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Climate change mitigation and nature conservation both require higher protected area targets

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Abstract

Nations of the world have, to date, pursued nature protection and climate change mitigation and adaptation policies separately. Both efforts have failed to achieve the scale of action needed to halt biodiversity loss or mitigate climate change. We argue that success can be achieved by aligning targets for biodiversity protection with the habitat protection and restoration necessary to bring down greenhouse gas concentrations and promote natural and societal adaptation to climate change. Success, however, will need much higher targets for environmental protection than the present 10% of sea and 17% of land. A new target of 30% of the sea given high levels of protection from exploitation and harm by 2030 is under consideration and similar targets are being discussed for terrestrial habitats. We make the case here that these higher targets, if achieved, would make the transition to a warmer world slower and less damaging for nature and people.

Keywords

Biodiversity conservation; Natural climate solutions; Nature-based solutions

The year 2009 was a watershed in the progress of climate change [1, 2]. At a meeting at the Royal Society in London to examine the past and consider the future of tropical coral reefs, participants realised that global emissions, which by then stood at 386ppm CO_2, had already exceeded the estimated 350ppm CO_2 tolerance of this ecosystem [1]. It was too late to simply reduce emissions; to secure a viable future for coral reefs some of the CO_2 already in the atmosphere would now have to be recaptured [1]. This recognition moved debate from consideration of how to avoid future problems, to the fixes required for those already existing, a conversation that still continues [3-5].

The Paris Agreement acknowledged this shift in perspective by incorporating carbon recapture in the two more ambitious Representative Concentration Pathways, RCP 2.6 (a stringent mitigation/low emissions scenario) and RCP 4.5 (a stabilisation/moderate emissions scenario) [6], more recently extended to include social and economic dimensions through Shared Socio-economic Pathways [7]. The most effective way to quickly capture sufficient CO_2 from the atmosphere is via photosynthesis, so both RCPs include scenarios of mass reforestation and habitat restoration [4, 8]. But while climate change and emissions reduction are now high on the political agenda, addressing the global and accelerating deterioration of nature [9] is at least as urgent. In practice, however, biodiversity loss receives far less attention and global actions to reverse it have been largely ineffective [9]. It is now widely recognised that synergies between climate change and biodiversity conservation mean that the two agendas must be pursued concurrently to meet societal and environmental goals, such as the UN's Sustainable Development Goals, Convention on Biological Diversity's Aichi Targets, and the Paris Agreement [9]. This recognition is now also reflected in global social movements aimed at driving political action [10].

While reducing emissions remains fundamental, mitigation is also essential [4]. Conserving and restoring natural habitats is among the most cost-effective emissions mitigation strategies available but while clear synergies exist between the objectives of biodiversity protection and carbon capture, there is also a risk that if conservation and climate change mitigation agendas are mis-aligned, one could easily undermine the other.

The last decade has seen a surge in research on the benefits and costs of nature-based solutions to climate change mitigation and adaptation and, as much of it acknowledges, there are trade-offs among outcomes [4]. For example, habitats that store the most carbon, or are best for flood control, or for pollution mitigation, are not necessarily the most diverse, intact, or natural. Hence the single-minded pursuit of a narrow goal, such as carbon storage or reduced consumption of fossil fuels, might well lead to policies antithetical to wildlife protection. An example of the former would be establishment of large-scale, low diversity plantations with the potential to sequester large amounts of CO_2 in repeatedly harvested timber but which could potentially hasten the disappearance of threatened species by co-opting space and blocking dispersal [11]. An example of the latter would be increased land conversion to facilitate crops for biofuels to reduce reliance on fossil fuels at the overall expense of carbon emissions and biodiversity [12]. It is critical to avoid such "bio-perversities" in any climate mitigation policies [13].

The numerous co-benefits from wildlife and habitat protection for climate mitigation and adaptation must be embedded in revised global ambitions. Climate solutions must promote conservation, while conservation efforts must work to counter climate change. Natural or restored habitats perform functions that are crucial in mitigating climate change and promoting societal adaptation. For example, wetlands, peat bogs and rainforests are often intense carbon sinks [14-16] while intact, vigorous wetlands and coral reefs form natural, self-repairing breakwaters that can protect coasts against sea level rise better than man-made defences [17]. Unfished mesopelagic fish populations promote carbon sequestration in the deep sea [18] and protecting marine animals and ecosystems can benefit carbon storage and prevent release of carbon already locked away [5, 19]. Natural and restored forested landscapes promote water retention and counter flooding while regulating climate and rainfall at local, regional and continental scales [20], while protected habitats in agricultural landscapes sustain populations of natural pollinators, predators that control pests, and facilitate seed dispersal [21, 22].

Existing global conservation targets (the 'Aichi targets') agreed through the Convention on Biological Diversity (CBD) [23], and later incorporated into the Sustainable Development Goals [24], run until 2020. The Aichi targets have spurred governments to act and there have been some successes, but global biodiversity continues to decline [9]. Attention is now turning to the post-2020 agenda and, with the urgency of climate change well-recognised [25], there is a need to align conservation and climate change agendas so that both may see greater success and fulfil their essential roles in achieving the Sustainable Development Goals. The post-2020 CBD targets need a rapid increase in ambition and action. For nature to substantially contribute to climate change mitigation higher coverages of intact ecosystems will be essential because of the reliance of ecosystem service delivery, including carbon sequestration and storage, on biodiversity and the crucial need to leave existing carbon stores intact. Moreover, given that many ecosystems are already degraded, ensuring continued provision of ecosystem services requires not only the precautionary protection of currently intact habitats, but also large-scale habitat restoration.

Providing greater space for recovery of intact, vibrant nature is not altruistic conservation, but is, we argue, an indispensable act of self-preservation, producing a cascade of benefits that will help maintain the habitability of the biosphere as the climate changes, thereby securing the wellbeing of generations to come. In truth, the goals of protecting 10% of marine habitats and 17% of those on land by 2020 (Aichi Target 11) were political and never considered sufficient to save nature, even without climate change, or to enable nature to contribute substantially to climate change mitigation. Based on the species-area relationship, regarded as one of ecology's few universal laws, protection of so little habitat will condemn thousands of species to extinction if habitat outside them is converted, degraded or lost. It is this logic that underpins calls for 'Nature Needs Half' [26], together with an understanding that ecosystem processes and services of the scale needed to sustain the wellbeing of life on Earth require large wildlife populations and huge expanses of intact and restored habitat.

Since the current Convention on Biological Diversity targets were agreed, new research has shown that future conservation success will depend on greatly increased coverage of fully and strongly protected areas and restored habitats. For example, in the oceans, a synthesis of 144 studies asked how much protected area coverage was needed to achieve, optimise or maximise benefits for six core environmental and/or socioeconomic objectives [27]. The goals were representation of biodiversity; ensuring ecological connectivity among protected sites; avoidance of population collapse; avoidance of adverse, fisheries-induced evolution; enhancement of fisheries yield; and meeting the needs of multiple stakeholder groups. The results consistently indicated that protecting several tens-of-percent of the sea is required to meet goals with average and median values of 37% and 35%, greatly exceeding the 5% or so of the ocean that is currently protected and the 10% target (http://www.mpatlas.org).

Climate change adds a new dimension to the question of how much protected area coverage is needed to assure conservation of wild nature. Climate change is already reducing wildlife population sizes and forcing range shifts as conditions alter [28, 29]. Protected areas counter such stresses by building up populations, and connectivity of populations and habitats is emerging as a key property in securing species persistence and resilience to rapid change [5]. Hence networked protected areas, especially where embedded within well-managed land- or seascapes, provide crucial stepping stones to accommodate range shifts and, where no further movements are possible, refuges of last resort [5]. Analyses suggest that adequate levels of population viability and connectivity can be achieved only with MPA coverages of 30% or more [27]. We are not aware of comparable analyses for terrestrial ecosystems, but figures are unlikely to be lower [30], given the more limited capacity for dispersal on land than in the sea [31].

Policies that target single objectives can lead to unintended consequences and a lack of alignment between goals as we argue above [11-13]. However, protected areas, with their multiple benefits to wildlife and human societies, offer a low-tech and cost-effective nature-based tool to simultaneously pursue climate change mitigation and adaptation and staunch biodiversity loss [5, 32]. Of course, methods matter and the ability of protected areas to achieve multiple goals depends on factors such as level of protection, public engagement, governance, location, size, staff and budget but we have a large body of experience on how to effectively design and deliver protected areas [33, 34] and restoration programmes [35]. To date, much effort in marine protected area establishment has focussed on remote and more intact ecosystems [36] which, while important in delivering planetary benefits, is insufficient to address other immediate human needs. Extending benefits to more people will require greater protection efforts in populous regions in both sea and land.

Over the past decade, we have gained a much clearer scientific understanding of the role of natural ecosystems in human wellbeing and planetary processes, and the scale of the challenge from rapid climate change. Given the plight of natural ecosystems and humanity's reliance on them for our survival, there is an urgent need to increase protection targets set by the Convention on Biological Diversity to secure sufficient space for nature to thrive and adapt in our fast-changing world. This is so important because protected habitats must be part of frontline defence in efforts to mitigate climate change and to promote ecosystem and societal adaptation against its effects. Our goals need to coalesce in a joined-up strategy for planetary survival. For marine habitats, there is growing consensus that at least 30% of the sea should be protected by 2030 [36] and a similar level of ambition is justified on land [37-39], with protection targeted to achieve ecological representation and connectivity to support and restore nature and its wealth of services. For the next phase of reshaping global conservation ambitions, our focus must shift from saving nature, to harnessing the benefits of nature to save ourselves.

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