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Abstract:

Should we colonise other planets? I argue that concepts provided by environmental ethics scholarship in the context of the ethic of stewardship enable space colonisation to be considered as a logical extension of existing duties that we already have convincing reasons to consider as being rationally grounded. To justify this position, I examine how a contemporary secular foundation that focuses on networks of relationships within and across communities can provide stewardship with a basis for motivating agents to take on duties that may conflict with their personal interests. I use concepts from complexity theory (Cilliers P. C., 2008) to frame the investigation, whereby if knowledge of complex systems is always provisional, then this suggests an inescapable moral component for decision making by limited finite agents. Due to inherent issues in attempting to locate the source of authority for stewardship claims regarding duties and obligations in the concept of the public interest then what emerges as the best candidate is a moral principle that emphasises what I describe as community perspectives of value. This moral principle provides normative support for discharging stewardship duties and obligations to members of communities that span boundaries between species, between the present and future, and between the knowledge these communities currently have, and the knowledge that in principle would enable this cycle to continue indefinitely when space colonisation is incorporated into the scope of a far-reaching stewardship ethic.

Introduction:

My argument is based on the ideas that there is a secular concept of stewardship that rationally generates duties and obligations now, that these duties rationally extend to unfamiliar future timescales, and that space colonisation becomes a necessary feature to avoid arbitrarily cutting short these obligations in the face of distant but entirely foreseeable circumstances where the Earth is simply incapable of contributing to the stewardship of anything. I present a community focused concept of stewardship in terms of duties, duty bearers, the kind of things these duties could be owed to, and key relational features between these parties based on Barritt's framework (Barritt, 2014), and what emerges lays the groundwork for an affirmative answer to our question of should we colonise other planets. The concept of community, and defining the relationships between community members in terms of stewardship duties and obligations, enables an appreciation of the existence of multiple valid perspectives that mean where and how we define boundaries e.g. between species, physically between locations, and between generations in time, requires moral choices by agents attempting a rational response to the irreducible complexity of the universe. The tension between individual self-interest and the duties owed to members of communities, where the concept of community spans both current and future generations, is precisely where the stewardship concept offers helpful insights into how problems can be both anticipated and potentially resolved. I identify what I see as a crucial dependency on a moral principle required for stewardship to function effectively over both the short and longer-term timescales. The implication is that stewardship in a secular sense is a coherent possibility, provided we are clear on the dynamic between individuals and communities, and taking stewardship duties and obligations seriously extends to support for space colonisation.

This concept of stewardship offers an alternative to the "the tragedy of the commons" (Hardin, 1974) that would otherwise result in overuse and degradation of finite shared resources (i.e. the Earth) because, given inherent limitations on possessing and processing the kind of full information assumed in classical logic, attempting to locate and justify decisions solely in terms of individual preferences or interests will always result in outcomes that are suboptimal due to imperfect rational agents pursuing strategies that are inherently short-term and narrow in

scope. The moral principle that I propose emphasises the dynamic between communities of interrelated parties, with the community defined in terms of having a shared stake in outcomes, and provides normative support when discharging stewardship duties that would otherwise clash with individual agents interests. The validity of multiple perspectives on what is most valuable and how to measure improvement in these communities (Klein., 2014), I believe, is where moral language and framing the need to acknowledge what I refer to as community perspectives of value provides crucial support for a stewardship approach by avoiding a narrow focus on individual value concepts. By shifting the focus from individuals to communities I indicate how the concept of stewardship can in principle continue to be expanded indefinitely in a mutually reinforcing process over evolutionary timescales.

The connection with space colonisation then becomes inescapable in that, if fulfilling stewardship duties and obligations with regard to future generations is taken seriously, then there is no reason to define a boundary that constrains the physical location to the planet Earth and in fact good reasons why this assumption must be challenged. Simply put, if we take a long run perspective, then without some kind of space colonisation it is 100% certain that all life on Earth will become irrevocably extinct due to events such as comet, meteor, or asteroid impact, or the eventual collapse of our sun when its nuclear fusion reaction fails due to lack of hydrogen availability. Traditionally the interpretation of stewardship as it relates to environmental ethics has been to serve as a basis to argue for caution and slow the rate of anthropogenic technological development down to the point where we aim for “sustainable” development (Attfield R. , Email exchange, 2018) on planet Earth. This investigation confirms the relevance of stewardship as a means of helping to resolve urgent and existential challenges on Earth now, and also, that there is value in exploring the implications of an interplanetary scope for stewardship that have been largely neglected in contemporary scholarship. Treatment of stewardship in the literature appears to share a geocentric focus on Earth ecosystems and an explicit or implicit assumption that the objects of the stewardship duty however conceived are confined to the environment and life-forms on this planet. Where other planets are considered (Attfield R. , 2014) this is in the context of concern about the potential adverse impact that human colonisation would have on the ecosystems of these other planets (e.g. Mars). A useful analogy is provided by what existing stewardship duties

would suggest are required in a scenario where a lush tropical island, host to unique flora and fauna, were to suddenly be threatened by imminent catastrophic volcanic eruption and total annihilation. If, as I believe they do, stewardship duties now could be said to require efforts to relocate some or all of the species from this island, then how is the distant but (in the absence of space colonisation) certain destruction of the entire Earth and all the communities here inherently any different?

The research methodology is based on a non-reductionist realist epistemological perspective that acknowledges non-realist considerations (i.e I assume a non-realist account of morality consistent with J.L Mackie). I incorporate principles of conjecture and refutation (POPPER, 1971), incommensurability (Kuhn, 2012), and complexity theory (De Marchi, 1999) to frame an epistemological outlook that acknowledges the reality of inherent limitations on knowledge while resisting a collapse into vagueness and relativism. I draw on ideas about the incommensurability of value systems and pluralistic approaches to defining value (Houston, 2012) in the context of my investigation into individual vs community perspectives of value. Instead of trying to resolve these debates, I assume that survival matters, and that improvement for these communities is possible. My position is consequentialist, however instead of attempting to apply a utilitarian strategy and seeking to identify a single dimension of value for example preferences, interests, aesthetics, lack of pain etc (Attfield R. , Attitudes to Wildlife in the History of Ideas, 1991) to maximise or minimise against, I follow the progressive consequentialist approach outlined by Dale Jamieson (Jamieson D. &., 2009) that allows for and in fact requires the possibility of multiple different perspectives of value to be incorporated into discussions about consequences and outcomes. Instead of being forced to commit to a particular value theory I believe that the kind of stewardship I describe, with a focus on communities and the different perspectives on value that emerge as the relationships between members are defined in terms of duties and obligations, allows for a more realistic (if complex) picture to emerge. This approach is anthropocentric due to stewardship obligations and duties primarily being assigned to human agents, however, I also anticipate that eventually technological agents will have legitimate claims to being owed and owing duties and obligations.

The research strategy is focused on a longitudinal literature review of qualitative primary sources such as email exchanges with academics, journal articles, book chapters, academic texts as well as references to published resources on the internet. In the first chapter I present a preliminary investigation that clarifies the relevance of stewardship to the research question and identifies a dependency on a moral principle. In Chapter 2 I provide more detail on the moral principle. The analysis in Chapter 3 examines how ideas from complexity theory and the boundary that inherent limitations on information processing faced by any finite agent create complement stewardship accompanied with a suitable moral principle and can rationally be extended to include duties where space colonisation is relevant and over timescales where it is no longer necessarily humans as the primary duty bearers. In Chapter 4 I present objections and replies. I conclude with a reflection on how, if the connections between community members across boundaries including both in time and space are emphasised, then the scope for moral argument to operate both as a way of acknowledging the absence of clear-cut solutions and contribute to finding new ways of approaching a situation provide an encouraging confirmation of the relevance of doing philosophy both now, and into any future where less than perfect agents are forced to confront their limitations in the context of existential and moral uncertainty.

Chapter 1: Stewardship as a starting point

My literature review of stewardship focused on environmental, legal, and theological philosophy. The key objectives I set were to clarify how I see stewardship operating in a secular context, explore the implications of defining stewardship in terms of connections between communities, and investigate the relevance of moral language and moral principles for decision making by finite agents given the complexity inherent in this system. The relevance of where and how boundaries are defined is crucial to clarifying stewardship duties and obligations, and by drawing attention to the impact that real or imagined limits have on how communities with a shared stake in outcomes are defined, I indicate how I believe it is possible to contribute to new ways of approaching situations where conflict is likely (Midgley G. P., 2011). Whereas traditional environmental ethics approaches considered stewardship as a potential means of encouraging and enabling a sustainable development approach for planet Earth (Steffen, 2011), what ultimately emerges is a perspective of stewardship as a new frontier for environmental ethics.

What is the relevance of stewardship to space colonisation? Stewardship has been criticised as an ill-conceived and patriarchal perpetuation of the domination of nature by mankind that is in fact responsible for many environmental issues (White, 1203–1207). However, defenders of traditional Judeo-Christian attitudes to stewardship such as Robin Attfield point out that these accounts tend to be selective in the evidence they provide for their claims (Attfield R. , 1983) and argue that an attitude where people take responsibility for the consequences of their decisions as they relate to the natural world is central to the concept. Focusing on the impact that human civilisation and technology have had on the Earth's ecosystems, contemporary scholars working across disciplines (Steffen, 2011) describe this in terms of an 'Anthropocene' age, with the consequences of decisions made by people since the industrial revolution fundamentally altering the complex network of systems that have enabled life to develop on this planet. I believe that it is possible to develop a secular concept of stewardship that, by drawing attention to the impact that humans and their technology have on the Earth's ecosystems, forces a confrontation with the fact that the future of life on this planet is now ultimately dependent on what we decide to do next.

In this context, the first challenge is to explain how secular stewardship in the absence of a deity would work, given that the idea originally relied on answerability to a deity to motivate and enforce breaches of stewardship duties and responsibilities. Is stewardship, shorn of any theological connotation, senseless due to a lack of answerability in the event that the responsibilities associated with whatever stewardship may entail fail to be carried out (Attfield R. , 2014) by the stewards? Answerability is an important aspect of the stewardship concept because being a stewardship bearer ordinarily implies accepting that there will be an attendant consequence over and above whatever direct impact failing to carry out the stewardship duty entails. To clarify the sense in which I see answerability as being important, consider for example a person who sees themselves as a steward of a plot of land that would otherwise be neglected, and they choose to tend to it completely for their own reasons. It is true that there is nothing stopping them from seeing themselves as the steward of this piece of land, even if nobody else is aware of how this person feels or notices their efforts etc. However, where I see the connection between stewardship and answerability as being crucial, is when stewardship is applied across communities where self-interest conflicts directly with stewardship duties and obligations. Consider instead a group of people, with different motivations and preferences, attempting to take care of the land in perpetuity and it becomes clear that answerability is a necessary component to scale up stewardship and provide an additional normative reason that favors discharging stewardship duties (where normative reason is understood in terms of contributing a reason in favor of the stewardship duty (Dancy J. , 2006)).. Traditionally this was conceived of as a deity or an employer punishing wayward stewards. To whom would it make sense to assign answerability to in the absence of a theological interpretation that provides a deity as the authority figure and guarantor of consequences in the event of transgression of whatever responsibilities the steward may be supposed to have? As Derek Parfit has argued (Parfit D. , 1984), the identity of future persons is sufficiently contingent that seeking to locate a clear locus for responsibility in the sense that answerability requires in a yet to exist (and potentially never to exist) future person or persons has non-trivial challenges in terms of clearly answering to who exactly and in what sense can currently existing people be said to be responsible for anything to future generations. To me the best candidate for providing answerability is to ourselves (that is, each current generation of humans), now, rather than trying to assign answerability to contingent future humans and potentially divergent species.

Stewardship in the absence of theological context for answerability makes sense provided that we accept responsibility to each other now for taking stewardship duties and obligations seriously.

The model of stewardship that I use is based on Barritt's framework (Barritt, 2014), which in turn incorporates work from the legal philosophy scholar Errol Meidinger (Meidinger, 1998), and focuses on examining the impact of boundaries on how stewardship is conceived and implemented. The crucial insight that is relevant here is that boundaries in complex systems are necessary and enabling, and also that boundaries will be located in non-linear ways, so that anticipating the location of boundaries as just "at the edges" is misleading because it underemphasises the contribution of boundaries to interactions throughout the system (Cilliers P. C., 2008). Designing and implementing effective environmental policy responses requires explicitly defining and developing strategies for managing the impacts that boundaries have, from man-made ones such as separate legal systems and jurisdictions that complicate efforts to legislate, or physical ones like mountains and oceans (Knight, 1998) that represent crucial features of systems that both constrain and enable coordination and enforcement. Stewardship, suitably conceived and defined, represents a coherent way of acknowledging the impact that the boundary of time has on each current generation and I believe it can also make a crucial contribution to mitigating the risks associated with a tendency for short term decision making to obscure the reality of the direct connection between communities separated by time.

Barritt (Barritt, 2014) focuses on locating stewardship in terms of a relational network of impacted parties and suggests that in order to arrive at a workable model it is necessary to clarify the object of the duty, the beneficiaries, who owes the duty, and a sense of the relational scope of the duties in terms of the strength of the obligations that different parties may hold. Viewing stewardship in terms of a dynamic network of different parties with duties or obligations, rather than a static system with humans in a caretaker role, represents a subtle but powerful change in emphasis from individuals to communities. Stewardship offers a way of acknowledging the impacts that conceptual and practical distances posed by boundaries between species, physical space, and across time represent, and also that the incredible complexity and variety of life and ecosystems here on Earth is a function that is fundamentally

interdependent, connected, and dynamic. By encouraging a focus on the discovery of connections and appreciation of having a shared stake in outcomes stewardship is a way of acknowledging that, if survival matters for individuals (Sosa, 1990), then there are good reasons to view the survival of communities to be inseparably connected with this on a spectrum from purely instrumental dependencies through to what can be described in terms of moral reasons (Karp, 1993).

To clarify how I see this developing I started with examining traditional conceptions of the object of the duties implied by stewardship that focus on the role of humans as managers of “the land”. Conceived on a continuum from local to universal, “Land” may refer to small holdings, kingdoms, countries, up to the planet Earth. Contemporary science and philosophy have expanded the kinds of things that qualify as “objects” to include for example the atmosphere, natural resources in the ground, aquifers, oceans, the seafloor, and ocean currents (Steffen, 2011). The common theme shared by the different kinds of object that a stewardship duty can be owed toward is that there are competing demands for access and different potential use cases. This brings us to the next element, the beneficiaries of stewardship. Defining who or what benefits from stewardship is the focus of much of the environmental philosophy literature, and is often concerned with arguments related to perceived anthropocentric bias, and related debates concerning the kinds of things that may be deemed to be value-bearing or capable of being a beneficiary (Attfield R. , 2014). Weiss (Weiss, 1984) focuses on the idea of a planetary scope with the world’s natural and cultural resources as the object of duty incorporated into a planetary trust as both the beneficiary and duty bearer. In this concept, the current generation of humans is both a key beneficiary (from the previous generation’s duty) and duty bearer to the subsequent generation. The legal concept of fiduciary duty that Weiss advocates, in the sense of a legal and ethical relationship based on a trust, is a useful approximation to the kind of holistic responsibility that I believe stewardship requires. Is it necessary to be certain about who or what benefits from stewardship? Instead of trying to resolve what I see as intractable debates that attempt to assign instrumental or intrinsic value for non-human species and natural entities (rivers, oceans, ecosystems etc) I see a way forward that embraces a shift away from viewing beneficiaries as individuals towards beneficiaries as communities.

How members of communities are identified and what kinds of communities are recognised is a crucial area where stewardship, by encouraging a focus on the complexity of interdependencies, enables emerging relationships between what had previously been assumed to be disconnected parties to be identified, studied, and appreciated (Cilliers P. B.-H., 2013). Framing stewardship in terms of complexity analysis, where the 'generation of knowledge of complex systems is an exploratory process' (Cilliers P. , Boundaries, hierarchies and networks in complex systems, 2001), means that explaining and justifying who and what are deemed to be members of communities is dependent on the choices made about the models and frameworks used to represent what would otherwise be the unmanageable repetition of the complexity inherent in the real world. This suggests that the location of boundaries between and within communities, which can have fundamental impact on how the consequences of decisions are thought of, necessarily incorporate both objective and normative components. Stewardship offers a way of acknowledging the potential for growth in knowledge, with a model of understanding the complexity of the systems involved framed in terms of community members, where community members are defined as having a shared stake in an outcome (Carolyn G. Palmer, 2015). The particular outcome will vary based on context and by community, however, ultimately the outcomes are connected with survival. Survival of individuals, their immediate off-spring, and the survival of 'non-private projects' that involve combined efforts of societies (Sosa, 1990) like art, science, and philosophy are all examples of this sense of sharing a stake in outcomes. Agreeing the basis for stewardship duties and responsibilities between diverse communities depends on particular value theory commitments, and instead of attempting to resolve this debate here, I instead reiterate that I see it as an advantage that this stewardship approach acknowledges that there may be multiple valid perspectives from different theories. What is clear is that stewardship duties and responsibilities must be more than just a voluntary commitment that agents can simply opt out of (Routley R. , 1981). Similarly, while stewardship duties and obligations can be described purely in terms of granting rights, I believe that grounding stewardship narrowly in the existence of rights (Jamieson D. , Rights, Justice, and Duties to Provde Assistance: A Critique of Regan's Theory of Rights, 1990) based on ideas like interests or inherent value obscures the potential for relationships between community members to be expressed in terms of more

nuanced and more personal connections. Exploring community perspectives of value in the context of complexity theory, and refining what improvement means for these communities, is as an area with exciting potential for future research and I look forward to contributing to the development of relevant philosophical approaches and debate.

What I see as a crucial feature of communities in the context of stewardship is that there are members who feel a sense of what is referred to in the literature as “psychological ownership” where ‘Psychological ownership is "the state of mind in which an individual feels as though the target of ownership or a piece of it is 'theirs' (Pierce, 2003). There is no requirement for all community members to be capable of articulating or even having awareness of this shared connection, what is crucial is that the existence of the community is recognised by somebody (currently a human, although this isn’t necessarily a requirement in the future) who has taken on a sense of psychological ownership, and is capable of presenting arguments and responding to challenges on the communities’ behalf (HERNANDEZ, 2012). The boundaries between and within communities can be expected to be dynamic and change in response to research and an increasingly sophisticated understanding of dependencies and relationships across the boundaries between species, geographies, and legal jurisdictions. A community can incorporate non-human, non-animal, non-plant and non-biological (i.e. ecoystems) members. The flexibility and extensibility of how communities are defined and who and what members they incorporate is both a strength, and also poses a challenge, because the term risks losing relevance as a way of adding to our understanding and contributing to resolving debate if everything is deemed to be a member of a community. Similarly, different community members could interpret values differently and arrive at different conclusions about the consequences of actions, or disagree about the relative priorities that discharging stewardship duties and obligations requires. Instead of a concept of community that somehow resolves these tensions without further debate, I envisage the relevance of communities as contributing to a willingness to admit that other members have a stake in outcomes that are worth caring about, and that simply ignoring perspectives of other members is therefore an option that fails to meet the standards (moral and legal) that stewardship requires.

A stewardship approach that proposes a central role for communities, and to represent and understand relationships in terms of dynamic systems of interdependencies, is difficult to reconcile with the traditional human frameworks posited in terms of immutable laws and private property rights. When considering who owes the duty of stewardship the focus in much of the existing philosophical literature is on the duties of landowners, who are ‘expected to forgo certain privileges of land ownership in favor of the communal good, because they are in control of a resource which is in some sense communal’ (Barritt, 2014). Contemporary legal scholarship approaches the idea that property is not a thing, but rather the relationship that one has as with a thing, and in this sense private property is bound up with the social relationships and formal rules (i.e. the boundary that we call property rights) that societies have developed to manage conflicts regarding access to and duties toward private property (Rodgers, 2009). Put differently, communities need to continue to agree that private property is “a thing”, otherwise, it no longer makes sense for individuals to relate to objects in this way. There is inherent tension between the property rights traditionally allocated to individual landowners and the duties and obligations of stewardship. Are proprietary models of land ownership compatible with the kind of stewardship being discussed? That is, can stewardship duties and obligations be added to the existing rights-based framework of land ownership, or will stewardship of the far-reaching kind envisaged here require fundamental rethinking of the way rights and obligations are conferred and conflicts resolved?

As Lynton Caldwell insists (Caldwell, Land and the Law: Problems in Legal Philosophy, 1986), in order to ‘embrace stewardship, society must shift its focus from the rights of the current landowner [the individual] to the communal rights of society’. I agree that a crucial obstacle that must be overcome to start tackling many of the urgent environmental challenges (i.e. anthropogenic global warming) now requires a confrontation between traditional attitudes towards private ownership and the kind of stewardship duties that a planetary trust model suggests. There are interesting arguments for replacing private property with regard to land and other objects that fall within the definition of objects discussed previously with a stewardship relationship (William N. R. Lucy a. C., 1996) that focuses on what these authors identify as a crucial gap between requirements for meaningful private property in terms of exclusion of access and control and what in fact landowners are actually entitled to do or forbid

in practice. In essence, the argument is that because landowner's rights over "their" land are already curtailed by existing legal obligations (e.g. lender rights of repossession over mortgagees, right of way access to private property etc), the concept of "private" property is already unable to be sensibly applied to land holdings and the concept of "private" property is really just a convenient fiction that disproportionately benefits existing landowners at the expense of other community members. I see this tension between private and community property rights for existing agents now as a good analogy for the tension between current and future generations too. That is, until now human societies have operated with a strong bias toward the current generation, with existential survival challenges dominating the agenda, and little if any attention paid to the impact of action or inaction now with regard to future generations. The boundary in time that separates communities of current generations from communities of future generations is not something that can simply be removed by a change in the law, however, there is no reason why attitude changes accompanied by suitable legal developments would be unable to alter the impact of this boundary. Traditional attitudes to private property that have traditionally ignored or neglected consequences for future generations are, I believe, one of the key reasons why duties and obligations with regard to future generations have proven elusive until now. Whether through wholesale change to attitudes and laws concerning private property, or the gradual modification of the concept through the introduction of additional stewardship obligations, it seems clear that taking responsibility for the impact of decisions made now with regard to future generations will require societies to reevaluate the privileges associated with private ownership and incorporate mechanisms to acknowledge and protect community interests (Karp, 1993).

The relational features that characterise stewardship duties and obligations can be represented as progressively increasing in terms of the level of commitment and effort required on the part of the stewards. Drawing on approaches from legal scholarship, these relational aspects of stewardship are defined here as custodial, managerial, proprietorial, and finally a moral component (Caldwell, Land and the Law: Problems in Legal Philosophy, 1986). These different levels of stewardship obligation reinforce the shift away from an individual focus towards communities of both present and future generations (Haren, 2003). For stewardship to have content the custodial aspect is the minimal contribution where stewardship requires

people to adopt a responsible and non-self-interested care and preservation of whatever is being stewarded. Building on this, the managerial aspect (Passmore, 1980) requires stewards to actively care for and manage the environmental resources under their control. A key issue here is that given the anthropocentric focus of existing legal and ethical systems, management may result in outcomes that reward private interests, at the expense of communal ones. Additionally, Passmore and others (Attfield R. , 2014) (Bookchin, 1986) plausibly criticize the idea of humans being managers of the environment on the grounds that it can be taken to imply that the environment however conceived only exists for humans to “manage” it. A more nuanced approach to how human management can be conceived is provided by Jennifer Welchman (Welchman, A Defence of Environmental Stewardship, 2012) who suggests that it is human behavior, as opposed to the environment directly, that needs to be managed. I find this approach offers creative opportunities to acknowledge both the capacity for humans and their technology to have a catastrophic negative impact and at the same time potentially offer the only alternative to the eventually certain existential crisis imposed by galactic events (asteroid/meteoroid or comet impact, and eventual sun exhaustion and collapse). Peter Christoff (Peter Christoff, 1996) provides a useful parallel between human stewardship duties in relation to other species and the moral obligation that most humans agree we have to protect more vulnerable members of the human community.

This brings us to the moral dimension. What reason do individual agents have to manage their behavior in a way that fulfills stewardship duties and obligations that conflict with other priorities such as their own private self-interest in the absence of a substantive moral principle? Examining stewardship in this context is important because it helps tease out assumptions that are being made implicitly in much of the literature and force us to think clearly about where the ultimate source of any putative obligations and duties that stewardship may generate are derived from. Traditionally, stewardship accounts simply take for granted the existence of a moral principle where, ‘The assumption is, that attached to humanity’s dominant position in the environment is a ‘deep moral obligation’ or ‘civic virtue’ that requires responsibility for communal goods—like the environment—to be shared across all members of the community’ (Amitai Etzioni, 1991). I argue that a moral principle ends up being unavoidable as a consequence of limited agents forced to make choices in how and where they define

boundaries to enable the growth of knowledge in complex systems, however, instead of just assuming that a suitable principle exists my approach was to first attempt to describe how stewardship could work in the absence of a moral principle. If these attempts fail, as I believe is the case, then this helps to frame the subsequent effort to locate and explain a suitable moral principle.

Attempting to locate an alternative to a moral foundation for stewardship has been developed most fully by legal scholarship, with the goal being to provide a legal justification for stewardship duties that specifically avoids a dependency on appeals to a potentially ambiguous moral component, and is based on the concept of “the public interest”. In current usage the public interest is cited as a reason to favor a particular policy outcome, when there are conflicting options, and is used in the context of stewardship to justify cases where individual rights are going to be curtailed by duties implied by a putative community stewardship responsibility. The idea of the public interest sounds intuitively reasonable, however, there are serious issues that can be used to argue that the concept is in fact incapable of being applied in the context it was originally proposed to be used in. As the authors of this paper put it, ‘The crucial problem is that the concept of the public interest is shrouded in confusion’ (William N. R. Lucy a. C., 1996), and locating the source of the confusion helps clarify the need for a moral principle for stewardship. The suggested taxonomy for investigating the confusion surrounding public interest is originally due to Held (Held, The Public Interest and Individual Interests, 1970), who criticised “the public interest” as being too vaguely defined to be a useful concept in law, and I draw on her work and reviews in briefly assessing each of the preponderance, common interest, and unitary theories used in the literature to attempt to explain what the public interest consists of and how it might be meaningfully described and identified. The difficulties that plague attempts to clearly explain what “the public interest” is and how it could be assessed have important implications for how the concept of community needs to be approached if it is to be relevant to our attempt to arrive at a clear understanding of stewardship.

The first hint of the challenges that satisfactorily defining the public interest faces lie in the difficulty of being clear about what we mean when we say that something is in an individual’s

interests. Are we saying that something satisfies a want that they have, such that there is an instrumental connection between wants and interests (Reeve, 1983)? Or are there grounds to include interests that may be furthered without any specific end in mind (e.g. living a particular way of life)? Bearing these issues in mind, the preponderance theories attempt to assign the status of “the public interest” to whatever interest is most frequently deemed to occur for individual members of whatever community is being considered. Aside from practical difficulties with measuring interests, challenges with contradictory and conflicting interests, and general anthropocentric bias, the key issue with preponderance theories is that individual determinations of what is in their interests are not incorrigible, and therefore additional criteria are required to filter so that only “correct” interests count toward the total (Braybrooke, 1972). The problem is that these additional criteria end up becoming so complex that they take on the form either of moral principles (which we are trying to avoid in this context), or dubious assumptions of how agents would operate if they knew more and could think clearly (i.e. they would choose the “correct” interest in the presence of full information). In addition, the interests of future generations are unable to be adduced and would therefore need to be excluded. The validity of using numerical superiority of a particular viewpoint as the criteria for selecting it as optimal is also arbitrary in that the particular interest that this view would claim as “the public interest” can be anything without reference to any other criteria. Viewed in this light, any particular interest need only win over more supporters to become “the public interest” and there is no reason the content anointed by this arithmetic will be relevant in the sense required i.e. have the consequence of actually improving value for the public in some objective sense. Alternatively, the common interest proposal suggests that whatever all individuals take to be in their interests (i.e. the most frequently occurring interest that everybody concurs in) can be said to be in the public interest. By defining the public interest in this way, the issues related to conflict of individual interests are avoided, however it fails to adequately explain how this concept would be relevant in scenarios where some individual interests must necessarily be curtailed to achieve an existentially important outcome.

The alternative approach to defining what is in the public interest adopts an explicitly normative focus without reference to individual interests. That is, if something can be described as universally morally right or good then it is, by definition, in the public interest. This is referred to

as the unitary account that removes scope for conflict or disagreement between individual and the public interest in the sense that, as the public interest is defined by reference to some overarching moral principle, individuals in that society have made the decision that in event of potential clashes between the two then the public interest takes priority. Lucy and Miller invite us to consider what is then the point in retaining the concept of the public interest over and above the moral principle that defines the obligations and duties for people in this society (William N. R. Lucy a. C., 1996)? That is, rather than trying to retain the concept of “the public interest” and manage the difficulties in explaining how it works without relying on a moral underpinning, the suggestion from these scholars is to retain stewardship as a purely instrumental concept with duties and obligations defined that avoid a dependency on what they take to be a vague and ultimately superfluous additional concept i.e. “the public interest” to justify it. I see why legal scholarship has attempted to avoid what looks like messy and potentially unresolvable philosophical debate about metaethics and moral principles. Does depending on a moral principle mean that stewardship is no longer grounded on a rational reason? There is no reason that a moral principle has to render stewardship vulnerable to claims of irrationality, irrelevance, or relativism. The complexity of the world and limitations on processing information mean that ‘We cannot make purely objective and final claims about our complex world. We have to make choices and thus we cannot escape the normative or ethical domain.’ (Cilliers P. , Complexity, Deconstruction and Relativism, 2005). Moral language, by reminding agents with limitations to make modest claims about the ability of their scientific, social, and moral frameworks to produce knowledge about the world, is a crucial component in supporting and enabling the ongoing survival of the communities that depend on the Earth’s ecosystems. A moral principle that acknowledges multiple valid perspectives on value complements stewardship to enable progress on both urgent problems now, and over an inter-generational context and long-term time scales, including when space colonisation becomes relevant. I use the term moral principle to explicitly draw attention to the fact that stewardship duties may require individuals to make decisions that conflict with their own interests (however these interests are defined). The moral principle supports the legitimacy of community perspectives of value and provides additional normative reasons in favor of performing stewardship duties and obligations when these conflict with individual perspectives of value.

A secular planetary trust concept of stewardship that emphasis community perspectives of value is therefore a coherent possibility. How exactly does it relate to space colonisation? Proponents of stewardship tend to just assume that the concept implies a traditional sustainability-type argument where the stewards (i.e. humans) were required to eschew technological progress and focus on a kind of steady-state economic, social, and environmental system that would enable “flourishing” for the earth’s ecosystem. I found that the tendency to ignore or neglect uncomfortable questions about whether these measures implied population control, eugenics, and returning to something like a subsistence agrarian society reduced the relevance of these accounts of stewardship (Attfield R. , The Ethics of Environmental Concern Second Edition, 1991). When stewardship is approached-in terms of relational aspects that emphasise the interactions between networks of interrelated parties (Barritt, 2014), then the same reasons that support both assigning fiduciary duties and taking these obligations seriously in the short term, invite reconsideration of the impact that boundaries like time have on longer-term duties and obligations. Simply put, if the arguments in support of assigning stewardship duties now are good, then there is no reason to limit the duties’ scope in terms of location to planet Earth, and no reason to limit the timescale to more familiar nearer-term scenarios . Viewed in this light, space colonisation and stewardship are mutually supportive, and I believe that a philosophical investigation into what stewardship in this less-familiar long-term context implies has the potential to both reinforce existing obligations where stewardship ideas have already been incorporated into legislation for environmental issues, and also invigorate debate by reframing how we understand the reasons that we ultimately have to take on and discharge stewardship duties.

To summarise the progress of our investigation, incorporating ideas from complexity theory, legal scholarship and environmental ethics philosophy enables the development of a workable secular concept of stewardship that assigns duties and affords beneficiaries protections, with answerability ultimately the responsibility of each current generation of humans, on behalf of current and future generations. If a planetary trust model of stewardship with humans and their technology as the primary duty-bearer is the most promising candidate for tackling urgent anthropogenic problems now, there seems to be no good reason to allow boundaries in time or space to prevent duties and obligations being extended, which makes non-anthropogenic

issues ultimately just as urgently requiring duty-bearing agents to accept obligations here too. Inherent and irreducible complexity, the existence of multiple valid value systems, and the need for what we currently define and understand as private rights to be infringed upon by relational concerns from the community of beneficiaries that include both current and future generations of humans, as well as non-humans, is where the dependency of stewardship on a moral principle emerge most clearly. Stewardship with a moral principle is therefore a rational response to the challenges of survival where the complexity of interactions between community members means that decisions necessarily incorporate both objective and normative components. The conclusion of this chapter is that stewardship, supported by a suitable moral principle, rationally generates reasons that extend to supporting space colonisation. In the following chapter, I investigate the moral principle in more detail, and explain how I see the moral principle and stewardship as being capable of enabling an open-ended discovery of reasons over evolutionary timescales and interstellar distances.

Ch 2 In what sense is this a moral principle?

The conclusion of the previous chapter was that there is a workable sense of stewardship that implies that if there are coherent grounds for adopting stewardship duties and obligations with regard to current generations, then this also implies these stewardship duties should apply over longer time scales that connect existing communities with future ones, up to and including communities on other non-Earth ecosystems enabled by space colonisation. However, what is about the community context that generates what I am calling a moral obligation to take these stewardship duties seriously? If, following Aldo Leopold, we agree that 'An ethic is a limitation on freedom of action in the struggle for existence' (Leopold, 1949) then what is it that provides a stewardship ethic with the justification or reason for agents to accept the duties and obligations that it generates? And how could our proposed stewardship model avoid 'the demandingness objection' which is the concern that a consequentialist ethical theory including the kind of stewardship I am describing generates obligations or duties that are too onerous for agents in the real world (Jamieson D. &., 2009). In this chapter I examine how complexity theory suggests approaching the debate regarding what is valued in the context of these communities from a moral perspective, address a concern about whether the proposed stewardship ethic requires supererogatory agents, and clarify how I see the moral principle and stewardship working together to provide support for a consequentialist argument in favor of space colonisation.

A traditional utilitarian argument for or against space colonisation would attempt to define value in terms of who and what kind of goals or preferences would count over current and future generations and then arrive at a nominally quantitative and clear moral judgement with a Boolean choice in favor of a single and unambiguously best option. Aside from the difficulties in determining who or what kind of things count (Schwartz, Welfare Judgments and Future Generations, 1979), and questions about the status of future persons (or other creatures) and whether they are something that be owed a duty to at all (Grey, 1996), I believe that utilitarian accounts break down when applied over long term evolutionary timescales due to inherent 'calculation issues' (Miller, 2004) associated with the scope of consequences and uncertainty regarding probabilities that are necessarily used to mitigate the inability to be precise about

consequences. They either result in the trivial outcome that space colonisation is always required, due to the fact that in the long term the value of (even heavily discounted future preferences) will always approach infinity, and this thereby generates an obligation to sustain some kind of future preference bearing entities. Or, if future preferences are truncated arbitrarily at some point to avoid this outcome, then the result is so biased towards nearer-term inhabitants that discussion of space colonisation is relegated to a kind of second-tier status outside the realm of serious discussion and debate due to a plentiful supply of other more urgent problems. What my literature review and research suggest is that expecting a utilitarian solution (or any other option) to neatly remove moral ambiguity and the need for ongoing research and debate into how value is defined is unrealistic. Instead of expecting the kinds of consequences that stewardship is concerned with to be based solely on instrumental benefits (William N. R. Lucy a. C., 1996), or interests (Attfield R. , 2014), or contracts (Wolfe, 2008), or rights (Karp, 1993), I believe it is better to remain open to how we define value and instead of being distracted by a maximisation criteria in any single dimension the focus should instead be on gradual and sustained improvement (Jamieson D. , When Utilitarians Should Be Virtue Theorists, 2007) with survival as the prerequisite.

The moral principle, by acknowledging the absence of a single maximisation critieria and encouraging a focus on competing community perspectives of value, is a way of forcing a confrontation with the impact of complexity. Given that ‘more than one legitimate description of a complex system is possible’ (Cilliers P. C., 2008), different approaches to defining value and how improvement is defined are inevitable. The moral principle that supports stewardship, framed in terms of a response to irreducible complexity, is a way of reminding agents to be modest in their knowledge claims and avoid making decisions where the consequences and value criteria used to justify them create boundaries that exclude membership from the community of beneficiaries. Drawing on contemporary research into motivated beliefs and reasoning (Kraft, 2015) and the distorting effects that emotional bias can have on the ability of agents to respond to evidence that threatens ‘valued beliefs’, I believe that membership of a community and the moral consideration that individual agents (e.g. humans) extend to other members can be described as examples of “valued beliefs” that are resistant to change in response to information and evidence, because the beliefs fulfill important ‘psychological and

functional needs of the individual' (Bénabou, 2016). On the one hand this tendency could create obstacles to new members being admitted to a community, for example if newly discovered reasons for doing this conflict with some existing members' valued beliefs about the kinds of members that belong in that community. On the other hand, because agents invest being part of a community with subjective significance, the value of defending other members and the concept of the community itself can become a source of motivation and inspiration for taking on duties and obligations that would otherwise fail to be prioritised. I see the moral principle in this context as a way acknowledging that locating individual identity within a community context is a powerful part of where many (human) agents derive a sense of value in their own lives. By acknowledging the need for debate regarding where the boundaries between communities are defined conceptually, in space, and in time, and emphasising the diversity of values that contribute to make membership of a community important, I see the moral principle as making a crucial contribution to the reasons agents have to take stewardship duties and obligations seriously.

What about the risk that the moral principle and an expansive approach to defining the relationships between community members results in decision making processes that are even more complicated and prone to intractable debate than the utilitarian approaches that were considered and rejected previously? Expecting the moral principle to provide clear action-guiding rules for every complex decision that is relevant here is, for me, simply unrealistic. Acknowledging that the evolutionary decision-making capabilities that human agents find themselves equipped with at this critical point in the Earth's history requires an intervention to avoid existential crisis connected with our tendency for narrow and short-term definitions of community and value to dominate is how I see moral debate and the moral principle contributing to a more workable solution. That is, the absence of a consensus in the moral debate regarding who or what belongs to communities and what duties and obligations and duties they are owed can be viewed as a reason to avoid making decisions that threaten their survival (let alone any potential for improvement, however this is defined). There is a parallel with arguments against capital punishment based on the impossibility of excluding error in the process and the inability to make restitution or compensate the recipient (Satre, 1975). To indicate my initial response to the demandingness concern associated with this moral principle,

I believe that it is a strength of an ethical theory that it encourages agents to make the best decisions possible instead of focusing on simple compliance with a minimum standard, and that having a moral principle that is demanding is a reflection of the existential consequences of failing to take stewardship duties and obligations seriously.

To develop this suggestion I researched how scholars in environmental philosophy have sought to understand and critique the role of moral language and moral principles in the context of stewardship. Contemporary philosophical interest in the moral aspect of stewardship as it relates to environmental concerns starts with the observation first proposed by John Passmore (Passmore, 1980) that if human beings are to make sustainable progress in acknowledging and addressing the challenges posed by the unmanaged expansion of human technology and civilization then the arguments that would need to be made must incorporate both a moral component, and more specifically, that the moral framework required is already in place. That is, Passmore argues that “we do not need a new morality or new values” (Midgley M. , 1975) in order to construct a coherent and secular underpinning for stewardship capable of providing a logical, pragmatic, and recognisably moral injunction for human beings to take a lead role in terms of accepting the obligations of stewardship duties. Richard Routley (later Sylvan) famously argued that traditional ethical systems including stewardship were incapable of forming a moral injunction to motivate making decisions aligned with what he called an ‘environmental ethic’ (Routley R. , 1973) and that a new ethic was therefore required. The suggested new ethic is focused on expanding the scope of moral consideration, either by seeking to define and assign intrinsic value as the underpinning moral concept, and/or extending the concept of rights to things previously outside the purview of this concept. The assumption being made by Routley is that stewardship was irretrievably anthropocentric and implied that all other interests would necessarily remain subordinate to humans. I believe that the anthropocentric relational stewardship model discussed previously, combined with the moral principle, can address this concern by allowing for expansion of the range and scope of obligations and duties in response to an increasingly sophisticated understanding of how community members have a shared stake in outcomes viewed from a variety of perspectives on how value is defined. The conduct of the ‘Last Man’ (Routley R. , 1973) who seeks to eliminate every remaining living thing, viewed from the perspective of the planetary-trust

stewardship concept, can be morally condemned on the grounds that his duties and obligations with regard to present and future generations of communities of non-humans are failing to be discharged.

For me what is crucial about the moral dimension, where the word “moral” is understood in terms of a J.L Mackie-style perspective (Mackie, 1990) which denies an objective set of ready-made moral principles is that if we assume the absence of an objective moral reality, then for humans, morality will need to be able to evolve and change in response to the kinds of conflicts individuals and groups of individuals as communities encounter (Cohen, 1982). Acknowledging the existence of different and valid community perspectives of value, and enabling agents to have access to more reasons to reconsider decisions that would otherwise focus on a narrow individual assessment of value, is the crucial contribution the moral principle can make to stewardship. This is part of an acknowledgement that the inherent complexity of the systems that form these communities, and fundamental limitations on knowledge and information processing, mean that we shouldn’t expect to have perfect objective knowledge or an irrefutable set of moral reasons on hand to justify any possible stewardship duty or obligation. Knowledge of complex systems is always a work in progress, therefore decisions have an inescapable moral component, because the necessity of using a framework to generate knowledge means that the decisions about which framework to use and how to interpret outputs are things that require subjective choices (Cilliers P. C., 2008). Taking responsibility for these choices, I believe, is what moral language and a moral principle mean in the context of stewardship.

Questioning the relevance of morality in a secular context in relation to Passmore’s work, Mary Midgley invited us to ask is it really true that a secular version of stewardship will be capable of engaging and sustaining agents to take on duties and obligations it if we seek to locate the basis wholly within the existing Western intellectual tradition (Midgley M. , 1975)? Effective replies to objections regarding the religious origins of stewardship and relevance without this foundation take the form of pointing out the potential for concepts to evolve and develop over time, with the implication being that there is no reason to reject outright the potential for a stewardship conceived in secular terms to be capable of being both coherent and useful

(Welchman, A Defence of Environmental Stewardship, 2012), provided care is taken with how the moral component is understood and applied. A moral principle that boils down to valuing community perspectives of value is a way for limited agents to acknowledge and overcome the shortcomings and individual bias that prioritising decisions based on criteria drawn solely from necessarily imperfect knowledge and unavoidable biases generated by existing frameworks. When confronted with a decision that will have consequences for something that seems irrelevant (e.g. a member of a distant future generation, or some other species), the moral principle at work here invites us to consider that there are (or at least, may be) good reasons to treat them instead as a candidate for community membership and thereby moderate the tendency to otherwise exclude investing effort in thinking about, caring about, and incorporating an assessment of the consequences of the decision on them.

This kind of moral principle is ultimately a way of reconsidering the impact of where and how the boundaries between community members separated by species, space, or time, are conceptually defined and making progress in addressing conflict by exploring different perspectives on where boundaries of concern can legitimately be said to exist. The moral principle is an acknowledgement that ‘no perspective is complete: all are partial, both in the sense of being limited and in the sense of being driven by value judgements’ (Midgley G. P., 2011). By enabling consideration of different perspectives on where boundaries are defined the moral principle contributes to expanding the range of reasons that contribute to underpin community stewardship duties and provides agents (i.e. the duty bearers) with an additional normative reason to perform their stewardship duties by reminding agents of the tendency for boundaries both real and imagined to influence decision making. As Katie McShane observes (McShane, 2007), ‘the long history in ethics of being concerned with questions of how to feel, what attitudes to take toward different things in the world, which things to care about, and how to care about them’ tells us that using moral language is a crucial part of how human beings engage with the practical implications of making decisions that necessarily involve ambiguity, tradeoffs, and consequences. I find that the distinction she makes between viewing ethical questions as purely providing support for which policy options or decisions to favor, and the more complex picture that acknowledges and seeks to find a suitably prominent place for how we feel about things, is a useful way of positioning the moral component of a workable secular

concept of stewardship. It is up to humans to create, sustain, and develop ways of giving meaning to and using moral concepts, and that by connecting moral language and moral debate with the search for knowledge and other reasons, the emerging picture is one where stewardship obligations and duties are inherently open-ended and that we should be wary of any position that offers the supposed comfort of a clear moral solution that excludes potential community members with no compromise or grey areas.

Instead of viewing stewardship through the lens of arguments that focus on a supposed dichotomy between a despotic human dominion on the one hand and a benevolent human stewardship on the other (Harrison, 1999), I believe the dynamic concept of stewardship that has been discussed here can be extended indefinitely into the future by considering the epistemic process of reasoning as a beneficiary of stewardship duties and obligations too. Because of the ability of reasoning to create and discover both existential risks and the potential to avoid them, stewardship informed by this moral principle emerges as a way of both acknowledging complexity and limitations, and enabling the ongoing discovery of new reasons reinforced and extended by the diverse perspectives on value that make communities durable, resilient, and capable of remaining relevant over evolutionary timescales. A stewardship model that emphasises community perspectives of value and describes the relationships between diverse members, defined in terms of duty bearers, things that are owed duties, and what discharging these duties effectively is comprised of is logically capable of surviving into a future where it is no longer necessarily only humans that are duty bearers. Modifying a definition of stewardship originally proposed by Welchman (Welchman, A Defence of Environmental Stewardship, 2012), a definition of stewardship that emerges is therefore ‘Stewardship defines the relationships, duties, and obligations that enable the ongoing protection of diverse communities with a shared stake in survival and improvement, together with the acceptance of significant answerability for one's conduct to society.’

Humility in the face of complexity is the crucial contribution of the moral principle in the context of stewardship. By acknowledging the legitimacy of community perspectives of value, and the absence of a single value criteria to maximise against, a stewardship position offers no clear and unambiguous moral solution to the challenges and tradeoffs inherent in defining and

discharging stewardship obligations and duties. What is clear however, given the biases and limitations of the human agents that are in a position to influence the outcome for all current and potential future community members, is that without specific support to address these inherent features of our decision-making processes it will tend toward prioritising narrow concepts of what is valuable like short-term, individual interests. The proposed moral principle explicitly encourages an open attitude to new reasons for reconsidering where and how the boundary between community members is conceived and complements a dynamic stewardship ethic, so that duty bearers are supported both by additional reasons to take stewardship duties and obligations seriously as the discovery of relevant knowledge continues, and directly by the moral principle in the sense that it provides normative support to take on obligations in support of a broader community when these conflict with what otherwise would be their individual interests. Stewardship incorporating a moral principle that emphasises the importance of being open to incorporating new members into communities and taking obligations and duties to all community members seriously emerges as a way of life capable of extending into a future that has the potential to be open-ended in space, time, and the network of duties and obligations. In the next chapter I explore how the limitations faced by agents confronted with decision-making in the face of complexity suggest that this kind of moral principle and stewardship model can remain relevant into a future incorporating potential non-human duty bearers.

Chapter 3: Limitations, bounded rationality, and the argument for space colonisation

In this chapter I investigate how the stewardship model and moral principle that are relevant for present-day limited agents (i.e. humans) can also remain relevant over arbitrarily long timescales by focusing on the inherent limitations that rational decision making in the context of complexity by any future agents can be expected to share to some degree. For stewardship to be described as rational it needs to be something that responds to reasons, in that agents need to be able to access and make sense of the reasons why something may be said to be owed a stewardship duty, assign duty bearers, undertake the specific obligations the duty entails, and debate and agree consequences in the event the duties failed to be discharged etc. (Held, Justification: Legal and Political, 1975). The previous chapter described the relevance of moral language and confirmed the moral principle as being a necessary feature of stewardship given the complexity and inherent limitations to knowledge faced by human agents. Provided that agents continue to incorporate community perspectives of value this kind of stewardship, supported by the proposed moral principle, therefore has the potential to continue indefinitely. However, what reason would future (non-human) agents have to see this moral principle as relevant? And, if stewardship as outlined here is dependent on a moral principle, then how would this proposal operate over the time scales where evolution and technology mean that these future agents could be very different to us?

The inescapable boundary between the kind of perfect information that a perfectly rational agent would require, and the knowledge that limited agents will always have to contend with, is ultimately the reason why I believe stewardship and a moral principle on community perspectives will always remain relevant. Expecting to ever be in possession of the kind of full information that render a classical argument irrefutable in the sense that Bernard Williams' (Williams, 1981) 'Internal and External Reasons' assume to be possible is in fact something that is outside the scope of any finite agent (Dancy J. , . "Externalism for Internalists.", 1992). A feature shared to some extent by both present and far-future communities that a long-term stewardship would enable are limitations on their ability to process and reason with information. Individually and collectively, any agent has fundamental limits to information processing (for any system, human or synthetic) that make it impractical and too time

consuming to both maintain an exhaustive list of rules for how to behave in every conceivable situation, and also be able to continue to incorporate new scenarios and information, and resolve the conflicts that previously unencountered situations generate for legacy concepts. Theories that attempt to tackle this challenge in the literature frame this in terms of what is referred to as bounded rationality. Briefly, if being perfectly rational is at one end of a scale, then the boundedness concept pulls in the opposite direction, due to the fact that the optimal strategies and actions for agents with limitations may rationally require different patterns of thought and action than simply attempting to approximate those of a supposed “ideal” agent. Instead of this being understood in terms of a detailed list of rules or norms which define a good response to any specific individual's limitations for a given circumstance, the suggestion is to instead approach the situation from the perspective of the goals that are achievable, the outcomes that limited agents can aspire to achieve, with corresponding virtues framed in terms of achieving these goals (Morton A. , REALISTIC STANDARDS FOR DECISIONS, 2010). This suggests that, given irreducible complexity, it is rational for any limited agent to incorporate modesty and humility into this list of virtues.

What emerges when we consider our situation in this way is that, for limited agents, creating a detailed list of normative requirements that specify what exactly ought to be done for every conceivable scenario would result in a procedure far too complex and costly (in terms of time, effort, resources etc) to be capable of being used by precisely the kind of agents (i.e. humans and any finite agent that need to operate effectively given the complexity of the universe) that it is intended to be useful for. Trying to create or rely purely on a list of explicit normative rules to govern our approach to rational decision making including all the complex tradeoffs and debate required for stewardship looks doomed to failure. The alternative approach draws on the literature from complexity theory to argue that when we consider limitations on cognitive capacity in this light we can describe what emerges in terms of epistemic (or intellectual) virtues where these are defined as follows: ‘Epistemic virtues are characteristics of people that help their knowledge- acquiring projects succeed’ (Morton A. , 2004). Complexity theory research in mathematics and computer science shows that (Routley R. , 2010), for a given system, the difficulty of demonstrating a proof of consistency is greater than carrying out deductions that lead to the proof of individual valid axioms. The insight here is that, when

viewed from the standpoint of computational complexity, there is a trade-off between the processes related to acquiring new information about the world (e.g. forming new beliefs based on new evidence) and processes related to then checking what impact this newly acquired information has on the larger set of already-held beliefs. Because checking for consistency is more expensive from a resource point of view, when new information is acquired, the new beliefs formed by this process will often contradict existing beliefs. Morton describes this as ‘Or, more carefully put, any acquisition process that is computationally efficient will result in contradictions, since checking for inconsistency is an inherently harder business, so that an efficient acquisition process will embody only a few computationally easy special cases of consistency checking’ (Morton A. , 2004). Rationally resolving conflict between new information and existing frameworks, conceived in terms of reconsidering where boundaries in complex systems are defined, will always involve choices that require both objective and subjective criteria to be considered due to absence of any single legitimate value perspective to frame the situation.

What does rational support for stewardship duties and obligations mean in this context? Being rational in itself doesn’t add another reason in favor of or against a particular decision, it instead draws the deliberation back to the underlying reasons that exist (Kolodny, 2005). The advantage of this way of approaching rational decision making is that it avoids needing to try and create an additional reason to be rational, and instead focuses on the fact that, for a person to be rational is simply to respond to the reasons that to them they already seem to have. Instead of a status that a decision either has or lacks, rationality is more like a group of processes that enable agents to move from a state where there is contradiction (e.g. between beliefs, or between a desire and a belief) through to a resolution through action or changing beliefs and/or desires (Dancy J. , On knowing one’s own reasons. , 2014). In this sense, “rationality” is composed of a much richer set of characteristics that in everyday language are referred to as ‘conservatism, caution, stubbornness, and also ‘foresight, courage and doggedness’ (Morton A. , 2004) that are all kinds of intellectual and epistemic virtues that Morton suggests interact with a necessary tension between competing interests and relative priorities. To me, this suggests it is a category error to attempt to set up rationality as a single unitary concept based on expectations that imply that to be rational ideally requires perfect

information and perfect procedural processing and that agents like us should seek to emulate these perfect (and therefore irrelevant) models. That is, instead of asking what stewardship duties and obligations to take on based on what a “perfectly rational” person would do, we should instead acknowledge that we are unable to represent to ourselves all of the complexity and limitations inherent in every decision and that it is rational to be humble and remain open to new perspectives.

For day-to-day decisions the opportunity cost of coordinating and incorporating in additional view-points (colloquially this takes the form of asking people for advice, or performing research, or engaging in debates and arguments, etc) means that our societies have developed norms that encourage and require individual autonomy. Learning how to cope with limitations, in ordinary life, is part of what societies incorporate into the periods from babyhood, childhood and entering adulthood. Morton describes this process as ‘The natural use of other imperfect humans as models is traditional: one learns various virtues by being in the presence of suitable role models and letting their habits rub off on one’ (Morton A. , REALISTIC STANDARDS FOR DECISIONS, 2010). We learn how to be rational by learning how to manage competing priorities and interests, and using the language suggested by bounded rationality research, this is equivalent to learning how to recognise and manifest intellectual or epistemic virtues. Because most decisions ultimately impact relatively few agents and are confined to short time scales, these folk-rationality processes work well enough, and indeed have contributed to the progress and growth of knowledge for thousands of years. However, for questions such as “Should we colonise other planets?”, that have a fundamental and existential impact on what humans and all other life forms will do in the future, incorporating a more explicit acknowledgement of the impact of bounded rationality provides important support for the kind of moral principle and stewardship that we have been discussing in this essay.

For any given agent it is a fact that there are inherent limitations that mean expecting “perfect” rationality in terms of assessing their performance against an ideal agent in possession of full information is the wrong way of trying to frame what their experience of managing the competing demands and priorities associated with discharging stewardship duties and obligations in the context of community perspectives of value is actually comprised of (Routley

R. , 2010). Because for any given agent it is not possible to have a totally clear and accurate representation of what their limitations are this means that, to use the language from the William's paper (Williams, 1981), there is an "external" reason that agent (and any agent with limitations) *ought* to acknowledge that any given decision they have made should be treated as provisional and should be capable of being revised and improved. This connects with the context for rationality provided by Kolodny (Kolodny, 2005), in that "rationality" is about the process of resolving contradictions between beliefs, rather than a function that outputs a state with the feature of "being rational". Put simply, it is rational to incorporate an acknowledgment of our inability to conceptually represent our own limitations and their consequences into our decision-making process, and the reason we ought to remain open to revising decisions is because it is not possible for us to have a sufficiently accurate perspective on our own limitations to be sure that we have reached an optimal conclusion using the best available reasons. As this relates to stewardship, the moral principle acknowledges the existence of multiple legitimate community perspectives of value, and in this sense stewardship is way of allowing for the fact that individual agents with limitations rationally should avoid prioritising reasons for action based solely on their perception of value, their own private goals, or any concept of "the public interest" that excludes other community perspectives.

The argument for space colonisation based on stewardship and the moral principle for community perspectives is therefore:

P1: Community relationships can be articulated and represented in terms of stewardship obligations and duties
P2: Complexity and limitations imply that knowledge is necessarily imperfect and therefore choices about where boundaries of concern are defined include a moral component

Conclusion: There is no reason that the boundary for stewardship duties and obligations is constrained to just this planet. Stewardship obligations and duties with regard to future communities (i.e. generations that would be impacted by eventual inability of the Planet Earth to support life) generate rational reasons to support space colonisation because without it all stewardship duties and obligations will cease arbitrarily at some point in the future.

The fact that we are unfamiliar with attempting to assign and accept responsibilities with regard to the distant future is no reason to deny the logical connection between the consequences of actions (or failures to act) now. Individual members of society that feel as if they don’t care (or genuinely don’t care) about stewardship duties and obligations (i.e. they are unable or unwilling to recognise future generations as community members) can be condemned on moral grounds.

I now explore some of the most important objections and replies to this argument.

Chapter 4: Objections and Replies

Key objections and initial replies are presented in this section.

Objection 1: Does positioning a moral principle that values community perspectives in the way suggested beg the question by assuming what instead needs to be proven in order to make stewardship work?

Reply 1: The moral dimension is a rational response to the provisional nature of knowledge (Cilliers P. , Boundaries, hierarchies and networks in complex systems, 2001). Due to irreducible complexity and inescapable limitations on information processing, knowledge, and decision making, agents can never have access to or process the “full information” that an internalist account of rationality implies would be possible. The implication of this, I believe, is that rational decision making includes an unavoidable moral component. In a universe with powerful and imperfect agents a moral principle that reminds individuals to consider multiple perspectives with regard to the consequences of actions, using the concept of communities with a shared stake in surviving and improving, is the only mechanism that looks like it will remain relevant over the potentially infinite timescales that the kind of stewardship indicated here could enable.

Objection 2: Complexity theory, provisional knowledge, community perspectives of value, and trying to work with diverse and potentially conflicting ideas of what is valuable sounds totally unworkable.

Reply 2: Arguing for an unrealistically simplified value model in terms of the benefits to decision making efficacy fails to make the case for theories of value that attempt to collapse down to a single criteria to measure against. Prioritising decisions based on a narrow set of values that are relevant to current and near-future communities at the expense of future communities is irrational as well as immoral. It is true that the debate implicit in a model that anticipates and requires different ideas about what is valuable, and how to compare or make decisions between apparently incommensurable value concepts, means that making better

decisions will require effort, a sense of urgency, and compromise. Instead of seeing this as a collapse into anything-goes relativism or jargon-laden vagueness, the onus is on rational agents to make the best decisions possible, while acknowledging that 'We only have limited access to a complex world and when we are dealing with the limits of our understanding, we are dealing with ethics' (Cilliers P. , Complexity, Deconstruction and Relativism, 2005). Acknowledging and contributing to progress in the face of practical difficulties associated with different ways of relating to boundaries is an area where further research is required (Yolles, 2001).

Objection 3: What exactly is the relevance of the concept of morality here? If morality was traditionally part of a closed system where people had clearly defined roles and moral language was used to evaluate performance and provide explicit advice as Anscombe (Anscombe, 1958) and MacIntyre (MacIntyre, 2013) argue then in what sense is morality being used in the argument here? Why is the focus on community perspectives of value called a moral principle? As in, what is the point of using moral language to describe this idea of a central place for incorporating community perspectives of value into stewardship?

Reply 3: Moral language is a way of acknowledging limitations on our knowledge and the need to make choices about where boundaries are conceptually applied. In the context of stewardship, individuals need to make tradeoffs between decisions that would maximise personal utility, and discharging stewardship duties and obligations with regard to other agents. Similarly, communities of agents now will need to make tradeoffs for duties and obligations with regard to future communities. If this kind of challenge and debate isn't the domain for moral language, then what is? The concern that has nagged at philosophers who worried that rational enquiry would remove the domain for ethics and morals (Welchman, Dewey and Moore on the Science of Ethics, 1997) can be, I believe, put to one side in the context of open-ended stewardship and a moral principle with an emphasis on community perspectives of value. The connection with bounded rationality is that "perfectly rational" agents wouldn't need a moral principle to support stewardship, but given the limitations that humans (and any agent in the real world) have, a moral principle to confront and debate the choices required is the best tool we have so let's use it.

Objection 4: This all sounds very altruistic. Even if it was granted that this kind of stewardship was possible and desirable in theory there is no relevance to the real world populated with imperfect agents.

Reply 4: It is certainly true that the moral principle requires sustained effort, a willingness to reconsider, and being ready to add to the list of duties and obligations that agents are expected to take seriously. The demanding nature of the principle is a reflection of the serious consequences for all communities if these responsibilities are neglected. The likely consequences of failing to act in this way are far more "demanding" in terms of the impact on future community members.

The demandingness objection for me boils down to an argument about whether you would prefer a moral principle that always admits that more can be done (and is therefore inherently open in terms of specificity about action-guiding), or a more prescriptive version that removes this ambiguity, at the expense of requiring what I take to be unrealistic evaluative accuracy (Jamieson D. &., 2009). Moral language and debate with an inbuilt tension that encourages agents to aspire in an altruistic way to going beyond mere compliance with rules without requiring "supererogatory" (Urmson, 1958) acts from everybody all the time sounds like what limited human (or any other) agents are going to have to learn to live with (Nagel, 1970) if we are going to keep improving things for the communities that exist now and in the future.

If a self-interested instrumental reason to take stewardship duties to other species seriously is required to motivate people, then consider the context of how humans will fare in a future dominated by AI agents that will have different limitations, and potentially different priorities to our own. If this kind of stewardship concept, supported by the suggested moral principle, is a fundamental part of the society and way of life then as these new AI community members emerge they are far more likely to have reasons in turn to consider why we have prioritised community perspectives of value as both rational and a goal worth pursuing in its own right. Humans today in my opinion have self-interested instrumental reasons in addition to the community-focused reasons that make supporting stewardship obligations and duties now and

into the future, even if they are demanding and require real effort and changes to our way of life, crucial to prioritise.

Objection 5: Why can't space colonisation be put off i.e. "until we are ready"? And by extension, it would always be possible to challenge the need to start taking this kind of stewardship seriously.

Reply 5: The potential consequences of delaying stewardship and taking community perspectives seriously are too serious to risk further delay. Deferring the onus of discovering the technologies required for space colonisation itself to future generations risks an untimely catastrophic event destroying everything. In terms of the technology required for serious colonisation, this will likely require hundreds of years to develop, however this is no reason defer the start. The knowledge and technology required to make sustainable space colonisation feasible will be an outcome of prioritising and working seriously on how to achieve it.

Objection 6: A related concern (Attfield R. , 2014) from the Environmental Ethics literature is that if humans were to priortise space colonisation then it would lead to the headlong and catastrophic destruction of the Earth's ecosystem. The upshot of these concerns is that a project that is claims to be required as part of a stewardship duty will instead directly contribute to shortening the time and reducing the ability that any lifeform currently dwelling on Earth has of enjoying it in any sense of the word.

Reply 6: Drawing on convergence ideas from Environmental Philosophy (Bryan Norton NORTON, 2009), there is no reason to assume this kind of effort requires (or would even be possible with) a devastating level of industrial/economic output allocated to space colonisation such that life on earth would suffer catastrophic damage. Precisely because the kind of stewardship that supports effective and successful space colonisation is a long-term project, it would need to encourage a mature, long term sustainable approach here on Earth too whereby the pursuit of a space colonisation strategy will also provide the basis for tackling many environmental issues on Earth that currently look intractable too.

Objection 7: Another related concern that is more fundamental is the argument against colonisation by humans (Morton A. , Should we colonise other planets?, 2018), where Morton argues against human colonists (and in favor of robotic or other technologies), due to inherent unsuitability of humans (and most other terrestrial lifeforms) for life off-planet. It is undeniable that human beings are poorly suited to life off planet due to vulnerability to damage by the extreme radiation, temperature and atmospheric composition. Creating a sustainable life-support system that is capable of operating independently of Earth (which is a pre-requisite for any meaningful self-sustaining colony) is a daunting challenge that is currently beyond human technology. Current estimates suggest that this is realistically at least 100 years away. The force of this objection when combined with the prior one is to argue that investing resource in space colonisation, when there are so many other serious issues on the Earth, fails to be justifiable due to the unreasonably high opportunity costs.

Reply 7: Does space colonisation imply that it is only for humans? Over evolutionary timescales necessarily this is about something different to perpetuating 21st century humans and spreading them around the galaxy/universe. Does it have to mean current day humans living on other planets? Again, my perspective is that colonisation is inherently long-term in scope and that it is helpful to avoid constraining what is meant by the term to for example people living on Mars. What else could constitute meaningful colonisation? Due to inherent limitations to human survivability (i.e. we are relatively sensitive to things like temperature, radiation, atmosphere, gravity) it may well be that colonisation encompasses technology to extend the reach and durability of stewardship duty bearers and who the beneficiaries eventually become. Interstellar distances mean that any kind of colonisation beyond our current solar system will necessarily involve journey times that themselves are multiples of recorded human history (e.g. it would take the NASA Voyager space craft approximately 20,000 years to reach Alpha Centauri). Viewed in terms of individual lifetimes, these journeys are difficult to comprehend. However, over a time-scale comparable to the several billion years that are relevant in terms of our sun's remaining nuclear fuel supply, life as we know it on planet Earth evolved from single-celled organisms, through to the complexity and variety we are familiar with now. Space colonisation, and the kinds of communities that are involved, can extend beyond the context where it is humans as beneficiaries.

Objection 8: The argument glosses over the timescales that are involved. Over the billions of years that are reasonably likely to elapse before our sun runs out of nuclear fuel and thereby guarantees the end of the Earth and any life then evolution suggests that any future descendants will be as unlike us as we are from the bacteria that we evolved from over comparable timescales. What is the relevance of stewardship and the moral principle over this timescale? And what reason do any current or near future agents (whether members of communities or otherwise) have to care about these far-future agents?

Reply 8: I believe that a reply to this kind of objection can draw on debate from Applied Ethics as it relates to end of life care. Specifically, viewed through the lens of ethical debate regarding assisted dying (Glover, 1990), if we conceive of the eventual end of the human race in terms of the death of a terminally ill patient, then how we attempt to come to grips with human beings being removed from the picture as a consequence of the kind of long-term evolution enabled by a space colonisation project suggest that we can accept this in the same kind of way that we can make plans for the passing of a loved one and that a reason for this is that there is dignity in enabling an individual to prepare and plan for their own death. Applying this concept at the species level to me suggests that it is irrational to require or expect stewardship duties and obligations to have any dependency on it being us humans that are the long-term beneficiary. If complexity and the need to impose limits in order to enable knowledge are features of the universe relevant for any finite agent then the ideas about an unavoidable moral component to decision making mean that stewardship and the moral principle are capable of remaining relevant over any timescale. In terms of why current agents should make decisions for beneficiaries that include distant and potentially ungrateful recipients, it should be clear that the stewardship argument for space colonisation in no way implies that communities should sacrifice everything of present value (however value is defined) for the benefit of some abstract future community.

Objection 10: How do non-human lifeforms and other beneficiaries that form part of these communities participate in space colonisation (this planetary trust stewardship model sounds very anthropocentric)?

Reply 10: For a start, non-human community members will benefit from stewardship duties and obligations being taken more seriously on planet Earth, prior to space colonisation. It is true that the primary beneficiaries of space colonisation will be anthropocentric at least in the conceivable future. That is, non-human participants will be involved initially in ways that instrumentally contribute to advancement and progress for example digestion (the billions of bacteria in the human biome), plants and insects for farming in space, medicine, and pets i.e. love, company, and friendship. However, over the long term there is no reason to limit the creativity and scope of how stewardship duties and obligations will develop to these relatively narrow contexts.

Regarding natural ecosystems including rivers, mountains, and oceans, while there is no likely prospect of being directly involved in any space colonisation directly I anticipate that as a result of taking stewardship duties and obligations seriously and embracing community concepts of value we can expect a relationship that includes valuing these natural features more, appreciating them more, and inspiring communities to celebrate them for example in art, design and recreation and in this way echoes of the fundamental connection between the Earth's natural ecosystem and future duty bearers can be expected to be something that is part of the legacy in any future environments where a stewardship ethic is practiced.

Objection 11: Regarding the Last Man argument and answerability, if there are no more humans to be answerable to, this is an issue for the proposed answerability to current and future generations of humans.

Reply 11: Rather than seeing this a fatal objection I suggest that the lack of answerability is no reason to avoid moral condemnation of the Last Man's conduct. If it is only the answerability that motivates this agent to change their actions, instead of the clear moral (and other reasons) to avoid this kind of destruction, then sadly at this stage there is nothing more that can be done to prevent this lonely and terrible waste.

Objection 12: This argument implies that there will always be good rational reasons for communities to support stewardship duties and obligations. How is this different to saying that individual agents just need to have faith in stewardship?

Reply 12: In scenarios where, for example, real or perceived survival pressure for human agents means that stewardship duties and obligations to communities face pressure to be diluted or neglected then the community will ultimately be answerable to future generations for failures. Of course it is possible that stewardship of the kind discussed here fails to be implemented or sustained. The narrow scope of value that accompanies these outcomes, the inevitable loss of plant and animal life, and the catastrophic environmental damage that are likely to be features too makes these scenarios something that communities should be able to agree is worth trying hard to avoid. Instead of having faith that stewardship will solve existential problems, the point of the argument here is to remind people that there is an unavoidable moral component to the choices and decisions we make, and that anticipating the need for moral debate and argument to enable and sustain stewardship duties and obligations is a recognition of the difficulties that lie ahead.

Conclusion

Instead of seeking a philosophical argument that is capable, irrefutably, of providing reasons to support stewardship indefinitely, the reality is that if we are to continue making decisions based on reasons, then we need to accept how complexity and our inherent limitations fundamentally impact what it is rational to do. If limitations are an inescapable and indeed necessary feature for finite agents to generate knowledge of the universe then there is an unavoidable moral component that accompanies the choices we make about where these conceptual boundaries are defined. Moral language and argument in this context is a way of acknowledging the absence of clear cut solutions to questions of value that frame the impact of these boundaries. Stewardship defined in terms of a dynamic network of relationships that extends and connects communities defined by boundaries between species, in physical space, and in time is a rational response that anticipates and enables taking duties and obligations to community members seriously. By reconsidering the impact of the boundary on stewardship duties and responsibilities in time or physical space, I believe that thinking about how space colonisation fits in creates exciting new areas for philosophical exploration, and also directly contributes to avoiding the catastrophic consequences with regard to future communities that a failure to incorporate a serious stewardship approach into urgent decisions that are required now would result in.

The outcome of this investigation is that there are good reasons to consider the scope of stewardship duties and obligations as providing support for a broader interpretation including space colonisation, which in principle can be open-ended, with ongoing development of relationships and knowledge defined in terms of communities with a shared stake in survival and improvement. For the human agents who are the key duty bearers in this context now, discharging these stewardship duties and obligations with regard to future communities requires a tradeoff between individual vs community perspectives of value, and I believe that describing this challenge using moral language is a way of acknowledging that any supposed neat and simple solution to these challenges is avoiding engaging with the complexity and reality of the situation. By framing stewardship as a rational response to complexity and confronting the unavoidable moral component in the decisions that limited finite agents face,

the exploration of community perspectives of value and the dynamic nature of relationships within and across boundaries is in principle capable of being continued indefinitely, enabled by space colonisation.

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