

CHAPTER 4

Mountains Delight in Winter Nbs & Benefit Sharing

GREEN
LEAVES

BROWN
RHIZOMES

STAMENS
YELLOW

FLOWERS
LIGHT PINK

LIMESTONE
BLUE-GRAY

"Only through mutual consideration, symbiosis, and altruism with nature can we find the best way to a true survival and development."

-Nelson An-ping Chang, Chairman of TCC Group Holdings

In 2022, CBD COP15 adopted the GBF with 23 action targets for 2030 and 4 long-term goals for 2050, emphasizing protecting 30% of oceans and land, as well as benefit sharing, to ensure the sustainable use of biodiversity resources and to meet human needs fairly and justly. TCC implemented action target 15, integrating NbS in operations to address climate change, and promoting OECMs at its sites echoing the 30x30 target. TCC also funded KBCC, rescuing endangered plants and preserving genetic resources, with the aim of restoring them to their original habitats under suitable conditions, and providing medical research to promote human welfare.



KBCC

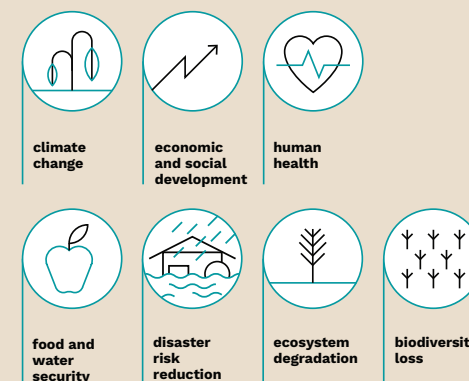
4.1 Nature-based Solutions

The 2023 World Economic Forum report, Nature Positive: Role of the Cement and Concrete Sector, highlights NbS contributing 37% to the Paris Agreement's carbon reduction goals. TCC uses NbS to manage environmental impacts of operation sites and restore ecosystems to mitigate climate change and create positive effects on nature.

What are Nature-based Solutions (NbS)?

NbS are defined by IUCN as "actions to **address societal challenges** through the protection, sustainable management and restoration of ecosystems, benefiting both biodiversity and human well-being." They use the power of nature and functioning ecosystems as infrastructure to provide natural services to benefit society and the environment.

NbS have prime potential to help address global challenges such as:

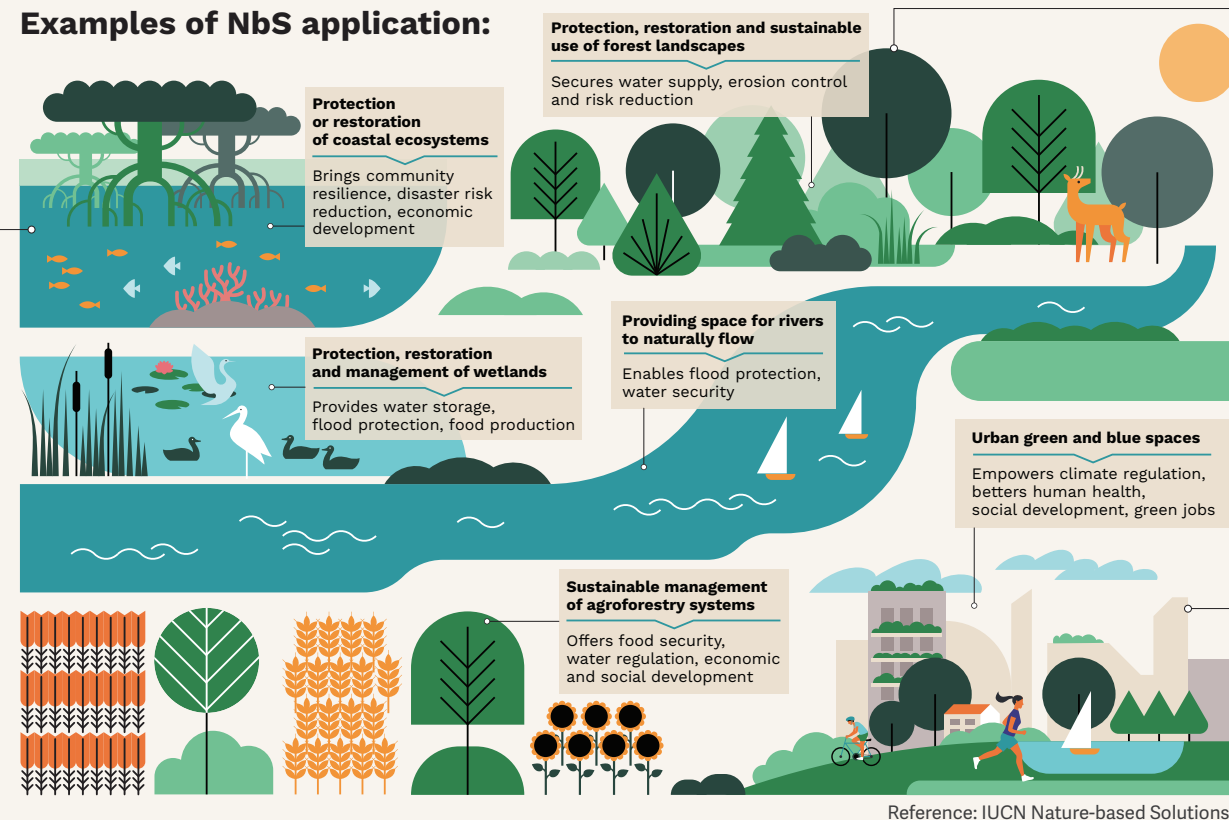


NbS can provide long-term environmental, societal and economic benefits:



Reference: IUCN Nature-based Solutions

Examples of NbS application:



4.1.1 _The Coral Restoration & Cultivation

Issue Addressed Ecosystem Degradation and Biodiversity Loss
NbS Application Model Protection or restoration of costal ecosystems

Hoping EcoPort initiated Coral Rehabilitation Project in 2021 since the discovery of coral populations and fragments. The project had two phases: Bio Cube Coral Creation Project and Planting Project with Grating Plates. Together, these efforts have rehabilitated 1,001 coral plants, expanding the coral restoration area fourfold. Hoping EcoPort continues to monitor the growth conditions of the corals in the restoration area, recording the size and health quarterly. Recent observations have also revealed the emergence of new coral juveniles, indicating a gradual enrichment of the coral population. In addition, a survey of fish and shellfish was expanded in 2023. The results show that the corals have become a favorable habitat, attracting a rich variety of fish and even the presence of the precious giant clam. Despite being an operational port, Hoping EcoPort aims to coexist with marine ecology, sustainably managing and protecting coastal and marine ecosystems.



4.1.2 _ White Popinac Removal & Decarbonization

Issue Addressed Climate Change Mitigation and Adaptation, Ecosystem Degradation, and Biodiversity Loss
NbS Application Model Protection, restoration and sustainable use of forest landscape

White Popinac, one of the top 100 invasive species, was introduced to Taiwan for its economic value but has become a significant threat to the local ecosystem due to mismanagement. It spreads rapidly and releases toxins that inhibit surrounding plant growth.

TCC partnered with local governments to convert White Popinac into zero-carbon biomass energy using advanced co-processing technology in cement kilns. In 2023, TCC's Hoping Plant removed 45.52 tons of White Popinac from the Papaya River basin, reducing coal use by 47 tons. In January 2024, the Suao Plant collaborated with various agencies to use White Popinac and waste tree branches as alternative fuel.

TCC plans to continue working with local governments to remove invasive species and replant native species, protecting biodiversity and mitigating climate change.



4.1.3 _ Vakangan Green Energy & Mutual Benefit

Issue Addressed Climate Change Mitigation and Adaptation, and Economic and Social Development
NbS Application Model Urban green and blue spaces

TCC Green Energy partnered with FDC International Hotels Corporation, transforming the Vakangan hot spring into Taiwan's first geothermal power base. Combining tourism and local symbiosis, The eco-friendly design dedicates one-third of the land to open spaces with water retention, prioritizing grasslands over hard paving to enhance flood resilience and safety.

This project supports Taiwan's energy transition, preserves the environment, integrates local culture, provides jobs, and revitalizes the community.

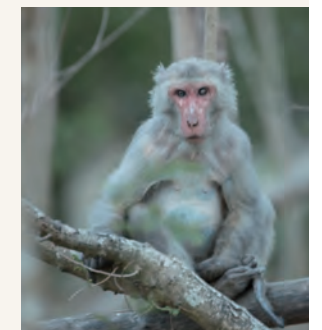


4.1.4 _ Shoushan Plant Flood Detention and Adaptation

Issue Addressed Climate Change Mitigation and Adaptation, Disaster Risk Reduction, and Biodiversity Loss
NbS Application Model Urban green and blue spaces

After TCC's Shoushan Plant stopped operations, TCC and the Kaohsiung City Government developed a 2.4-hectare detention basin park to reduce flooding in South Gushan. Completed in July 2023, the park features trees and grass-covered slopes along the riverbanks. It serves as a flood prevention measure and a space for ecological education and leisure, linking the Love River and Shoushan blue-green space.

The park attracts native species, waterfowl, and migratory birds, creating a complete ecosystem. Future plans include managing invasive species and stray dogs to protect native wildlife.



4.2 Other Effective Area-based Conservation Measures

What are OECMs?

An other effective area-based conservation measures (OECMs) is a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic, and other locally relevant values. The UN CBD states that OECMs contribute to global biodiversity conservation and are part of the 30×30 goal. Thus, creating an inventory and certification for OECMs is a priority for many countries.



Toward 30 by 30 | OECMs



Expert Group Visited Hoping Mine and EcoPort

2024/1/30

OECM Expert Group

Experts and scholars at home and abroad, including the Forestry and Nature Conservation Agency, National Park Service, National Tsing Hua University, Providence University, NTU, and Kyushu University

ASSESSMENT CRITERIA

Not a Protected Area recognized officially or for the purpose of ecological conservation traditionally

Governed and managed

In-situ conservation of biodiversity

Sustained long-term outcomes

Hoping Mine | Sustained Long-term Outcomes

The Hoping Mine focuses on soil and water conservation and restoring the mine's original landscape, aligning with Secondary Conservation principles. Some restoration areas have been in progress for over 20 years, achieving a relatively complete forest structure. Expert group confirm these efforts align with OECMs' long-term sustainability principles, noting the mine's location outside protected areas and its effective restoration team. Facilities for nurturing and acclimatizing native species have been set up for gradual in-situ restoration. The restoration is reported to be successful. Following expert advice, TCC plans to conduct biodiversity surveys comparing rehabilitated and undeveloped areas to quantitatively assess restoration success.

Hoping EcoPort | In-situ Conservation

After finding coral fragments in Hoping EcoPort, efforts were made to rebuild their habitat using methods like bio cubes for coral growth in situ. Hoping EcoPort, prioritizing coral conservation, is recognized as Primary Conservation principles. Corals support fish ecosystems and offer educational, tourism, and cultural benefits. With a global shift towards using OECMs for biodiversity conservation, Hoping EcoPort seeks to deepen collaborations with experts and agencies to better understand and apply this method, while maintaining good local stakeholder relationships. Through rehabilitation and management, it aims to be an OECM example globally.

30 x 30

Living in harmony
with nature

1 - Water Wells in Spring
TCC & TNFD

2 - Clouds Changes in Summer
TCC & Forests, Soil, Oceans

3 - The Moon Lofts in Autumn
TCC & Society

4 - Mountains Delight in Winter
NbS & Benefit Sharing

5 - The Change of Seasons
TCC is committed to achieving balance between humans and nature

Appendix
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4.3 KBCC Gene Bank & Application

Since its establishment in 2007, KBCC has focused on conserving tropical and subtropical plants through ex-situ living conservation. It also engages in international academic exchanges. Recognizing the importance of plant extracts for pharmaceuticals, KBCC follows benefit-sharing principles, aiding research by providing samples for new drug development. Additionally, it ensures that cultivated plants are returned to their native habitats to restore native species.



NTHU Molecular Medicine Cross-team Collaboration

Successfully Developed a Patented New Drug for Brain Nerve Regeneration

udn/ 元氣網/ 醫藥/ 癱瘓好日子

A Biomedical Unicorn/ A New Opportunity for Brain Injury Patients
NTHU Team Develops Drug to Promote Brain Nerve Regeneration

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Around 70 million people globally suffer from brain injuries annually, with Taiwan reporting about 650,000 cases each year. Currently, no effective drugs promote neural regeneration. KBCC and Institute of Molecular Medicine (IMM), NTHU are developing such drugs. The team screened over 2,000 plant extracts and found Monstera epipremnoides. This was sent to Germany for natural product separation. With NTHU's Chemistry Department's support, a new compound was synthesized and patented (Invention Patent No. I823110). The drug screening platform and process development are ongoing.

Collaboration with KMU

Establish Taiwan's Only Large-Scale Natural Product Library



Since 2014, KBCC has provided Kaohsiung Medical University (KMU) with plant samples to create the "Koo Chen-Yun Plant Extract Library," aiming to shorten drug development timelines. The library contains 2,874 extracts from 81 plant families and over 970 species. It has supported numerous screening projects, discovering that plants from the Nepenthaceae and Musaceae families have activities against breast cancer, liver cancer, Hepatitis B, influenza viruses, and COVID-19. Some findings have been published, with ongoing research and related patents.

Taiwanese Millet Deposited in the Svalbard Global Seed Vault

Existing crops struggle with extreme weather, but millet, known for its drought and disease resistance and short growth period, is gaining importance. Since 2019, KBCC and National Cheng Kung University have analyzed and cryopreserved millet seeds from Taiwanese tribes. In 2023, the collaboration extended to Sun Yat-sen University for deeper research and promotion. In 2024, they partnered with the Taiwan Polar Research Center and the Agricultural Research Institute to send 170 types of Taiwanese millet germplasm to the Svalbard Global Seed Vault in Norway for ex-situ conservation. Over 400 varieties will be deposited to protect millet's genetic diversity.



Restoration of *Pyrenaria Buisanensis* at The Native Habitat



“*Pyrenaria buisanensis*” is a IUCN critically endangered species found only in low-altitude mountain areas of Pingtung County. Thought to be extinct, KBCC has worked on its restoration since 2017, transplanting 20 plants to a green space managed by the Pingtung County Government. This was KBCC’s first relocation of cultivated plants. By 2023, they expanded the restoration to over 3,500 seedlings. On Mother’s Day, 60 seedlings were planted at the Majia Township Visitor Center, symbolizing their return to Mother Nature’s embrace.

Launching the Dadu Mountain Native Species Restoration Project

Since 2018, KBCC has worked with the Taichung City Education Bureau to restore Taichung’s endemic plants in schools and develop environmental education courses at Wen-guang and Beishi Elementary Schools. They introduced teachers and students to the characteristics and conservation methods of Dadu Mountain’s endemic plants. KBCC also organized a two-day conservation camp, leading visits to Taichung Metropolitan Park to learn about endemic and rare plants. From 2020 to 2022, KBCC provided propagated plants for school restoration projects. In 2023, they conducted workshops on making plant specimen boxes and pressing specimens, helping students identify native plants and create specimens through hands-on activities.



Native Orchids Return to Orchid Island

Gradually Rebuilding the Ecosystem



Orchid Island, named for its native white butterfly orchids, has seen many orchid species face extinction due to climate change, tourism, and invasive species. Since 2018, KBCC and Taiwan Power Company have led the “Butterfly Orchid Homecoming Project” to conserve and restore endangered species like the *Bletilla formosana* f. *kotoensis* and *Dendrobium goldschmidtianum*. They have cultivated over 5,400 seedlings, with 2,000 acclimatized at Taiwan Power Company’s site and 1,370 adopted by residents. Jimagaod, which suffered a devastating fire, is also a focus for ecological restoration. KBCC uses Orchid Island and Jimagaod as training grounds for ecosystem rebuilding, collaborating with institutions like the National Museum of Natural Science. The project aims to introduce and breed species crucial for forest reconstruction. Future plans include a natural history exhibition room on Orchid Island to raise ecological awareness.



Tuberolabium kotoense



Dendrobium goldschmidtianum