



Asryelle Mora<sup>1</sup> and Camilo Mora<sup>2</sup>

<sup>1</sup>Carbon Neutrality Challenge

<sup>2</sup>University of Hawai'i at Manoa

### How to plant a trillion trees in a day?

Humanity has cut down >2.5 trillion trees. In a testament to our narcissism, we have debated whether we should restore the forest to offset our carbon emissions to avert the dangerous consequences of climate change upon us, while in reality the restoration of the global forest should be a moral and ethical imperative: we took the trees down, we have to put them back.

Remarkably, >2 billion acres of land are available for restoration, which can home >1 trillion trees. Unfortunately, such a restoration remains an impossibility. At the current rate of ~1.9 billion trees planted a year, it will take us 526 years to plant the trillion trees, which at the lower price range of \$0.2 to \$2USD per seedling will carry a price tag of \$0.2 to \$2 trillion dollars; an unbearable cost for any institution, government, or individual to absorb.

However, there is an alternative pathway to reaching this target: the general public. As daunting as restoring the world's forest may appear, it equates to every person in the world planting just ~130 trees; a 10 h job for an average volunteer in our planting events. Tackling this pathway requires shifting resources towards developing new method and tools (e.g., behavioral hooks to increase participation, innovations for land preparation, seedling production, irrigation, weed suppression, etc.). Citizens can not only provide the manpower to do the job, but the price tag of the project can be more manageable if cost is absorbed individually. Furthermore, it will allow people to gain stewardship over the future of nature. Massive planting events in India, Pakistan, Ethiopia, and Bhutan prove the concept. Restoring the world's forests is possible, but it will require getting our hands dirty, figuratively and literally.



Saskia E. Werners<sup>1,2</sup> and Michael Hagenlocher<sup>1</sup>

<sup>1</sup>United Nations University-Institute for Environment and Human Security (UNU-EHS)

<sup>2</sup>Wageningen University & Research

### Adaptation pathways for planning under overshoot

In an overshoot world, the impacts of climate change, hazards, and shocks will be increasingly compounding and felt across sectors, systems, and borders. This undermines progress towards achieving the Sustainable Development Goals and highlights the systemic nature of risks. It calls for a paradigm shift in how we assess and manage risks: from hazard-by-hazard and sectoral approaches to a systems approach that takes a whole-of-society perspective and treats adaptation as an integral part of understanding risks.

Adaptation will have limits, critically depending on our success to reduce greenhouse gas emissions, to develop sustainably and to transform. To prepare for what to do, when the ways in which we were used to managing our world hit a threshold (i.e., a trigger for action), practitioners and scholars have advanced adaptation pathways. Pathways define sequences of actions, which can be implemented progressively depending on future dynamics. Developing pathways together is found to promote collaborative learning and strengthen the capacity to anticipate and act on changes.

Our choices will inevitably cause trade-offs, calling for an inclusive societal debate on what we value, want to protect, aspire to, and need to change, in order not to perpetuate structural marginalization and vulnerabilities. The key thresholds will be our imagination for just and transformative adaptation pathways. A compounding uncertainty will be who and what to trust in a world of competing truth claims, disinformation, and deep fakes. The tipping points will be around situations where we fail to uphold the social contract and ecosystem functions that our societies depend on. Our hope lies in understanding systemic risks in an overshoot world and identifying emerging leverage points for systemic resilience.

### DECLARATION OF INTERESTS

The authors declare no competing interests.