary limitations on the taxa permitted to fall under the scope of 'biodiversity'" (Sarkar 2019 p.393). However, on any measure of such 'taxonomic spread', be it phylogenetic or functional, tigers will likely carry a significant weight within that measure (since they are both phylogenetically and functionally distinctive). Values can guide our selection of one measure over another, however the exclusion of a single species in spite of its contribution to a given measure can only be seen as arbitrary. Ad hoc exclusions such as this fly in the face of a concept which is supposedly about difference and diversity - about capturing the value of species that people may overlook or disvalue because they still contribute to the overall variety of life.

However, there can be independent ethical reasons to not pursue a forceful policy of tiger conservation in such areas without the consent and trust of local people. These

independent reasons need not be enshrined within the concept or measure of biodiversity itself – unless like Sarkar you think biodiversity must always align exactly with what should be conserved. However, it seems to me clearly unproblematic to think that biodiversity, including tigers, is good – but so is not forcing a biodiversity conservation policy on people without their consent. At times, these goods might come into conflict, however there is no need to conceptually align biodiversity with the more complex question of what should be conserved. Rather, the biodiversity concept should be able to *give us a reason for* conserving something, albeit a defeasible reason.

Accepting value-ladenness while resisting deflation leads to a middle-ground position which can capture the best of both worlds from normativist and naturalist accounts of biodiversity. With the naturalist, we may grant that biodiversity is a scientific concept, best explicated in terms of some empirical measure or metric. There should be no ad hoc exclusions from or inclusions to this measure – whatever measure and scale is chosen, it should be applied fairly and generally to the entity being investigated, be that an ecosystem, landscape or population. The results provided by such a measurement should then be able to give us a good (but not absolute) reason for taking certain conservation decisions which maximize biodiversity so-measured.

However, this understanding of biodiversity as a scientific concept is entirely compatible with it being a normative concept. As such, with the normativist we may agree that choosing the best scientific account of biodiversity and the most appropriate surrogates for measurement is a decision which requires the input of social and ethical values and may differ in differing contexts. Furthermore, like the normativist, I suggest that

the social and ethical values which determine the selection of a biodiversity metric in a given context should be arbitrated through a procedure of stakeholder engagement, a point I will expand on further in Chapter 5. As I shall argue in that chapter, in order to ensure the objectivity of such a procedure, a diversity of values must be included. In particular, those who are likely to be impacted by conservation decisions should be integral to these procedures. The different scientific options and their likely implications for conservation decisions should be fully explained to non-specialist and public stakeholders to allow for informed consultations. I will argue that such a constructive engagement between scientists and public stakeholders is the best route to ensure that diverse values can be included in the process of defining and measuring biodiversity and therefore of increasing the objectivity of scientific research into biodiversity.

§7. Conclusion

In this chapter, I argued that values play an essential role in defining and measuring biodiversity. I examined three different scientific accounts of biodiversity: species richness, phylogenetic distance, and functional diversity – showing that there was conflict both within and between each account. I argued that such conflict presents a problem for the biodiversity naturalist since values are required for the selection of one account over any other in assessing biodiversity and constructing biodiversity prioritization rankings. I then considered a potential naturalist response to this argument which attempts to provide epistemic reasons for the primacy of a phylogenetic account of biodiversity provided by Lean (2017). I objected that these epistemic reasons either fail to support the primacy of the phylogenetic account or else themselves are dependent on non-epistemic factors. I then

argued that the scale at which biodiversity is measured also seems to be dependent on non-epistemic factors by considering the way in which conflicts over scale impact on a recent argument against invasive species control. Finally, I argued that the dependence of biodiversity measures on non-epistemic social and ethical values should not lead to Sarkar's position of 'biodiversity deflation' whereby the concept becomes a placeholder for "normative discussion of what merits conservation" (Sarkar 2019, p.379). Biodiversity measures, although chosen partly for non-epistemic reasons, should also be able to act as a useful guide for our normative reasoning concerning what should be conserved, rather than simply reflecting such reasoning. However, such a guide is none the less defeasible and may be outweighed by other conservation aims as well as broader social and ethical concerns.

In the next chapter, I will consider what the value-dependence of biodiversity, as well as the other conservation aims I have considered in this thesis, means for the objectivity of conservation science. I will argue for a 'procedural' view of objectivity according to which value-claims, rather than being purified from conservation science, should in fact be stated explicitly and critiqued through an inclusive and fair arbitration procedure in which the values of a diversity of stakeholders can be bought to bear and, when required, act as a check on dominant or overlooked assumptions and values.

Chapter 5

Objectivity and The Aims of Conservation

In Chapters 2, 3 and 4 of this thesis, I showed how several of the key concepts used to frame conservation aims are value-laden. Naturalness, ecosystem health and biodiversity, I argued, are all dependent upon value-judgements for their definition and measurement. Differing value-claims will lead to different conceptions of the aims of conservation and therefore different understandings of these key concepts in conservation science. In this chapter, I will seek to understand what this value-ladenness means for the objectivity of conservation aims. In doing so, I will make use of a framework devised by Alexandrova (2018) for making sense of objectivity in the science of well-being. Alexandrova argues that the science of well-being should be thought of as a 'mixed-science' which requires a 'procedural' conception of objectivity. I will argue that conservation science is also a 'mixed science' and similarly requires a 'procedural' conception of objectivity. I will conclude by considering and responding to some problems for the application of such a 'procedural' account of objectivity to conservation science.

§1. Conservation as a 'Mixed Science'

Alexandrova (2018) uses the term 'mixed science' to refer to fields of scientific inquiry that make use of 'mixed claims' – these are hypotheses regarding putative causal or statistical relations where, "at least one of the variables is defined in a way that

presupposes a moral, prudential, political, or aesthetic value judgement about the nature of this variable" (Alexandrova 2018, p.424). Alexandrova argues that 'mixed sciences' have a distinctive type of value-ladenness, separate from the ways in which other sciences are value-laden. She lists five ways in which non-epistemic values have been said to play a role in science generally, arguing that mixed-science is distinct from each. These are:

1) **Values as reasons to pursue science** – science depends on the normative stance that knowledge is valuable, however this does not imply that individual claims within science might need to presuppose a moral standard.
2) **Values as agenda-setters** – Normative commitments regarding what is important and worth studying often set the agenda for research programs. This is however distinct from values determining the meanings of specific claims within those research programs once the agenda has been set.
3) **Values as arbiters between underdetermined theories** – Values are sometimes called upon to decide between two theories that are equally confirmed by evidence. However this is distinct from the role of values in mixed-claims where it is the definition of the terms within the claim itself that are dependent upon values. Values may be used to adjudicate between two equally confirmed mixed-claims however this is distinct from the meanings of the claims themselves being value-dependent.
4) **Values as determinants of standards of confirmation** – Values may be important in informing how much evidence is required for the confirmation of a given claim, especially when for example, the consequences of accepting a given claim are serious. This is again distinct from mixed-claims – they would still be value-laden

even if we decided that moral considerations are not relevant to the standards of confirmation.

5) **Values as sources of wishful thinking and fraud** – There are cases in which values have entered scientific practice as sources of wishful thinking or fraud, a scientist may fake data in order to confirm a theory upon which their career depends for example. However, this is clearly distinct from the meanings of concepts within a scientific hypothesis being value-dependent. As Alexandrova notes, even if mixed claims turn out to be illegitimate, it should be for different reasons than the illegitimacy of wishful thinking and fraud. (Alexandrova 2018, p.427-428)

Alexandrova's paper specifically deals with the science of well-being, however as I shall argue throughout this chapter, much of the same can be said about conservation science, which as I have established up to now in this thesis also employs concepts which are "defined in a way that presupposes a moral, prudential, political, or aesthetic value judgement about the nature of this variable" (Alexandrova 2018, p.424). Certainly each of the other five types of value-ladenness are at work in conservation science as well, but what makes conservation science distinctively value-laden, like the science of well-being, is its 'mixed' nature.

To illustrate just what is meant by a 'mixed claim' and to show the parallels between the science of well-being and conservation science, consider these illustrative examples. First, take one of Alexandrova's cases from the science of well-being:

(a) Economic growth promotes well-being.

There are numerous different accounts of well-being and which one is chosen will have a bearing on well-being's relationship with economic growth and therefore on the truth of this 'mixed claim'. Alexandrova explains that research has shown that higher income tends to improve 'evaluation of life' but not 'emotional well-being' and therefore:

> Depending on whether scientists use life satisfaction measures (which capture evaluation) or happiness measures (which capture emotional well-being), they will reach radically different verdicts on whether economic growth promotes well-being. (Alexandrova 2018, p.438)

Now consider the following claims in conservation science taken from previous chapters:

(b) Restoring lost species to an ecosystem will constitute a more natural ecosystem.
(c) Sheep grazing has led to ecosystem degradation in the uplands of mid-Wales.
(d) Species invasions often increase biodiversity.

These claims, like claim (a), should be considered as 'mixed claims'. In the case of (b), as we saw in Chapter 2, the truth of this claim will depend on the underlying values that are captured by differing understandings of naturalness. If we understand natural value as being constituted by the independence of an ecosystem from human purpose and intention, then we will conceive of naturalness as non-intervention, leading us to reject claim (b). This is the position adopted by Katz (1997) in his argument against ecological restoration. However, if we understand natural value to be constituted by continuity with the past state of an

ecosystem prior to some human disturbance then we will understand naturalness in terms of this historical continuity, leading us to accept claim (b).

In the case of claim (c), as we saw in Chapter 3, conflicting value-claims regarding grazing sheep on the Welsh uplands led to differing understandings of the health and degradation of these ecosystems. While both parties may agree with claim (c) to some degree, there is a conflict regarding the extent of its truth. Those in favour of a rewilding approach describe the uplands as sheep-wrecked and argue for the removal of sheep from large areas to allow for forest regeneration, while local communities are more inclined to stress how social and economic pressures to produce cheaper meat have led to changes in farming practices that have caused ecosystem degradation and therefore prefer a reversion to traditional farming practices and a more pastoral conception of the health of the uplands.

In the case of claim (d), the truth of this claim depends on the scale at which biodiversity should be measured. As we saw in Chapter 4, conflict over the appropriate scale for measurements of biodiversity is dependent on conflict over the values which the biodiversity concept should be capturing. If the value of biomass productivity and nutrient cycling is prioritized, this will favour a local measure of biodiversity and will support the truth of claim (d); whereas if option and heritage value are prioritized then this will favour 'beta' and 'gamma' or global measures of biodiversity and lead to the rejection of claim (d).

The value-dependence of claims (b), (c) and (d) and many others like them throughout conservation science makes it appropriate to call conservation a 'mixed science'. In fact, in the case of conservation science there is also an additional meta level at which

value-dependence occurs since, not only are concepts such as naturalness, ecosystem health and biodiversity dependent on values for their definition, but so are decisions about how to weigh these different aims and the values they represent in cases where they conflict with one another (as well as with other social values beyond the scope of conservation) – decisions which must be made in order to establish the overall aims of a given conservation project. For example, in cases of coral reef conservation where the methods of synthetic biology are deployed to assist the evolution of heat and stress-tolerant traits in coral populations, conservationists have to consider to what extent the naturalness of coral populations, in terms of their independence from significant human interventions like genetic engineering, is worth sacrificing in order to maintain the 'health' of those systems. Another example may be the extent to which resources and funding should be invested in conserving biodiversity understood as rare and unique species or lineages as opposed to maintaining the valuable ecosystem functions which constitute ecosystem health. Although there may often be an overlap here, since a healthy ecosystem should be able to support a diverse range of species, there is also likely some divergence as phylogenetically distinct lineages don't necessarily play crucial roles in ecosystem functioning, resulting in a difference in emphasis between the ecosystem health and biodiversity frameworks so understood. As such, both the *individual concepts for describing conservation aims* and *the overall aims for a given project* are value-dependent.

§2. Objectivity and Values

What does the value-dependence of claims regarding the aims of conservation means for their objectivity? Objectivity, of course, is a concept which has been interpreted and understood in many different ways throughout the history of philosophical discourse. As such, referring to objectivity can come across as confusing and overly-abstract. Some philosophers, such as Hacking (2015) warn against "talking about objectivity" (Hacking 2015, p.19) seeing it as an "elevator word" which "does nothing to help us with a ground-level question" (Hacking 2015, p.20). Although I am sympathetic to this point, concerns around objectivity point to some key issues that arise in light of the value-dependence of conservation aims that must be addressed. Having some account of the objectivity of mixed claims in conservation science is, I will argue, crucial to countering accusations of relativism and ensuring that conservation doesn't impose value-commitments on to ecosystems and people.

§2.1 Value-Independence and The 'View from Nowhere'

Objectivity in the sciences has traditionally be defined as inherently opposed to value-ladenness, a view which has become known as the value-free ideal (VFI). The VFI states that scientific justification should ideally proceed independently of any social or ethical values (Lacey 1999, Reiss and Sprenger 2020, Dorato 2004). It is motivated by the intuition that scientific claims should be true or false independently of our values towards them - scientific truth, it is often said, should ideally be impartial and free from bias. In order

to retain this impartiality, defenders of the value-free ideal impose a stringent fact/value dichotomy according to which science should deal only with facts about what is, rather than normative claims about what should be. This comes with the important caveat that epistemic values – values which are supposedly "indicative of truth or knowledge" (Elliott 2022, p.4) such as: empirical adequacy, explanatory power, simplicity and internal coherence – are permitted as necessary internal norms for scientific inquiry. According to this view, only 'facts', purified of all their non-epistemic evaluative content, can attain the status of objectivity.

This sense of objectivity as value-freedom is often understood as intimately related to the realist intuition that scientific theories attempt to accurately describe a mind-independent reality, or carve nature at the joints. For science to do this, it is argued, it must form a conception of what Nagel (1986) terms a "view from nowhere", that is, an understanding of the world as it exists independently of any particular standpoint or perspective. According to Reiss and Springer (2020) alluding to this 'view from nowhere' is attractive for the purposes of "settling disagreements, explaining the world, predicting phenomena, and manipulation and control" (Reiss and Springer 2020, p.4):

> … there is something appealing in the idea that factual disagreements can be settled by the very facts themselves, that explanations and predictions are grounded in what's really there rather than a distorted image of it. (Reiss and Springer 2020, p.4)

Acquiring this 'view from nowhere' is thought to require the purification of scientific claims from non-epistemic values since, it is thought, these values are inherently dependent on the

adoption of a particular perspective or standpoint. To value anything at all requires one to take a view from somewhere, since evaluations essentially must involve both a valuer and a valuee. In order to describe the world as it is therefore, independently of any perspective, the traditional conception of scientific objectivity demands that the truth of scientific claims and theories aren't dependent upon evaluative judgements.

§2.2 Objectivity and 'Mixed Claims'

In order to illustrate more clearly what is meant by objectivity, consider two claims which are intended to present a simplified distinction between the paradigmatically objective and subjective:

(e) A carbon atom has six protons in its nucleus.

(f) Chocolate is the best flavour of ice cream.

According to the traditional notion of scientific objectivity, claim (e) is thought to be objective because it does not depend on the adoption of any particular perspective or viewpoint. The number of protons in a carbon atom remains the same regardless of our socio-cultural standpoint, and this is explained by the fact that carbon atoms really do have six protons in their nucleus. This claim about carbon is therefore said to carve nature at the joints - it picks out an attribute of reality that is present regardless of any human mind or perspective. Claim (f), on the other hand, is thought to be subjective because it expresses a personal preference and nothing more. It is not an attempt to describe a mind-independent reality but rather an evaluation of a part of that reality – namely ice-cream flavours.

Where then do claims (b) (c) and (d) (the claims I listed in §1 - 'restoring lost species to an ecosystem will constitute a more natural ecosystem'; 'sheep grazing has led to ecosystem degradation in the uplands of mid-Wales'; and 'species invasions often increase biodiversity') stand in relation to claims (e) and (f)? Attempts to exclude non-epistemic values from claims such as (b), (c) and (d) have clearly been motivated by the traditional value-free understanding of scientific objectivity and the desire to put such claims in the same category as claim (e). Take for example the claims of ecosystem health naturalists from Chapter 3 who argued that in order to give an objective account of ecosystem health, the concept must be specifiable in a value-neutral way, as either statistically normal functioning or organisational self-maintenance. Likewise, take the claim of biodiversity naturalists in Chapter 4 that for biodiversity measurements to be objective they must track a natural property which has been selected for epistemic reasons rather than any social or ethical reasons. In both cases, naturalism is motivated by the desire to provide some objective basis for the aims of conservation which can put the claims of conservation scientists comfortably in the class of impartial scientific facts, alongside claim (e).

As I have argued throughout this thesis however, value-free accounts of the concepts used to describe conservation aims cannot be given. Unlike claims about the number of protons in the nucleus of a carbon atom, the truth of claims (b) (c) and (d) depend upon the adoption of a particular evaluative perspective. For example, the truth of claim (c) depends upon accepting an evaluative claim according to which the appropriate 'reference class' for judging the statistical normality (or 'identity conditions' for judging self-maintenance) of the upland ecosystems of mid-Wales should contain significantly less

livestock grazing and increased tree coverage. Given this value-dependence, it is unclear how claim (c), and others like it, can be said to conform to a 'view from nowhere' description of the world, since such evaluative claims, according to the traditional fact/value dichotomy, wouldn't feature in such a 'view from nowhere'. The 'view from nowhere' might include facts about the amount of sheep on the uplands, the level of tree coverage, what the ecosystem looked like historically and so on. However, according to this traditional account, the view from nowhere would not contain evaluative claims about the appropriate 'reference class' by which to judge statistical normality, or the 'identity conditions' essential to the self-maintenance of the system. It is therefore difficult to see how the traditional conception of objectivity as adherence to a mind-independent reality can be coherently applied to mixed claims regarding the aims of conservation. According to the traditional account then, we cannot account for the objectivity of claims regarding naturalness, ecosystem health or biodiversity in the same way that philosophers have previously accounted for the objectivity of claims about, for example, the number of protons in the nucleus of a carbon atom.

Despite this difficulty with applying the traditional notion of objectivity to the mixed claims of conservation science, there would be serious theoretical issues with conceding that claims regarding conservation aims are on a par with claim (f) regarding the best flavor of ice-cream. The idea that claims such as (b), (c) and (d) merely express preferences would lead to a pernicious subjectivism according to which naturalness, ecosystem health and biodiversity are in the eye of the beholder.

§2.3 Subjectivity and Relativism

In order to develop the issues of subjectivity and relativism, consider a similar accusation from the philosophy of medicine that the value-dependence of health and disease ascriptions entails that they are relative to a particular cultural value-system. One commonly discussed example given by medical naturalists to illustrate the issue of relativism in the medical context is 'drapetomania' – a supposed mental disorder diagnosed by American psychiatrists in the nineteenth century applying to slaves who desired to run away. According to naturalists, if health and disease are value-laden then it is not possible to say that it is objectively incorrect to call drapetomania a disease, only that we have differing values when it comes to slavery, and according to our values drapetomania should not be considered a disease. Glackin (2018) here quotes Ereshefsky (2009) as an example of this type of objection:

> You [the normativist] cannot say that those American doctors were wrong to call drapetomania a disease. All you can say is that we have different values than those nineteenth century doctors. (Ereshefsky 2009, p.224 in Glackin 2018, p.271)

In the case of ecosystem health, Callicott provides a similar objection, arguing that the normativist seems to hold that "health is in the eye of the beholder" (Callicott 1995 p.350). A position which is in fact explicitly endorsed in the literature by Hobbs (2016, p.154). Callicott gives the example of "an eroding clear-cut watershed drained by a silted-out (former) salmon stream" (Callicott 1995 p.349) which although viewed by ecologists and environmentalists to be unhealthy, is deemed to be healthy by the timber industry who,

"through an expensive advertising campaign, convince the public at large to think so as well" (Callicott 1995 p.350). According to Callicott, if this disagreement comes down merely to competing value-claims, then ecologists and environmentalists will be incapable of rejecting the views of the timber industry. Callicott argues that the normativist will have to accept that ascriptions of ecosystemic health are relative to specific value-systems and therefore in cases like the one above, an ecosystem will be both healthy and unhealthy depending on one's perspective – the river is healthy for the timber industry, but unhealthy for the ecologists and environmentalists.

Similarly concerning is the fact that if relativism about ecosystem health (or other conservations aims) were true, then it is not clear how there could be any factual constraints on its assessment. As such, it is difficult to say what the role of scientific ecology could be in the assessment of ecosystem health or why it should have any such role at all. If ecosystem health is truly "in the eye of the beholder" (Callicott 1995, p.350, Hobbs 2016, p.154) then making assessments of whether an ecosystem is healthy or not would be a matter of taste rather than informed rational judgement. One could never be genuinely mistaken regarding one's ascriptions of ecosystem health and therefore the scientific ecologist would have no grounds for disagreeing with, to take Callicott's example, the timber company who insists on the health of a clear-cut watershed.

Such a relativism would make conflicts over conservation aims intractable. For example, recall again my example of the conflict over rewilding the Welsh uplands. While local farmers may accuse rewilders of imposing the romantic ideal of an untouched pre-human wilderness onto a land long inhabited by people, rewilders may likewise accuse local

farmers of imposing their own subjective preference for a pastoral arcadian landscape. So long as values are seen as antithetical to objectivity, both sides of the conflict can only be understood as asserting and reasserting their subjective ideals with no hope for ethical learning or progress. The debate becomes as pointless as arguing over the best flavour of ice-cream. Furthermore, when the disagreement is understood in this way, as mere expressions of opposing preferences, there can be no recourse to any rational way of deliberating or adjudicating. The debate therefore inevitably strays into the murky territory of authenticity and belonging, with rewilders being cast as outsiders and subjected to problematic comparisons with colonisers imposing their ideals on an 'indigenous' population; while rewilders have accused local farmers of a lack of authenticity, claiming that they in fact belong to a privileged class of landed gentry, benefiting from public subsidies while providing little in return. Such hyperbolic accusations do little but further polarise and entrench the conflict (Wynne-Jones et al. 2018).

§2.4 Responding to Relativism

In order to respond to the problems associated with subjectivity and relativism, it will be necessary to first draw a distinction between the evaluative judgements which underlie mixed claims like (b), (c) and (d) and paradigmatically subjective claims like (f). In the case of claim (f), it seems clear that a person cannot be right or wrong about the best flavour of ice cream. The best flavour of ice cream, all would agree, is a matter of personal preference. Although there may be a fact of the matter about the most popular flavour; there is, in reality, no best flavour of ice cream. In the case of (b), (c) and (d) however, such an account appears to be, at face value, highly problematic. If, for example, it is not possible

to be right or wrong about the extent to which sheep-grazing is causing ecological degradation in the uplands of mid-Wales, then how can we even make sense of debates between rewilders and local communities? When local farmers in mid-Wales objected to Rewilding Britain's aim of removing grazing livestock from upland ecosystems to encourage forest regeneration, they were not merely asserting their personal preference or taste, rather they were claiming that rewilding organisations are genuinely mistaken in their views about what would constitute the health of these upland ecosystems. Similarly, when Lean (2021) argues that invasive species sceptics are wrong to claim that "invasive species often increase biodiversity", he is not claiming merely a preference for the values captured by global biodiversity measures over those captured by local biodiversity measures, rather he claims such sceptics are genuinely mistaken in their prioritization of the values captured by local biodiversity measures. Such debates are clearly more substantial than disagreements over the best flavour of ice cream – they are ethical debates involving genuine normative disagreement about what should be done. As Williams (1972) argues of moral judgements:

> One of their distinguishing marks, as against mere expressions of taste or preference, for instance matters of food, is that we take seriously the idea of a man's being wrong in his moral views; indeed, the very concept of a moral *view* marks a difference here, leaning as it does in the direction of belief rather than of mere taste or preference. (Williams 1972, p.17)

As such, mixed claims such as (b), (c) and (d) should be distinguished from (f), since we can make sense of the idea that a person could be genuinely mistaken about them, where as we

cannot similarly make sense of genuine mistakenness regarding the best flavour of ice-cream.

Furthermore, mixed claims can also be distinguished from (f) by their being susceptible to, and constrained by, reason. In the case of preferences, it is not possible to be persuaded through reasons to prefer one flavour of ice-cream over another. However, in the case of evaluative judgements, it appears (at least coherent) that people can be persuaded by way of reasons to change their view. Again Williams defends this point:

> Even if moral attitudes were rarely determined by reasons, and the reasons advanced in their support were rationalizations, our model of moral attitudes and moral judgements must be at least complex enough to leave a place for rationalizations. It is only if the position to which a man is led by these forces satisfies some conditions of being the sort of position to which reasons are relevant that we can understand it as a moral position at all. (Williams 1972, p.18)

In the case of disagreements over claims regarding the aims of conservation, we see that within such conflicts, reasons are advanced by either side in support of their views. The fact that such debates are susceptible to and constrained by reasons indicates that disagreements over conservation aims cannot be framed merely as expressions of opposing preferences, but are rather substantial normative disagreements. If, for example, the 'reference class' through which we determine ecosystem health and degradation is merely a matter of personal preference, like ice-cream flavour, then what basis could conservation scientists, or anyone else for that matter, have for claiming any sort of expertise on

ecosystem health? Although evaluative judgements aren't fully determined by the way the world is, they are none the less not completely free for human creation. This is because moral claims, like factual claims, are subject to rational and epistemic constraints. In other words, there are conditions placed on sound ethical reasoning that would not be placed on purely subjective claims like (f) – our preferential views don't require justification whereas our moral views do.

The above strategy of pointing out the ways in which evaluative judgements appear to be distinct from claims like (f) parallels developments in the philosophy of medicine such as Broadbent's (2019) argument (which I introduced in Chapter 3 §3.3) that value-ladenness and objectivity represent two, logically independent, dimensions of debate. According to Broadbent, value-ladenness need not entail subjectivity or relativism since there are plausible views according to which values are more substantial than mere conventions or preferences. One potential and direct move suggested by Broadbent is for normativists to embrace moral realism, in particular, a form of moral realism according to which, "moral facts have a character that means they cannot be discovered by empirical inquiry, but, nevertheless, that they are objective facts" (Broadbent 2019, p.614). According to such a view, ethical claims, although distinct from (e) in that they cannot be discovered by empirical inquiry, are still capable of being objectively true or false in just the same way as claim (e), that is, in so far as they accurately represent reality.

Such a direct move to an acceptance of moral realism, although available to the proponent of the value-dependence of conservation aims, may not however be required or desirable. Reference to an 'objective moral reality' may be too disembodied and spooky for

naturalistically inclined philosophers. Instead, we may want to maintain that there are no ethical facts (in the traditional sense of accurate descriptions of an ethical reality) since, according to the tradition of the fact/value distinction, ethics is not in the business of describing how the world is, but prescribing how it should be. Even so, ethical claims are still, as I argued above, susceptible to epistemic and rational constraints. As such, the evaluative judgements which underlie mixed claims such as (b), (c) and (d) can be challenged as well as supported by reasons and evidence. Even if there is no fact existing 'out there' regarding the extent to which, for example, sheep-grazing is degrading the uplands of mid-Wales, our claims regarding ecological health and degradation can still be more or less reasonable – and more or less correct - in so far as they have been scrutinised and subjected to critique. Such a view may be thought of as 'quasi-realist' in that it gives an account of how ethical claims can be genuinely mistaken without the metaphysical commitment to some sort of mind-independent ethical reality. Williams makes a similar point, arguing that we should not run together 'the idea that thought has a subject matter which is independent of thought' with 'the idea of thought being constrained to certain conclusions' (Williams 1972, p.36). Mathematics for example, is clearly tightly constrained to certain conclusions despite the significant philosophical controversy over whether it has a mind-independent reality as its subject matter (Williams 1972, p.36).

Whether one adopts full-blown moral realism or the more naturalistically plausible quasi-realist position I outline above, the result is that the value-dependence of mixed claims doesn't imply a pernicious subjectivity or relativism. I can maintain that the nineteenth century American doctors diagnosing slaves with 'drapetomania', or the timber industry representative claiming an ecosystem they've exploited is in fact healthy, are

genuinely mistaken in doing so. The values underlying these health/disease ascriptions are either not in line with objective moral reality (according the realist position) or else not rationally defensible (according to the quasi-realist position). Glackin makes this point in the medical context:

> Some societies might treat homosexuality, or bourgeois deviationism, or left-handedness as diseases; but they are wrong to do so in just the same way that some societies are wrong to allow slavery, or liquidate the kulaks, or leave their poor to starve… unless we are moral relativists… we have no reason to suppose that both sets of evaluations are right. And if we are convinced moral relativists, it is hard to see why we might find medical relativism particularly objectionable. (Glackin 2019, p.274)

Similarly, there's no reason to think that the value-ladenness of claims regarding the aims of conservation should lead to a position according to which those claims are mere subjective preferences, or only relatively true, unless one already adheres to a subjectivist or relativist view of values generally. The accusation of subjectivism or relativism therefore has no unique force when made against claims regarding the aims of conservation.

§3. Generating Objectivity in Conservation Science

So far, my strategy has been to question the subjective nature of values by distinguishing them from paradigmatically subjective claims regarding preferences or tastes. This strategy, successful as it may be in avoiding the theoretical challenge of subjectivism,

still leaves open the practical challenge of how to produce more objective mixed claims in conservation science. Given that traditional strategies for achieving objectivity through eliminating bias and purifying claims from their non-epistemic evaluative content are not available in the case of mixed claims (because they are inherently evaluative), how can we try to ensure that mixed claims are based upon values that are objective? For the moral realist, this will mean forming a conception of how to ensure that our mixed claims are accurately in line with ethical reality, whereas on the quasi-realist position, this will mean giving an account of the appropriate constraints to be placed on the production of mixed claims in order to ensure these claims have been subjected to sufficient rational scrutiny and criticism.

In the following section then, the strategy will shift from questioning the nature of values, to questioning the traditional conception of objectivity. In doing so, I will consider arguments against the VFI made by feminist philosophers of science such as Longino (2004) and Harding (2015). These philosophers have argued that generating objectivity is a social process which is enhanced rather than polluted by the inclusion of a diverse range of non-epistemic values. These social accounts of objectivity, I shall argue, can act as an essential first step towards understanding how conservation science can produce more objective mixed claims.

Developing an account of objectivity which is compatible with the inclusion of evaluative judgements within scientific claims is of huge practical importance for conservation science, since it is one thing to claim that it is coherent that there could be true or false (or more or less reasonable) evaluative judgements, and another thing to claim

that we can come to know which evaluative judgements are true or false. There is a clear danger that the value-dependence of mixed claims can be used to impose a particular view, either intentionally or inadvertently, upon people and ecosystems without sufficient scrutiny or justification. These dangers have been described in the case of well-being science by Alexandrova as 'imposition' and 'inattention' and it is to these practical concerns that I now turn.

§3.1 Imposition and Inattention

According to Alexandrova, (in the case of well-being science) 'imposition' means:

> an importation… of substantive views about the nature of well-being that those whose well-being is being studied have good reasons to reject. When eminent economists… advocate a measure of national well-being that takes into account only the average ratio of positive to negative emotions of the populace, the citizens can legitimately object if they take well-being to consist in more than that. (Alexandrova 2018, p.432)

Alexandrova also describes a related but less severe charge of 'inattention' which occurs when "the scientists engaged in mixed science fail to notice the value judgements they are making" (Alexandrova 2018, p.432).

'Imposition' and 'Inattention' are clearly also dangers for the use of mixed concepts in conservation science. The 'imposition' of conceptions of naturalness and ecosystem

health which are dependent upon the absence of human influence and activity has left a particularly damaging legacy within conservation science. Many of the first protected areas and national parks were established by displacing their Indigenous inhabitants to conform to an aesthetic and moral ideal which was often concealed behind the scientific language of 'wilderness' or 'natural balance' and the idea of climax ecosystems as 'self-maintaining' super-organisms. These same practices continue to this day. Although some of the scientific language has changed, many of the same dualistic and colonial values are still imposed on communities and used to justify their displacement and other violations of their human rights in order to protect biodiversity and reverse ecological degradation (Brockington 2002, Dowie 2011, Mbaria and Ogada 2016, Buscher and Fletcher 2019, Sarkar 2019, Pascual et al. 2021). Mbaria and Ogada (2016) argue that, in Kenya, this type of value 'imposition' has led to:

> … foreigners and their wants taking precedence over the need of locals in conservation decision making… particularly… in the vast unprotected wildlife habitats of North Kenya… initiatives to structure conservation in these areas consistently include the formation of conservancies that exclude locals from core areas set aside for tourist use. (Mbaria and Ogada 2016, p.30)

One example provided by the authors is of attempts by the IUCN to establish a 'modern management system' for the Loita forest (in this case in Southern Kenya). The forest had been managed by the local Maasai people for generations and provided them, "not only timber and medical herbs but also sites that continue to be of cultural and spiritual importance" (Mbaria and Ogada 2016, p.54). Ostensibly, the IUCN's aim was to "aid

in ‘maintaining the biodiversity and environmental values’ of the region” (Mbaria and Ogada 2016, p.54). However, Mbaria and Ogada question the true motives for the IUCN’s interest in Loita, arguing that the traditional management regime of the local Maasai people had in fact been far more successful in maintaining tree coverage than the Western management systems that had been applied to other forests in Kenya. The authors ultimately argue that the IUCN were in fact using the language of conservation to impose a system of separation between local people and the forest in order to gain greater control over the natural resources contained therein. Many similar examples are provided within Mbaria and Ogada’s book, serving to illustrate the significant problem that value ‘imposition’ causes for the use of mixed concepts as conservation aims.

In the case of ‘inattention’, there are similarly many examples of this danger at play in conservation science. One such example we observed in Chapter 4 was in arguments against the control of invasive species in which the concepts of biodiversity and ecosystem services were defined based on an implicit prioritization of the value of the ecological functions contributing to biomass production and resource cycling. As Lean (2019) argues, the invasive species sceptic uses these general conservation aims without providing an argument for their specific value-dependent interpretation of them (Lean 2021, p.7). This can therefore be understood as a case of ‘inattention’ in which those arguing against invasive species control fail to explicitly attend to and argue for the values contained within their use of a mixed-concept.

In order to avoid the dangers of imposition and inattention, a practical account is required of how more objective mixed claims can be produced. As I have argued already,

the value-free account of objectivity is clearly incompatible with the objectivity of mixed claims, as these claims contain an irreducibly evaluative component without which their meaning can't be determined. In the following section, I will provide some arguments against this value-free conception of objectivity. These arguments, I will claim, can help in moving towards an account of objectivity which can ensure that mixed claims regarding the aims of conservation don't, either intentionally or inadvertently, impose ethical views on to ecosystems and people without due process and rational scrutiny.

§3.2 Feminist Objections to The VFI and 'Social' Accounts of Objectivity

Some of the most significant objections to the VFI have come from feminist philosophers of science who have argued that supposedly objective and value-free research has in fact been guided by the values of culturally dominant groups and as such the value-free ideal acts to entrench these dominant values as unquestionable foundations of scientific inquiry. Harding (2015) explains how feminist philosophers in the last third of the 20th century discovered the impact of androcentric bias on research in almost every scientific field - from the neglect of women's bodies in biology to the lack of female interviewees in anthropological studies (Harding 2015, p.28). In each case, the greater inclusion of women's values and interests in scientific research "challenged basic assumptions of the disciplines" (Harding 2015, p.29).

Harding therefore extrapolates that "recognizing and valuing this kind of diversity in social values and interests would increase the reliability of the results of research" (Harding 2015, p.29). As such, she advocates for an approach she terms 'strong objectivity' which

incorporates a greater diversity of values and perspectives into the research community and begins research from questions that are important to marginalized groups. Unlike traditional methods for achieving objectivity, such as replication and peer review (which Harding terms 'weak objectivity'), 'strong objectivity' is designed to enable the detection of pervasive values and assumptions held by the dominant cultural groups who guide research.

Longino makes similar objections to the VFI, arguing that "the objectives of the value-free ideal are better achieved if the constructive role of values is appreciated and the community structured to permit their critical examination" (Longino 2004, p.140). Longino begins from the general problem of the underdetermination of theory by data – "the semantic gap between hypotheses and data that precludes the establishing of formal relations of derivability without employing additional assumptions" (Longino 2004, p.132). According to Longino, it is these "assumptions" which are "the vehicles by which social values can enter into scientific judgement" (Longino 2004, p.132). Longino argues that a recognition of this underdetermination should transform how we understand scientific justification from:

> not just a matter of relations between sentences, statements, or the beliefs and perceptions of an individual, but as a matter of relationships within and between communities of inquirers. (Longino 2004, p.133)

Longino's social account of justification erodes the apparent dichotomy between so-called epistemic and non-epistemic values since as she puts it – "cognitive practices have social dimensions" (Longino 2004, p.134) - the rules of legitimate scientific practice become

a matter of social and discursive interactions and the social context of the researcher forms an important aspect of their justificatory apparatus – "not an obstacle to knowledge but a rich pool of resources – constraints and incentives – to help close the gap left by logic" (Longino 2004, p.133). Objectivity then, according to Longino, can only be achieved through the effective criticism of the shared values of a community of researchers. This requires "interaction across communities" (Longino 2004, p.134). Longino terms this 'broad justification' and it shares with Harding's 'strong objectivity' the requirement of outsider critique in order to keep widely-held values in check. For Longino, "values and interests must be addressed not by elimination or purification strategies, but by more and different values" (Longino 2004, p.137) – this is how we acquire scientific objectivity, not by eliminating values but by embracing more diverse values.

Longino provides the example of research into bio-behavioral sciences which is split between approaches which emphasize genetic factors in understanding human behavior and those that emphasize aspects of the social environment. As Longino states, "members of each side characterize the other as politically and ideologically motivated" – geneticists are accused of "being socially insensitive, rigidly reductionistic, and giving support to racism, sexism, and social policies that perpetuate racial and gender injustice" while social-environmentalists are accused of "being fuzzy-headed liberals who want to engage in dangerous social engineering" (Longino 2004, p.138). Longino also points to "divergent professional interests", "aesthetic values", "social values" and "overall conceptions of human nature" as driving factors separating the two approaches (Longino 2004, p.138-9). Even though the two approaches are diametrically opposed to one another, "the consequent plurality of non-reconcilable accounts of the behaviors studied enhances our

scientific understanding rather than diminishing it" and therefore, "divergent values prevent foreclosure and drive an expansion of knowledge and understanding rather than narrowing them" (Longino 2004, p.139). Longino concludes:

> Structuring the community to include multiple perspectives and values will do more to advance the aims in relation to which value-free science was an ideal - impartiality and universality - than appeals to narrow methodology ever could. (Longino 2004, p.140)

§3.3 'Social Objectivity' in Conservation Science

There is evidence that such an approach would be fruitful in the context of conservation. One sociological study which surveyed nearly 10,000 conservationists from 149 different countries found that educational specialism and continent of nationality were the two strongest predictors of conservationist's values (Luque-Lora et al. 2022). As such, the authors point to the importance of both interdisciplinarity as well as increased geographical and ethnic diversity as strategies to incorporate more diverse values into conservation research. In particular, the authors criticise "the domination of a small and privileged subset of Western conservationists and worldviews" (Luque-Lora et al. 2022, p.9), arguing that this dominance has led to the neglect of important considerations when assessing conservation strategies. The authors point to the case of trophy-hunting where a recent study by Mkono (2019) displayed that debates around trophy-hunting "largely represented the anti-hunting views of the Western public, while overlooking the opinions of African people" (Mkono 2019, p.689) who in fact were less concerned about values related

to animal welfare and more concerned with “the neo-colonial character of trophy hunting, in the way it privileges Western elites in accessing Africa’s wildlife resources” (Mkono 2019, p.689). In this case, it is clear that the debate over trophy-hunting as a conservation strategy would benefit from being more inclusive of African perspectives and values.

A similar point can be made in terms of understandings of the aims of conservation generally – debates over, for example, the types of biological difference that are most valuable in a given context will clearly benefit from an understanding of what people, beyond a small group of conservation organisations and specialists, find valuable within their biological surroundings (Pascual et al. 2021). If for example, the phylogenetic view of biodiversity doesn’t prioritize a particular species or population which is of particular heritage value to some local culture, this may be a good reason to pursue a different conception of biodiversity within this context. Incorporating these different ways of valuing will enhance our conception and measurements of biodiversity, making them more objective, rather than undermining their objectivity as the naturalist supposes.

The arguments of Harding and Longino show that trying to adhere to an ideal of value-freedom and impartiality isn’t the best way to achieve objectivity, rather objectivity in the sciences is a social process which involves values at its core. These arguments show that definitions of conservation aims should not be cut off from social values in order to meet a rigid conception of objectivity as value-freedom. The inclusion of a diversity of social values and concerns can in fact act as a vital check on the values and assumptions of culturally dominant groups within conservation science and lead to more objective and socially

legitimate research, which is absolutely vital for a field which cannot function, or have any real impact, without public support.

Such an approach is in line with an influential stream of thought within the philosophy of science which Ludwig (2023) refers to as “the new orthodoxy of value-laden science” (Ludwig 2023, p.1). This ‘new orthodoxy’ accepts that “science is not properly characterized in terms of value-free objectivity”, whilst maintaining that science still “provides the best judgements societies have when facing complex social-environmental challenges” (Ludwig 2023, p.1-2). As such, the new orthodoxy of value-laden science:

> reflects the waning of a simple dichotomy between realist defenders of science who highlight value-free objectivity and constructionist critics who highlight the historical and social contingency of science. (Ludwig 2023, p.2)

This is the very dichotomy which lies at the heart of the debate between naturalist and normativist approaches to the aims of conservation. What is needed is a middle ground which “aligns science and society in reasonable ways and takes their complex relations into account” (Ludwig 2023, p.2) and can therefore lay the foundations for an approach which synthesizes the most important insights of both naturalists and normativists. Such an approach can be both honest about the value-laden nature of conservation science as well as being able to give an account of how conservation science might produce more objective claims.

Longino's account of objectivity as formed through the interactive critique between a plurality of differing evaluative stances is therefore a good start when it comes to constructing an account of the objectivity of claims regarding the aims of conservation. However, it is not clear that such an account, without further development, will be adequate for the specific 'mixed' nature of such claims. As Alexandrova argues in the case of well-being science, "pluralism about definitions of well-being already characterizes the science of well-being… but by itself, pluralism does not ensure that moral presuppositions are noticed and scrutinized in the right way" (Alexandrova 2018, p.434). This is also true of conservation science. As we have seen, there is a plurality of different accounts of the aims of conservation: naturalness, biodiversity and ecosystem health, each susceptible to a plurality of interpretations depending on one's values. However, pluralism and open criticism alone has not been able to objectively settle disputes between differing evaluative stances, which requires not just a scientific critique but a moral critique. As Alexandrova states: "Mixed claims need a very specific sort of criticism on normative grounds, not just any criticism" (Alexandrova 2018, p.434).

Alexandrova's answer to this is to develop the 'social' accounts of objectivity provided by philosophers like Longino and Harding even further, to produce what she calls 'procedural objectivity'. In what remains of this chapter, I will focus on this 'procedural' conception of objectivity and develop it through attempting to apply it to conservation science. I will then consider some objections to the application of a procedural conception of objectivity to conservation science.

§4. Procedural Objectivity

In this section, I will examine Alexandrova's argument for the for use of a 'procedural' conception of objectivity in the science of well-being and consider its application to conservation science. I will first describe Alexandrova's three rules for the procedural objectivity of mixed claims in well-being science. I will then consider to what extent these rules are sufficient for establishing the objectivity of claims regarding the aims of conservation.

§4.1 Rules for Procedural Objectivity

Alexandrova argues for a 'procedural' account of the objectivity of mixed claims, which:

> focuses on the process of inquiry not its results, aiming to ensure that this process is transparent, legitimate, and resistant to hijacking by specific individuals or groups… the objective values are those that survive criticism in the public sphere and that are tested through 'experiments in living. (Alexandrova 2018, p.436)

She devises three rules to ensure this procedural objectivity can be achieved:

1) "Unearth the value presuppositions in methods and measures" (Alexandrova 2018, p.437).

2) “Check if value presuppositions are invariant to disagreements” (Alexandrova 2018, p.438).
3) “Consult the relevant parties” (Alexandrova 2018, p.439).

The first rule states that value presuppositions must be made explicit. This means that scientists must make explicit reference to the more abstract or foundational questions in their research – if they are measuring well-being they should be able to give their account of what well-being is and why they chose the specific indicators or measures that they have chosen. As Alexandrova states:

> … whenever scientists measure or otherwise study the well-being of X, they should be able to say, at least in outline, what the well-being of X is; otherwise, they are not attending to their value presuppositions. (Alexandrova 2018, p.437)

Such explicitness also calls for an awareness that there are other accounts of any given mixed concept and that disagreement regarding the best account may be caused by substantial normative disagreement. Alexandrova argues this first rule clearly guards against ‘inattention’, which can be understood as a lack of explicitness.

The second rule suggested by Alexandrova is to check whether a measure is indicative of all the different philosophical accounts of well-being. For example, when one measure is understood to indicate well-being regardless of which account of well-being we choose. If a measure is robust in this sense, then this will earn some mixed claims “objectivity on the cheap” (Alexandrova 2018, p.438). However such covariance is rare and

often it will matter significantly which account of a mixed concept is used for producing a specific mixed claim.

In such cases of substantial disagreement, Alexandrova argues that, “the only way to practice trustworthy science is to make this choice in a deliberative public setting that includes the relevant parties” (Alexandrova 2018, p.439). This is her third principle for procedural objectivity in the mixed sciences – consult the relevant parties. In order to realize this principle in practice, Alexandrova argues for a combination of “deliberative polling” and “systematic participation of the public in science” in which:

> … groups of deliberators could be presented with various options for conceptualizing well-being (or freedom, health, and so on) and with the relative normative and practical advantages of each option. The deliberators will attempt to reach agreement according to whatever consensus-building and voting rules they decide to put in place. (Alexandrova 2018 p.439-440)

Alexandrova argues that both expert and public perspectives should be included in such deliberations. She argues that scientists and experts must still play a significant role in any such deliberation because their epistemic standpoint gives them access to specialist knowledge about values which it is important to recognize; while the inclusion of the public, particularly those most likely to be affected by the mixed-claims being produced, acts as an important check on the power of scientific institutions to impose their values upon people and communities (referred to as ‘imposition’).

§4.2 Procedural Objectivity in Conservation Science

A good place to begin in developing the notion of procedural objectivity in conservation science is to attempt to apply Alexandrova's rules for procedural objectivity to some of the cases which I have discussed in previous chapters.

§4.2.1 Explicitness

In terms of Alexandrova's first rule, making value claims explicit, it is clear that such a rule would aid in increasing the objectivity of mixed claims in conservation science. Take for example our discussion of the relationship between biodiversity and invasive species from Chapter 4 (§5). The lack of an explicit argument by invasive species sceptics for the use of local species richness as a measure of general biodiversity, as well as the lack of an acknowledgement of other accounts of biodiversity based on differing values, hides the presence of substantial normative disagreement over the value of ecosystem productivity as opposed to other values such as heritage and option value (Lean 2021). Similarly, as we saw in Chapter 2 (§2.3), claims regarding the naturalness of certain historical baselines often hid implicit value claims about the value of those baselines as opposed to others. Once again, making these value claims more explicit would aid in making claims of naturalness more objective by encouraging greater transparency regarding the normative claims that are at issue. Ascriptions of ecosystem health and degradation, as we saw in Chapter 3, similarly require greater transparency regarding the values which are at stake.

§4.2.2 Robustness

In terms of Alexandrova's second rule, checking for robustness, this will also be a useful rule to follow in the conservation context, although its application may be fairly limited. An example of where robustness may come into play is in the case of the eutrophication of the river Wye which I introduced in Chapter 3 (§2.1). As I described in this case, there is widespread agreement that measures which detect increased nutrient availability in the river are indicative of ecological degradation, regardless of our specific account of degradation and health. This is because of the near unanimous agreement on the value of a less eutrophicated river over a river high in nutrient pollution. In this case therefore, a measure of nutrient availability in the river is a robust measure of the health of the river Wye since it can serve as an indicator of health and degradation regardless of our specific value-laden accounts of those concepts. In the case of the river Wye therefore, we can get "objectivity on the cheap" (Alexandrova 2018, p.438) in our ascriptions of ecological degradation.

§4.2.3 Consult the Relevant Parties

Often however, differing accounts of conservation aims will lead to conflicts over the best indicators, metrics and measures to use, resulting from the substantial normative disagreements underlying these differing accounts. For example, return to the case of the Summit-to-Sea project in mid-Wales and the conflict between local communities and Rewilding Britain over what the aims of the project should be in relation to the upland ecosystems. While the aims Rewilding Britain may lead to the adoption of a measure of

something like forest coverage as a key indicator of health, the views of local communities may place less emphasis on this and more the continued presence of heather moors and the ecological structure they support. Recall Monbiot's quote as a clear example of this sort of conflict:

> I do not see heather moor as an indicator of the health of the upland environment, as many do, but as a product of ecological destruction. (Monbiot 2014, p.68)

In the case of such conflicts, as Alexandrova states, we must deliberate "in a public setting that includes the relevant parties" (Alexandrova 2018, p.439) in order to attain an objective resolution – this is her third rule.

The importance of participatory deliberative procedures for conservation decision-making is widely acknowledged in the conservation literature and has become in its own right a sub-genre of said literature, often referred to as 'participatory conservation'. Reed (2008) in his review of the 'participatory conservation' literature states that, "stakeholder participation is increasingly being sought and embedded into environmental decision-making processes, from local to international scales" (Reed 2008, p.2418). Reed cites two different categories or types of argument that are often provided within the conservation literature for the importance of stakeholder participation – "normative" and "pragmatic" (Reed 2008, p.2420). Normative arguments concern the "benefits for democratic society, citizenship and equity", for example increasing public trust in decisions, reducing marginalization, and promoting active citizenship. Pragmatic arguments, on the other hand, point out that participatory procedures have various practical benefits such as increasing

the take up and adoption of new technologies, ensuring that decisions meet local needs, increasing the durability of decisions that are made, and encouraging cooperation through transforming adversarial relationships (Reed 2008, p.2420).

This chapter can be understood as giving a third type of argument for the importance of stakeholder participation that is philosophical in nature, in addition to the 'normative' and 'pragmatic' arguments cited by Reed (2008). This philosophical argument for the importance of stakeholder participation claims that participation can increase the objectivity of conservation science. Despite the increased attention given to stakeholder participation within the conservation literature, little philosophical work has been done connecting this to debates around values and objectivity in conservation science and the metrics used to assess conservation aims. However, I think there are good theoretical grounds for connecting work on participatory conservation to an account of procedural objectivity in conservation science. For example, the arguments against the VFI provided by Longino and Harding which I considered in §3.2 can be seen to support my claim that stakeholder participation increases objectivity, since participation will lead to the inclusion of a greater diversity of values which is required to keep in check the unrecognized assumptions and values of culturally dominant groups within academic ecology and conservation science. Furthermore, as we saw in previous chapters, attempts to apply traditional value-free accounts of objectivity by developing naturalist accounts of conservation aims have been counter-productive, leading to unscrutinised value-claims being buried within conservation metrics, resulting in less, rather than more, objectivity. Inclusive participatory procedures will increase the likelihood that these previously hidden value-claims are unearthed and scrutinised.

This philosophical argument for stakeholder participation also expands on the existing participatory conservation literature by showing that participatory procedures shouldn't be understood as merely balancing the strictly 'scientific' objectives derived from conservation biology with external socio-cultural concerns; but rather, that scientific and socio-cultural concerns can't be so neatly separated. As such, ecological objectives and aims (such as naturalness, ecosystem health and biodiversity), must themselves be the subject of such participatory procedures.

Much of the participatory conservation literature is premised upon the prior approach, using deliberative procedures only as a means to distribute the benefits and burdens of empirically established conservation aims in a fair and just way. For example, Ranger et al. (2016) describe the use of deliberative democratic procedures to inform the management of two Marine Protected Areas (MPA) off the coast of Sussex on the south coast of England. Here, the authors state that the purpose of the deliberative procedure is to, "effectively engage users and incorporate social, cultural and economic considerations *alongside ecological objectives*" (Ranger et al. 2016, p.2, my emphasis). Their approach engaged with various stakeholders, such as: fishermen, both commercial and recreational anglers, local regulators, academic specialists, national regulatory bodies, marine archeologists, tourist industry representatives and recreational sailors and divers. Making use of a 'multi-criteria approach' which involved weighing up the importance of a plurality of different criterium through deliberative-democratic procedures, they were able to compare "ecological objectives with economic as well as socio-cultural ones in a shared framework" (Ranger et al. 2016, p.8).

While this is undoubtedly vital work, it should be understood as distinct from (but also complementary to) what I am arguing here. I am here claiming that participatory procedures should be extended into conservation science itself rather than only being used as a methodology to balance scientific aims with social concerns, since a neat separation of such scientific aims and social concerns is not even possible. In the case of the Sussex MPAs studied by Ranger et al., the so-called 'ecological objectives' may be fairly robust, in that it is widely agreed that the abundance of certain key fish species is a good measure of the ecological health of the MPAs. In many other instances however, as we have seen throughout this thesis, the 'ecological objectives' or aims of conservation projects can be hotly contested. In cases I have considered throughout this thesis, whether it be rewilding the Welsh uplands, the management of invasive species, or the use of genetic engineering technologies to maintain historical or natural species compositions – it is these 'ecological objectives' that are contested, not merely the need to balance the aims of conservation with external social concerns.

Funtowicz and Ravetz (1993) coined the term 'post-normal science' to refer to areas of scientific inquiry where "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowicz and Ravetz 1993, p.10). According to Funtowicz and Ravetz, in 'post-normal science' the traditional categories of fact and value "cannot be realistically separated" (Funtowicz and Ravetz 1993, p.18), "the uncertainties go beyond those of the system to include ethics as well" (Funtowicz and Ravetz 1993, p.18). This is an apt description of the situation faced by conservation biology.

Funtowicz and Ravetz also make the argument that public participation is vital within 'post-normal science' as a way to resolve this ethical uncertainty and increase the quality of scientific claims. To do this, they argue for what they call 'extended peer communities' involving, "the inclusion of an ever-growing set of legitimate participants in the process of quality assurance of the scientific inputs" (Funtowicz and Ravetz 1993, p.19). This, they argue, can improve the quality of scientific claims regarding environmental issues since, "persons directly affected by an environmental problem will have a keener awareness of its symptoms, and a more pressing concern with the quality of official reassurances, than those in any other role" (Funtowicz and Ravetz 1993, p.20). Funtowicz and Ravetz therefore suggest that such persons should be deployed in "a function analogous to that of professional colleagues in the peer-review or refereeing process in traditional science" (Funtowicz and Ravetz 1993, p.20).

It is important to note that this is not merely an ethical argument and should be distinguished from the claim that people have a right to be involved in decisions that affect their life (despite this also being a valid reason to pursue such participatory science). Funtowicz and Ravetz are clear: "The extension of the peer community is then not merely an ethical or political act; it can positively enrich the processes of scientific investigation" (Funtowicz and Ravetz 1993, p.20). An 'extended peer community' is one strategy that could be deployed to incorporate participation into the structure of conservation science. The inclusion of a wider variety of stakeholders within an extended peer community is not only ethically fairer, it could also help to ensure greater objectivity in the production of mixed claims by acting as a check on pervasively-held values among specialists.

Another important strategy which could be used to achieve the inclusion and participation of a greater diversity of evaluative perspectives within conservation science is a deeper engagement with citizen scientists and local knowledge holders. Conservation science must be open to greater epistemological pluralism - it must be able to look at the same system from multiple different angles - if it is to achieve the kind of value-dependent objectivity which I am outlining here. This approach of putting different knowledge systems on a more even footing in order to achieve a deeper and more complete understanding is well-articulated by the concept of 'two-eyed seeing' or 'Etuaptmumk' which has been advocated by Mi'kmaw Elder Dr. Albert Marshall, who describes it as:

> Learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of mainstream knowledges and ways of knowing, and to use both these eyes together, for the benefit of all. (Reid et al. 2020, p.245)

Reid et al. (2020) illustrate how 'two-eyed seeing' has been applied practically to measure ecosystem health. They cite the case of the Slave River and Delta Partnership. Consisting of, "three First Nations, three Métis organizations, two towns, a college and research institute, and various territorial and federal government agencies" (Reid et al. 2020, p.250), the partnership's "main goal was to develop community-based monitoring activities throughout the region" in response to concerns about the ecological state of the river and delta. At a 2011 workshop, the group identified forty-one different indicators for the health of the ecosystem, nineteen that employed a Western scientific lens and twenty-two that were based on Indigenous knowledge. The group then, in 2017, co-published a

report utilising these indicators to assess the health of the ecosystem in a “power-neutral” (Reid et al. 2020, p.251) manor. This involved a procedure in which:

> … they combined visual, narrative and textual tools to have key knowledge holders (an equal number of Elders, harvesters/fishers, government staff and scientists)… assess… the following: the importance of indicators and their interactions; the state of indicators compared with the past (low, medium or high); their own level of expertise for each assessment. (Reid et al. 2020, p.251)

The report concluded that there was:

> … a low probability that the social–ecological system is as healthy as it once was, and they found that where multiple Western science indicators were graded as "moderate" compared with the past, Indigenous knowledge indicators were graded as "low". (Reid et al. 2020, p.251)

The methodology used for this report and its underlying principle of ‘two-eyed seeing’ is an excellent example of how greater objectivity can be generated by the inclusion and equal participation of diverse stakeholders. The ideal of seeing from multiple perspectives simultaneously nicely encapsulates the sort of value-laden objectivity which this chapter has worked towards – rather than ‘the view from nowhere’, conservation science must instead embrace diverse ways of viewing.

§4.3 Procedures and Results

At this point an important clarification must be made regarding how procedural objectivity relates to the traditional conception of objectivity I described in §2.1. A proponent of the traditional understanding of objectivity may object that the procedural conception ignores *the* crucial component of objectivity – do the results of a given procedure match up to the way the world really is. They may argue that the idea that objectivity lies in procedures rather than results undermines the very purpose of engaging in such procedures - if participatory procedures are not intended to provide results which, in traditional realist terms, more accurately describe the world, then how exactly should their purpose be understood?

Alexandrova, for example, claims in the case of well-being science that:

> Securing the right normative assumptions for mixed claims is neither a metaphysical task of making sure well-being is out there, nor is it a task of eliminating values. Rather, I am after the sort of objectivity that ensures that values have undergone an appropriate social control, giving a community reasons to trust this knowledge. (Alexandrova 2018, p.436)

However, one might still ask of Alexandrova, do these social controls which give a community reason to trust knowledge about well-being do so because they are more accurately describing some real property of well-being? And if not, if there are no facts of

the matter about well-being 'out there', then why should the social controls described by an account of procedural objectivity provide a good reason to trust our knowledge?

In response to this, I think it can first be pointed out that the procedural conception of objectivity is entirely compatible with maintaining an underlying commitment to something like the realist conception of objectivity. To do so, as I alluded to in my response to relativism (§2.4), one could embrace a moral realism according to which there are moral facts that are not of the sort that can be discovered by empirical inquiry. On such a view, we can still make sense of the idea that the results of procedures can be mistaken if they are not in line with an objective ethical reality. However, given that, ex hypothesi, empirical inquiry isn't sufficient to access this ethical reality, procedures can still play a vital role in this picture as the best way to produce claims which are at least more likely to accurately describe this ethical reality.

Alternatively, if one's metaethical views demand the rejection of such an objective ethical reality, then one can respond more along the lines of the 'quasi-realist' view I described in §2.4. Remember such a view argues that we can make sense of genuine ethical mistakenness and of evaluative judgements being more or less reasonable, without the need for positing mind-independent ethical facts. According to this view, what is important for the objectivity of a mixed claim is not whether the mixed claim matches up with a mind-independent reality, but rather, whether it has been subjected to sufficient rational criticism. Again, the sorts of procedural rules I have described above are vital in ensuring that the evaluative claims of conservation science have been subjected to sufficient rational scrutiny, including from perspectives outside of academic conservation science. As

Alexandrova puts it: “the objective values are those that survive criticism in the public sphere and that are tested through ‘experiments in living’”. (Alexandrova 2018, p.436)

I don’t intend here to endorse either the realist or quasi-realist interpretation of procedural objectivity. The point here is merely that both present coherent pictures of the importance of participatory procedures for objectivity in conservation science. Either procedures are vital as a means to ensuring that our evaluative claims are in line with ethical reality; or procedures are vital in ensuring evaluative claims have been subject to sufficient scrutiny and criticism. On either account, procedures are an important part of producing more objective claims regarding the aims of conservation.

§4.4 What Procedural Objectivity Is Not

In order to further clarify the notion of procedural objectivity, I will in this section attend to some possible misconceptions by explaining what procedural objectivity is not. Hopefully by considering these misconceptions it will help to shed light on the positive aspects of procedural objectivity.

§4.4.1 A Vote

Procedural objectivity is not a vote. Although democratic principles are often important parts of the procedures used for stakeholder inclusion, the idea that such procedures can be reduced to a vote is misleading; and furthermore, the idea that definitions of, and claims about, biodiversity or ecosystem health are matters about which

we could simply take a public vote is clearly wrong. Procedural objectivity therefore does not entail that claims about which area is more biodiverse, or which ecosystem is most degraded, should or could be decided merely by conducting a vote among stakeholders. Instead, the form of democracy most appropriately appealed to in this context is 'deliberative democracy'.

'Deliberative democracy' is founded upon the idea that democratic participation cannot be reduced to episodic voting alone. Rather, deliberative theory claims that democracy is most effectively achieved through the process of 'deliberation'. Deliberation is, "debate and discussion aimed at producing reasonable, well-informed opinions in which participants are willing to revise preferences in light of discussion, new information, and claims made by fellow participants" (Chambers 2003, p.309). As such, in deliberative democracy:

> Talk-centric democratic theory replaces voting-centric democratic theory. Voting-centric views see democracy as the arena in which fixed preferences and interests compete via fair mechanisms of aggregation. In contrast, deliberative democracy focuses on the communicative processes of opinion and will-formation that precede voting. (Chambers 2003, p.308)

Deliberations don't entirely replace voting within deliberative theory then, however true democratic inclusion extends beyond voting into discursive interactions that allow citizens to express and reflect upon their values.

It is this deliberative democratic theory which inclusive procedures for stakeholder consultation within conservation science should draw inspiration from. These procedures may involve an element of voting, however it is the capacity of deliberations to encourage scrutiny of dominant perspectives, critical debate, and reflection upon one's own values that is most essential to the role of such procedures in increasing the objectivity of mixed claims produced by conservation science.

§4.4.2 Final

Procedures do not produce a final or conclusive resolution to debates over the aims of conservation. Procedures must be understood as constantly ongoing. It is not the case that the results of a given instance of stakeholder participation produce the final word on a debate. Procedural objectivity should be understood as an ongoing process of reflection and adjustment in response to new evidence and the inclusion of new and different values. Such processes should be understood as making our claims increasingly objective – rather than objectivity being an seen as an all or nothing endeavor.

§4.4.3 Infallible

A closely related point to procedures not being final is that procedures are not infallible. The results of a participatory procedure might be mistaken or might simply be inconclusive. This is in fact an important aspect of why they are not final. If procedures were infallible then they would be capable of producing the final word on a given issue. It is precisely because procedures are not infallible that we must continue to subject their

results to scrutiny and reflection. It may become apparent that the results of a procedure are mistaken if, for example, the effects of adopting any recommendations contained in its results turn out to have a negative unforeseen consequence. Alternatively, this mistakenness may become apparent because a group whose interests had previously been neglected or marginalized begin to make their voice heard. Procedures can only reassure us that we have searched for hidden biases through the inclusion of a greater diversity perspectives, not that we have in fact been able to find and neutralise all biases. In any case, this fallibility is not a reason to object to the importance of procedures, but rather a reason to continue reflecting on and refining them.

§4.4.4 Public Relations

Procedural objectivity is not merely an exercise in public relations or getting the public on board with conservation. Although garnering such support and legitimacy is one of the pragmatic benefits of public participation in conservation, this should be understood as separate to (or an epiphenomenon of) the point I am making, which is that such participation can produce more objective mixed claims.

§5. Problems for Procedural Objectivity in Conservation Science

In this section, I will argue that Alexandrova's procedural conception of objectivity faces some specific challenges in the context of conservation science which need addressing if it is to be successful as an account of objectivity fit for the aims of conservation. These challenges are: 1) problems over *who* to include in deliberative procedures; 2) the problem

of power imbalances within procedures; 3) the problem that procedural objectivity is necessarily anthropocentric; 4) a problematic dismissal of the importance of results over procedures; and 5) the problem of an infinite regress of procedures. I will consider and respond to these problems in turn.

§5.1 Who?

Alexandrova's final rule, 'consult the relevant parties', leaves an essential unanswered question – who are the relevant parties? While this question may be more easily resolved in the case of well-being science, since the well-being scientist usually has a well-defined group or demographic target for their measurements; in the case of conservation science, defining the relevant parties is a much more contentious issue. The impacts of conservation projects can often be radically non-local, with the effects of, for example, carbon sequestration, being global in impact. At the same time, conservation projects always must occur in some locality and as such their impacts are often most acutely felt in the local place in which they occur. Furthermore, in between the local and the global there are a huge amount of different evaluative scales to consider, regional, national, continental and all denominations in between, each of which may be impacted by conservation projects in differing ways and to varying extents, as well as each potentially having overlapping or conflicting values with one another on any given project or issue.

Sarkar (2019) argues that local values must take precedence in any consultations, based on his moral principle, "what one community… values should not be transferred without consent to the habitats of other communities" (Sarkar 2019 p.384). However,

conceptions of locality are vague and often involve overlapping and conflicting identities at different scales. As Sarkar himself notes, “different cultural concerns and values may be dominant at different spatial scales” (Sarkar 2019, p.387) and it is unclear which scale should take precedence. It is rarely possible to draw a line on a map within which people are local to a given project.

Furthermore, rather than Sarkar’s clear opposition between local and global values, as illustrated by his tiger example I discuss in Chapter 4, there is often not such an unambiguous divide – with local values sometimes overlapping with global values but conflicting with national or regional values. Take the example of the Lake District National Park in the U.K., which received allocation of world heritage status specifically as a ‘cultural landscape’ to be managed by local farmers. In this case, the local values of farmers are to a great extent aligned with the global values of UNESCO, but also conflict with many people’s values at the regional and national scale, who may value a wilder, less intensively farmed lake district.

Additionally, a conservation project may have significant non-local consequences. For example the restoration of an upland forest ecosystem can have beneficial effects for flood prevention in urban areas far downstream, it seems clear that the relevant parties consulted for a given project will almost always have to stretch beyond the strictly local area.

A common term invoked in the context of participatory deliberations is ‘stakeholders’. Stakeholders in conservation projects often consist of conservation

organisations, local representatives, land owners, government officials, and recreational users of the conservation area. However, there is no agreed upon way of determining who should be included as stakeholders in any given context or how to weigh their respective views. If we define stakeholder as anyone who is impacted by or could impact the outcome of a conservation project, then the list of stakeholders could potentially become endless. To what extent should we include people who are not directly situated near an ecosystem but care about it a great deal? Or to what extent can we include future generations and other species as 'stakeholders' in conservation projects? These questions have no definitive answer. However, for pragmatic reasons of course, a line must be drawn somewhere.

In the British context, the reality of stakeholder participation is skewed by the staggering inequality in land-ownership that exists in rural Britain. Shrubsole (2019) reveals in compelling detail the extent to which extreme inequality in British land ownership has had detrimental ecological effects by giving the views and values of a small number of landowners such great influence over land management policies. According to Shrubsole: "Just 36,000 landowners – a mere 0.06 per cent of the population – own half the rural land of England and Wales" (Shrubsole 2019, p.21). This shocking statistic is clearly an obstacle to true public engagement and participatory deliberations, since as things stand, this small number of landowners have the greatest influence when it comes land management policies in rural Britain – meaning that huge areas of British countryside are hidden from public access and managed according to the values and aims of these landowners, as grouse moors and hunting grounds for pheasant shooting. Land reform may therefore be the necessary precondition for truly objective procedures over conservation aims in the British

context – however elaborating on such an extensive political project is beyond the scope of this thesis.

The question of who to include in conservation decision making is undoubtedly an issue which has a complex political dimension. Ultimately, there can be no general answer to the question or generally applicable account of who to include in deliberations. Who the relevant parties are will vary on a case-by-case basis and is highly contextual. However, I do think Alexandrova's consultation rule can be strengthened by adding extra emphasis on the consultation of marginalized communities in order to ensure that diverse perspectives which are able to question dominant assumptions and values are heard. Recall from our discussion of feminist critiques of the VFI how the inclusion of previously neglected or marginal values was argued to be particularly important in achieving the 'social' objectivity proposed by Longino and the 'strong' objectivity proposed by Harding. As such, the public consultations suggested by Alexandrova's third rule should be bolstered by an additional requirement for the greater inclusion of the voices and perspectives of marginalized communities who may have not formerly been included in consultations or whose voices have been historically neglected, in order to keep in check uncontested or dominant values.

§5.2 Power Imbalances Within Procedures

The inclusion of diverse perspectives is, as I argue above, an important step towards greater objectivity. However, when it comes to deliberations over the aims of conservation, mere inclusion may be insufficient. The unequal power dynamics that exist within procedures and deliberations between parties with significant disparities in resources and

perceived authority, for example between international conservation organisations and Indigenous communities, mean that such procedures are in danger of being constructed in ways that perpetuate these inequalities. It is therefore vital that any deliberative procedures involving multiple stakeholders take seriously and respect the differing value-systems and worldviews of diverse stakeholders, rather than merely incorporating or assimilating these differences into a framework preconstructed by more powerful parties.

This will involve recognising the significance of the differing value-systems and understandings of local stakeholders when co-producing knowledge regarding conservation aims. Ludwig and El-Hani (2020) construct a framework of "partial overlaps" (Ludwig and El-Hani 2020, p.3) for conceiving of such differences in the context of ethnobiology, which it will be useful for me to appropriate here and extend more directly to the context of conservation science. Ludwig and El-Hani pose four challenges to the prospects of "integrating knowledge systems of heterogenous stakeholders" (Ludwig and El-Hani 2020, p.3) in ethnobiology:

> The *epistemological* challenge that traditional communities and academically trained scientists often rely on very different methods for producing and validating knowledge… the *ontological* challenge of collaborating in the light of very different assumptions about reality… the *ethical* challenge that epistemic and ontological assumptions are intertwined with different value systems... the *political* challenge that stakeholders often hold very different positions of power to enforce their epistemological, ontological, and ethical perspectives in collaborative practice. (Ludwig and El-Hani 2020, p.3-4)

The authors describe how these challenges pose a “dilemma between assimilation and division” (Ludwig and El-Hani 2020, p.5) whereby attempts to incorporate diverse stakeholders either end up assimilating different knowledge systems by only recognising them in so far as they hold up to the criteria of mainstream academic discourse, or else diverse knowledge systems are seen as incommensurable and therefore collaboration becomes impossible. Ludwig and El-Hani respond to this dilemma by positing a framework of ‘partial overlaps’ whereby the significant similarities and shared foundations between different knowledge systems are accepted, while the existence of important cross-cultural differences is also recognised.

An important lesson drawn out by their paper is that “disagreement can only be intelligible on the basis of substantial agreement” (Ludwig and El-Hani 2020, p.9). Take their example of the differing epistemological methods of Canadian government biologists and commercial clam diggers of the Kwakwaka’wakw First Nation in assessing clam abundance – while the biologists used a standardized method using randomly selected areas of beach, the Kwakwaka’wakw used “harvest outcomes that were not standardized but affected by different individual styles and contexts of clam digging” (Ludwig and El-Hani 2020, p.9). Each approach has its advantages and disadvantages. The approach used by the biologists was unable to measure abundance near rock walls since the perimeter of these areas couldn’t be standardized, as well as neglecting the expertise of experienced clam diggers. However the standardized approach did possess the virtues of “transparency and replicability of methods” (Ludwig and El-Hani 2020, p.9). Ultimately however, the disagreement between the two methods rests on a broader substantial agreement over the importance of the

epistemic tools of observation and counting. As such, the authors argue we should think of differing epistemologies as:

> … toolboxes of context-sensitive heuristics… some tools will be largely identical. Some will be related but noticeably different. And some tools will only be found in one of the toolboxes. (Ludwig and El-Hani 2020, p.9-10)

Similarly, the authors argue that 'partial overlaps' will be found in the ethical domain. These 'partial overlaps' in ethical and normative issues can form the foundations for the successful co-production of 'mixed claims'. Take Ludwig and El-Hani's example of traditional Brazilian fishing villages where the ethical imperative to preserve mangroves derives from the influence of the 'Caipora', an entity that, as well as being responsible for providing all the capture for hunters and fishers, protects the mangroves by taking retribution against people who mistreat or exploit them. As the authors state, there are clear shared values in this context between local people and academic conservationists, both of whom see the importance of protecting the mangroves. Mixed-claims regarding the 'sustainable' or 'healthy' use of the mangroves can therefore be built upon this overlapping value that is assigned to the mangrove ecosystem. However, this does not mean that the important differences in ontological commitments and ethical systems should be neglected. Such mixed claims should take seriously local beliefs about not upsetting the 'Caipora' if they are to meaningfully engage with local stakeholders. Ultimately, Ludwig and El-Hani address such cases of non-overlap by advocating a principle of 'self-determination' whereby exogenous epistemic and ontological resources are used only when they become relevant to the concerns of local communities.

In order to ensure that the deliberative procedures I have recommended for generating greater objectivity are truly inclusive of the differences in epistemic, ontological and ethical commitments highlighted by Ludwig and El-Hani, it will also be helpful to consider a recent framework for procedural justice that has developed within the conservation literature. Ruano-Chamorro et al. (2021) argue that procedural justice is vital for effective participation within conservation decision-making. They provide three dimensions of procedural justice: 'process properties', 'agency', and 'interpersonal treatment' (Ruano-Chamorro et al. 2021, p3). Furthermore, they argue each of these dimensions can only fulfilled against a background of 'recognition'. 'Recognition' (a concept which itself has accrued a vast literature dedicated to its explication) is understood as "acknowledging and respecting sociocultural diversity, including in relation to values, identities, cultures, types of knowledge, institutions, power, capacities, and rights" (Ruano-Chamorro et al. 2021, p3). Recognition is vital since, "what is recognized will shape who is involved in decision-making and whose voices are heard" (Ruano-Chamorro et al. 2021, p4).

Against this background of 'recognition', their three dimensions of procedural justice can be manifested. Firstly, 'process properties' are the "key conditions to help enable a fair process" (Ruano-Chamorro et al. 2021, p4). These include: "transparency, accountability, neutrality, correctability, ethicality, and trustworthiness" (Ruano-Chamorro et al. 2021, p4). Secondly, 'agency' refers to "the capacity (or power) of an individual to act independently and to make their own free choices" (Ruano-Chamorro et al. 2021, p5). In the context of procedural justice, 'agency' demands the redistribution "of power among participants by empowering (i.e., fostering the agency of) marginalized stakeholders by supporting their

voice, decision-control, and capabilities" (Ruano-Chamorro et al. 2021, p5). Finally, "interpersonal treatment refers to how people treat each other during interaction processes" (Ruano-Chamorro et al. 2021, p5). A more detailed discussion of these conditions for procedural justice is beyond the scope of this thesis. However, the idea here is simply to point in the direction of such accounts to show how the issue of power disparities within deliberative procedures can be dealt with by adhering to conditions of procedural justice. Such just procedures will result in more objective mixed claims regarding the aims of conservation because they will fully recognise and include the diverse evaluative perspectives required to detect and challenge pervasively held values and assumptions.

§5.3 Anthropocentrism

A further problem which could be raised for proceduralist accounts of the objectivity of mixed claims in conservation science is that, since they are produced by deliberative procedures which take place between only *human* valuers, the results of these procedures will necessarily be anthropocentric. Such an argument is reminiscent of Katz's argument for non-interventionism discussed in chapter 2 §2.2, in which Katz argues that any intervention conservationists make in an ecosystem is by definition done for human purposes and therefore a reflection of human values and preferences, thereby constituting the anthropocentric domination of the ecosystem (Katz 1997). An equivalent objection to my account of procedural objectivity may argue that if it is human values which determine, for example, the healthy state of a given ecosystem, then this health is merely a reflection of what is beneficial for those humans which have been involved in the procedure. Only

human values are being taken into account and so ecosystem health becomes anthropocentric.

An account of conservation aims which makes them necessarily anthropocentric may be considered to be problematic since it goes against a longstanding emphasis amongst conservationists and environmental philosophers for the intrinsic value of at least some non-human entities. It therefore may be argued that the aims of conservation should have an innately ecocentric or non-anthropocentric character which is better captured by the naturalist accounts which don't rely on values. This is because, according to the naturalist, their account makes health (or biodiversity, or naturalness) a property of the ecosystem itself, irrespective of the values of human subjects. However, as I argued, no naturalist fully value-free account of conservation aims is possible, with naturalist accounts always ultimately depending on values, albeit hiding these values implicitly within their accounts. So, once this value-dependence is recognised, these accounts too are open to similar accusations of anthropocentrism. For example in the case of ecosystem health, if what constitutes 'normal functioning' or 'self-maintenance' in fact turns out to depend on human values, then these naturalist conceptions of ecosystem health too are open to accusations of anthropocentricism on the same grounds.

A response to accusations of anthropocentrism, from the point of view of the procedural account, may be provided in two ways. The first is to point out that just because the values involved in deliberative procedures originate in human beings does not mean these values are themselves necessarily anthropocentric. Callicott (1986) points to a distinction between the 'source' and 'locus' of value which I think is useful here. The

'source' of value is the origin of value, whereas the 'locus' of value is the entity that is being valued. So on my procedural-normativist account, although value originates in or is generated by deliberative procedures between humans, the entities being valued are often non-human and valued intrinsically. For example, the river Wye may be labelled as degraded not only for anthropocentric reasons such as a loss of tourist revenue but also because eutrophication has diminished intrinsically valuable salmon and trout populations. In this case, although both the financial income provided by tourism and the salmon and trout populations are valued *by* humans, one clearly presents an anthropocentric reason for the degradation ascription and the other a non-anthropocentric reason. Both types of reason may be given weight in procedures determining health and degradation ascriptions, and so such an account is not necessarily anthropocentric.

However, the above response, although successful in showing procedures aren't *necessarily* anthropocentric, is still vulnerable to the charge that procedures will tend to be anthropocentric since they are established and participated in exclusively by humans and as such are more likely to prioritize anthropocentric over non-anthropocentric values. A second response to accusations of anthropocentricism therefore goes further, arguing that some non-human entities should in fact be seen themselves as 'sources' of value whose values require appropriate representation within deliberative procedures.

For example, in deliberations over the degradation of the river Wye, we may think that the eutrophication of the Wye is not only leading to degradation because of the decline of salmon and trout populations which humans value intrinsically, but also because the salmon and trout populations themselves value the function of oxygenation carried out by

macrophytes in the river ecosystem which they require for respiration and ultimately their continued survival, which is being disrupted by eutrophication. A less eutrophicated river would therefore be a healthier one, not only because of a broad consensus of human values regarding the river but also a consensus amongst the values of the non-human populations that make up the river ecosystem. This extra dimension of value may be termed ‘nonanthropocentric instrumental value’, in order to denote that some ecological functional and structural states may be instrumentally valuable to non-human entities themselves. Such an approach reflects Plumwood’s critique of anthropocentricism as based in human/nature dualsim that I considered in Chapter 2. Take her ideal of a ‘counter-centric’ ethics which considers the diversity of both human and non-human interests in determining conservation aims:

> We do not have to choose between basing our resistance on human concerns or basing them on non-human ones. Counter-centric ethics enables us to advance both arguments based on our own species welfare and on that of the other, taking account of prudence but also giving the good of our planetary partners meaning and weight as reasons for acting differently. (Plumwood 2002, p.124)

According to such an approach, rather than a binary choice between basing our conservation aims in the 'subjective’ preferences of humans or the ‘objective’ properties of nature, there exists instead a variety of heterogenous interests, both human and non-human, to be considered and deliberated between

The direct inclusion of non-human biological entities in deliberative procedures has often been seen as a non-starter however, due to "the idea that non-human animals cannot express themselves politically in the rational manner necessary to be able to speak of deliberation" (Meijer 2019, p.406). This apparent difficulty stems from the paradigmatic conception of deliberation proposed by Habermas (1981) that sees deliberation as a thoroughly rational process and, as such, participants in deliberative procedures must be constrained to those who can take part in rational debate (Habermas 1981). In keeping with this view, one strategy may be to assign human representatives to non-human participants, who are themselves capable of representing non-human interests within deliberative procedures. For example, Garner (2016) suggests we could, "institutionalise the representation of non-humans through the placement of guardians whose role would be to represent the interests of animals even when they clash with human interests" (Garner 2016, p.320-321).

However, this faces a clear problem in so far as the interpretation and assessment of non-human interests is itself value-laden, and as such the perspectives and values of the assigned representatives would be able to reassert themselves unchecked, under the guise of supposedly 'non-human' interests. As such, this approach does little to solve the problem of objectivity with which this chapter is concerned since in assessing non-human interests (especially those of entities at higher levels of abstraction such as populations, species, or ecosystems), representatives will be in danger of imposing their own values (intentionally or unintentionally) onto the entities they represent.

A different and more direct strategy is to reject the rationalist view of deliberation and attempt to include non-humans themselves within deliberations. The rational ideal of deliberation has been increasingly questioned by scholars who argue that the rationalist view enshrines already existing power relations into deliberations since the style of rational-argumentative communication is generally more suited to dominant cultural groups, while the perspectives of groups who don't conform to this style of communication are disvalued (Young 2000).

Such critiques have recently been taken up by Eva Meijer (2019) in the development of a theory of "interspecies deliberation" (Meijer 2019, p.405). Meijer argues that non-human animals have their own languages and forms of communication which can and should be accommodated within deliberative theory. As such, she claims that:

> Instead of arguing that other animals are as rational as humans, and living up to… Habermasian standards… we need to develop a view of deliberation—with them—that encompasses their forms of rationality and speech (Meijer 2019, p.423)

As an example of such interspecies deliberations, Meijer considers goose-human conflict around Schiphol Airport (Meijer 2019, p.441). The most common 'solution' to such conflict is to kill the geese to reduce their population, which is both "morally problematic" and "practically ineffective" (Meijer 2019, p.441). As Meijer notes: "Many parties play a role in these conflicts—including the media, farmers, politicians, and biologists—but the geese themselves are not consulted, even though they can exercise agency and interact with

humans" (Meijer 2019, p.441). Meijer instead argues that deliberations over a solution to this conflict requires the inclusion of the geese themselves, suggesting that:

> … interaction with the geese should inform the decisions made about them and these decisions should be communicated back to the geese in a language they can understand—for example, through material interventions. They can then respond, for example, by leaving a certain spot or defending it, to which humans can then further respond… Human experts in various fields, such as art, biology, and politics, could play a role in learning about the geese and finding new ways to live with them. (Meijer 2019, p.442-443)

This work on interspecies deliberative theory could certainly be important for ensuring deliberative procedures over conservation aims are able to resist accusations of anthropocentrism, although a full development of this point is beyond the scope of this thesis. However, I should here point out that this approach, too, is not without its limitations. Most significantly, Meijer's account specifically deals with the incorporation of *animals* into deliberative theory, however it is not clear how well the account stretches to other kingdoms of taxa. It seems likely that the more distantly related a biological entity is to ourselves, the more we will struggle to interpret its language or way of communicating and successfully deliberate with it. Deliberations with geese are one thing, deliberations with fungi or microbes are another. Even within the animal kingdom, the issue of interpretation will be a significant one. Uncertainty over the correct translation or interpretation of animal behaviour and communication leaves a significant gap into which unchecked human value-claims could once again enter the picture under the guise of the

interests of this-or-that population or species, allowing for the issues of imposition and inattention to reassert themselves.

Both approaches to non-human inclusion within deliberative procedures do therefore face challenges. However, they are not insurmountable. In particular, more research is needed into 'interspecies deliberation', which could prove to be a fruitful line of further inquiry. At this point, I think I am certainly able to conclude that deliberative procedures are not *necessarily* anthropocentric, and there do exist potentially workable strategies available to further include and incorporate non-human interests within deliberative procedures, either indirectly through representatives or else through more direct forms of inclusion.

§5.4 Infinite Regress

A final worry that may be raised regarding procedural objectivity is that it leads to an infinite regress of procedures required to decide on the correct principles and rules for subsequent procedures. For example, it may be argued that a given procedure for determining indicators to be used to measure the ecological health of a given ecosystem requires a prior procedure to decide on who should be included and the correct format and rules for such a procedure to follow. This in turn would require a prior third procedure to decide upon the appropriate rules for this second procedure, and this third procedure would need a fourth procedure to determine its rules, and so on.

While this is indeed theoretically concerning, in practice, level-one, or at the very most level-two, procedures are sufficient for providing greater objectivity to claims. We may think that there will be occasions where a level-two procedure is required to decide on some basic principles, objectives and rules for a level-one procedure to follow – however stakeholders are likely to be satisfied with not undertaking further procedures to determine rules for these level-two procedures. In practice therefore, we may draw an arbitrary line beyond which further procedure is not required. Furthermore, the principles and rules for procedures are constrained by widely-shared principles of justice and rationality which to some extent limit the extent to which procedures can differ in their underlying rules and principles. These limiting features constrain procedural objectivity to such an extent that a large regress of further procedures are unlikely to be required to determine the appropriate rules for a given level-one procedure.

§6. Conclusion

This chapter set out to understand the implications of the value-ladenness of conservation aims on their objectivity. I began by reiterating the work of previous chapters, claiming that the conservation aims considered throughout this thesis: naturalness, ecosystem health and biodiversity are value-dependent. I introduced Alexandrova's term, 'mixed', to describe these value-dependent concepts, arguing that claims regarding the aims of conservation which feature these concepts should be understood as 'mixed claims'. I then considered what this value-dependence means for the objectivity of these mixed claims regarding the aims of conservation. Firstly, I considered and responded to the idea

that mixed claims in conservation are subjective or only relatively true. In doing so, I argued that values must be distinguished from purely subjective claims about preferences and tastes as being potentially mistaken and subject to rational constraints.

Next, I considered the practical challenges of 'imposition' and 'inattention', which concern the potential for mixed claims to either intentionally of inadvertently impose a narrow evaluative view on to ecosystems and people. I argued that in order to respond to these challenges, we must form a conception of objectivity which is compatible with the value-dependence of mixed claims and can increase the likelihood that the values underlying mixed claims are themselves objective. In order to do so, I looked to feminist critiques of the value-free conception of objectivity to point the way towards a 'social' form of objectivity which is compatible with value-dependence. To develop this social account, I then considered Alexandrova's rules for 'procedural' objectivity, arguing that such rules are the best hope for producing more objective claims regarding the aims of conservation.

Finally, I considered and responded to some problems for the application of procedural objectivity to conservation science. There are some residual concerns regarding the question of who to include within procedures – a question for which the answer will necessarily be heavily context-dependent and for which I am pessimistic regarding the possibility of any general account. Despite this practical concern however, I showed that the procedural account can successfully respond to concerns regarding unequal power dynamics within procedures by ensuring a focus on procedural justice so that diverse knowledge systems are given due recognition rather than being assimilated to mainstream discourse. I also argued that deliberative procedures can respond to accusations of

anthropocentrism so long as the non-anthropocentric values of stakeholders are given weight in procedures, as well as suggesting the possibility of specific representatives for species or populations within procedures themselves. Finally, I responded to the worry that the procedural view leads to an infinite regress of procedures.

This chapter has also clarified and supported the arguments of previous chapters. The previous chapters showed that several key concepts used in conservation science to conceptualize its aims are value-laden 'mixed' concepts. However, it is now possible to understand that far from leading to a pessimistic conclusion regarding the legitimacy of these concepts, a recognition of this value-ladeness is the first step to achieving a more thorough form of objectivity in conservation science. In order to deploy concepts such as naturalness, ecosystem health, and biodiversity in more objective ways, conservationists must first recognise that value-judgements inevitably must be made in order to operationalize these concepts. This chapter has shown how deliberative procedures can be an effective way of ensuring that such value-judgements are made more explicit and subjected to greater levels of scrutiny from a more diverse range of perspectives. In light of this, it is possible to better understand the significance of the normativist position considered in previous chapters. In particular, the work of this chapter provides a much more complete picture of the second condition of my normativist account of ecosystem health (p.114). Normativist accounts of conservation aims do not undermine the legitimacy of said aims, but rather, in exposing their value-laden nature, normativism provides the foundation for a more feasible account of their objectivity.

Chapter 6

Conclusion: Values and Objectivity in The Aims of Conservation

This thesis has proceeded along the following lines. After some brief introductory remarks in Chapter 1, Chapter 2 examined the use of naturalness as a conservation aim. To what extent, I asked, can conservation be conceived of in terms of saving nature. I found that naturalness could imply radically different conservation aims depending on the underlying value-claims forming the context of its use. I divided uses of naturalness as a conservation aim into two general categories: 'historical fidelity' and 'non-intervention'. While conceptions of naturalness as 'historical fidelity' can be used to justify interventions such as species reintroductions, eradication of invasive species and de-extinction, these same actions would be prescribed against by a conception of naturalness as 'non-intervention'. I argued that the conflict between these two conceptions of naturalness is a result of the different underlying value-claims inherent in each. Through a detailed examination of Plumwood's analysis of human/nature dualism, I argued that each of these different evaluative perspectives, in their own way, were part of a broader dualistic view which conceives of humanity and natures as radically opposed and internally homogenous categories. I concluded by suggesting a conception of naturalness which captured the value of the autonomy of nature as a less dualistic and more coherent way forward for the use of naturalness as a conservation aim.

Chapter 3 explored the concepts of ecosystem health and degradation, arguing that ascriptions of ecosystem health and degradation are similarly dependent upon underlying value-claims. I made use of the distinction between 'normativists' and 'naturalists' in the parallel debate from the philosophy of medicine over the role of values in conceptions of human and organismic health and disease, finding that a similar dialectic could be found in debates over ecosystem health. I considered what I took to be the two best options for a naturalistic, value-free account of ecosystem health – one which makes use of the Boorseian notion of 'statistical normality', and another which makes use of the notion of 'organizational self-maintenance'. I argued that neither of these accounts are successful in devising a conception of ecosystem health that is fully value-neutral. In the Boorseian case, I argued that statistical normality can only be made sense of through the construction of a 'reference class', the constitution of which is dependent on evaluative judgements. In the case of 'organizational self-maintenance', I found that it is dependent on an evaluative choice regarding which features of the ecosystem are considered as essential to its identity such that we can regard it as the same ecosystem through time, as well as an evaluative claim regarding the value of self-maintenance and stability over change. I concluded by laying the framework for a normativist account of ecosystem health which conceived of it as the maintenance of a valuable structural and functional arrangement, where this value has been decided by an inclusive deliberative procedure.

Chapter 4 went on to consider biodiversity and its use as a conceptual framework for the aims of conservation. I found that there are a multitude of ways in which biodiversity can be defined and measured. I considered what I take to be the three most significant interpretations of the concept: 'species richness', 'phylogenetic distance', and 'functional

diversity'. I also considered the different scales at which biodiversity can be measured and the implications of scale for debates over invasive species. I found that differing accounts of biodiversity, as well as differing interpretations of each account, can pull in different directions when devising biodiversity prioritization rankings. Such conflicts between differing understandings of biodiversity, I argued, can only be settled through reference to non-epistemic values. I considered and made some objections to Lean's argument that a phylogenetic conception of biodiversity should be preferred for epistemic reasons. I concluded by arguing against a deflationary view of biodiversity according to which the concept should simply be taken to reflect "normative discussion of what merits conservation" (Sarkar 2019 p.379). Although selection of a specific conception and measure of biodiversity is value-dependent, this does not mean that biodiversity should always equate with what, all things considered, is worthy of conservation. Despite their selection being value-dependent, measures of biodiversity should also feed back into and inform our evaluative views regarding what should be conserved.

Chapter 5 investigated what the value-dependence of the conservation aims I considered in the previous chapters means for the possibility of objectivity in conservation science. Through drawing a parallel with the science of well-being and the arguments of Alexandrova (2018), I argued that conservation science, like the science of well-being, should be understood as a 'mixed science' – that is, a science which contains claims in which at least one of the terms is dependent upon an evaluative judgement for its definition. I argued that this value-dependence is at odds with traditional conceptions of scientific objectivity as independence from non-epistemic values, also known as the value-free ideal (VFI). I responded to the concern that value-dependence therefore results in subjectivism or

relativism by distinguishing ethical value-claims form strictly subjective claims regarding preferences or tastes. I then argued that the value-dependence of claims in conservation science does come with some practical issues, adapting the concerns of 'imposition' and 'inattention' described by Alexandrova in case of well-being science to the context of conservation science. I argued that in order to respond to these issues, a 'social' conception of objectivity, which is compatible with value-dependence while stressing the importance of subjecting these values to scrutiny and criticism from diverse perspectives, is vital. I agreed with Alexandrova that a 'procedural' conception of objectivity was the best way to achieve this type of scrutiny and critique of value-claims and applied her rules for procedural objectivity to the case of conservation science. I found that, in particular, her rule concerning consultation of the relevant parties was significant in securing objectivity in conservation science. I connected this idea to the 'participatory conservation' literature and developed the argument that the production of more objective claims is a good further argument for the importance of participation and deliberative procedures in conservation.

This thesis has made several important contributions to the field of philosophy of conservation which could help to guide the direction of future research. First and foremost, this is the first piece of literature that sets out a coherent picture of the role of values in determining the aims of conservation. Other authors have addressed this topic through the lens of one conservation aim or another (for example, Sarkar (2019) on biodiversity), however no one has previously tied together the full spectrum of conservation aims into a single, more general, narrative. Through investigating three different conceptualisations of the aims of conservation in Chapters 2-4 – naturalness, ecosystem health, and biodiversity – I discovered a similar dialectical structure was present within debates around each. In each

case, conservation aims had been understood as value-free and somehow inherent in nature, simply awaiting sufficiently accurate scientific measurement. However, I found that each aim can be interpreted and defined in different ways depending on the underlying value judgements which necessarily must be made if aims are to be operationalised for conservation decision-making. Conservation aims, I argued, are value-dependent 'mixed concepts'.

Such a generalised account of the value-ladeness of conservation aims is an important contribution of this thesis and will be helpful for further research into the philosophy of conservation going forward. Future research should focus less on eliminating values by attempting to provide purely naturalistic accounts of conservation aims and more on finding ways to expose the value claims that are implicit within different conceptions of the aims of conservation and developing strategies to arbitrate between them. Chapter 5 of this thesis, which showed how greater objectivity could be generated within conservation science by the explicit inclusion of a greater diversity of values arbitrated through deliberative procedures, represents an initial push in this direction. Although this chapter still leaves much to be worked out, I believe it represents an important future direction for research into the philosophy of conservation.

As well as the development of such a general approach, this thesis has also made several more specific interventions on particular topics. Firstly, on ecosystem health, this thesis is the first attempt to really make use of the extensive literature on health and disease in the philosophy of medicine to develop a normativist conception of ecosystem health. I found a great deal of untapped resources within the philosophy of medicine to

develop such an account and to resist the charge that it would lead to a relativism regarding ecosystem health and degradation ascriptions such that they are "in the eye of the beholder" (Callicott 1995, p.350, Hobbs 2016, p.154). Secondly, I showed how a normativist approach to biodiversity can be developed that accepts value-ladeness while resisting Sarkar's deflationary conclusion. I argue that biodiversity is a defeasible good that must be conceptualized in terms of some measure of diversity, although the specific measure that is chosen is dependent of values. This represents a novel approach to conceptualising biodiversity which retains the most important insights of both normativists and naturalists. Thirdly, on the topic of naturalness, I showed that both restorationist and non-interventionist views of naturalness are dependent on dualistic values, which had previously been seen as more of a problem for non-interventionists than restorationists. However, rather than taking the problem of dualism to mean that naturalness should be abandoned as a conservation aim, I sought to defend a less dualistic conception of naturalness based on the value of autonomy. Such a defense of naturalness in the face of a full acknowledgement of the concept's dualistic origins, although to some extent inspired by the work of Plumwood, is a fairly rare strategy, and certainly goes against the grain of a great deal of nature-sceptical philosophy that is currently in vogue.

Beyond its contribution to the philosophy of conservation, this thesis also has implications for conservation in practice and for the way that conservation is thought about and engaged with in the public sphere. For conservation in practice, the approach described in this thesis would encourage conservation practitioners to be more aware of and explicit about their own values, especially when using normatively loaded terms like naturalness, ecosystem health, and biodiversity. Conservationists must ensure that their version of a

healthy ecosystem, or a natural landscape, or a biodiverse species assemblage, isn't imposed on to people who may have different conceptions of these same aims; the values of conservationists should be checked and balanced against a diverse range of evaluative perspectives to ensure greater objectivity. This means that deliberative procedures should be a feature of conservation research right from its very foundations – not just as a way to balance the aims of conservation with external social and political aims, but rather a means of determining the very aims of the field of conservation science itself. This, in turn, has implications for how conservation should be regarded within the public sphere. Given its inherent value-ladeness, conservation is an ethical and political project as well as a scientific and technical one, and as such, it should be seen as an arena for public engagement, debate, democracy, and deliberation. Such an approach therefore demands as great an engagement as possible with the public at large, especially citizen scientists, traditional ecological knowledge holders, and all public stakeholders with either recreational or economic relationships with the ecosystems and sites at which conservation projects are taking place.

The thesis began by asking the question: "what should conservation aim for?" I am now in a position to make three key conclusions regarding this question:

1. **Pluralism** – There are a variety of plausible conceptions of the aims of conservation. No single normative concept can adequately capture all the values which conservation science seeks to promote and defend. Each of the aims considered in this thesis, naturalness, ecosystem health, and biodiversity, have a role to play in informing and shaping the objectives of conservation projects.

2. **Normativism** – Conservation aims are value-dependent. The aims of conservation can't be read off from the way the world is, since, in the case of the 'mixed' concepts I have considered in this thesis, the way we describe how the world is, is in part a reflection of how we think the world should be. Describing an ecosystem as more healthy, or more natural, or more biodiverse, than another, is dependent on making evaluative judgements regarding what should be captured by these concepts. Such evaluative judgements, however, should not be seen as problematically subjective or relativistic. Evaluative judgments, unlike mere preferences, are capable of genuine mistakenness and are constrained by and susceptible to, reasons.

3. **Proceduralism** – Conservation aims should be decided through inclusive deliberative procedures in order to increase their objectivity. Given the value-dependence of the concepts used to frame the aims of conservation, it is vital that procedural checks are put in place in order to make these values explicit and subject them to scrutiny and criticism from a diversity of evaluative perspectives. It is particularly important to include the perspective of those who will be directly affected by conservation interventions, as well as marginalised groups whose perspectives have often been excluded and neglected by mainstream conservation discourse. These procedures are not only vital in ensuring decisions are made in a more just way, I argued that they are also essential for ensuring the objectivity of the values which underlie claims about the aims of conservation.

In coming to these conclusions, I have encountered some critical challenges to and limitations of the thesis requiring further research to resolve. Most significantly, the application of procedural objectivity still requires some working out. The question of who can and should be included as stakeholders within a given deliberative procedures is itself deeply value-laden and political in nature and is in need of further research in order to provide a more detailed analysis of how such decisions should be made. Issues such as: the unequal distribution of land-ownership and social-political influence; tensions between inclusion at different spatial scales; the non-local effects of conservation projects; and the potential inaccessibility of procedures to marginalized stakeholders; all require further attention.

Furthermore, the inclusion of non-human stakeholders within deliberative procedures raises challenges for the traditional rationalist conception of the nature of deliberation. As such, further research in this area could prove important for both philosophy of conservation literature as well as philosophical understandings of deliberation. It remains unclear the extent to which deliberation can be reimagined to accommodate non-human stakeholders. As such, it is unclear whether such a strategy should be adopted over the more modest strategy of utilising human representatives for non-human entities (an option which comes with its own problems, such as the potential re-emergence of imposition and inattention issues). Further study could work on comparing the effect and feasibility of both of these different strategies for addressing anthropocentrism within deliberative procedures.

Finally, although there are already well-developed frameworks of procedural justice, further research is needed on the relationship between this and procedural objectivity. In particular, the ways in which procedural justice is conducive to objectivity and the question of which specific aspects on procedural justice are most significant for achieving objectivity could be explored further. A strong framework of procedural justice therefore requires further development within the context of achieving greater procedural objectivity to ensure that all voices, particularly those that have been historically marginalized, are given weight in deliberative procedures.

Further research is therefore required on several aspects of the practical application of procedural objectivity to conservation science. However, I believe I have here provided a strong philosophical foundation for any such further research into values and objectivity in the aims of conservation.

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