



Reducing GHG emission through wastewater treatment improvements

The Project includes the use of both aerobic and anaerobic wastewater treatment systems. Aerobic wastewater treatment systems generate CO₂ as a by-product while anaerobic systems produce a mixture of methane and CO₂. Under the sewerage improvement component of the project, 27,662 cubic meters per day of urban wastewater will be collected and transported to treatment plants, while 2,339 cubic meters per day of rural wastewater will be collected and treated in rural wastewater treatment stations.

Improving green tea farming for carbon sequestration

Nitrogen fertilizer is currently applied in tea farms at a rate of 277 kilogram of nitrogen per hectare (ha) per year, with only 20% efficiency, and a substantial proportion of the fertilizers is eventually emitted into the ambient air in the form of nitrous oxide. To address this, the Project promoted green agricultural practices that use a recommended formula of fertilizers according to soil testing and soil amelioration that will lessen emissions.

Expected results

When the Project is completed in 2026, its climate mitigation and other green initiatives will improve environmental conditions upstream and reduce, avoid, or sequester GHG emissions.

Better forest health

Strengthened forest monitoring and disease prevention measures would reduce pine tree infection in the Huangshan area by 80%, which will then reduce the release of CO₂ into the atmosphere. This could save an estimated 18,428 pine trees annually. In 2018, 80% of the trees that died. The carbon sequestered would amount to 18,557 tons of CO₂. The pine forest disease prevention program is expected to provide carbon sequestration of close to 0.5 million tons of CO₂ over 25 years.

Improved wetlands with green features

The variation in the quantity of the GHG release is largely due to differences in the nature of the emitting vegetation, including soil microbiota, which interfere with the production and consumption of methane. Thus, the wetlands to be constructed under the Huangshan Project along the Xin'an River in She County will have greener features that are set to improve anaerobic conditions and reduce the release of methane.

Improved wastewater quality and agricultural practices and productivity

Through improved water systems, total daily GHG emissions are predicted to fall by 5,026.5 tons of CO₂ equivalent.

Environment-friendly practices in green tea farming are expected to improve the productivity of croplands, reduce nonpoint source pollution, and increase biodiversity and carbon sequestration. In addition, the 10% reduction in chemical fertilizer usage in around 4,500 ha of tea farms would reduce GHG emissions by 23,333 tons CO₂ equivalent per year ■

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(Source: Asian Development Bank)

Mangroves are often misunderstood and undervalued ecosystems. These coastal forests are sometimes perceived as “dirty” or “dead areas”, a wasteland that could be cleared in favour of sandy beaches, swanky resorts or other developments. These myths about mangroves could not be farther from the truth. They are the only trees that thrive in salty waters and improve water quality by filtering out nutrients and sediments.

They are also teeming with life: more than 1,500 plant and animal species depend on mangroves. This includes fish and birds who use the shallow waters beneath mangrove trees as nurseries. Research now indicates that mangroves are also critical for larger mammals, such as monkeys, sloths, tigers, hyenas and African wild dogs. Protecting mangroves and restoring damaged ones also helps combat climate change through carbon sequestration as they are some of the most carbon-rich ecosystems on the planet, storing on average 1,000 tons of carbon per hectare in their biomass and underlying soils.

But mangroves are threatened. Worldwide, a fifth of them have already disappeared. The main driver of mangrove loss is coastal development, when mangrove forests are cleared to make way for buildings and fish or shrimp farms. “Mangroves are a remarkably diverse and important ecosystem that works in tandem with other marine ecosystems including seagrass beds and coral reefs all of which are essential not only for the health of our ocean, coasts and the biodiversity that they support, but for the wellbeing of humans”, said Head of Marine and Freshwater at the United Nations Environment Programme (UNEP) Leticia Carvalho. “We also need to protect and restore our mangroves as they are an important habitat and source of food supplies for many indigenous peoples and local communities around the globe”, she added.

To celebrate World Mangrove Day, we have compiled five key benefits of mangrove ecosystems paired with winning photos from the Mangrove Photography Awards, an annual competition partnering with the United Nations Decade on Ecosystem Restoration and the UN Decade on Ocean Science.



An inside look at the beauty and benefits of mangroves

1. Mangroves are climate heroes

To meet the global climate targets, the world urgently needs to reduce emissions and remove carbon from the atmosphere. Mangroves are critical in this second task. They extract up to five times more carbon than forests on land, incorporating it in their leaves, branches, roots and the sediments beneath them. The salty and oxygen-poor conditions beneath mangrove forests mean that decomposition of organic material happens very slowly. In the right environmental conditions, mangroves can store the carbon they took from the atmosphere for decades, centuries, or even millennia.

2. Mangroves protect against extreme weather and disasters

Not only do mangroves help prevent the progression of climate change, they also play an important role in limiting its impact. As global temperatures rise, extreme weather events like storms and flood surges are becoming more frequent and severe. The trunks of mangroves absorb the impact of waves, making them an excellent front line of defense that helps to protect higher ground. Restoring and protecting mangroves and valuing their role as a nature based-solution improves resilience of coastal communities and national economies.



▲ A corner of Dam Bay Mangrove Forest in Vinh Nguyen Ward, Nha Trang City in Khanh Hoa Province

Along with other measures, investments in mangroves are expected to generate benefits around four times greater than the costs. Mangroves have also been found to be an effective defense against tsunamis, reducing wave heights between five and 35 per cent.

3. Mangroves are a haven for threatened animals

Of the over 1,500 species that depend on mangroves for their survival, 15 per cent are threatened with extinction. This number is increasing when looking at mammals: Nearly half of mammals living or feeding in mangrove forests could go extinct in coming years, with trends worsening for most of them. Protecting and restoring mangrove forests thus means bringing back critical habitat for vulnerable animal species like tigers and jaguars. The good news is that restoration works! Initiatives in Indonesia and the United Arab Emirates have been recognized as UN World Restoration Flagships for bringing

back nature in coastal ecosystems.

4. Mangroves boost food security

As biodiversity havens, mangroves support a huge variety of plants and animals, many of them important for food production. They act as nurseries for young fish and home to honey bees. For 1.5 billion people, fish is the most critical source of protein and in low-income food-deficit countries, nearly 20 percent of the average animal protein intake comes from fish. The disappearance of mangroves would have dramatic consequences for fisheries in developing countries.



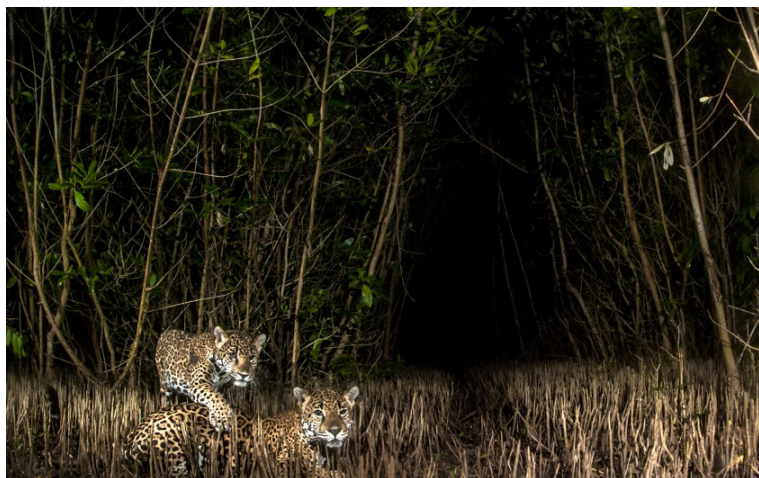
Conversely, restoring mangroves could add 60 trillion young, edible and commercially valuable fish and invertebrates to coastal waters every year, providing a significant boost to food security as our human population continues to grow.

5. Mangroves can bounce back naturally

Bringing lost ecosystems back to life is a daunting task. However, one of the most effective ways to protect and restore damaged mangroves is through enhanced recognition and implementation of Indig-



▲ *The Mangrove Photography Awards*



▲ *The Mangrove Photography Awards*

enous Peoples' collective rights and actions across the broader spectrum of environmental governance and rule of law as envisaged in the Kunming-Montreal Global Biodiversity Framework.

This is particularly important given that “globally, Indigenous Peoples are custodians of 80 percent of the planet’s biodiversity with 5000 unique traditional cultures and ancestral lands covering 32 percent of all global land and inland waters across 90 countries”. When communities along the coast of Java, Indonesia, started replanting mangroves to conquer rising sea levels, the results were sobering: only 15 - 20 percent of planted saplings survived. The rest was simply washed away with the tides.

With the help of researchers and partners - such as Wetlands International - the villagers tried out a new solution: trapping the mud with seawalls made of natural materials, giving young mangroves space to recover naturally. The results were astounding. Mangrove

Mangrove Action Project is running its ninth annual Mangrove Photography Awards. The competition invites photographers of all levels around the world to contribute their images to celebrate the beauty and diversity of mangrove forests and inspire action to conserve them. Today, less than half the world's original mangrove forests remain, and it has never been more important to promote the conservation of these fragile ecosystems through inspiring photography. These powerful images are a compelling reminder of the vital role mangroves play and inspire us to protect them for future generations. In celebration of World Mangrove Day, discover stunning mangrove images from across the globe.

survival rates shot up from 20 to over 70 per cent. The Building with Nature Initiative has since been recognized as UN World Restoration Flagship for its success.

Natural regeneration is now recognized and tried out in other parts of the world, together with other restoration approaches suited to local conditions. Understanding and addressing the drivers of mangrove loss is the first step towards ecosystem restoration ■

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(Source: UNEP.org)