Clowning Around with Conservation: Adaptation, Reparation and the New Substitution Problem

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ABSTRACT

In this paper we introduce the 'New Substitution Problem' which, on its face, presents a problem for adaptation proposals that are justified by appeal to obligations of reparation. In contrast to the standard view, which is that obligations of reparation require that one restore lost value, we propose instead that obligations to aid and assist species and ecosystems in adaptation, in particular, follow from a failure to adequately justify – either by absence, neglect, omission or malice – actions that caused, or coalesced to cause, climatic change. Because this position suggests a different reason for reparation – namely, it does not rely on the notion that an obligation to repair is contingent upon a lost good – it permits moving forward with assisted colonisation and migration, but does so without falling subject to the complications of the New Substitution Problem.

KEYWORDS

Conservation, adaptation, anthropocene, novel ecosystems, intervention ecology

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Colourful and charismatic, tropical clownfish (family *Pomacentridae*) dart between sea anemones and coral like so many performers in an ocean-floor circus. Partly thanks to its whimsy, the diminutive clownfish was vaunted in the 2003 film *Finding Nemo*, which one might assume would be enough to rally the people and save the fish; but the International Union for Conservation of Nature (IUCN) placed the clownfish alongside koala, ringed seals, leatherback turtles and six other charismatic species as one of their ten 'flagship' species likely to be affected by climate change (IUCN, 2009). In the case of the clownfish, the reason for the loss is a combination of warming waters and ocean acidification, which affects the coral and the reefs in which the clownfish dwell.

So here's a problem. If clownfish are to survive, either (a) they may have to be brought to less acidic waters with temperatures in their viable range, or (b) the systems in which they currently thrive will have to be brought to a state that is more conducive to their survival. Moving the clownfish (option a) will, in turn, alter their new homes: reef ecosystems in which they otherwise do not belong. This has its appeal, but threatens to upend different reef systems upon which many other sea creatures – sharks, rays, turtles and so on – depend. Doing so, in other words, may save the clownfish but sacrifice the system. Not moving the clownfish and restoring the reef ecosystem (option b), on the other hand, is not really an option. Attempts to restore may well result in not only the death of the clownfish, but also potentially the total extinction of the reefs in which they dwell, as there can be no guarantees that the system is resilient enough to survive climate change and ocean acidification.

Alternatively, either (c) one might seek to recreate the ecosystem *ex situ*, perhaps by building artificial reefs and creating abiotic structures in which the same or a similar ecosystem might reconstitute itself, or (d) one might roughly leave hardier elements of the ecosystem in place and introduce more resilient species that will assist in the survival of existing systems. One could, in the first instance (option c), relocate everything, including the clownfish. But this is a fairly unstable solution, as climate change pushes background conditions into flux, suggesting that the whole system must perpetually be on the move. Or, (option d) one might sacrifice a few species in order to generate more robust ecosystems *in situ* that can weather the coming storm. It would appear that there is no simple answer: either the clownfish must be moved and some different reef system sacrificed, or the reef system must be moved and the clownfish sacrificed.[1]

No matter how one approaches the problem, the clownfish that inhabit the barrier reefs will likely become extinct in their native range. At this point, an ostensibly familiar conundrum arises: ought we to prioritise the species or the ecosystem? Should we relocate the clownfish, and thereby save the threatened species but create novel ecosystems to facilitate the long-term adaptation of

1. In a separate work, Minteer and Collins explore a related but more generalised version of this same question (Minteer and Collins, 2010).

the flora and fauna in new areas? Or ought we to facilitate the adaptation of reef systems *in situ* by instead introducing more resilient substitute species and other interventions that will assist in the flourishing of what remains?

Generally, these questions are taken to offer a puzzle regarding whether one can fix ecological systems by adding viable substitutes; so, for instance, whether ecosystem managers can substitute fences for wolves in the management of elk. Call this the 'Substitution Problem' (Katz, 1985). But there is a second aspect to this more familiar Substitution Problem that emerges in the face of global climate change and that is reinforced by the conclusions of resilience theory (Holling, 1973; Peterson, Allen and Holling, 1998). Climate change will create no-analogue futures, i.e. ecosystems with no historical counterpart (Fox, 2007). For species level evolution to continue, we must either relocate endangered species into like-habitats that will secure their continued survival (Hoegh-Guldberg, Hughes, McIntyre, et al., 2008), or we must create new habitats for the most resilient species to proliferate and thrive. Failing this, we commit ourselves to allowing threatened species and ecosystems to disappear.

In this paper, we suggest that climate change introduces a new problem for conservation – what we are calling the 'New Substitution Problem'. The problem is a problem regarding obligations to nature, and asks more specifically what sort of obligations we might have to address threats to species and ecosystems – whether, in other words, it makes sense to preserve the value of such things – in the face of a changing environment. If natural systems will from here forward continually shift into novel configurations, then it would appear that there is no possible means by which one might discharge an obligation to preserve environmental value. This problem, we claim, is not easily resolved by appeal to traditional value-based positions which seek guidance for action by appealing to some component of value or some system of value. We argue instead that the New Substitution Problem can be overcome by appeal not to the value of this or that species or ecosystem, but rather by appeal to justificatory standards set by a community of reasonable and rational affected parties. We limit our discussion to the Argument from Reparation (AFR), which suggests that our obligations to assist in adaptation stem from a moral obligation to right prior wrongs. We do not aim to defend the AFR as superior to other more common value-based approaches (e.g. that we ought to protect nature because of its value), but rather aim only to defend the AFR against interpretations that propose that it too is value-based. Not only is such a line of reasoning common throughout the public policy discourse, as for example in the polluter pays principle, but it requires differing practical prescriptions depending on how it is understood. Our claim is that the AFR rests not on the generally presumed line – that is, that one must repair damages or harms caused to victims – but that it rests on a prior failure to justify one's actions. As we have in other work, we argue that obligations to aid and assist species and ecosystems in adaptation, in particular, follow from a failure to

adequately justify – either by absence, neglect, omission or malice – actions that caused, or coalesced to cause, climatic change (Hale, Hermans and Lee, 2013; Hermans, Lee and Hale, 2013; Lee, Hermans and Hale, Forthcoming). This position, we believe, effectively recasts the climate adaptation question so that it no longer depends on the identification of ecosystem value, thereby obviating the New Substitution Problem and salvaging the Argument from Reparation.

To put this more succinctly, the *challenge* for our paper is to address the New Substitution Problem (which we think is novel and different from the Old Substitution Problem). Our *thesis*, however, is that the Argument from Reparation (which is but one of several adaptation arguments) ought not to be understood as an argument that entails an obligation to 'make whole again' so much as an obligation to 'justify'. The New Substitution Problem poses a challenge to the AFR only if what the AFR requires is that one repair (restore, restitute, rectify, etc.) damages or lost value. If, on the other hand, the AFR does not require strictly that one repair value, but that reparation can be achieved through other means as well – in this case, rectifying through a process of deliberative justification (Forst, 2012) – then the New Substitution Problem ceases to be a problem and adaptation advocates have at least one line of reasoning to which they can defer when suggesting that we may have an obligation to assist species and/or ecosystems in climate adaptation. We argue this position by deploying a *substantive case* – the case of the clownfish – though any case in which the value of a species or a system is said to be conserved through the various interventions currently under discussion in the new literature of 'intervention ecology' will serve equally well (Hobbs, Hallett, Ehrlich, et al., 2011; Higgs, 2012).

NEMO NO MORE? VALUE-BASED APPROACHES TO INTERVENTION

Since the 1980s coral bleaching has been recognised as a growing problem in the tropical and sub-tropical seas. Climate change affects not only the atmosphere, but also the oceans, in a way that directly threatens the survival of coral and reef ecosystems. As atmospheric carbon increases, coral growth sharply declines because carbon precipitates out of the atmosphere and accumulates in the oceans, thereby changing the pH of the water (Baker, Glynn and Riegl, 2008). In some places this has already resulted in large-scale die offs and loss of coral, which in coming decades is likely to grow worse (Hoegh-Guldberg, Mumby, Hooten, et al., 2007; Lesser, 2007; Baker, Glynn and Riegl, 2008; Hoegh-Guldberg and Bruno, 2010). Exacerbating matters, as the water warms and the currents of the oceans shift, some flora and fauna populations shift as well, proliferating in otherwise unfamiliar environments. As ocean acidification drives changes and losses in coral reef ecosystems, reefs will

undergo significant changes in biodiversity and species composition (Munday, Jones, Pratchett, et al., 2008). Such shifts in the ocean environment may force reefs into novel configurations, with a composition new to an area, much of which is a consequence of human activity (Thomas, 2011). Anthropogenic climate change thus presents a principal hurdle for the conservation and restoration of reef systems around the world.

Partly in anticipation of climatic threats to reef ecosystems, but also in response to bleaching and coral loss due to other anthropogenic causes, some nations – particularly those dependent upon ecotourism and coastal fisheries – have initiated efforts to promote the artificial generation of reefs. Governments and private actors alike have dumped objects such as tyres and tanks onto the sea floor in an attempt both to dispose of unwanted material and to manufacture reef systems (Collins, Jensen, Mallinson, et al., 2002). The hope is that valuable aquatic creatures like clownfish might then continue to inhabit the same waters and regions, but live among artificial reefs.

In 1985, for instance, the United States adopted an official national artificial reef plan. The plan states that, 'while the majority of reefs have been built to support and enhance recreational fishing, interest is growing in using artificial reefs to restore, mitigate or create habitat, to improve recruitment, and enhance juvenile survival and growth of reef-associated species' (Stone, Schmied and Steimle, 1985). Some evidence even suggests that larger artificial reefs are more 'stable' than some natural reefs (Ogden and Ebersole, 1981). Perhaps as climate driven changes in the ocean threaten the existence of natural coral reefs, artificial reefs could provide a means, as the National Artificial Reef Plan suggests, to assist in the adaptation of these systems (NOAA, 2007). Many of the objectives of the reef plan, in fact, reflect lofty environmental goals, justifying construction of the reefs by appeal to the value that will be preserved or conserved. Typically these goals will place value in such ecosystem attributes as rarity, uniqueness, ecosystem function, ecosystem services, popularity, and even charisma. Reef ecosystems have been and will continue to be damaged by ocean acidification, and in light of this potential value loss, the claim is that we ought to do something to preserve whatever value we can. On its face, this is a problem about value: 'less reefs' equals 'less value'. Many familiar arguments for conservation appear to follow naturally from this line of thinking (Sandler, 2010).

But there are problems for this value-based approach, as has been pointed out by numerous other environmental authors (for example, see the debate between these authors: Elliot, 1982; Katz, 1992; Light, 2003). While creating an environment for more fish certainly creates more value (mostly of a homocentric sort)[2] provided by the mere presence of fish, the creation of an

2. Bucking convention a bit here, but in an attempt to clarify the discussion, we will be using the term 'homocentric' in lieu of 'anthropocentric'. We understand the latter term to be primarily a metaethical stance regarding the source of value, whereas homocentric concerns, so far

artificial environment, according to some ways of thinking (like Elliot's) does not provide the same non-homocentric value as that held by a lost natural system. This problem of lost value is particularly resonant in a world with novel ecosystems: there is no present analogue for a reef made of tyres. As Elliot might point out, there is little to value in these novel ecosystems, precisely because they are so artificial.

This is not merely a conceptual problem. It is also a potentially devastating practical problem. The front flap of Emma Marris's influential *Rambunctious Garden* suggests that 'we must give up our romantic notions of pristine wilderness and replace them with the concept of a global, half-wild rambunctious garden planet, tended by us' (Marris, 2011). The worry here is that conservation of natural systems will cease altogether to be a goal and that some actors may take it upon themselves to facilitate the generation of novel ecosystems simply because these systems seem like they will be bearers of value. Indeed, Peter Kareiva, chief scientist for the Nature Conservancy, has said in thinking about the anthropocene: '…what should be the new vision for conservation? It would start by appreciating the strength and resilience of nature while also recognising the many ways in which we depend upon it. Conservation should seek to support and inform the right kind of development – development by design, done with the importance of nature to thriving economies foremost in mind' (Kareiva, Lalasz and Marvier, 2011). In another spot, Kareiva says the following (as quoted by Marris): 'You hear conservationists talk about what they want to save, what they want to stop…They should talk about what they want the world to look like in 50 years' (Marris, 2009). Such views are growing in number and volume throughout the conservation community, and thus it is important to address them as carefully as possible.

THE ARGUMENT FROM REPARATION AND THE NEW SUBSTITUTION PROBLEM

The presumptive argument in favour of climate adaptation is that some ecological value must be conserved in the face of threats to that value. So, for instance, one might argue that the clownfish ought to be protected because it is intrinsically valuable; or because it brings whimsy to the oceans; or because it delights children; or because it is beautiful, or integral or delicious. Certainly, these sorts of value-based arguments can go quite a distance in advancing the case for conservation and adaptation.

There are, however, many other ways to justify adapting a species or an ecosystem to climatic change as well, not all of which depend on making the

as we are conceiving of them, relate to the justificatory appeal of the claim. In other words, homocentric concerns relate to the concerns of humans, but they needn't necessarily assume an anthropocentric axiology to maintain their moral force.

case for lost value. One of the more prevalent is the Argument from Reparation. Consider:

> *Argument from Reparation (AFR):*
> Because climate change and the consequences stemming therefrom is a predicament of our own making, we have an obligation to assist nature with adaptation.[3]

In instances of climatic change, the AFR is sometimes also referred to as the 'Causal Argument', though it has multiple instantiations and appears throughout the literature (for example, see: Neumayer, 1999; Shue, 1999; Cairns, 2003; Caney, 2006). The idea here is that because anthropogenic drivers are a primary cause of climate change, humans therefore have an obligation either to address damages stemming from climate change or to justify the causes and consequences of climate change. In instances of restoration, which is where one more frequently encounters the AFR, the argument provides the justificatory source of the obligation: the reason why we should restore an ecosystem is to right a prior wrong.

Inasmuch as the AFR relates superficially to the reparation of lost value, it too would appear to be a value-based position. Given the value-based interpretation of the AFR, of which we are critical in this paper, it would be important to identify not only the baseline state of affairs prior to the occasion of damage, but also to specify what component of the ecosystem was damaged and how such repair might proceed. In the case of reef conservation, this is an ongoing and complicated discussion (Sandin, Smith, DeMartini, et al., 2008). Once one has identified this damaged or degraded component – say, for instance, that a species like the clownfish is missing from the system – this generally isolates the source of lost value. For instance, sea anemones are said to be important to reef ecosystems because they provide a home for clownfish and other reef dwellers. If they are missing or damaged or threatened, if, in other words, they are 'functionally extinct', their value to that ecosystem is thereby absent. Were this component to be replaced in some way, then the value of the ecosystem might then be repaired. Or, at least, so goes the reasoning.

Two challenging problems stem directly from this value-based reasoning: the Baseline Problem and the Substitution Problem.[4] The Baseline Problem

3. One referee objects that this is not an argument, since it does not appear to follow standard syllogistic format. Inasmuch as this paper is one of several connected papers addressing intervention ecology, and inasmuch as we have defended the Argument from Reparation using this formulation in other papers, we have decided to stick with the above formulation rather than syllogising it. A fuller articulation of the argument occurs throughout the legal and environmental discourse and appears in principles as varied as the polluter pays principle and the 'you break it, you buy it' principle. It could just as easily be stated in syllogistic form: (a) If you break it, then you buy it, (b) You broke it, therefore (c) you buy it.

4. In other earlier work, we sought to address more traditional cases of the Baseline Problem and the Substitution problem in the context of standard backward-looking restoration cases (Hale, Hermans and Lee, 2013; Lee, Hermans and Hale, Forthcoming). The Baseline

poses a challenge to those who hope to restore an environment back to its pre-degraded state. There are obvious complications with identifying the baseline prior to which the ecosystem was not damaged (Knowlton and Jackson, 2008; Sandin, Smith, DeMartini, et al., 2008). Due to space limitations, however, we cannot address the Baseline Problem in this paper. The Substitution Problem, by contrast, raises a question about whether, in fact, value can be restored to an ecosystem simply by substituting a component part and replacing it with a functional component that restores health or function to that system. That is, can you return some component from functional extinction by introducing a substitute?

The classic version of the Substitution Problem is primarily a problem for restoration ecology, since it is backward-looking – directing its focus to a prior state of the universe in order to determine how a wrong should be rectified (Hermans, Lee and Hale, 2013). When intermingled with irreversible global climate change and the question of adaptation, however, the problem faces yet further forward-looking complications. Climate change introduces the objection that under no circumstances will we ever be able to save the ecosystem *in situ*, and that even if we save some component of that system *ex situ*, we will be forced to sacrifice other systems in order to do so. Since we will never be able to save a system, one might assume, we cannot possibly have an obligation to do so (Roberts, 2013).

In the past when we've looked at questions of environmental restoration, our concern has been primarily about how to make an ecosystem whole again (Hermans, Lee and Hale, 2013). But assisted colonisation introduces a new twist on the more classic version of the Substitution Problem (hereafter the Old Substitution Problem): not which ecosystem components can be swapped out, but rather whether the value of either the parts or the whole can be maintained in the face of variable conditions. Where the Old Substitution Problem seeks to restore value or 'make nature whole again' by swapping out parts, the New Substitution Problem seeks to maintain value or 'adapt the whole' by substituting some parts for others. The new problem is that there is no whole to make whole again; or, in other words, that adaptation for reparation purposes

problem is motivated primarily by concerns of repair: how to determine what baseline state of the world is the state to which the world must be returned. We argued that the Baseline Problem in restoration cases presents a problem because it is thought to be a problem of value: that what must be established is the baseline value of the ecosystem before human intervention (Lee, Hermans and Hale, Forthcoming). Instead we suggested that one can avoid the Baseline Problem by turning away from more traditional notions of value and thinking instead in terms of justifiable action.

We also deployed the Substitution Problem to argue against functionalism and ecosystem identity as a source of value in restoration projects. What we are here calling the 'old' substitution problem suggests that we can fix the world by swapping out substitute parts. In that work, we used the case of wolf reintroduction to argue that we cannot understand ecosystems in terms of functional models, since ecosystem models always underdetermine the actual environment (Hermans, Lee and Hale, 2013).

would appear to be impossible. This is a unique and new conundrum brought about by the no-analogue futures implications of climate change.

Return then to our more concrete example. Suppose we favour this Substitution approach to clownfish or coral reef adaptation. If we substitute threatened natural with resilient artificial systems and provide a fertile environment for species to take root in novel locations, some species will thrive and others will struggle. Such colonisation will occur somewhat haphazardly as the waters stir and the genetic bins are shaken. Some reef species will become dominant and others will fall away. There is of course a small likelihood that the distributional composition of the entire reef systems will be the same, but if so, such a distribution will in fact be accidental. On the other hand, should we choose to rescue the most vulnerable reef species and relocate them to new environments, this will involve introducing non-native species into an environment where they have not been before.

When it comes to novel ecosystems, we do not have the epistemic luxury of evaluating the vitality of the ecosystem. In the absence of some pre-established objectives, there is considerable confusion about what to value. We have only the individual components to evaluate: do the components work? Or, perhaps, do the components work well together? What is on the table with regard to the creation of new artificial reefs is not merely a matter of assisted relocation, but whether the formation of entirely novel ecosystems is a desirable ecological objective; and whether, more importantly, it can be justified by appeals to reparative obligations (deriving from the AFR). This problem is therefore a bit different than the problem of relocating a single species in order to ensure the long-term survival of that species.

The New Substitution Problem clearly builds on the Old Substitution Problem, in that both involve prioritising the value of either the system or the components of the system and ensuring that they function together. Where the Old Substitution Problem seeks primarily to restore ecosystem function by swapping in functional replacement parts, however, the New Substitution Problem is considerably more piecemeal, seeking to maintain value by putting pieces together in whatever way that works. Since we cannot know with any certainty what role substitute components will play in the formation of new environments, or whether and in what respects the substitute components are maintaining value in a system that otherwise would not exist, we cannot know whether the system is working. That is, we cannot know if we have maintained or preserved value.

The universality of climate change places us on a counterfactual trajectory, on a path toward a state of the world that will be radically different than it ever has been. As a consequence, we can never restore ‘natural systems’ to their original state, but will always forever be adapting them to new climatic states. This New Substitution Problem poses a potentially crippling challenge to arguments for adaptation that conceive of our obligation to assist in adaptation

as emergent out of a responsibility to right the wrong of climate change by undoing the damage. In other words, if one approaches the AFR from the vantage of value, then the New Substitution Problem leaves conservation with few options.

We aim to suggest here that there is another way to determine what our obligations to nature are. In this case, remember that we are looking primarily at obligations of reparation, which we take to stem from prior degradation. We think rather that obligations of reparation have more to do with the degree of anthropogenic complicity in the bringing about of the 'novel ecosystem' – an ecosystem with no present analogue – than with the destruction or degradation of value. In particular, we think that the degree to which we establish such complicity depends strongly on the extent to which ecosystem-regarding practices supporting initially damaging the ecosystem have been 'justified' and/or are 'justifiable', which we are construing in, roughly speaking, Habermasian or Scanlonian terms (Habermas, 1991; Scanlon, 1999; Forst, 2012).

There is a great deal more to say on this pragmatic conception of justification and justifiability, and unfortunately too little space in this paper to address this complicated topic. The short version, however, is that the complicity of actors in taking unwarranted and unjustified actions generates the obligation to repair damaged ecosystems. If some yokel throws a stick of dynamite off a party boat in order to catch fish, and in so doing destroys a reef, it is his recklessness that forms the foundation for his obligation to repair the reef, not necessarily the loss of value in the reef. It is justifiability, in other words, not some feature of the ecosystem or a component of the ecosystem, that is the driving force in establishing the value or disvalue of reef ecosystems. When we go through the process of insisting that we must conserve an ecosystem, we do so only within the context of a wider discussion about whether prior destructive actions were taken for good reason. We do not, for instance, seek to restore forests where our lively, active cities currently stand. We do not, to take another instance, seek to return predators and disease vectors to our school zones. This is because whatever 'values' these parts or systems carry is partly predicated on the idea that such values have not been previously considered or taken into account. And, more importantly, the conservation is not limited to *value*. There are also deep and challenging concerns about rights, virtue, freedom, consent, trespass and so on, none of which are adequately captured by limiting the discourse to value talk.

We think not only that our view cuts more nearly to the core impulse of restoration ecologists – what really bothers restoration ecologists and environmentalists about ecological degradation is that so much of it is pointless, senseless and reckless – but also that our view elides problems like the New Substitution Problem.

We hope to have done two things in this section: first, to introduce a new variation on an old problem; and second, to argue that ecological reparation is

best understood not as restoring function or value to an ecosystem, so much as rectifying past actions by returning the world to a state that affected parties can agree addresses concerns that were otherwise ignored, neglected or denied.

A PATCHWORK FUTURE

The simple fact about ecosystem management nowadays is that there is enough scientific know-how and economic wherewithal that, given a good enough reason, as well as enough money and time, we can manage known systems reasonably well. If someone somewhere chooses to introduce a species into an ecosystem in order to save that species, dedicated ecosystem managers can likely make it work. (Ron Sandler [2012] somewhat challenges this view, but we are sceptical.) Indeed, a species may well thrive in its new ecosystem, and the ecosystem may be none the worse for its substitute inhabitants.

Unfortunately, where this has worked in the past, it is impossible to know if it will work in the future. Due to ecosystem novelty, ecologists will have little to no idea whether the system is itself thriving. A parasite may thrive in its host, for example, but this relationship can be understood as parasitic only if there is a prior model of a healthy host. Indeed, fabricating a novel ecosystem in order to save a species does little more than loosely patch together an organic system that works, that resembles nothing that ever occurred before, that privileges some choice species over others, simply because someone somewhere has selected the component species as worthwhile. We can indeed cultivate parasites by putting them in fertile hosts, but if we do, we are selecting those parasites as worth cultivating.

We began this paper with a discussion of the New Substitution Problem in relation to clownfish and coral reefs, and so we shall end it. If we seek to address the problem of species loss by fabricating entirely new ecosystems and assisting in the novelisation of these ecosystems, we do so at the risk of accelerating the consequences of climate change rather than thwarting the impacts of climate change. That is, we commit the same mistake that got us into this mess in the first place. As the climate changes, so too will our ecosystems. When we change them too, we accelerate this process. Moving ecosystems in order to save species is not simply like putting a bunch of flora and fauna in an environment in which they might thrive, like choosing houseplants for our living room – but rather creating interdependent systems either from whole cloth or by stitching together a patchwork of components, the smooth functioning of which we shall have little clue how to measure.

Because climate change will alter the global environment – displacing species, fundamentally changing ecological relationships, and in many, if not most, cases, removing the possibility of restoration – assistive adaptation may indeed be required. But if it is, it will have to be justified in the right way.

What this means is that we will have to ask ourselves not what valuable things in the world we must preserve, but rather what sort of world we, now and in the future, could accept as reparation for our wrongdoing. Our thesis provides a rationale for understanding obligations stemming from anthropogenic degradation as duties of reparation. We avoid the New Substitution Problem by emphasising the justifiability of actions and not the value of this or that species or ecosystem. On this view, our job isn't to restore ecosystems to a previous level of value, but rather to undo or make up for unjustified action.

If it is true that we are morally culpable for the environmental changes underway, and we believe we are, we propose that our culpability rests in our repeated failure to justify our consumptive actions and the losses associated with them. Not all of our actions, to be certain, but many of our actions: our enormous cars, our giant homes, our coal plants to keep our shopping malls lit at night, and so on; and not all of us, to be certain, but many of us. The approach we offer suggests that our responsibility to the non-human world now and in the future hangs on the unjustifiability of our actions today. It is thus independent of such historically contingent views of the 'natural'. In order to right these wrongs of justification we must ensure that all adaptation activities of reparation be justified by appeal to what affected parties could accept as reparation, and that further forward-looking actions more directly be justified *simpliciter*. This will require, then, that affected parties – experts, citizens, stakeholders, proxy representatives – work together on an adaptation strategy. Only an open deliberative framework can lay the groundwork for a fair and just adaptation. We cannot proceed with a patchwork notion of this valuable piece here and that valuable piece there.

Assisted colonisation or managed relocation will certainly require revising historical paradigms and presuppositions, both within ecology but also within ethics. Ecological restoration to a previous natural state is impossible without turning back the clock on climate – which is to say, barring some extraordinary geopolitical upheaval, it is virtually impossible. Therefore, our obligations can only possibly be fulfilled by ensuring that the assistive measures that we do take are justified. What this means isn't that the solution we arrive at must meet with an independent set of evaluative standards, but rather that the solutions we propose be subjected to the wide deliberative scrutiny of a suitably educated and affected body of reasonable and rational evaluators (for various examples of such a position, refer to the work of these authors among others: Habermas, 1991; Daniels, 1996; Scanlon, 1999; Rawls, 2001). It is, in other words, the process of seeking assent and permission, as well as recognising affected parties, that will qualify any reparative act as right or wrong. The justification comes in the justifying.

For some threatened populations, assisted migration may present the only reasonable means to ensure survival in the face of extreme climate change. Objections to these efforts include concerns that such actions will create

'unnatural' novel ecosystems. We think that such concerns are a distraction. One of the primary arguments as to why we must preserve or restore an ecosystem, like a reef, or assist in the adaptation of a species, like the common clownfish, is because climate change is for the most part anthropogenic. If the Argument from Reparation is the source of the obligation to assist, then it would appear as though we are saddled with the New Substitution Problem. But we have sought to argue that this needn't be so. Our job isn't to assist in the acceleration of novelty in the name of reparation. Our job is to create the conditions for recognition of the concerns of affected parties and then to work together to figure out a path forward.

OBJECTIONS

The preceding analysis raises several potential objections.[5] For starters, some might disagree that the Argument from Reparation offers a compelling reason to assist in the adaptation of non-human species and natural ecosystems. Following Sandler's arguments against species value (Sandler, 2010), however, the AFR may be the only reasonable position standing. To us it appears to offer one of the strongest reasons to assist in adaptation. If ocean acidification is one of the leading causes of reef degradation and clownfish loss, and the primary source of this degradation is anthropogenic climate change, then this would seem to amplify our obligations to assist in the long-term viability of reefs or clownfish. If the cause of degradation has other sources – a tsunami, or a volcano or an asteroid, say – what would be the source of any obligation to repair damaged areas? Indeed, such cases would require a different justificatory approach altogether, perhaps then invoking a value-based reason. Inasmuch as the human community has brought about climate change, many are of the mind that this same community bears additional obligations to reduce the harms stemming from it. At least in the environmental literature, the Argument from Reparation, in the guise of the polluter pays principle or some related 'you break it, you buy it' formulation, serves to strengthen the obligation for forward-looking conservation in the face of climate change.

Others may worry that without value or function to support the conservation of a given ecosystem, conservation priorities become arbitrary. Why, for instance, ought someone care about the clownfish and not the sea slug? Our position is that a robust deliberative process both can and ought to provide a

5. As we have mentioned, this paper, while offering a standalone argument, is part of a larger project aimed at addressing wider ethical concerns faced by intervention ecologists. It appears as one of a cluster of articles, each of which is structured to tackle the Baseline Problem, the Substitution Problem, the New Baseline Problem and the New Substitution Problem respectively. As such, this section introduces concerns that on one hand are specific to the New Baseline Problem but on the other hand intersect with objections in the other cited papers.

reflexive check on such decisions. In the case of the clownfish, the IUCN, as a proxy for the international community, has established the clownfish a species worth preserving. There are many reasons, no doubt, for such a designation – including its cuteness and caprice and whimsy, as well as perhaps its importance to the health of the reef ecosystem – but it is also worth noting that further scrutiny of such factors may lead to dramatically different conclusions – like that under somewhat more dire circumstances, we ought to let clownfish go extinct. So long as such reasons are subjected to the scrutiny of an evaluative public, and so long as there are no perversions in the process that might distort informed decision making, the problem of arbitrariness can be avoided.

Some may object that such a deliberative approach is morally thin, and that our solution only side-steps, but does not avoid issues of value, considerability and so on. This objection relies on an intuition that with only a procedure to guide decision making, bad reasons may proliferate and be used to justify bad action. We readily admit that this is a conceivable implication of our view. However, provided that the justificatory process is open and honest, provided that the procedure leaves space for revision, we trust that better solutions and actions will emerge from the ongoing dialogue.

Still others may object more pointedly that a deliberative approach simply punts on the question of value, and that once one enters into discourse, the question of value will once again rear its head. But consider that *if* the problem of environmental degradation is not in fact a problem of communities or individuals neglecting to value a species or an ecosystem, but rather a problem of failure to justify actions, then this is not at all punting on the question of value. Two things must be said here. First, the question of whether a species or ecosystem is valuable is relevant *only if* the problem of environmental degradation is a problem of failing to acknowledge the value. Many people value things in the world and yet act recklessly toward them. They may, for instance, take risks with their health or their loved ones, even though they value these things immensely. Such decisions are undoubtedly characterisable as failures to value, but the fact that environmentally destructive behaviours are often more aptly characterised as 'reckless' instead of 'evil' suggests that degradation is at least sometimes not a problem of value. Second, in these instances minimally, and perhaps in many more instances maximally, if deliberative scrutiny is insisted upon, and a process established for evaluating the strength or weakness of various relevant reasons is secured, this can assist tremendously in preventing such reckless actions. The extinction of the clownfish, due in no small part to damage caused by climate change (which we take to be the consequence of many millions of reckless actions coalescing into catastrophic climate outcomes) would thereby only be morally justifiable if good reasons either for allowing the clownfish to go extinct, or somehow for causing climate change in the first place, could be defended. Such an approach

therefore does not side-step other issues like that of value entirely, but insists upon discursive engagement over how to proceed.

CONCLUSION

Any number of reasons might suggest that we ought to assist in the adaptation of nature as a means of preservation. Nature is valuable, it is beautiful, and it is important to us. Beyond this, the clownfish has particular value as a 'flagship' species for the IUCN. It is as a cultural as well as an economic resource. At the end of the day, if clownfish go extinct, human actions will be responsible at least in part for this remarkable species' disappearance. What it means to 'repair the damage' under these circumstances is what is cast into doubt by the New Substitution Problem. The AFR, as we hope to have shown, avoids the New Substitution Problem by casting adaptation as a problem of justification, rather than of lost value. Our thesis in this paper is that obligations of reparation require the scrutiny of reason from a wide deliberative community of affected parties. They are not limited to the promotion of value or the prevention of disvalue.

Reparation through adaptation may not necessarily require that we construct artificial reefs to replace those lost due to ocean acidification; nor does it necessarily specify *prima facie* that we ensure the long-term presence of clownfish in our oceans. Any obligation that we may have to promote reef development or assist in the migration of clownfish, must instead be understood as derivative entirely from the conclusions of reasonable and rational deliberation about how best to right the wrong. Perhaps, then, an open and honest justificatory process can provide the necessary procedural guidance for conservation to be successful in the face of climate change.

What conservation will ultimately look like will depend, in large part, on the decisions emerging out of such a justificatory process. Many conservationists of course are already engaged in just such a deliberative process, but such efforts have either tended to seek a rigid middle ground – a compromise solution between those who prioritise the species, the ecosystem or both (McLachlan, Hellmann and Schwartz, 2007) – or have been perverted by various other political and economic factors. In the case of the clownfish, as we have said, conservation may well involve assisted migration, replacement or artificial reef construction. Though a value-based approach may be obstructed by the New Substitution Problem, and reject artificiality and infringement on 'natural' systems, we hope to have shown that many of the proposed adaptation approaches may be reasonable in certain conditions. Namely, such conditions would be those that as near as possible reflect the ideal speech conditions that are all at once reflective of open and earnest public attempts to fairly evaluate and weigh reasons, as well as constitutive of communicative reason itself

(Habermas, 2003). This obligations-based approach – as opposed to the value-based approach – can provide a more fruitful foundation for the practice and policy under which modern ecology and conservation management is already operating (O'Neill, 1997).

Put a little differently, the Argument from Reparation does not fall victim to the New Substitution Problem precisely because the New Substitution Problem is couched in a presumption about what morality demands of us. The presumption that morality demands that we promote entities of great value, or that we respect entities of moral worth, promises to derail the Argument from Reparation. Instead, we have suggested that the Argument from Reparation relates fundamentally not to the reproduction of lost value, but instead to the failure of human actors to adequately justify their past actions.

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