RARITY AND ENDANGERMENT: WHY DO THEY MATTER?

Suppose that Maria is fascinated by a rhino she sees at the zoo. This, she thinks, is a wonderful animal.

The zookeeper then informs her that the rhino – a young male named Tukul - is a Javan rhino and so one of the last of its kind. Now Maria thinks that the animal is not just wonderful but precious.

Suppose that Maria's judgements that Tukul is (respectively) wonderful and precious are both value judgements. Suppose that whereas Maria initially takes Tukul to have value, she takes him to have even more value upon learning that there are so few others of his kind. And suppose, moreover, that Tukul really does have, not just whatever value he would have regardless of the rarity of Javan rhinos, but also some value because Javan rhinos are so rare. From what does this extra value derive?

Before moving on, it is worth pausing to note that questions of this sort are rarely asked in discussions of the value of organisms. Although both animal ethicists - such as Peter Singer (1995) and Tom Regan (1983) - and biocentrists - such as Paul Taylor (1986) and Robin Attfield (1983) - defend positions on that topic, they tend to focus on what is sometimes called the intrinsic value of individual organisms – that is, the value such entities possess in abstraction from their relations to other entities.[1] For instance, Regan (1983: §7.5) would argue that Tukul has 'inherent value', not because Javan rhinos are rare, but simply because he (the rhino) is a 'subject-of-a-life'. Similarly, Taylor (1986: §2.3) would claim that Tukul has 'inherent worth' simply because, like any living thing, he has a good of his own. By contrast, to ask whether Tukul has value because Javan rhinos are rare is to ask whether he has value because of his relations to other entities (that is, his conspecifics). It is to ask whether he has a certain sort of extrinsic value.

Conservation biologists, for their part, *are* often concerned with rarity; yet their concern is typically fixed at the level of taxa, such as species. Though a particular conservation biologist may have a personal interest in the welfare and dignity of certain individual organisms, her professional interest is likely to focus on issues concerning the taxa to which individuals belong. If she researches Javan

[1] Palmer (2010) is one notable exception. Like Christine Korsgaard (1983: 170), I use the phrase 'intrinsic value' to denote, not the value a thing has when it is valuable for its own sake (later on, I will refer to this as 'final value'), but the value it has by virtue of its intrinsic properties.

rhinos, for example, her work will probably be focused, neither on respecting the inherent value of individual rhinos nor on improving their lives, but on preserving *Rhinoceros sondaicus*, the species to which all Javan rhinos belong.[2]

To ask whether individual organisms acquire value by virtue of being rare is, therefore, to ask a question that falls into the fissure between two prominent ways of thinking about the value of organisms. The same may be said of endangerment. To ask whether individual organisms acquire value by virtue of being endangered is, likewise, to ask a question that is seldom asked. Nonetheless, as I shall try to show in what follows, these questions are worth asking. Indeed, I will argue that, by virtue of being either rare or endangered, an individual organism can acquire values of several different kinds, which – as I will also try to show – interact in interesting ways.

1. Clarifications

From what, then, does Tukul the rhino's extra value derive? One answer to the question is implied by Levi Tenen's claim that a 'rare animal, species, mineral, et cetera, will have a higher degree of value partly because it is rare.' (2020: 124) That claim implies that

> (1) Tukul has more value than he would have had were Javan rhinos more common because he possesses the value-adding property of *rarity*.

Four clarifications:

First, in this context 'value' does not denote monetary value. We may suppose, instead, that to say that x has value is to say that it is, all things held equal, a good thing that x exists.[3] Accordingly, we

[2] Granted, some conservation biologists argue that their colleagues should pay more attention to the value of individual organisms (see, for example, Wallach et al. 2018). However, these *compassionate conservationists* both see themselves and are seen as *challenging* a common tendency in conservation biology. In any case, they focus their attention on the intrinsic value of organisms (primarily the value organisms have by virtue of being sentient).

[3] That rough sketch of what it means to have value could, I admit, be challenged (see, for instance, Parfit 2011: 237-8). But developing a watertight definition of value would take us too far off track. Anyway, for our purposes the rough sketch will suffice.

may also suppose that to say that x has *more* value than y is to say that it is, all things held equal, *better* that x exists than y exists. And, finally, we may suppose that to say that x has value in this sense is to say that x *really* has that value and not merely that it is *taken* to have it. So I take 'has value' to mean 'is valuable' or 'deserves to be valued'.

Second, there is the question of how the word 'rarity' should be interpreted in contexts, like this one, in which it is applied to organisms. Biologists, for their part, typically define rarity in terms of low abundance and/or small geographical range (Drever et al. 2012: 166; compare Flather and Sieg 2007: 44). The reference to geographical range jars, however, with common usage of the word 'rarity'. Were one not doing biology, it would be strange to apply the adjective 'rare' to organisms which, though confined to one small location, were highly abundant. One could say that such organisms were rare outside of that one location; but it would be odd to say that they were, in some unqualified way, rare. In any case, those philosophers, such as Tenen, who discuss the value of rarity tend to define 'rare' solely in terms of abundance. I will follow suit. From here on, I will take 'rare' to mean *low global abundance*.

Third, there is the matter of what kinds of things can be rare. Like writers such as J. Baird Callicott (1980: 326) and Thomas Hurka (1980: 496), Tenen sometimes applies the adjective 'rare' to *species* (Tenen 2020: 124). I think it's fine to focus on species rather than some other taxonomic unit (though for a different view, see Cline 2018). I'll focus on species too. Strictly speaking, though, it is a mistake to refer to the rarity of *species*. Because each species is unique, no species can be any rarer than any other. Rarity typically attaches to individuals of a certain kind – to individual Javan rhinos, say, rather than to *R. sondaicus*. Accordingly, to put the point in a rough and ready way, the claim that Tukul is rare implies that there aren't many creatures like him.

Fourth, it may be helpful to consider, if only briefly, how species-rarity, as defined above, relates to species-endangerment. The answer depends on how 'endangerment' is understood. Suppose that we understand it in terms of probability of extinction, so that a species counts as endangered only if its probability of near-term extinction is sufficiently high. On that definition, it might seem that – to quote Alastair S. Gunn - 'it is the very rarity of certain species which makes them candidates for extinction' (1980: 29; see also, Fischer 2021: 174). But that impression would not be accurate: the fact

that individuals of a certain species are rare does not entail that that species is endangered. As Gill Aitken points out, some organisms, such as *Amorphophallus titanium*, the enormous 'corpse plant', are rare without being endangered (2004: 24).[4] Still, although the fact that a species is rare does not *entail* that the species to which those individuals belong is endangered, the former *typically* is accompanied by the latter (Drever et al. 2012: 166). And this seems to be the case with Javan rhinos. As Javan rhinos have become increasingly rare, so *R. sondaicus* has become increasingly endangered.

2. Final and non-final value

To recap: we have been considering the following proposition:

> (1) Tukul has more value than he would have had were Javan rhinos more common because he possesses the value-adding property of *rarity*.

Now its meaning has been (partially) clarified, we are in a better position to assess whether (1) is true.

Certainly, some writers would endorse Tenen's claim that rarity can add value. For instance, John O'Neill suggests that 'Rarity appears to confer a special value to an object.' (O'Neill 1992: 124) Callicott is less cautious. 'The preciousness of individual deer, as of any other specimen,' he maintains, 'is inversely proportional to the population of the species.' (Callicott 1980: 326; compare Hurka 1980: 496) But that sweeping claim is, on the face of it, implausible. It is by no means clear that a tremendously harmful organism would gain value as it becomes rarer. It seems more plausible that, to quote Tenen,

[4] Conversely, an endangered species need not be rare. Imagine that a rat-hating scientist flips a coin to decide whether to unleash a fast-spreading, fast-acting and deadly virus upon the several billion individuals that make up the global population of rats. In that scenario, all the various species of rat would be endangered even though rats themselves would not be rare. Similarly, the IUCN allows that a species could be endangered without being rare. According to that organisation's criteria, a species could count as endangered if individuals of that species are very numerous and yet rapidly reducing in number (see IUCN 2012: 18).

> rarity may just be an amplifier of value already present in the thing. Good things are more valuable if they are rare, whereas the same may not be true of neutral or bad things. (Tenen 2020: 124; compare Kagan 1998: 283, Gunn 1980: 31, Rolston 1995: 525)

It is reasonable to suppose that individual Javan rhinos fall into the category of good things. So, if Tenen is correct, then it would seem that (1) can be tweaked to give the following:

> (2) Tukul has more value than he would have had were Javan rhinos more common because he possesses the value-amplifying property of *rarity*.

Is (2) true? It depends what kind of value we are considering. Amongst other things, it depends on whether we are considering (a) the value a thing has for its own sake or (b) the value it has for the sake of something other than itself. Our elder daughter, for instance, has value of the first kind. She is not of value simply because she occasionally helps to load the dishwasher or hang out the laundry. She also has value for her own sake. That cannot be said of the bus ticket I purchased to get me into town. That ticket was of value merely because it enabled me to show that I was entitled to travel on a certain bus line on a certain day.

Following Tenen and others, I will call the value a thing has for its own sake *final value*. For want of a better term, I will call its opposite *non-final value*.

Tenen suggests that rarity can amplify 'an entity's final value' (2020: 124; compare Kagan 1998: 283). I am not certain that suggestion is true. Granted, unlike Miles Tucker (2016: 1911), I do not think the very notion of something's being valuable for its own sake by virtue of its relations with other things indicates some sort of 'confusion' (see further, James 2022: 126, n.13). Nonetheless, it strikes me as being plausible that the rarity of such things as Javan rhinos does not amplify their final value but merely draws our attention to whatever such value they possess independently of their being rare (see further, Aitken 2004: 23).

Still, even if my doubts are justified and rarity cannot in fact amplify final value, it seems that it can amplify non-final value. Suppose that Maria derives a bittersweet pleasure from seeing Tukul

precisely because she knows that Javan rhinos are rare (see further, Angulo and Courchamp 2009). This isn't merely to suppose that Tukul is *taken* to have value. It is to suppose that he really does have some value because he brings about something – namely pleasure – which (arguably) really is of value. Yet to say that Tukul has value for this reason is not to say that he has final value. It is to say that he has value for the sake of something else – namely, for the sake of giving pleasure to Maria. It is to say, therefore, that Tukul has a sort of non-final value.

In this case, then, an individual organism has non-final value because the fact that it is – or is at least taken to be – rare generates pleasure. In other cases, rarity might amplify non-final value because of the individual organism's ecological role. Suppose that individuals of a certain keystone species – call them xs - are rare. And suppose that the ecosystem to which those xs belong is valuable. Because xs are rare, each x may have a large amount of non-final value by virtue of the large positive contribution it makes to the valuable ecosystem to which it belongs (see further, Leitão et al. 2016, McDonald 2014: 131-132).

3. Constitutive value

Tenen alludes, if only in passing, to another reason why organisms might have value precisely because they are rare. He suggests that an individual organism could have 'constitutive value' precisely because it is 'a constituent of the given whole (viz. the species).' (2020: 124; see also, James 2022: 60 n. 5)

That claim implies that one could reason as follows about Tukul's value:

1. *R. sondaicus* is valuable
2. Tukul is a part of *R. sondaicus*
3. So Tukul has constitutive value as a part of *R. sondaicus*
4. Tukul makes up a larger part of *R. sondaicus* than he would have done were Javan rhinos more common
5. So Tukul has more constitutive value than he would have had were Javan rhinos more common

Premise 1 is plausible. Granted, it may be that some species lack value. Perhaps some of them, such as the nasty harmful organism mentioned above, have disvalue. Even so, it is clear that at least some species – including, I would suggest, *R. sondaicus* – have value. Various reasons can be offered in support of that claim (see Hale 2016). It is widely accepted that species can have value because their existence satisfies human needs and interests, but many argue that they can have value for other reasons too: because, for instance, they contribute to some form of biodiversity (Bradley 2001); or simply because they are valuable for their own sakes, regardless of any contributions to they might make to anything else (Soulé 1985: 731; Smith 2016). There is no need to review all of these reasons here, though, still less assess their relative strengths. For now, it is enough to note that Premise 1 is plausible.

Some biologists and philosophers would accept Premise 2. Indeed, Russell Powell claims that 'the received view in biology and philosophy of science' is that 'species are individuals located in space and time with organisms as their constituent parts, rather than atemporal sets with organisms as their *members*.'[5] That is an exaggeration: what is often known as the species-as-individuals view is more contentious than Powell's words imply.[6] Even so, it is a respectable view. So, for argument's sake, let's provisionally accept that Premise 2 is plausible and move on to consider the rest of the argument.

If premises 1 and 2 are true, then Premise 3 plausibly follows. The plausibility of Premise 4, for its part, depends on how one conceives of *R. sondaicus*. If one conceives of that species as existing in its entirety at any point in time after the appearance of the first Javan rhino and before the death of the last, then it is plausible that an individual Javan rhino today makes up a larger part of *R. sondaicus* than did an individual Javan rhino in 1800, when Javan rhinos were more common. But if one conceives of *R. sondaicus* as a temporally-extended individual, then Premise 4 seems less plausible. For the species-as-individuals view might be taken to imply that at any point in time since the Early Pleistocene, when Javan rhinos seem to have first appeared, *R. sondaicus* has been composed, not just of all those individual Javan rhinos alive at that particular time, but also of all those individual Javan rhinos that

[5] Powell 2011: 606. The species-as-individuals view was championed by Michael Ghiselin (1974) and David Hull (1978). More recently, it has been defended by Berit Brogaard (2004) and Richard A, Richards (2010: Chapter 6).
[6] See Ruse (1987) for an early critique of it.

passed away before that time.[7] If this 'growing block' conception of *R. sondaicus* is correct, then it follows that Tukul makes up a *smaller* part of that species than would a Javan rhino that was born in, say, 1800. And if *that* is the case, then not only Premise 4 but also Premise 5 is thrown into question. For if Tukul makes up a smaller part of *R. sondaicus* than would a Javan rhino that was born in 1800, then he would seem to have *less* constitutive value as part of that species than any rhino that was born in 1800.[8]

4. Progenitive value

We began by asking why Tukul might have more value than he would have had were Javan rhinos more common. I suggested that the rarity of Javan rhinos can amplify the non-final value of individual Javan rhinos in the following ways: (a) by giving pleasure to people who enjoy encountering rare animals; (b) by amplifying the value any particular individual rhino has on account of its contributing to the health of the ecosystem to which it belongs; and (c) by amplifying the value any particular Javan rhino has as a part of *R. sondaicus*. However, not all those reasons plausibly explain why *Tukul* might have more value than he would have had were Javan rhinos more common. Because Tukul is not wild, (b) does not appear to apply, and (c), for its part, is highly contentious. Still, (a) seems to apply. Tukul could have more value than he would have had were Javan rhinos more common because he gives pleasure to those zoo visitors who are thrilled to see such a rare creature.

That reason partly explains why Tukul has more value than he would have had were Javan rhinos more common. But only *partly*. The full picture is, I will suggest, more complicated.

Begin by considering the extinction of *R. sondaicus*. Would that event be a bad thing? The answer is timeframe-dependent. It seems to me that it would be very bad if all the world's Javan rhinos were wiped out this week. It would also, I believe, be bad if they were wiped out in ten years' time. But

[7] Admittedly, this doesn't apply to the very first Javan rhino; but it applies to all of its successors.
[8] It would be interesting to consider whether the argument presented above would be sound were one to work with Peter Simons's (2013) view that biological species are spatiotemporally bounded collections. I leave it to readers to consider this. (I would like to thank one of the Journal's anonymous referees for prompting me to think about this point.)

would it be bad if *R. sondaicus* were to become extinct ten million years from now? I'm less sure that this would be bad – or, at least, it seems to me that this event wouldn't be *as* bad as *R. sondaicus* going extinct in ten years' time (compare Lenman 2002: 255). After all, no biological species will last forever.

In what follows, then, I will assume that we are thinking about extinction in terms of the timescale indicated by the IUCN's stipulation that a species counts as critically endangered if quantitative analysis shows 'the probability of extinction in the wild is at least 50% within 10 years or three generations (up to a maximum of 100 years).' (IUCN 2012: 18) The generation time of Javan rhinos – that is, their average age at breeding - is approximately 16.5 years (Haryono et al 2016: 31). Accordingly, by 'the extinction of *R. sondaicus*', I mean to refer to its extinction in the next fifty years.

I assume that the extinction of *R. sondaicus* would be a bad outcome, even if it were not caused by human beings. As to *why* it would be bad, I am happy to admit a wide range of answers. Some will say that it would be bad because *R. sondaicus* has intrinsic value. Some will say it would be bad because it would upset presently-existing rhino-lovers. Some will say it would be bad because it would deprive future generations of a chance to encounter Javan rhinos.

I won't try to list all the reasons why the extinction of *R. sondaicus* might be thought to be a bad outcome. I will simply assume that it would be a bad outcome. By the same token, I will assume that the prevention of that outcome qualifies as a valuable end – one that we have reasons, moral, aesthetic, economic or whatever, to pursue.

Call that end 'the preservation of *R. sondaicus*'. Individual Javan rhinos can serve as means to that end - and in various ways. An individual rhino could, for instance, serve as a repository of genetic material that could be used by scientists to breed more individuals of its kind. However, the main way any particular Javan rhino could serve as a means to the end of preserving its species is, of course, by reproducing. This is not to say that all Javan rhinos would be able to help to bring about that end in that way. Those that are, say, infertile would not be able to contribute in that way. Even so, some Javan rhinos could, by reproducing, help to preserve the species to which they belong (see further, de-Shalit 2000: 15, n. 15, Tenen 2020: 124). Any (fertile, non-isolated, etc) individual Javan rhino could successfully reproduce and, by so doing, provide the means to that end. That is to say, any particular

such rhino has a certain amount of instrumental value as a means to the end of the preservation of *R. sondaicus*. Any such rhino has, let us say, some *progenitive value*.[9]

Two initial observations about progenitive value. First, up until now, we have been focusing on rarity rather than endangerment. But although – as we shall see below - progenitive value tends to track rarity, it depends on the probability that the relevant species will go extinct. Ultimately, that is, it depends on *endangerment*. Second, progenitive value qualifies as a *value* because to say that some organism has it is to say that, all things being equal, it is a good thing that that organism exists. Granted, progenitive value is not a kind of final value. The value of an individual that has it derives, rather, from that individual's capacity to bring about something that is independently valuable (the preservation of the species). To be more precise, progenitive value is a form of *option value* – a sort of instrumental value which an entity possesses 'if it is potentially a useful means to a sought after end' (Sandler 2012: 17).

Expressing matters in general terms, let us take X to denote the relevant species, and let us refer to individuals of that species as xs. The progenitive value of any particular x will depend on various factors. It will, for instance, depend on *how* bad the extinction of X would be. If it would be very bad, then (all things held equal) any particular x will tend to have high progenitive value. If, by contrast, the extinction of X would be a good thing (recall that nasty harmful organism mentioned above), then any particular x will typically have negative progenitive value. The progenitive value of any particular x will also depend on the characteristics of that particular x (whether it is past reproductive age, for instance). But note that, whether an x has a lot of progenitive value or only a little, whatever such value it has will tend to increase exponentially with the rarity of xs. So if xs are very common, then it is unlikely that any particular one of them will have much progenitive value. If, by contrast, xs are very rare, then the progenitive value of any particular (fertile, etc) x will be disproportionately high.[10]

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[9] One could argue that the ultimate bearer of progenitive value is not the individual organism but – in the case of sexually-reproducing organisms - its gametes, and that the organism has value as a bearer of those gametes. Even so, for the sake of simplicity I will continue to refer to the progenitive value of individual organisms.

[10] Unlike the appeal to constitutive value sketched in Section 3, this proposal does not presuppose any controversial conception of what a species is. It merely presupposes that when xs mate and produce viable offspring, those offspring will be xs.

We seem, therefore, to have another answer to the question with which we began. Assuming he is fertile, then

> (3) one of the reasons Tukul has more value than he would have had were Javan rhinos more common is because he has high progenitive value.

Strictly speaking, though, (3) is false, for it implies, falsely, that progenitive value ultimately depends on population size. Granted, as we have seen, value of that kind does tend to be negatively correlated with population size. But that is merely a tendency. Ultimately, progenitive value depends on the *composition* of the relevant population.

The point is best made by means of an example. So, to this end, suppose that in some imaginary but all-too-possible world there exist just three fertile Javan rhinos – Tukul, the male who so impressed Maria, and two females. Each of those rhinos has a certain amount of progenitive value because any of them could, by reproducing, help to secure the valuable end of there being future Javan rhinos.[11]

Now imagine that both the female rhinos die without issue. If rarity amplifies value, then Tukul's value might reasonably be expected to increase.[12] By contrast, his progenitive value would plummet. Perhaps, all things considered, he might have more value than he would have had were he not an endling. Perhaps, as Tenen might suggest, he would have a huge amount of value on account of the near-maximal rarity of Javan rhinos. Perhaps he would have a huge amount of constitutive value on account of the fact that he is such a large part – maybe an essential part – of *R. sondaicus*. But as an endling of a sexually reproducing species, Tukul would have no opportunity to reproduce and hence very little progenitive value.[13]

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[11] Given the miniscule population size, it is unlikely that the species would persist for very long. Allee effects would probably result in its swift extinction. But for simplicity's sake, let's set that fact aside.

[12] If, that is, it changes at all. Suppose that Tukul's rarity gives him non-final value as a source of bittersweet pleasure for zoo visitors. It follows that that value will increase only if the visitors are *aware* that Javan rhinos have become rarer.

[13] Here, to drive the point home, is a more fanciful case. Suppose that there exist 99 male Javan rhinos and 1 female. If that female dies, then the following things happen: Javan rhinos become rarer and the progenitive value of each and every male rhino drops. So here is another case in which an increase in rarity is accompanied by a decrease in progenitive value.

5. Persistence value

In the previous section, I suggested that if one or more fertile, non-isolated (etc) female Javan rhinos exist, then

> (4) one of the reasons Tukul has more value than he would have had were *R. sondaicus* not endangered is because he has high progenitive value.

But let us suppose that those fertile females do not exist. Let's suppose that Tukul is an endling. It follows that *R. sondaicus* is doomed. The species, as biologists say, is *functionally* extinct (see further, Jarić et al. 2016: 84). Nonetheless, because one Javan rhino still lives, it is not yet *numerically* extinct (see further, Sellman et al. 2016: 83).

Tukul cannot stave off the numerical extinction of *R. sondaicus* by reproducing, but he can stave it off merely by existing. So long as he exists, and *only* so long as he exists, *R. sondaicus* persists.[14] So, although he has little or no progenitive value, Tukul has value for this reason. He has what I shall call *persistence value*. In other words, if he is an endling, then

> (5) one of the reasons Tukul has more value than he would have had were *R. sondaicus* not endangered is because he has persistence value.

Before moving on to consider the implications of this claim, let us pause to consider the relations between persistence value and progenitive value. To say that Tukul has persistence value is to say that he has value for the sake of something other than himself (namely, the continued existence of *R. sondaicus*). So, like progenitive value, persistence value is a kind of non-final value. However, the two kinds of value differ in at least two respects. First, unlike progenitive value, persistence value is not a

[14] I am assuming that *R. sondaicus* would not exist in the relevant sense were it preserved merely as DNA in a test tube, for instance, or as a DNA sequence stored on a computer hard drive.

form of instrumental value, for instrumentality necessarily involves a causal relation between whatever has instrumental value and whatever valuable state of affairs it brings about, and the relation on which persistence value depends – that is, the relation between Tukul's continuing to exist and the continued existence of *R. sondaicus* – is not causal (James 2022: 24). Second, as we saw above, to say that Tukul has progenitive value is to say that he has value as a means to the end of the preservation of his species *for the next 50 years*. By contrast, to say that Tukul has persistence value is to say that he is, at this very moment, ensuring the continued existence of *R. sondaicus*. So claims that Tukul has progenitive value and claims that he has persistence value are both similar and disimiliar. They both imply that Tukul has value for the sake of something other than himself. But the 'something' and the relation indicated by the phrase 'for the sake of' is, in each case, different.

Merely by existing, then, Tukul postpones the extinction of *R. sondaicus*. But how significant, one might ask, could this slight postponement be? The answer depends on *why* it would be bad for *R. sondaicus* to go extinct. If we address that question by thinking in terms of evolutionary time - if, for instance, we think that it would be bad for the species to go extinct because it would mark the end of a valuable evolutionary lineage – then postponing that extinction by just a few years will not seem significant at all. After all, when measured against the millions of years it took *R. sondaicus* to evolve, what difference could a few more years make? But if we appeal to other reasons, that postponement might seem more significant. Suppose, to adopt an anthropocentric perspective, that one of the reasons it would be bad for *R. sondaicus* to go extinct is because the event would distress rhino-lovers. From the temporally-parochial perspective of the world's rhino-lovers, it might seem a good thing to postpone the extinction of *R. sondaicus* for just a few years.

So, when Tukul became an endling, he lost progenitive value yet gained persistence value. Now that he is an endling, he has persistence value because, merely by existing, he staves off the extinction of his species. In this respect, endlings such as Tukul differ from non-endlings. Suppose that the 2050 population of Javan rhinos were to consist of not one but five individuals. If that were the case, then none of those individuals would have persistence value since any one of them could die without *R. sondaicus* going extinct. Persistence value would, rather, be borne by the population as a whole; for if

that population were to disappear, *R. sondaicus* would follow suit. Accordingly, when Tukul becomes an endling, the persistence value of the population condenses, as it were, into Tukul himself.

5. Death, extinction and the destruction of worlds

In this section, I present one more reason – though, admittedly, a more speculative one - why the endangerment of *R. sondaicus* might enhance Tukul's value. To bring it into focus, though, we must begin by considering, not the badness of extinction, but that of *death*.

Josef Popper-Lynkeus, Karl Popper's uncle, is reported as having said that 'when a man dies, a whole universe is destroyed…' (Popper and Eccles 1977: 3) The word 'universe', here, does not denote a material universe, of course. It stands for the world as one experiences it in the living of one's life – what phenomenologists sometimes call a *lifeworld* (see further, Cerbone 2006: 51).

Consider, by way of example, the lifeworld of an imaginary individual – a sixty-five-year-old husband and retiree named Alfred. Not only do the contents of Alfred's lifeworld have meaning for him; they are partly constituted by the meanings they have for him. To Alfred, the ring in the drawer of his bedside cabinet is not just any old ring; it is the one he inherited from his mother. The shiny red and black object beside it is his lucky pebble, discovered on a family holiday over fifty years ago. The cabinet itself was scratched by the removal men when he and Josie moved into the house which was to become, for three decades, their home.

Now suppose that Alfred dies unexpectedly. Obviously, the ring, the pebble and the bedside cabinet do not pop out of existence; yet they lose the particular meanings they had for Alfred. To a stranger, the ring may be just a ring, the pebble just a pebble, the bedside cabinet nothing more than a bedside cabinet. More generally, Alfred's lifeworld as a whole, the distinctive world that he once inhabited, disappears. It disappears because the only person for whom it could be a lifeworld is no longer alive.

Popper-Lynkeus's use of the word 'destroyed' implies that it is a bad thing when a lifeworld disappears. Whether or not it is bad for the one whose lifeworld it was, it is, I will suppose, impersonally bad - a minus rather than a plus, so to speak, on God's Axiological Ledger. Granted, it isn't clear that

it is *always* bad when a lifeworld disappears. It is far from clear that we should regret the disappearance of a confirmed Nazi's lifeworld, for instance. But Alfred's lifeworld was not, let us suppose, problematic in this sort of way. So let's assume that its disappearance was a cause for regret. That is not to deny that Alfred's death should be regretted for other reasons, too. No doubt it should. It is merely to say that one of the reasons his death was a bad thing was because it involved the loss of his lifeworld.

However, one might ask, did Alfred's lifeworld *entirely* disappear? As I suggested above, the *distinctive* lifeworld he inhabited must have disappeared when he died. Assuming Nietzsche was wrong about eternal recurrence, no one will ever experience the world in *precisely* the way Alfred experienced it. Yet some people will inhabit *similar* worlds. Hence some elements of Alfred's lifeworld will live on.

For example, suppose that Josie, Alfred's beloved wife, survives him. In this case, Alfred's lifeworld doesn't entirely disappear. Some entities that had certain meanings for Alfred will have similar meanings for Josie. Her mother-in-law's ring, for instance, might well mean something to Josie; that bedside cabinet might well remind her, as it reminded Alfred, of the day they moved into their house. So, although it is bad when Alfred's distinctive lifeworld disappears, that badness is partly offset by the persistence of Josie's lifeworld. It is bad, we might say, that Alfred's lifeworld disappeared; but that badness is to some extent mitigated by the fact that some of his lifeworld is preserved in Josie's lifeworld.

Now modify the example. Suppose that Alfred was not survived by his wife. Suppose, indeed, that he was the very last member of the (fictitious) Akshani people, the very last Shani. In this case, it is likely that there would be even less overlap between Alfred's lifeworld and those of any surviving people. After all, none of those people would be privy to the culturally specific meanings Alfred and other Shanis once saw in things. None of them would see, as he and his fellow Shanis once saw, that inclining one's head in such and such a way indicates distrust, for instance; none of them would know that it is bad luck to hear a nightjar's call or a blessing to see the year's first full moon; none of them would even be able to understand the language that Alfred and his ancestors once spoke. It follows that if Alfred really were the very last Shani, the badness of his death would be even less offset. If he were a cultural endling, his death would be an even worse thing.

Much the same may be said of at least some animals. After all, some animals have lifeworlds.[15] Moreover, although it would take further work to establish the point, it is at least plausible that, as with humans, one of the reasons it is bad when such an animal dies is because its lifeworld disappears. Accordingly, it is plausible that one of the reasons we might reasonably regret Tukul's death is because it involved the disappearance of his lifeworld. To be sure, as with the case of Alfred, the badness of this lifeworld-loss would be partly offset if Tukul were survived by any other Javan rhinos, for then much of Tukul's lifeworld would persist in theirs.[16] But what if Tukul were the very last Javan rhino? In that case, the badness of losing his lifeworld would not be offset quite so much. His death would be, in that respect, a worse thing. It follows that Tukul himself matters more than he would have done were he not the last Javan rhino. He matters more because his death would be especially bad.[17]

To say that Tukul has this value is to say that he has value, not for his own sake, but for the sake of something other than himself. It is to say that, merely by existing and remaining sentient, he staves off a bad event. That event is not best described as the extinction of *R. sondaicus* – so the value in question is not a form of persistence value. The relevant bad event is, rather, the minimally-offsetable loss of Tukul's lifeworld. So let us call this kind of non-final value *lifeworld value*. Let us say that if he is an endling, then

> (6) one of the reasons Tukul has more value than he would have had were *R. sondaicus* not endangered is because he has high lifeworld value.

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[15] Much recent work in cognitive ethology supports this claim (see, for example, Bekoff, Allen and Burghardt 2002). For an excellent (though far from recent) defence of the claim that some animals have not just certain higher-order mental properties but *lifeworlds*, see Compton 1979: 24-25.

[16] It is likely, indeed, that the badness of Tukul's death would be offset to a greater degree than the badness of Alfred's death. Why so? Well, as we saw, the lifeworld of any particular human being, such as Alfred, will typically intersect to a certain extent with the lifeworlds of other human beings. Likewise, the lifeworld of any particular Javan rhino will typically intersect to a certain extent with the lifeworlds of other Javan rhinos. But it is, I think, likely that the overlap between rhino lifeworlds will be greater – which is to say that, considering how they experience the world, Javan rhinos are probably a more homogenous group than are human beings.

[17] This indicates that Tukul's death would be even worse were he, not just the last Javan rhino, but the last rhino of any sort. For the death of the last rhino is likely to mean the loss of a lifeworld that is for the most part not shared by any non-rhinos. (I write 'is likely to' rather than 'will' because one can conceive of a possible world in which much of the last rhino's lifeworld is preserved in the lifeworld of some non-rhino – for instance, an animal which, through convergent evolution, has come to occupy a rhino-like ecological niche and which has, accordingly, evolved a similar lifeworld.)

6. Conclusions

We have been trying to work out whether individual organisms can acquire value by virtue of being either rare or (a subtly different thing) endangered. I don't claim to have identified all the answers to this question; however, I have argued for the following conclusions:

(i) In some cases, the increasing rarity of individuals of a certain species amplifies the non-final value of each individual.

(ii) Individuals of a valuable species typically have more value when they are rare, but this is not just because rarity can amplify value. For instance, such individuals typically have high instrumental value as means to the end of preserving their species (*progenitive value*).

(iii) Progenitive value tends to increase exponentially with rarity.

(iv) When rarity amplifies value, then as individuals of a valuable species become increasingly rare, each such individual will become increasingly valuable. However, in certain circumstances, increases in rarity will be accompanied by a *decrease* in the progenitive value of such individuals.

(v) Endlings have little or no progenitive value. Nonetheless, simply by existing, they postpone the numerical extinction of their species. So, unlike non-endlings, endlings have pe*rsistence value*.

(vi) When an individual dies, that individual's lifeworld is lost. This is not necessarily a bad thing; however, when it *is* a bad thing, the badness of the loss may be offset to the extent that any surviving lifeworlds resemble the one that was lost. This implies that, all things held equal, a sentient endling will typically have more *lifeworld value* than it would have had were it not an endling.

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