Coining one currency for nature

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Abstract

Collective humanity is at a critical juncture. Despite our efforts to set targets and goals, biodiversity and climate are both changing rapidly, pushing us towards a biosphere our species has not known. To solve this problem, one view is that we need transformational change of the economic paradigm, but that might be more ideal than pragmatic. A new idea could be that we take inspiration from the way in which life has evolved, and co-opt some mechanism to self-regulate biodiversity within a planetary boundary we at least know is not definitely unsafe. One means could be to co-opt the philosophy of the carbon coin, and devise a new single currency for nature. We would then track a conjunction of anthropogenic pressures from space or remotely, combine that with a model predicting biodiversity change, and then link that to our new global currency that would self-regulate those pressures towards bending the curve. There is a lot we would need to learn to make it work, but I think this might be what life would do.

Main

Collective humanity is at a critical juncture. Biodiversity and climate are both changing rapidly, pushing us towards a biosphere our species has not known (*1*). For climate and biodiversity change, our efforts to halt both are not functioning (*2*, *3*). We have a 1.5 degrees Celsius target for climate change and some understanding of how can get there (*4*), but such agreements and targets are not enforceable. For biodiversity the situation is worse. There is a body that regulates goals for biodiversity change, but our 23 Targets (*5*) are not close to fully agreed by the community. Importantly, our Targets do not recognize that the mechanisms of the service of biodiversity are borne of biodiversity itself, and that the uncertainty of this relationship is unknown (*6*). For both biodiversity and climate change I blame our failures on no individual. Our current economic paradigm has locked us into a trajectory that feels to have become unstoppable.

In parallel, investment in nature tech start-ups is growing, with companies aiming to monitor biodiversity for the betterment of humanity. These companies are wanting to make reasonable choices on the measurement and value of biodiversity, but a clear message and direction is not coming from biodiversity researchers. There is now a significant and real risk that these tech companies find ways of monitoring biodiversity at scale in real-time, but build systems that optimize parameters from the literature that we know are not correlated with metrics that are meaningful. This will be compounded when that same problem occurs independently across tech companies, such that collectively we will measure metrics that are not meaningful, and that don't map between one another.

One view is that we need transformational change of the economic paradigm (*7*). That might be an ideal, but it is not pragmatic, and I doubt there will be many ways in which we can say it has worked. Within our current paradigm we have the TNFD (Taskforce on Nature-related Financial Disclosures; (*8*)), but I am not convinced that will work either, since it doesn't regulate or enforce metrics. Companies will be able to record one biodiversity metric and then make a

decision to change, meaning reported change in biodiversity will not be meaningful either within or between companies.

A new idea could be that we take inspiration from the way in which life has evolved, and co-opt some self-regulatory mechanism. Think of life selecting for genes that up or down regulate themselves or switch off and on other genes, or hormones that up or down regulate the secretion of other hormones. Co-options are selected upon co-options, such that when we look at the present lineages of contingent evolution, we see an entire history of improvised selections for self-regulation. Lineages that either selected for self-regulation, or went extinct. For biodiversity change, the pragmatic approach is that we need to co-opt mechanism that already exists, that self-regulates biodiversity within a planetary boundary we know is at least not definitely unsafe.

One potential co-option has been figured out for us already: the carbon coin (*9*). The philosophy of the carbon coin is that central banks should back a new form of carbon currency, that can be issued to companies when they make some action to mitigate or capture carbon. Whereas cryptocurrencies are mined by using carbon to run calculations, a carbon coin would be mined by reducing emissions in the atmosphere. Two crucial outcomes are that it would be a single global carbon standard, and that it could ultimately help to self-regulate towards net zero.

If we suppose a carbon coin happens, we then need to ask ourselves whether that might solve both the climate and biodiversity crises together. That seems unlikely, there are too many ways in which climate change mitigation is counter to biodiversity change mitigation. We therefore need an additional check and balance currency: a nature coin. As in carbon coins, a nature coin would represent a single global standard that facilitates self-regulation. As far as I know, biodiversity researchers have not been talking about a nature coin or currency, that would be backed and issued by central banks. A lot of the debate is about the biodiversity metrics we should be tracking (*10*), which is important but not overly. Mass extinction events are caused by rapid environmental change (*11*), they are not caused by the choices we make on the biodiversity we track. If we can find a way to put the brakes on environmental change with a nature coin, and allow the Red Queen to catch up (*12*), it might be that everything else emerges organically.

Equally, it might not. We need to guide the way in which our nature coin down-regulates. If we do not, we risk mitigating inconsequential anthropogenic pressures, either because their effect size is smaller than we anticipated, or because their effect is actually inherited from somewhere else. To do that, we need a reasonable model that guides our decisions. We can then track a conjunction of anthropogenic pressures from space or remotely, combine that with our model predicting biodiversity change, and then link that to our new global currency that will self-regulate those pressures towards bending the curve. Entities would be awarded a nature coin only when pressure change has been confirmed remotely, reducing the likelihood of false reporting. We would still need to monitor future biodiversity, but that comes secondarily to confirm that the currency is functioning. And then if it's not, we use that future record to refine our model of biodiversity change.

To build that system, we need to settle on some set of measures of biodiversity that we attribute value. Or in other words, if a carbon coin is designed to stabilize global temperature, then what should a nature coin stabilise? That's a difficult question. We don't know specifically what's important, since it varies depending on location, the service in question, and multiple other variables. However, we need to realise that each individual means through which we measure biodiversity is to some extent capturing the variation of others. I would agree that we definitely don't want one metric (*13*). Instead, we need the minimum number such that we

capture enough of the uncorrelated ways in which all are collectively important. That could then be manageable, and perhaps more crucially and hopefully, enough.

We then need a boundary (*14*), which we use to guide the nature coin in the manner of 1.5 degrees Celsius for the carbon coin. Given the complexity of biodiversity, I would argue that if setting a target or planetary boundary feels like guessing, then we should be reluctant to do it. The stakes are too high, and the realised mechanisms of the biosphere too complex. But regardless, from the things we do know, we can at least say some things. I know that as I write this sentence civilization has not yet collapsed, and that right now I continue to exist in a biosphere that is suitable for humanity. We don't fully know how the mechanism of the biosphere works, but independent of lag effects and our own economic paradigm, we know that what it propagates at present is safe. For certain, it seems unwise to set a boundary at a time in which anthropogenic pressures or climate change are more intense than at present.

Perhaps then our global target needs to be anthropogenic pressure oriented. We bring drivers to a point at which we can with some certainty say that our key biodiversity variables will not move around much lower than where they currently are. Collective humanity *could* regulate drivers, and then we bet the biosphere and our model on two fronts: that anthropogenic activity is not already over-committed, and that averting mass extinction can then emerge organically. Such a system doesn't need to be certain. Science is not. A model that predicts self-regulation significantly more often than not would be enough for me.

For a nature coin to work, there are at least eight areas in which we need to prepare: 1) We need to be confident that the anthropogenic variables we measure do explain change in intactness. To do that I think we need more models built on the basis of causal inference (*15*); 2) we need to be confident that through valuing only some set of biodiversity metrics, we are not going to overlook something important; 3) we need to get better at building models that consider multiple anthropogenic variables together, such that we can be confident we will not overlook surprising high magnitude interactions; 4) we need to be better at accounting for uncertainty by incorporating variation predicted by temporal or spatial autocorrelation (*16*); 5) we need to sample biodiversity in space across more locations and across a greater breadth of anthropogenic intensities (*17*); 6) we need to know that space-for-time models can be used to back project time series, in a manner that is not consistently wrong; 7) we need a consistent global monitoring system in place so we can track biodiversity at future intervals (*18*), to check the currency is working; and 8) we need to have an infrastructure in place that we can use to track change in anthropogenic variables from space or remotely at high resolution (*19*).

We need to realise that what we are doing is not working. We need to think of humanity a thousand years from now, pondering to themselves why they started trading coins for nature. We need to ask ourselves what life would do. Because after all, we are life.

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