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Mangroves give cause for conservation optimism, for now

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Mangrove forests are found along the shorelines of more than 100 countries, and provide a wide range of ecosystem services that support the livelihoods and wellbeing of tens of millions of people. Despite their importance, loss of global mangrove area has been so substantial that twelve years ago academics warned of “a world without mangroves” [1]. This seminal work highlighted the large historical loss of mangroves, suggesting that they had declined faster than almost any other ecosystem, including coral reefs and tropical rainforests. The authors predicted that if nothing was done, the world could be deprived of mangroves and their ecosystem services by the end of this century. Such rates of mangrove loss reflect a broader global environmental crisis, with intergovernmental groups such as the International Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) recently predicting the catastrophic loss and degradation of ecosystems globally [2]. However, we report that compared with other ecosystems, the global loss rate of mangrove forests is now less alarming than previously suggested [3]. This gives cause for conservative optimism among broader projections of environmental decline.

Globally, mangrove loss rates have reduced by an order of magnitude between the late 20th and early 21st century, from ~2% to <0.4% per year [3]. The reduction in global loss rates has resulted from improved monitoring and data access, changing industrial practices, expanded management and protection, inaccessibility of remaining intact mangrove forests, greater application of community-based management, increased focus on rehabilitation, and stronger recognition of the ecosystem services provided by mangroves [4,5]. While area is not the only metric with which trends in mangroves should be assessed [6], there is strong evidence that positive conservation change is occurring.

Mangroves are now considered a high-priority ecosystem for a number of recent large international conservation initiatives such as the International Blue Carbon Initiative and the Global Mangrove Alliance. Mangroves are also now being discussed in international policy circles, and are increasingly incorporated into the Nationally Determined Contributions of countries to meet their pledges to the Paris Agreement of the United Nations Framework Convention on Climate Change. It is clear that mangrove conservation has gained substantial momentum, with greater public and government awareness leading to increased investment and on-the-ground action (see Supplementary Information for examples of successful management interventions).

Despite recent mangrove conservation successes, tempered optimism is necessary, as conservation gains are not evenly spread, nor guaranteed into the future. Conservation success is regionally variable, and we still need to address remaining hotspots of mangrove destruction. At 0.70% and 0.41% per year, countries such as Myanmar and Malaysia, respectively, continue to show rates of loss in this century that are substantially above the global average [3], primarily due to rice cultivation (Myanmar) and oil palm plantations (Malaysia). New deforestation frontiers are also beginning to emerge, particularly in Southeast Asia and West Africa. Papua in Indonesia is of particular concern; this biodiversity hotspot has not previously experienced significant mangrove loss, but many of the large agriculture development plans proposed to increase economic and food security are likely to impact mangroves [3]. Emerging deforestation frontiers can be addressed early on with improved environmental governance and increased public intervention, in order to secure positive conservation outcomes in these locations.

Mangrove rehabilitation is lauded as a method to offset historical and ongoing losses and can yield long-term ecosystem service provision. However, successful rehabilitation is still challenging to achieve at scale, and current rehabilitation projects around the world can fail because key ecological thresholds and rehabilitation best practices are ignored, as when planting in low-intertidal locations that are not suitable for mangrove growth [6]. In some countries, non-native species have been used and have quickly become invasive, with myriad ecological impacts on the intertidal zone [6]. The biophysical science of rehabilitating mangrove vegetation is largely known; best-practice guidance for rehabilitation is available, so the challenge is to ensure that such guidance is executed correctly. Work is required to overcome key socio-political hurdles, including lack of training, unclear land tenure and unrealistic planting targets set by national governments or NGOs that encourage and incentivise rehabilitation efforts in unsuitable coastal locations [7]. These socio-political challenges are not insurmountable, and addressing them through robust policy engagement and stakeholder participation, while time-consuming, could unlock more than 800 000 hectares of land that are potentially suitable for rehabilitation [8].

Conserved and rehabilitated mangrove systems must be ecologically functional and adaptable to the anticipated impacts of sea-level rise, which is a key future risk for a large proportion of the world’s mangroves [9,10]. Mangroves can potentially keep pace with moderate rates of sea-level rise through a range of physical and biological processes that allow them to increase their surface elevation in relation to a rising sea. However, human actions can interrupt processes such as the supply of suspended sediment, and reduce the resilience of mangroves to sea-level rise. This can occur by reducing inshore suspended sediment concentrations through river damming [9], or by creating barriers to landward transgression of mangrove forests that cause 'coastal squeeze'. Maintaining current progress in mangrove conservation requires us to take decisive steps to manage deforestation at emerging frontiers, improve the success and scale of mangrove rehabilitation, and increase the resilience of mangroves to sea-level rise. Maintaining momentum in mangrove conservation and management can continue to reduce the rate of mangrove loss while potentially gaining new areas through rehabilitation.

Mangrove conservation has recently shifted from a pessimistic to a more optimistic trajectory. It is clear though that there remain substantial challenges in maintaining this trajectory and ensuring that conservation gains are not short-lived, and are spread to other countries that are still experiencing substantial mangrove loss. Securing such gains will require continued international policy attention, research into the value of mangroves and their ecosystem services versus other land uses, and renewed efforts to improve the success of mangrove rehabilitation at a scale that will be ecologically impactful. Previous mangrove losses have been so great that the global conservation community must strive for more than just a reduction in future rates of loss.

We also have an important opportunity to learn from management and governance success stories that have helped protect mangroves, and build upon international interest in the sustainable blue economy. Conservation Optimism is an emerging paradigm that can unite stakeholders and the public and increase their engagement with conservation and inspire local action. Capitalizing on successes in one ecosystem and transferring this knowledge can help us limit broader environmental degradation, making mangroves an important and positive case study for the Conservation Optimism movement.

SUPPLEMENTAL INFORMATION

Supplemental information includes one figure and can be found at https://doi.org/10.1016/j.cub.2019.12.054.

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DECLARATION OF INTERESTS

The authors declare no competing interests.

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