



THE MANGROVE RESTORATION POTENTIAL MAP

The Mangrove Restoration Potential Map is a unique interactive tool developed to explore potential mangrove restoration areas worldwide and model the potential benefits associated with such restoration. The mapping tool was developed by The Nature Conservancy and IUCN, in collaboration with the University of Cambridge, and can be found on **maps.oceanwealth.org/mangrove-restoration**

Identifying Your Country's Potential for Mangrove Restoration

The Mangrove Restoration Potential Map allows countries to:

- Identify restoration potential nationally;
- Highlight particular areas where restoration is likely to be most feasible;

Mangrove Restoration Potential

Globally there are over 8,000 km² of coastal land where mangroves have been lost but where restoration may be possible, with over 6,630 km² of these being highly restorable.

These restorable areas are located across 105 countries and territories. In addition, we have identified some 1,389 km² of likely degraded mangroves where full recovery can

- Identify areas with potentially high ecosystem service gains; and
- Review the integration of mangrove restoration as part of meeting international climate and biodiversity commitments.

be expected to bring benefits with relatively little investment.

Mangrove restoration or rehabilitation is not something that can be easily undertaken on every coastline. While there is a strong and growing understanding of the importance of mangroves, and of the opportunity to restore them, there is a clear need for additional guidance to support policymakers and to steer planners towards the most viable areas. The Mangrove Restoration Potential Map (MRP Map) is a groundbreaking new tool that can address this need and assist countries in prioritizing places where mangroves can be successfully restored. The interactive map shows where restoration is feasible, and provides an indication of the potential gains from restoration in terms of benefits to people.

Meeting International Pledges and Commitments While Supporting Local Livelihoods

Mangrove restoration can support the implementation of many international agreements, such as:

- Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC)
- Aichi Targets 14 and 15 to the Convention on Biological Diversity
- Implementation of the Convention on Wetlands (Ramsar Convention)
- Sustainable Development Goal (SDG) 14 (Life Below Water) and SDG 13 (Climate Action).

Mangrove restoration can also be counted towards achieving international targets, such as the Bonn Challenge, which aims to restore 1.5 million km² of degraded and deforested land by 2020 and 3.5 million km² by 2030; or the Global Mangrove Alliance goal to increase the global area of mangrove habitat by 20% over current extent by the year 2030.

Mangrove ecosystems provide a multitude of goods and services, including: provision of food and clean water (provisioning services); climate regulation, soil composition regulation and disaster risk reduction (regulating services); and recreational and spiritual space (cultural services). The natural capital of mangroves thus has immense worth not only in sustaining the lives and livelihoods of millions of people along the world's coasts, but also in real economic terms.

Sustainable Development Goal (SDG) 14

(Life Below Water) presents the health of our ocean and coastal ecosystems as fundamentally important for human wellbeing and sustainable development, as well as playing a key role in both slowing climate warming and helping humans deal with climate change impacts. These ecosystems should therefore feature prominently in the Nationally Determined Contribution (NDCs) of nations where they are naturally occurring. SDG 14's Community of Ocean Action on Mangroves promotes the Goal's implementation through mangroves, making this map a vital tool for the members of this community as it seeks to guide restoration of this natural infrastructure resource.

How the MRP Map Assesses Restoration Potential

Restoring mangroves is highly unlikely in areas that have eroded or subsided to become fully inundated by the sea, or in places that have been converted to urban buildings and infrastructure, and so these areas are excluded from our models of restoration potential. For other areas, factors influencing mangrove restoration include: the tidal range; recent sea level rise; projected future sea level rise; recent change in sediments; time since loss; average size of loss patches; and the proximity of loss areas to remaining mangroves. Using these factors, an expert advisory group developed the restoration potential score used in the MRP Map to give an indication of the potential for restoration in different areas.

What Areas are Most Suitable for Mangrove Restoration?

The MRP Map highlights the most viable places for mangrove restoration using factors driving restoration potential. Mangrove restoration opportunities exist in every region and virtually every jurisdiction where mangroves occur, however, several places are of particular interest (see Tables 1 and 2). Southeast Asia stands out as having the highest overall total extent that could potentially be restored. Such a figure



is further increased by large additional areas of degraded mangrove, while extensive losses in this region prior to the period of this study (notably through conversion to aquaculture) provide additional potential for restoration in western Indonesia, Thailand and the Philippines.

Mangrove Restoration Decision-making

As a starting point for mangrove restoration, it is prudent to consider putting them in places where they have been recently lost, provided the driver of loss can be prevented from recurring and the local conditions remain suitable. Such sites are most likely to have local soil conditions, tides and elevation appropriate for restoration, while their proximity to remaining mangroves can greatly facilitate natural regeneration processes.

Where mangroves are degraded rather than lost they present an opportunity for rapid and effective intervention. Restoration of such areas may require little more than a reduction in or cessation of damaging actions. Some ecosystem services are still maintained by degraded mangroves, albeit at lower levels. Allowing mangrove forests to recover to full diversity and stature will safeguard and enhance these services and prevent the consequences of full loss, such as subsidence and erosion, which can make recovery a challenging and highly costly task.

In other cases the feasibility of restoration may depend on the proposed methods, scale and level of investment. Eroding coastlines are not always ideal for restoration, however, some highly successful methods are being developed in Southeast Asia that may enable such restoration, with sufficient investment.

It remains critically important that decisions of where and how to restore are also locally informed. This will of course include local ecological and physical conditions, but equally local social, legal, and economic influences. Mangrove restoration can be greatly facilitated if local land tenure is understood and respected. Community engagement and support can ensure long-term security for restoration projects and equitable benefit-sharing can prevent further degradation and provide an example which, in turn, leverages further restoration efforts.

Further reading Van Lavieren, H., Spalding, M., Alongi, D., Kainuma, M., Clüsener-Godt, M., and Adeel, Z. 2012. Securing the Future of Mangroves. A Policy Brief. http://inweh.unu.edu/wpcontent/uploads/2015/05/Securing-the-Future-of-Mangroves1.pdf

Regional summary of restorable areas. Note that these only cover areas of loss; degraded mangrove areas will provide additional benefits					
Region	Area restorable (km ²)	Proportion of original mangrove areas restorable	Average restorability score	Extent of highly restorable mangrove areas (km²)	Area of degraded mangrove areas (km²)
Australia & New Zealand	350.9	3.3%	0.73	328.6	54.6
East & Southern Africa	412.0	5.3%	0.72	407.0	133.0
East Asia	7.0	4.0%	0.69	6.5	2.6
North & Central America & the Caribbean	2,277.2	9.6%	0.65	1,636.3	140.2
Pacific Islands	166.6	2.6%	0.62	147.1	5.0
South America	1,068.2	5.2%	0.70	794.9	92.6
South Asia	352.7	3.9%	0.63	279.7	32.4
South East Asia	3,037.1	6.4%	0.64	2,591.2	847.0
Middle East	11.4	3.3%	0.63	7.9	2.7
West & Central Africa	437.1	2.1%	0.73	430.5	78.5
TOTAL	8,120.0	5.5%	0.67	6,629.9	1,388.6

Restorable areas for selected countries (those with largest extents or high proportion of restorable mangrove area) Restorable **Proportion of original** Extent of highly restorable Area of degraded Average Country area (km²) mangrove areas restorable restorability score mangrove areas (km²) mangrove areas (km²) Australia 336 3.3% 0.74 314 54 3.2% 129 1 Bangladesh 138 0.60 3 Belize 65 12.9% 0.64 64 58 Brazil 491 4.2% 0.73 476 15 Colombia 0.73 51 216 8.6% Cuba 160 4.5% 0.62 74 68 Ecuador 6.7% 0.69 26 1 107 Ghana 22 9.6% 0.67 22 2 3 Honduras 70 12.2% 0.65 69 India 152 4.1% 0.65 126 12 Indonesia 1,866 6.4% 0.64 1,616 419 3.4% 0.66 157 63 Malaysia 168 1,455 12.8% 0.65 993 33 Mexico 259 258 40 8.0% 0.70 Mozambique 431 295 Myanmar 436 7.9% 0.75 104 10.6% 0.69 99 16 Nicaragua 105 0 Nigeria 110 1.7% 0.69 Papua New Guinea 2.7% 4 135 0.61 126 129 14 Philippines 156 5.4% 0.62 Sri Lanka 29 12.1% 0.59 24 1 Thailand 6.9% 78 8 175 0.63 United States 204 2 227 10.5% 0.68 Venezuela 12 120 4.1% 0.61 109 43 Vietnam 174 9.6% 0.67 149

Explore the Mangrove Restoration Potential Map at maps.oceanwealth.org/mangrove-restoration

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