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Biodiversity Revisited: looking back from 2050

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The world has irrevocably changed. 2020 was posited as a "super year" for biodiversity with multiple sustainability-related international meetings and the anticipated conclusion of the *Convention on Biological Diversity's* 10-year Aicihi Targets. It will be remembered for very different reasons: catastrophic fires in Australia, the COVID pandemic, floods and locust outbreak in East Africa, a drastic drop in oil prices, the collapse of the airline industry...

This reminds us that the future is uncertain. That big changes are possible over a short time.

2020 has revealed systemic inequalities within and across societies. It has exposed the co-vulnerabilities of those marginalised by the status quo: the impoverished, women, Indigenous communities, people of colour, and the natural world.

But 2020 has also shown that interactions between peoples, governments, and environments can be transformed: it has provided the opportunity to re-establish humanity's relationship with nature.

Now is a time for creativity: for science to fuse with story-telling[1], for imagination to connect past, present, and future ethical dilemmas[2]. It is a time to revolutionise how we listen, think, and act; a time for diversity to thrive on our planet.

We offer three possible futures that could emerge from this disruptive shock. We hope these stories spark conversations about the trade-offs and consequences of *current* choices for biodiversity, climate, human health, and sustainable development.

We urge you to read between the lines. To use your imagination, to consider the embedded assumptions about governance, politics, power, human agency, and which bits of biodiversity "matter". You may find yourself liking bits of all these stories, and feeling uncomfortable with all of them at the same time.

We invite you to the year 2050. You...

...prepare breakfast in your communal kitchen: empanadas from maize grown in the national agricultural area and eggs from local farm hens. Luckily, your rations arrived yesterday so you savour the aroma of fresh coffee while the news streams through a vid-cast.

The 2021 popularist uprising provided the catalyst for degrowth, economic redistribution, and social welfare. Human rights and distributive justice are now core principles of global governance. Viewed from above, the hustle and bustle of your local market could be Johannesburg or Melbourne, rather than Bogotá, but on closer inspection you see distinguishing features: maize and potatoes instead of sorghum and wheat. Local foods, local exchange, local diversity.

Degrowth may have flatlined emissions, but the world is still warmer, the weather more extreme. Venture capital has dried up, research budgets have been slashed, and high-tech solutions are a thing of the past. “What if we could have sequestered more carbon?”, you ponder, considering the fates of coastal communities, of places where glaciers have melted, of fires that continue to rage. Climate extremes are causing human suffering in some places and mass extinctions continue.

Decreased consumption has reduced environmental impacts, yet some forms of nature are now prioritised over others. ‘Useful’ nature is in good shape: mangroves buffer sea level rise, urban forests provide recreation, restored wetlands purify water, and agroecological farms provide food. The orangutans and giant panda might exist in far-off places, but with limited funding for conservation or monitoring, you may never know.

Most charismatic megafauna are now extinct, but basic needs are met and society seems to be adjusting to life within limits.

... wake up and open a bag of lab-engineered coffee: former plantations are now tropical conservation sanctuaries. You rip into a box of Berry Good - a fortified breakfast from intensive, climate-controlled farms. It is the middle of the dry season, the heat is unbearable, day and night.

You arrive at the annual Global Conservation Summit and plug in. Your brain is transported thousands of miles to the Congolese rainforest where you and your colleagues visit gorillas through a virtual reality tour. Audio guides explain how the 800 kilometre digital fencing and military drones have protected this landscape from illegal

activities. You are impressed by these measures, but wonder where the people live... are they in the outskirts of Kinshasa? Do they live like the low-wage labourers you walk past every day in Jakarta?

Extreme conservation measures were adopted globally in 2021 as the world struggled to limit the spread of zoonotic diseases exacerbated by unsafe food systems, habitat destruction, and wildlife trade. Climate urgency was overshadowed by multilateral reforms to establish a powerful UN Pandemic Response Council, funded by a global elite that mobilised to ensure the survival of iconic wildlife. While white rhino and tigers survive in militarised protected areas, most climate sensitive species are now only found in climate-controlled enclosures in zoos. Polar bears have all but disappeared from an ice-free Arctic in the summer. Landscapes outside of protected areas are highly degraded as species conservation measures fail to maintain key ecosystem functions in a changing climate.

More people are employed protecting species rather than hunting and harvesting them for food and trade: iconic species are thriving, but society as a whole is disconnected from nature.

… munch your breakfast of locally farmed oats and an apple from your roof-garden. As you inject your carbon-neutral dose of caffeine, it is met with a shot of nostalgia for a cup of Venezuelan coffee.

Your Unity BCI (Brain Computer Implant) projects drone footage from the Radical Climate Action Alliance: deserts covered with solar farms; oceans with wind-farms; biofuel crops and re-engineered carbon forests. Rooftops are adorned with solar-capture chips that could be in Beijing, Helsinki, or Tel Aviv. You feel a sense of pride at a nuclear reactor displaying your national flag. The clip closes with images of carbon-capturing trees in the Amazon; who knows if there are birds singing? The world's carbon sanctuaries are closed to all visitors - including Indigenous peoples who sustained these landscapes for thousands of years.

Concerns about species, ecosystems, and local communities have been subsumed by efforts to sequester carbon and generate clean energy. Environmental and human rights treaties were revoked in 2021 so global action could prioritise climate. Negative emissions will minimise impacts to your national treasure: The Great Barrier Reef, but strict travel limits mean there is no ecotourism there or anywhere. This has impacted local economies and funding for conservation around the world.

Going carbon neutral required partnerships with corporations. Some have been revolutionary, but ultimately, the same pockets are being lined. Different commodities, different markets; same inequalities. An advertisement for Oz Green Energy flashes across your retina. You wonder where they source the raw materials and under what conditions...

Everyone now enjoys climate-friendly energy, and hopes that the frequency and severity of floods, droughts, and fires of the early 2000s will become a thing of the past.

Each of these futures is situated within a rapidly changing Anthropocene, where different ideologies, if enacted, would radically transform relationships between humanity and nature.

These worlds are allegories that capture major elements of a two-year dialogue, involving almost 300 people of 46 nationalities, a diversity of disciplines and career stages. The *Biodiversity Revisited Initiative* created a transdisciplinary agenda that calls for research to mobilise plural knowledges, ethics, and actions to sustain a diverse future for life on Earth[3,4]. It includes a series of research questions to consider how narratives shape and create reality; the intersections between biodiversity, culture, and the Anthropocene; linkages between biodiversity and economies; and transformative research and practice for biodiversity.

The seeds of these futures exist in the present: we have imagined how they may play out in the future to unpack the implications and trade-offs of different ideologies[5]. In the first story, social justice and radical economic interventions to address global inequalities are prioritised[6]. Here, the biodiversity that is valued is local: agrobiodiversity on farms and in oceans, ecosystems that provide instrumental services for human wellbeing. The second story describes a world where extrinsic values of iconic species, often in faraway places, take primacy. Here, relatively large contiguous areas are maintained while local communities are physically and economically displaced[7]. In the final story, there is a singular focus on mitigating climate change, with governments and corporations directing capital into technological fixes. Biodiversity matters but only where it can sequester carbon, or provide ecological infrastructure[8].

None of these futures are inevitable, and many others exist: zero conflict, obliterated nature, societal collapse. As vignettes, they are unavoidably incomplete. The limits of these worlds show us that who does the imagining matters for which story is told, for what stories are enacted. Our intention is not to suggest that there is a choice between worlds, but rather promote more creative ways of considering the choices and trade-offs of different trajectories. These stories take place in the future, but the trade-offs exist in the present. Reconciling them requires us to engage with the messy reality of science, emotions, values, and politics.

Imagination in the Anthropocene

Imagination is critical to a sustainable and just future for life on Earth[1,9]. Writing after the West African Ebola outbreak, Prof. Micheal Osterholm and colleagues called for more "creative imagination" to consider future pandemic scenarios[10] - a call that feels particularly salient five years on. Purely technocratic approaches fail to engage with emotive motivators of change like fear, hope, grief, and agency and are less likely to inspire actions towards alternative futures[9,11]. Inclusive and creative processes can generate positive stories about the future, fostering the agency and capacities to imagine multiple futures, to acknowledge power, work with it, and re-shape it[9,12]. Stories can help build new relationships between humanity and nature; and new discourses that transform how we live, act, and govern[12,13].

When the future is predicted from the probable and knowable, it is often derived from outdated assumptions[14]. Engaging the imagination helps move far beyond the convention of decadal development and conservation targets. It opens up possibilities of navigating complex, messy, and uncertain worlds, where knowledge, values, norms, and rules are contested. It allows us to acknowledge that 'a desirable future' is subjective and political, that trade-offs are inevitable[15].

Imagination, scenarios analysis, and strategic foresight are developing as practice in research, investment, and planning[1,9,16]. Science can play an important role in embracing imagination by fostering novel participatory methods that enable society to explore what is possible, plausible, and desirable[1]. These approaches can be used to build anticipatory responses to get ahead of the curve, rather than react to crisis[16]. It forces us to ask: What can be done differently in the next five years? In the next 30? What do we need to know and what will we never know? How can options be created and traps avoided? How do we make decisions in light of inevitable uncertainty?

Our stories show that choices have consequences. Some close down options. Some open up multiple pathways. Either way, winners and losers emerge. Humility[17] and response-ability[18] are required to address the troubled challenges of the present and the future. Imagination can help us grapple with these challenges, to embrace diverse ways of thinking, listening, being, and knowing to create more just and sustainable futures for life on Earth.

If progress is taking a step forward, what if you're standing on the edge of the abyss?[19]

Pause. Reflect. Imagine... Respond.

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