TCC

GROUP HOLDINGS

TNFD

The Taskforce on Nature-related Financial Disclosures Report

FROM NO NET LOSS TO NET POSITIVE IMPACT

YEAR 2023

Yunnan Bletilla orchid at the TCC Hoping Mine in Hualien.

Please refer to the 2.1.2 Biodiversity Plan

COVER STORY

Life Resilience

Yunnan Bletilla orchid (Bletilla formosana (Hayata) Schltr.) is a unique native orchid species of Taiwan. It blooms again in the limestone terrain of the mountains at over a thousand meters after being carefully restored by TCC and Dr. Cecilia Koo Botanic Conservation Center (KBCC).

The orchids on the rock walls are a response to extreme environments, a result of the ongoing dialogue between the vitality of life and environmental pressures.

TCC has long focused on the interaction between humans and nature. Over the past seven years, TCC has been committed to energy transition, low-carbon production, and waste management, as our adaptive response to climate change. Just like the rebirth of Yunnan Bletilla orchid in the mines, the industry is also seeking its ecological position.

ABOUT THE REPORT

This Report is written based on the TNFD LEAP methodology for TCC Group Holding's (hereinafter referred to as "TCC") Taiwan cement plants, mines, its subsidiary Hoping Power, and Hoping EcoPort, and also presents content related to the operations in Mainland China and the Dr. Cecilia Koo Botanic Conservation Center (KBCC).

Living in harmony with nature

EDITOR'S ADDRESS

The poetry of Chairman Nelson An-ping Chang: "Water wells in spring; clouds changes in summer; the moon lofts in autumn; mountains delight in winter." Earth's beauty changes in seasons unveil the chapter of TCC TNFD Report. Spring, the beginning of the seasons, sowing the seeds of natural restoration; summer, the flourishing and growth of all creatures; autumn, enjoying the colorful world, happily sharing the harvest with companions; winter storing, enjoying the joy and beauty. These seasonal changes reflect TCC's firm belief in nature, and the business philosophy of nature-based management, in service of life, harmony, and well-being for all.

Chairman's Addres

Living in harmony with nature
Biodiversity: for Humanity the Bell Tolls

"On the Planet Earth we live today, all species of wild mammals account for only 4% of mammals worldwide in total weight. Among them, more than one-third is our humankind with a population of over 8 billion people, and the other two-thirds are those that domesticated as a primary source of food for humans. Is there still a biodiversity?"

Humans cannot survive in an environment deprived of biodiversity. Notwithstanding, in the past fifty years, 873 species of wild animals have gone extinct. If humans continue to exploit and destroy unwarily, over 26,000 species of wild animals might disappear off the face of the earth in the next twenty years. Humans have attempted to build an insulated Biosphere multiple times, but each time it has resulted in failure because humans were far from knowing how to create a self-reliant ecosystem. Not to mention that the least-known aspect is the underground surface, or the so-called soil ecology, which is also one of the key reasons why TCC Group Holdings resolved to launch the Ho-Ping Ark Ecological Program.

I love diving a lot, among other hobbies. I went scuba diving in the north coastal waters, and such offshore islands as Orchid Island, Green Island, and the Pescadores in Taiwan beginning 1978. At that time, the undersea world was dazzling and crystal-like as felt in a paradise, but no more nowadays. Coral reefs cover only one-thousandth of the earth's surface but they provide habitat for a quarter of marine life. If global temperatures rise to 1.5°C warmer in the future, the number of corals alive will decrease by 70-90%, which could severely impact marine ecosystems.

To date, the world has experienced five mass extinctions. Our generation is the only one in human history to realize that there had been five mass extinctions and that we will probably fall victim the next time. If we are not paying attention, we might be the last generation to witness this massive destruction.

We are facing the dual challenges of biodiversity loss and climate change, caused by the rapid and continuous exploitation of the earth's limited resources. We shall not view these critical conditions as two separate issues. Climate change and biodiversity loss are not only environmental issues but also economic development, security, and social moral and ethical issues.

It is imperative that people should change the way they think from the perspective of "I" to "we." However, the global crisis is not just a natural climate crisis; three other crises ensue.

The first is the cognitive crisis. People doubt whether the sweeping climate crisis will really happen. The answer is positive if the weather conditions keep deteriorating. The second is the ideological crisis. People doubt whether those they do to refrain it from getting worse is useful. We must be confident enough to believe that what we do will help the earth. The third is the imaginative crisis. People cannot imagine how horrible it will be if the climate crisis comes true. We do not know how many of the existing over-8-billion people will survive. These are our crises.

The world is at the most important crossroads in history, facing the most profound systemic changes and challenges.

The crux is how we can get prepared to coexist with nature.
Every human action or behavior will affect the foundation of the natural world.

Nelson An-ping Chang
Chairman
TCC Group Holdings

Life | The Most Important Thing

"Management philosophy with nature at the core."

Cement, integral to civilization, is the world's second-largest consumed resource, highlighting their importance to human development. Sourced from nature, limestone, its main ingredient, ties it to environmental issues beyond carbon emissions. TCC has been addressing environmental concerns since 1980s, prompting early introspection on its relationship with nature and the environment.

"Without nature, the 1.5-degree goal of the Paris Agreement cannot be achieved."

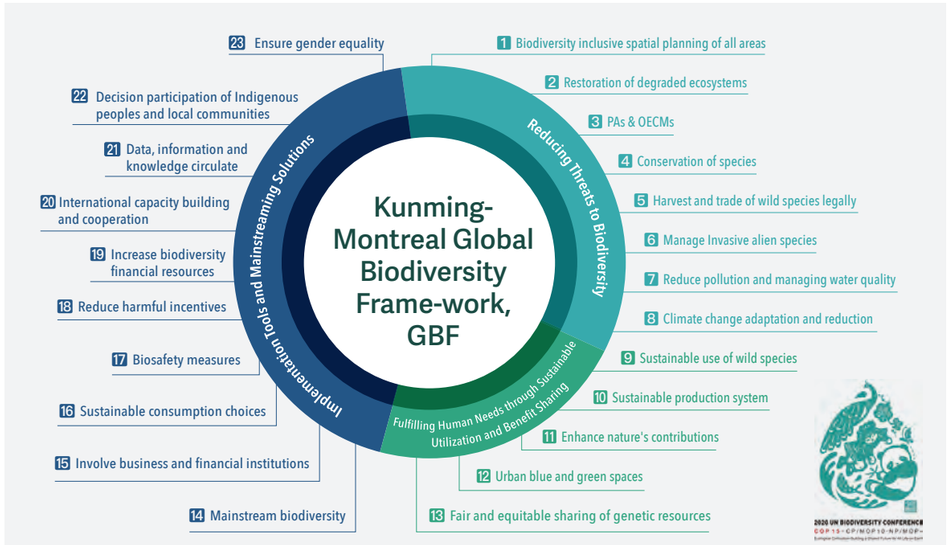
Both COP27 climate summit and COP15 biodiversity summit called for:
Climate action and nature positive are equally important on the net-zero scale. TCC embeds nature and biodiversity in its net-zero strategy, promoting sustainable development and natural harmony. **Please refer to the 2023 TCC Sustainability Report for details.**

TCC established the world's largest tropical plants conservation base in 2007, initiated restoration of mining areas in 2016, began coral rehabilitation in Hoping EcoPort in 2021, and launched forest carbon sink and soil ecology research in 2022. TCC participated in the pilot program of the Taskforce on Nature-related Financial Disclosures (TNFD) and integrated the official TNFD framework in 2023, becoming TNFD Early Adopter. Additionally, TCC has aligned with the Science Based Targets for Nature (SBTN) and the World Business Council for Sustainable Development's (WBCSD) Methodology for the Net Impact Assessment of Biodiversity in the Cement Sector (NIA), assessing the feasibility of achieving No Net Loss (NNL) and Net Positive Impact (NPI).

In 2024, TCC's environmental efforts were highlighted by Business for Nature in the It's Now for Nature campaign, showcasing the construction materials industry. TCC aims to reverse nature loss by 2030, standardizing its conservation methods and adhering to global standards. Supporting the global 30×30 goal to conserve land and marine areas by 2030, TCC is dedicated to fostering Nature Positive.

Aligning 23 targets under GBF, TCC dedicated to halting and reversing the loss of biodiversity.

In 2022, COP15 Biodiversity Summit passed the Kunming-Montreal Global Biodiversity Framework (GBF), setting global action targets for 2030 and long-term global goals for 2050. TCC continues to execute nature actions and planning in accordance with GBF, striving for living in harmony with nature and nature positive.



Reference Table of GBF and Each Chapter of This Report

CHAPTER			Action-oriented Target
	0	15	Businesses Assess, Disclose and Reduce Biodiversity-Related Risks and Negative Impacts
	1	14	Integrate Biodiversity in Decision-Making at Every Level
	2	02	Restore 30% of all Degraded Ecosystems
		08	Minimize the Impacts of Climate Change on Biodiversity and Build Resilience
		11	Restore, Maintain and Enhance Nature's Contributions to People
	3	19	Substantially and Progressively Increase The Level of Financial Resources
		22	Ensure Participation in Decision-Making and Access to Justice and Information Related to Biodiversity for all
	4	03	Conserve 30% of Land, Waters and Seas
		04	Halt Species Extinction, Protect Genetic Diversity, and Manage Human-Wildlife Conflicts
		06	Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact
		13	Increase the Sharing of Benefits From Genetic Resources, Digital Sequence Information and Traditional Knowledge

Action | Nature Positive

GLOBAL TREND

1992
The Rio Conventions of the United Nations:
The United Nations Framework Convention on Climate Change (UNFCCC)
Convention on Biological Diversity (CBD)
United Nations Convention to Combat Desertification (UNCCD)
2006 **UN Principle Responsible Investment (PRI)**
2010
CBD COP10 20 Aichi Biodiversity Targets stipulated
2015
17 sustainable development goals (SDGs) of UN released
COP21 Paris agreement
2010-2020
United Nations declared the Decade for Deserts and the Fight Against Desertification

2021
UNFCCC COP26 proposed a strict compliance with the threshold value of 1.5°C of global warming, proposal of Net Zero target, phase-out of fossil fuels, Deforestation Pledge, committed to put an end to the issues of deforestation and land loss by 2030
2022
COP27 UNEP stated protecting biodiversity is protecting the Paris Agreement
2021-2023 IPCC 6th Assessment Report
2023 The official version of **TNFD Framework released**
2024
IFRS Sustainable Disclosure Standards S1 and S2 standards effected
CBD COP16 in Cambodia

Nature-based Solutions

2021
UNEP released《Ecosystem Restoration for People, Nature and Climate》
UNEP & IUCN released《Nature-based solutions for climate change mitigation》, proposing the carbon reduction potential of NbS
COP28 IUCN emphasized the role of NbS

Nature Positive

2022
CBD COP15
- UN & G20 jointly launched Taskforce on Nature-related Financial Disclosures (TNFD)
- Adoption of GBF, with the target "30 by 30" established, along with an enhanced promotion of Other effective area-based conservation measures (OECMs)

→ Protect and Restore 30×30
→ Prosper with Nature
→ Share Benefits Fairly
→ Invest and Collaborate

2010 | 2020 | 2030 | 2050

TCC ACTION

FOREST

1992 Shoushan Mine terminated
2006-2050 Long-term environmental and ecological monitoring program in Hoping Mine & Taibaishan Mine
2007 Dr. Cecilia Koo Botanic Conservation Center established
2020 First estimation of ecosystem service value and the survey on the plant restoration efforts in Jinchang Quarry of Hoping Mine
2021-2050 Implementing biodiversity management plan (BMP) for high-risk mines

2023
NbS action: Cooperating with government by using advanced cement kiln co-processing technology to convert invasive Popinac as zero-carbon biomass energy
2024
Launched Hualien Hoping Industrial Park Nature Conservation Project

OCEAN

2015 Life below water survey launched
2019-2025 Port Environmental Review System (PERS) certified
2020 Identification and distribution survey of the coral species

2021 Bio Cube Coral Creation Project commenced
2021 Hoping EcoPort certified the APSN Green Port Award System (GPAS)
2022 Hoping EcoPort certified Environmental Education Facility

SOIL

2022-2050 "Ho-Ping Ark Ecological Program," the only long-term research on soil species in the world commenced
2023-2050 Hoping Mine Restoration Area Forest and Soil Rehabilitation Project

INITIATIVE

2020 Becoming SBTi partner, using the world's most rigorous standards to face climate change
2021 Joining membership of Business for Nature
2022 The first manufacturer in Taiwan involved in the TNFD Pilot Program
Founding member of Taiwan Nature Positive Initiative
Signed Business for Nature CBD COP15 initiative: Make it Mandatory, Call to Action

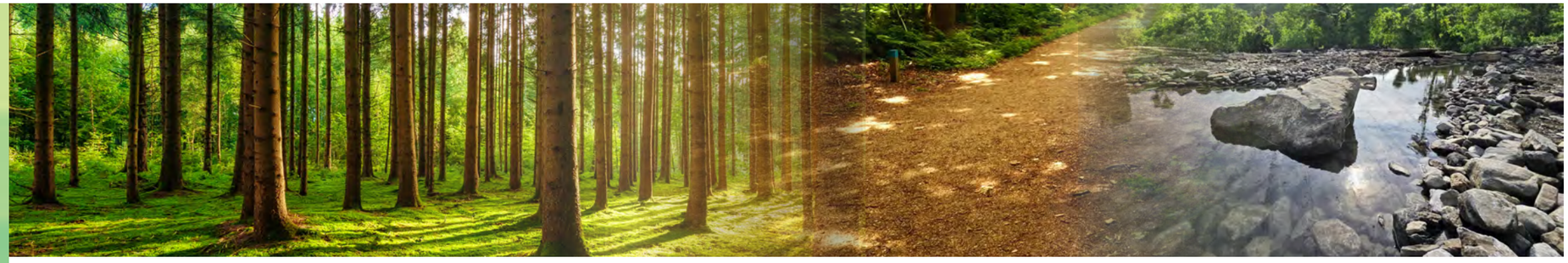
2023 TNFD pilot program released
2024 Formulated TCC Biodiversity Policy
Formulated TCC No Deforestation Commitment
Taiwan's only major construction material company of TNFD Early Adopters
Representing construction material company joining It's Now for Nature campaign

TOWARD NATURE POSITIVE

No Net Loss **NNL**

Net Positive Impact **NPI** **2040**

Other Effective Area-Based Conservation Measures **OECMs**



Hoping Mine Reforestation Project

SEMIANNUALLY

KBCC

Taibaishan Mine Ecological Restoration Project

TIMELY

Sustainable Landscape Laboratory, National Ilan University Professor Ji-Wei Huang

Hualien Hoping Industrial Park Nature Conservation Project

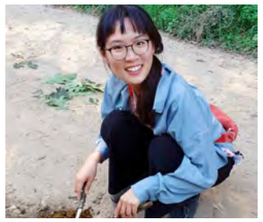
TIMELY

School of Forestry and Resource Conservation, NTU Dr. Chyi-Rong Chiou

Hoping Mine Restoration Area Forest and Soil Rehabilitation Project

QUARTERLY

Frameless Landscape Architects, Taiwan Forestry Research Institute Dr. Chiao-Ping Wang (Consultant)



Ho-Ping Ark Ecological Project

QUARTERLY

KBCC Professor Chia-Wei Li andJian-Fu Liu Collection Manager

Soil Expert Dr. Chiao-Ping Wang

NTU IEEB Professor Chih-Han Chang

Hoping EcoPort Coral Rehabilitation Project

QUARTERLY

Eco-Angel Environment Conservation Association Secretary-General Ying-ling Chen

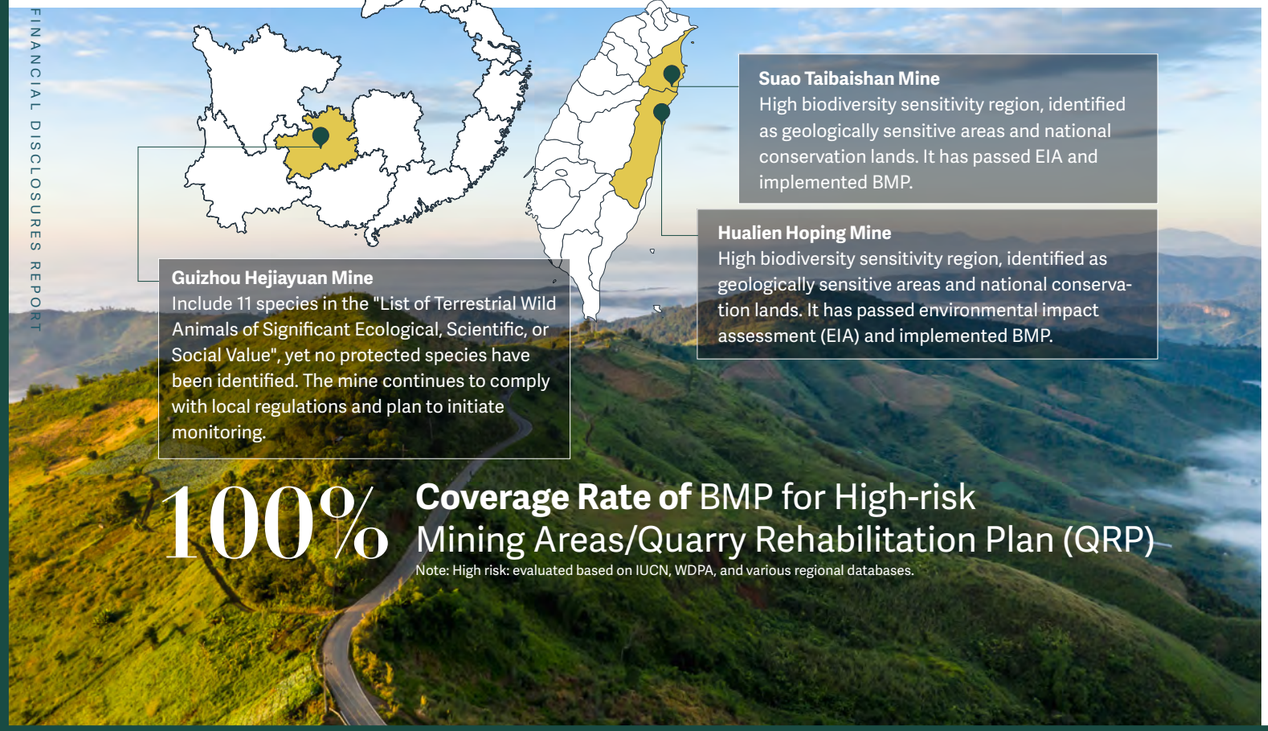
Nature and Biodiversity Assessment

TCC operates 21 mines and 14 cement plants in Taiwan and Mainland China. In Taiwan, biodiversity impacts are assessed using the Ministry of the Interior's Function Zones and the Ministry of Agriculture's Biodiversity Datasets, focusing on IUCN Categories I-IV protected areas and species of concern. In Mainland China, the Biodiversity Impact Assessment Tool (BIA), created by the Shanshui Conservation Center and Peking University, is used. The BIA tool combines data from the China Nature Observation database, the IUCN Red List, the World Database of Key Biodiversity Areas (KBA), and the World Database on Protected Areas (WDPA), covering both international and Chinese criteria.

The analysis indicates TCC's operations in the Hualien Hoping and Suao Taibaishan mines are in regions of high biodiversity sensitivity (totaling 300.7 hectares), where long-term biodiversity management plan (BMP) have been implemented. In the Hejiayuan Mine in Anshun, Guizhou, the region potentially includes species in the "List of Terrestrial Wild Animals of Significant Ecological, Scientific, or Social Value", yet no protected species have been identified, indicating it is not a high biodiversity risk area. Other mines and plants are also assessed to have no potential biodiversity risks.

TCC Cement Business Operation Sites		Mainland China		Taiwan
Location and Area	Numbers	Areas	Numbers	Areas
Cement Plants	12	741.54 hectares	2	68.32 hectares
Mines	19	1323.35 hectares	2	300.7 hectares
RMC Plants[1]	1	0.9hectares	23	25.11hectares

Note 1 : RMC sites are not located near any natural areas.
TCC will evaluate the initiation of biodiversity assessment procedures.



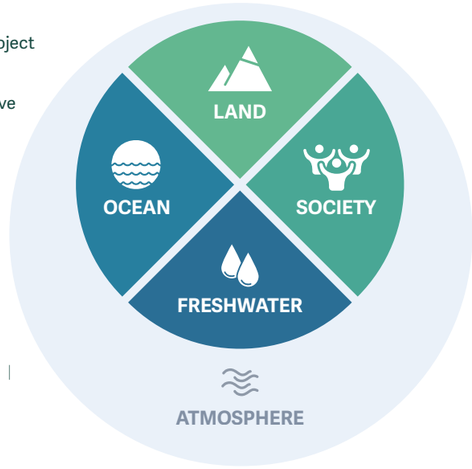
2023 TCC Nature Action Performances

LAND

- The Mines in Mainland China: 19.7% Restoration and Reforestation Rate
- The Mines in Taiwan: 51.2% Restoration and Reforestation Rate. 88% The Percentage of Indigenous Species Conservation in Hoping Mine; 90% The Percentage of Indigenous Species Conservation in Taibaishan Mine
- Hoping Mine Proportion of Soil Organic Matter of Restoration Zone Increased by 1.3 Times/ 3 year restoration
- Hoping Mine (Jinchang Quarry) Forest Carbon Sink 123.21 tons/ hectare, Higher Than Average of Rain Forests in Asia
- Conservation of Plants (Including Endangered Species) of KBCC: 34,646 Varieties

OCEAN

- Coral Rehabilitation Project at Hoping EcoPort Total of 1,001 Corals Have Been Rehabilitated
- The Area Designated for Rehabilitation Has Been Expanded to Four Times
- Hanben Ocean Station Beach Cleaning | 307 Participants
- Hanben Ocean Station | 77,241 Visitors



SOCIETY

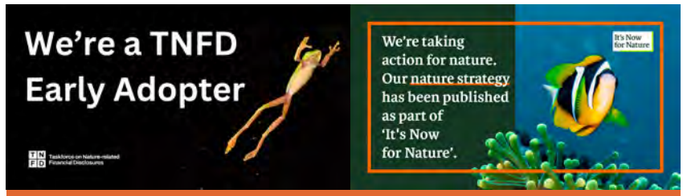
- 85% Approval Rate of The Tribal Consultation and Voting Procedure in Iyo Tribe
- 82.2% Approval Rate of The Tribal Consultation and Voting Procedure in Gukut Tribe
- 97.6% Approval Rate of The Tribal Consultation and Voting Procedure in Knlibu Tribe
- TCC DAKA | 8.44 million Visitors
- Cement Academy Assists Total 1,293 Students
- Hoping EcoPort Environmental Education Courses | 39 Sessions

FRESHWATER

- Hoping Plant Membrane Bioreactors (MBR), -7.34% water withdrawal compared to 2022
- Hoping Power Rainwater Harvesting System | Recycling Estimated 18,000 m³ Annually

ATMOSPHERE

- Hoping Power Plant Total Air Pollution -34% Compared to 2016
- Enhancement and Replacement of Gas-gas Heater and Ammonia Injection Grids



The 18th CSR and ESG Awards of Global View Monthly in 2022 ,"First Prize" of Environmental Friendly Project

Taiwan Biodiversity Award, 2023 Golden Prize, 2024 Bronze Award

High Extinction Award, the 9th National Environmental Education Awards

Biodiversity Policy
No Deforestation Commitment
Stakeholder Engagement Policy
Risk Management Committee Charter

Taxus / Taibaishan Mine

CHAPTER 1

Water Wells in Spring — TCC & TNFD

WORK GLOVES GREY
SOIL BROWN
LEAVES DARK GREEN
LEAVES LIGHT GREEN
LEAVES YELLOW GREEN

1.1 _ Nature & Biodiversity Management

In accordance with the TNFD framework, the functional committees under the Board of Directors at TCC—the Risk Management Committee and the Corporate Sustainable Development Committee—are tasked with relevant governance. Regarding the business and value chain's footprint, through the LEAP approach, the nature-related dependencies, impacts, risks, and opportunities of operation sites were analyzed. Also, stakeholder input was collected via questionnaire. Finally, a financial assessment of nature-related opportunities was conducted.

Governance
- Board of Directors
- Risk Management Committee
- Corporate Sustainable Development Committee

Strategy

TCC Group Holdings Taiwan Operation Sites, Including
- Mines
- Cement Plants
- Power Plant
- Port

Locate
- IUCN Protected Areas
- Functional Zones of the Ministry of the Interior
- Biodiversity Datasets from Ministry of Agriculture

Evaluate
- ENCORE
- TNFD Sector Guidance
- Nature-related Dependencies & Impacts Workshop

Assess
- Nature-related Risks & Opportunities
- Assessment Workshop

Prepare
- NIA
- SBTN

Stakeholders
- Government
- Local Communities/ Indigenous Peoples
- Influential Advocacy Organizations
- Non-profit Organizations
- Academic Institutions/ Financial Institutions
- Employees

Financial Disclosures on Nature-related Opportunities
- Alternative Energy
- Alternative Raw Materials
- Alternative Fuels
- Water Reclamation
- Natural Ecology Conservation

1.2 _ Governance

Board of Directors

Includes the management of nature and biodiversity risks in the agenda and supervises and oversees the Company's strategy formulation, execution, and monitoring

Corporate Sustainable Development Committee

Two meetings were convened in 2023

- Formed the Biodiversity Group to tackle biodiversity issues, initiating research on soil carbon sinks and soil fauna.
- Focused on Net Positive Impact (NPI), No Net Loss (NNL), and No Deforestation Commitment in 2024
- Reviewing biodiversity index and progresses in soil research, aiming for Nature Positive

Risk Management Committee

Three meetings were convened in 2023 and 2024

- Inventoried the operational impact of the April 3rd Hualien earthquake and oversaw the recovery progress.
- Included biodiversity risk in the "TCC Risk Management Policy and Principles" and submitted to the Board of Directors for adoption.

Office of Responsibility and Sustainability

Integrates the Company departments' resources to promote research and actions on nature and biodiversity

- Corporate Governance Group
- Comprehensive Care Group
- Sustainable Products and Manufacturing Group
- Sustainable Environment Group
- Green Energy Group
- Sustainability Information Disclosure Group
- **Biodiversity Group**

Biodiversity Group members:

- The President Office
- General Affairs Department
- Engineering Affairs Department
- Finance Department
- Office of Responsibility and Sustainability
- Hoping Plant
- Suao Plant
- KBCC
- Hoping EcoPort
- Hoping Power Plant
- Expert Teams (NTU, NIU, and Eco-Angel EnvironmentConservation Association)

- Responsible for practices of international frameworks and initiatives such as TNFD and SBTN.
- Assesses biodiversity and natural disaster risks; plans and executes corresponding biodiversity conservation programs

1.3 _ The LEAP Approach

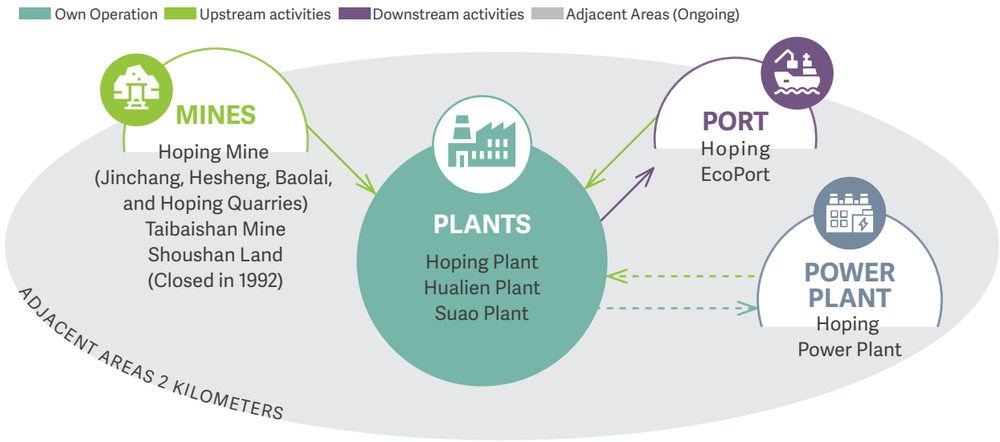
1.3.1 _ Locate

Analysis of TCC's Interface with Nature

TCC operates across 11 sectors, including cement, new energy, resource recycling, and land and maritime logistics, all of which are closely related with nature. The scope of the year includes value chain in Taiwan, extending to a two-kilometer radius for adjacent area evaluation.

- Own operations: Cement Plants in Taiwan
- Upstream activities: mines, the port (158.8 hectares, offering materials of cement)
- Downstream activities: the port (transporting cement and clinker)
- Adjacent areas: the power plant (27 hectares, only the plant itself is assessed, upstream and downstream evaluations will be conducted in the future) and two-kilometer radius of operation sites

Assessment scope of the year



TCC Established Locate Criteria

TCC collaborated with Associate Professor Chyi-Rong Chiou from the School of Forestry and Resource Conservation, National Taiwan University (NTU), to assess the nature sensitivity of its operation sites following the criteria of ecosystem sensitivity and species sensitivity.

The assessment results for ecosystem sensitivity and species sensitivity were classified into four levels, i.e., Very High (VH), High (H), Medium (M), and Low (L). The results were then integrated into a nature sensitivity matrix. Based on the nature sensitivity matrix, sites with a nature sensitivity of VH were prioritized for assessment.

Nature Sensitivity Classification

Nature Sensitivity		Ecosystem Sensitivity			
		VH	H	M	L
Species Sensitivity	VH	VH	VH	H	M
	H	VH	H	M	L
	M	H	M	M	L
	L	M	L	L	L

CRITERION 1

Ecosystem Sensitivity

TCC has implemented a biodiversity policy, pledging not to explore or exploit World Heritage Sites and IUCN Protected Areas I-IV. **Leveraging the IUCN Protected Areas and Ministry of the Interior Functional Zones**, TCC analyzed the ecosystem sensitivity of its operation sites, classifying them into four levels, i.e., VH, H, M, and L.

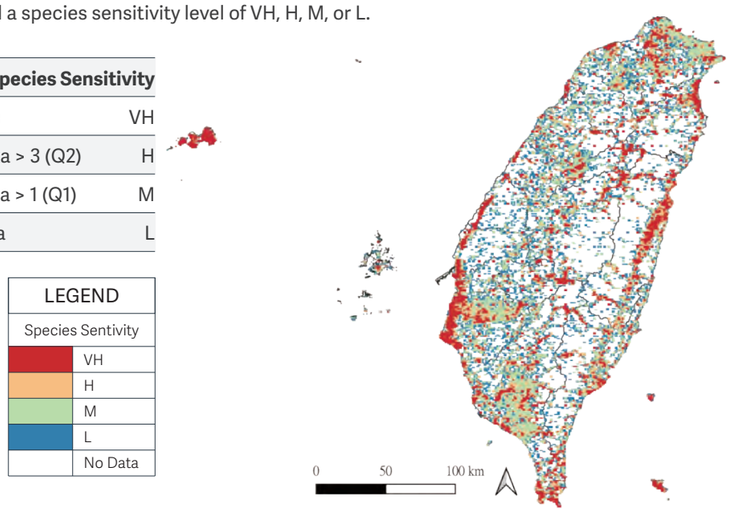
Sensitivity Level	Categories & Examples
Very High (VH)	IUCN Protected Areas I-IV, such as nature reserves, wildlife protected areas, important wildlife habitats, nature protected areas, national parks, national natural parks, important wetlands, and conservation areas for the aquatic flora and fauna.
High (H)	→ Type 1 Environmental Conservation Zone (but not of IUCN Protected Areas I-IV), such as First-Grade Coastal Conservation Zones, National Forest Enterprise Zones within the Protection & Conservation Lands, Protection Forests, other Public Forest Areas, Reservoir Water Storage Areas, and River Areas → IUCN Protected Areas V-VI, such as marine protection areas → Disaster-prone areas, such as geologically sensitive areas and potential debris flow torrents
Medium (M)	→ Type 2 Environmental Conservation Zone, such as timber productive areas with the Protection & Conservation Lands, forest recreation areas, experimental forests of universities and colleges, and forestry experimental forests. → Type 4 Environmental Conservation Zone, such as the zones and land use for protection and conservation related to reservoirs, water sources, and designated scenic areas in the Urban Planning Law.
Low (L)	Items other than the above

CRITERION 2

Species Sensitivity: Monitoring mines for 10+ years

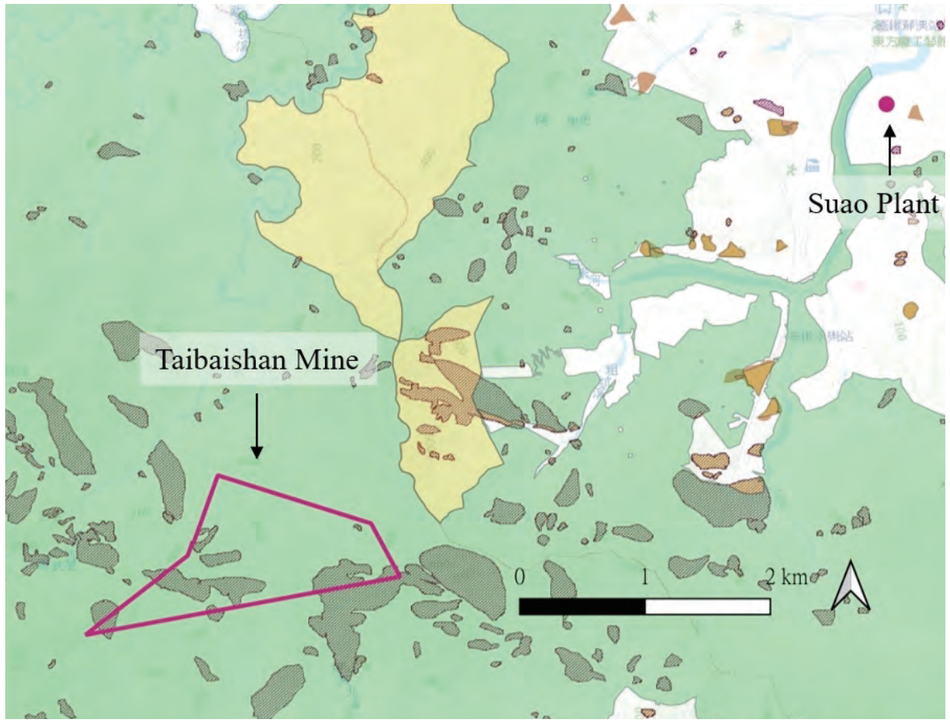
Using the **data from the Taiwan Biodiversity Network (TBN) of the Taiwan Biodiversity Research Institute, Ministry of Agriculture**, TCC analyzed the species sensitivity at its operation sites, assessing if there is presence of the flora and fauna categorized as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) in the IUCN Red List of Threatened Species1 in the vicinity. TCC divides the TBN atlas species into four quartiles, each assigned a species sensitivity level of VH, H, M, or L.

Classification Basis	Species Sensitivity
Number of Taxa > 5 (Q3)	VH
5 (Q3) >= Number of Taxa > 3 (Q2)	H
3 (Q2) >= Number of Taxa > 1 (Q1)	M
1 (Q1) >= Number of Taxa	L



CRITERION 1 ANALYSIS RESULT

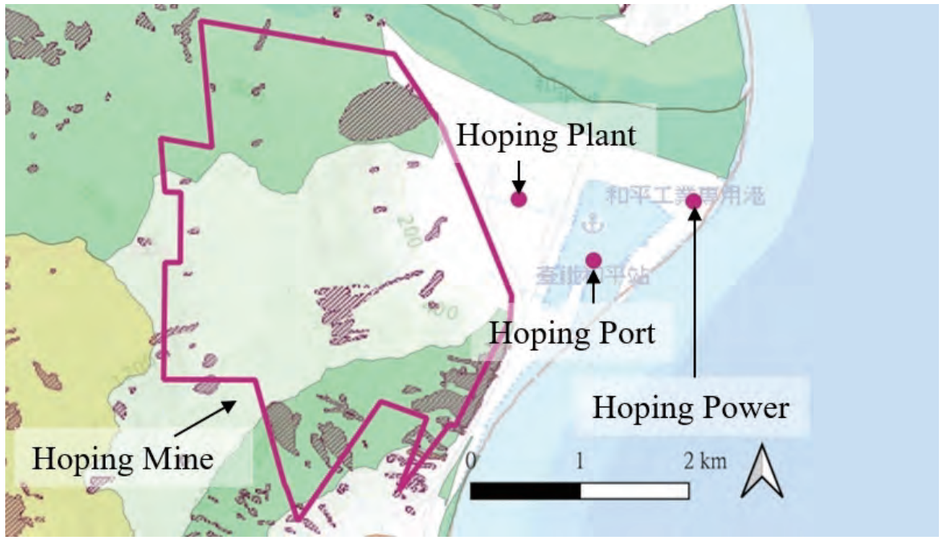
The cement plants, Hoping EcoPort, and Hoping Power Plant are in areas with low ecological sensitivity, not near sensitive locations. Conversely, the Taibaishan Mine in Yilan, Hoping Mine in Hualien, and Shoushan Land in Kaohsiung are in geologically sensitive and environmental conservation areas, indicating high ecosystem sensitivity.



The Suao Plant and the Taibaishan Mine

Both are not located in the IUCN Protected Areas I-IV, as the Suao Plant is in the area of a low ecosystem sensitivity, and the Taibaishan Mine in the Type 1 Environmental Conservation Zone and the geologically sensitive area, presenting a high ecosystem sensitivity.

The Taibaishan Mine has been through the environmental impact assessment (EIA) and rigorously abides by pertaining laws and regulations. See CH2.1.2 Biodiversity Plan.



The Hoping Mine, the Hoping Plant, the Hoping EcoPort, and the Hoping Power Plant

None of the sites are located in the IUCN Protected Areas I-IV, and the Hoping Plant, the Hoping EcoPort, and the Hoping Power Plant are in the areas with a low ecosystem sensitivity.

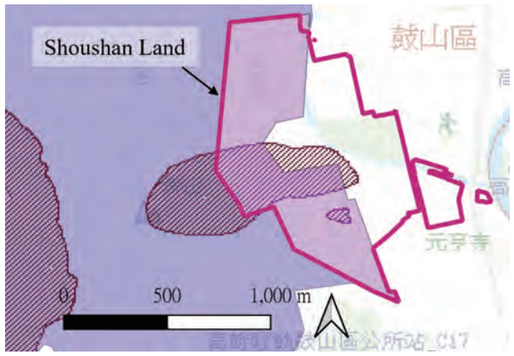
The Hoping Mine is located in the Type 1 Environmental Conservation Zone and geologically sensitive area, presenting a high ecosystem sensitivity. The Hoping Mine has been through the EIA and introduced the low-carbon vertical shaft transport system to reduce impact of development. See CH2.1.2 Biodiversity Plan.

Shoushan Land

It is not located in the IUCN Protected Areas I-IV.

Part of the mine is situated in the conservation areas in urban planning and geologically sensitive areas, presenting a high ecosystem sensitivity. The Shoushan Land, with the mining ceased in 1992, is now a hiking trail and flood detention basin park, connecting the city blue and green spaces and functioning as a flood control facility.

The Shoushan Land is adjacent to Shoushan National Nature Park. TCC plans a collaborate with the National Park Service to conduct nature conservation and integrate regional restoration resources



CRITERION 2 ANALYSIS RESULT

Birds Fish Amphibians Mammals Plants

Operation Site	No. of Potentially Threatened Species	Species Sensitivity	List of Species
Mines			
Hoping Mine	9	VH	Eurasian Jay; Formosan Bulbul; Long-tailed Shrike; Mountain Hawk-Eagle
			Lilac Daphne; Beach Morning-Glory; Rubus sumatranus; Depressed Orange; Heptapleurum ellipticum var. ellipticum
Taibaishan Mine	2	M	Rubus sumatranus; Small-leaved Distylium
Shoushan Land (non-operational)	18	VH	Black-naped Oriole; Taiwan Hwamei; Black Kite; Fairy Pitta; Chestnut Munia; Green-winged Teal; Formosan Crested Myna (Taiwanese subspecies); Mandarin Duck
			Stejneger's Paddy Frog
			Green Barb
			Argyreia formosana; Epithema taiwanensis var. fasciculata; Siraitia taiwaniana; Scutellaria austrotaiwanensis; Golden Lycoris; Heptapleurum ellipticum var. ellipticum; Acuteleaf Caper; Fan Palm
Cement Plants			
Hoping Plant	0	L	----
Suao Plant	1	L	Black Kite
Hualien Plant	6	VH	Formosan Flying Fox
(non- operational)			Formosan Bulbul; Long-tailed Shrike; Chestnut Munia; Taiwan Hwamei
			Looking Glass Tree
Power Plant			
Hoping Power Plant	1	L	Formosan Bulbul
Port			
Hoping EcoPort	0	L	----

Note: The TBN data was used for analysis.

The ecological survey data of TCC mines, tracking species sensitivity, shows that the species sensitivity of the mines has been lower than the atlas analysis results since before mining began, and the biodiversity has been maintained for years. (See the Environmental Monitoring Report in the ESG section of the corporate website). For the nature conservation practices of each area, please refer to **CH2 Clouds Changes in Summer | TCC and Forest, Soil, Ocean.**

Locate: Comprehensive Analysis

With the analyses of Criterion 1 and Criterion 2 combined, the Hoping Mine and the Shoushan Land have high nature sensitivity, while the Taibaishan Mine and the Hualien Plant have a medium sensitivity. The remainders have a low nature sensitivity. In order of priority, TCC have conducted long-term restoration projects in the mines and continue to monitor the environments and ecology.

Operation Site		CRITERION I Ecosystem Sensitivity	CRITERION II Species Sensitivity	Nature Sensitivity
Mines	Hoping Mine, Hualian	H	VH	VH
	Taibaishan Mine, Yilan	H	M	M
	Shoushan Land, Kaohsiung (non-operational)	H	VH	VH
Plants	Hoping Plant	L	L	L
	Hualien Plant (non-operational)	L	VH	M
	Suao Plant	L	L	L
Power Plant	Hoping Power Plant	L	L	L
Port	Hoping EcoPort	L	L	L

1.3.2 _ Evaluate

Mines/Cement Plants/Power Plant/Port: Apply TNFD Sector Guidance & ENCORE for Dependency and Impact Assessment

The natural disaster protection indicator was added in response to the April 3rd Hualien earthquake

In accordance with the TNFD's LEAP approach and Sector Guidance, and utilizing the ENCORE jointly developed by the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and the UN Environment Programme Finance Initiative (UNEP FI), TCC has conducted a preliminary screening to identify the potential dependencies and impacts of the mines, cement plants, power plant, and port on nature. Meanwhile, TCC established Biodiversity Group organized Nature-related Dependencies & Impacts Workshop to identify the levels of dependencies and impacts of different sectors on natural capital.

TCC operation sites are primarily located in the Hualien-Taitung region, which is prone to risks of earthquakes and typhoons. On April 3rd, 2024, a magnitude 7.2 earthquake struck Hualien, with the Hualien Hoping Circular Economy Park being at the epicenter. As a result, TCC places emphasis on natural disaster protection services to prevent operational disruptions. The natural disaster protection indicator was added to the analysis results.

The Dependencies and Impacts Aligned with TNFD LEAP Approach and Sector Guidance

	Scope	Mines	Plants	Power Plants	Port
Dependencies Ecosystem Services	1 Surface water	HIGH	VERY HIGH	VERY HIGH	HIGH
	2 Ground water	HIGH	VERY HIGH	MODERATE	HIGH
	3 Water flow maintenance	HIGH		MODERATE	MODERATE
	4 Water quality		LOW	LOW	LOW
	5 Climate regulation	HIGH		VERY LOW	MODERATE
	6 Mediation of sensory impacts		LOW		
	7 Dilution by atmosphere and ecosystems		LOW		
	8 Filtration			LOW	
	9 Bio-remediation			VERY LOW	
	10 Mass stabilisation and erosion control	MODERATE		LOW	MODERATE
	11 Flood and storm protection			MODERATE	MODERATE
	12 Natural disaster protection	VERY HIGH	VERY HIGH	VERY HIGH	VERY HIGH
Impacts Impact Drivers	A Disturbances	HIGH	HIGH	HIGH	HIGH
	B Freshwater ecosystem use	HIGH	HIGH	HIGH	VERY HIGH
	C Marine ecosystem use		HIGH		VERY HIGH
	D Terrestrial ecosystem use	VERY HIGH	VERY HIGH		HIGH
	E GHG emissions	HIGH	HIGH	HIGH	HIGH
	F Non-GHG air pollutants	HIGH	MODERATE	HIGH	
	G Soil pollutants	HIGH		MODERATE	HIGH
	H Solid waste	HIGH	HIGH	HIGH	MODERATE
	I Water pollutants	HIGH	MODERATE	MODERATE	HIGH
	J Water use	VERY HIGH	HIGH	VERY HIGH	

VERY HIGH HIGH MODERATE LOW VERY LOW

Evaluate Comprehensive Analysis & TCC Uniqueness

In 2023, TCC Biodiversity Group organized Nature-related Dependencies & Impacts Workshop to practically identify the dependencies and impacts from operations, along with TNFD Sector Guidance and ENCORE, to illustrate the uniqueness of each operation site.

MINES

ECOSYSTEM SERVICES
- Biomass provisioning
- Global climate regulation
- Storm mitigation
- Natural Disaster protection (strong earthquake, landslide, tsunami, etc.)
- Water supply
- Soil formation & maintenance
- Soil quality regulation
- Water flow regulation | Flood mitigation
- Habitat maintenance
- Visual amenity services
- Education, scientific and research services

ENVIRONMENTAL ASSETS
- Use of biological resources (biofuels)
- Renewable resources
- Atmosphere
- Water resources
- Mineral & underwater mineral
- Terrestrial ecosystems
- Subterranean ecosystems
- Freshwater ecosystems

DEPENDENCIES

Energy
- Oil
- Electricity

Resources
- Water resources
- Minerals

Site stability

Access road clear

IMPACTS (IMPACT DRIVERS)	DRIVERS OF NATURE CHANGE
M GHG emissions	↑ Climate change
H Invasive alien species	↑ Invasive alien species
H Freshwater ecosystem use	
H Terrestrial ecosystem use	↑ Land use change
H Disturbances	
M Non-GHG air pollutants	
L Soil pollutants	
L Solid waste	
M Water pollutants	↑ Pollution
L Other resource use (biological and non-biological)	
M Water use	↑ Resource use/replenishment

Levels HIGH MODERATE LOW

Mines Depend on Environmental Assets, Focusing on Invasive Alien Species and Terrestrial-Marine Disturbances

TCC depends on the ecosystem services provided by the water flow and soil maintenance in the mines. It also highly relies on limestone minerals and energy. The large area of forest within the mines can provide natural disaster protection, such as climate regulation, storm mitigation, and landslide reduction, and serve the functions of water and soil conservation and maintenance of habitats for local species. TCC emphasizes ecosystem services and environmental assets' value. In addition to a strict compliance with EIA, TCC has introduced advanced eco-friendly vertical shaft transport system to avoid pollution and damage, continues to carry out restoration works, prevents invasive species, and reduces light pollution and noise in the mines to reduce the impacts on the mines.

TCC Uniqueness - Education, Scientific and Research Services

Since TCC established Open Eco-factory in 2020, it has been organizing eco-tours at mines to promote industrial-environmental harmony to the public (including local communities and various organizations). The mines are moderately dependent on ecosystem services related to education, scientific and research services.

CEMENT PLANTS

ECOSYSTEM SERVICES
- Biomass provisioning
- Global climate regulation
- Local climate regulation
- Natural Disaster protection (strong earthquake,landslide, tsunami, etc.)
- Water supply
- Soil quality regulation
- Water flow regulation
- Flood mitigation
- Air filtration
- Habitat maintenance
- Noise attenuation

ENVIRONMENTAL ASSETS
- Use of biological resources (biofuels)
- Renewable resources
- Energy resources
- Atmosphere
- Water resources
- Mineral & underwater mineral
- Terrestrial ecosystems

DEPENDENCIES

Energy
- Coal
- Alternative fuel
- Oil
- Electricity

Resources
- Water resources
- Minerals

Site stability

Access road clear

IMPACTS (IMPACT DRIVERS)	DRIVERS OF NATURE CHANGE
H GHG emissions	↑ Climate change
L Invasive alien species	↑ Invasive alien species
L Ocean ecosystem use	
L Freshwater ecosystem use	
H Terrestrial ecosystem use	↑ Land use change
M Disturbances (visual & noise)	
H Non-GHG air pollutants	
L Soil pollutants	
L Solid waste	
M Water pollutants	↑ Pollution
H Other resource use (biological and non-biological)	
M Water use	↑ Resource use/replenishment

Levels HIGH MODERATE LOW

Cement Raw Materials are Minerals, with a Focus on GHG and Air Pollution

TCC plants depend on natural resources, including water, limestone, and energy resources, and rely on ecosystem services such as air filtration and water supply. The cement manufacturing process requires a large amount of energy to raise the kiln temperature to over 1,300°C. The calcination of limestone releases CO_2, leading to air pollutants and wastewater issues, and directly impacts the climate..

TCC continues to expand the use of alternative raw materials and fuels, install power generation by waste heat recovery, and develop carbon capture technology to reduce the use of natural resources and CO_2 emissions. Meanwhile, the membrane bioreactor (MBR) system is introduced to avoid sewage discharge.

TCC Unique – Bioresources

TCC collaborates with local governments to address the alien species White Popinac, reducing the risk of recurrence. The high-temperature co-processing technology of cement kiln is leveraged to convert it into bioenergy. Regarding renewable resources, the domestic waste in Hualien is treated through co-processing as refuse derived fuel (RDF).

POWER PLANT

ECOSYSTEM SERVICES	Biomass provisioning
	Global climate regulation
	Natural Disaster protection (strong earthquake,landslide, tsunami, etc.)
	Water supply
	Water flow regulation
	Flood mitigation
	Air filtration
	Education, scientific and research services
ENVIRONMENTAL ASSETS	Use of biological resources (biofuels)
	Energy resources
	Renewable resources
	Atmosphere
	Water resources
	Mineral & underwater mineral
	Terrestrial ecosystems
	Marine ecosystems

Levels HIGH MODERATE LOW

DEPENDENCIES
Energy
Coal
Oil
Electricity
Resources
Water resources
Minerals
Site stability

IMPACTS / IMPACT DRIVERS	DRIVERS OF NATURE CHANGE
H	GHG emissions
	↑ Climate change
H	Ocean ecosystem use
M	Freshwater ecosystem use
M	Terrestrial ecosystem use
	↑ Land use change
L	Disturbances (visual & noise)
H	Non-GHG air pollutants
L	Soil pollutants
M	Solid waste
M	Water pollutants
	↑ Pollution
L	Other resource use (biological and non-biological)
H	Water use
	↑ Resource use/replenishment

The Power Plant Depends on Water for Regulation, Focusing on GHG and Water Resource

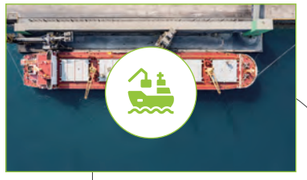
Hoping Power Plant depends on water and energy resources, relying air filtration to regulate greenhouse gas (GHG) emissions and air pollutants from the power generation process, and seawater to regulate generator temperature. The drivers of nature change brought by the Hoping Power Plant include GHG emissions and water use, leading to climate change and disrupting the balance of resource cycles.

In 2024, the Hoping Power Plant initiated a biomass feasibility study and installed renewable energy such as wind energy, solar energy, hydro energy, and ocean thermal energy conversion (OTEC) to reduce GHG emissions. Additionally, the Hoping Power Plant completed the air quality control system (AQCS) upgrade in 2022, reducing air pollution by 34% compared to 2016 levels, and fully installed rainwater harvesting systems to reduce its water withdrawal.

TCC Uniqueness – 3-in-1 Circular Economy Design of Port, Power Plant, and Cement Plant

TCC utilizes the limestone from Hoping Mine for desulfurization at Hoping Power Plant, reducing pollution and GHG emissions. Coal ash and desulfurized gypsum from Hoping Power Plant are converted into raw materials of cement, making it the world's only eco-friendly power plant without ash pond (landfill). The plant sits nearby a port, minimizing coal transport distance, and utilizes indoor coal storage, equipped with an enclosed conveyor system, to eliminate coal dust and water pollution.

PORT



ECOSYSTEM SERVICES	Biomass provisioning
	Global climate regulation
	Storm mitigation
	Natural Disaster protection (strong earthquake,landslide, tsunami, etc.)
	Water flow regulation
	Soil quality regulation
	Habitat maintenance
	Entertainment-related services
	Visual amenity services
	Education, scientific and research services
ENVIRONMENTAL ASSETS	Use of biological resources (biofuels)
	Renewable resources
	Atmosphere
	Water resources
	Freshwater ecosystems
	Marine ecosystems

Levels HIGH MODERATE LOW

DEPENDENCIES
Energy
Oil
Electricity
Resources
Water resources
Site stability
Marine ecosystems (as environmental education materials)

IMPACTS / IMPACT DRIVERS	DRIVERS OF NATURE CHANGE
M	GHG emissions
	↑ Climate change
L	Ocean ecosystem use
L	Terrestrial ecosystem use
	↑ Land use change
L	Non-GHG air pollutants
L	Solid waste
M	Water pollutants
	↑ Pollution
M	Water use
	↑ Resource use/replenishment

The Port Depends on Marine Ecosystem, Focusing on Water Use and Pollution

The Hoping EcoPort depends on water resources and the marine ecosystem to facilitate ship navigation, cargo handling, and port facility operations. The marine ecosystem also provides essential ecosystem services, such as climate regulation and coastline protection. The Hoping EcoPort strives to avoid water pollution incidents in its operations and is committed to maintaining the ecology in the port and along the coastline, actively engaging in marine ecosystem restoration.

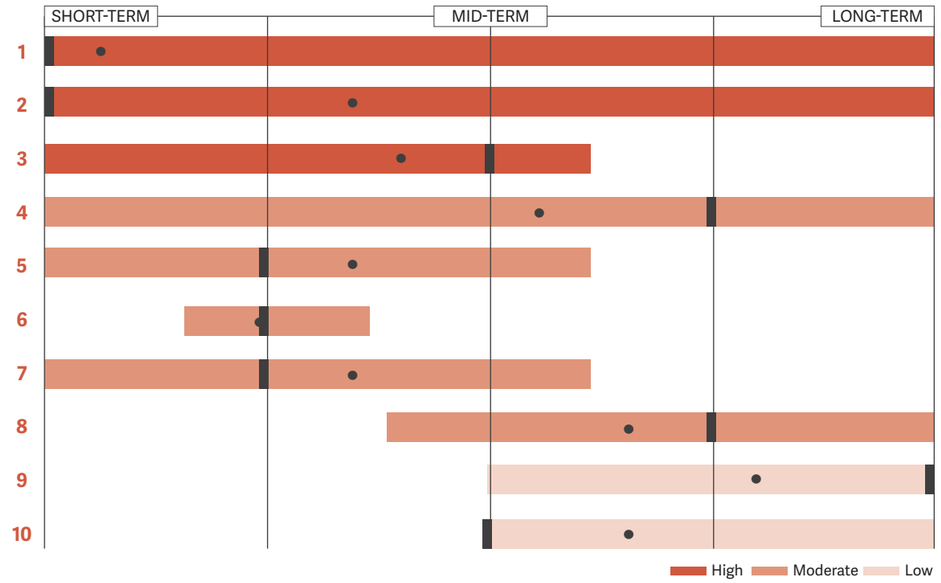
TCC Uniqueness – Education, Scientific and Research Services

In 2021, the port launched Coral Rehabilitation Project. To date, it has successfully restored 1,001 corals. Hoping EcoPort organized Eco-tours as well, offering environmental education to students and the public by environmental education professionals. The port serves as a crucial venue for coral restoration and environmental education, highly depending visual amenity services and education, scientific and research services.

1.3.3 _ Assess

TCC identified 10 nature-related risks and 12 nature-related opportunities, ranking in the order of likelihood. As the impacts of risks and opportunities are continuous, TCC presented them over a continuous timeframe. Based on the averages of the risks and opportunities assessed by the Biodiversity Group members, the metrics were classified as short-, mid-, or long-term risks or opportunities.

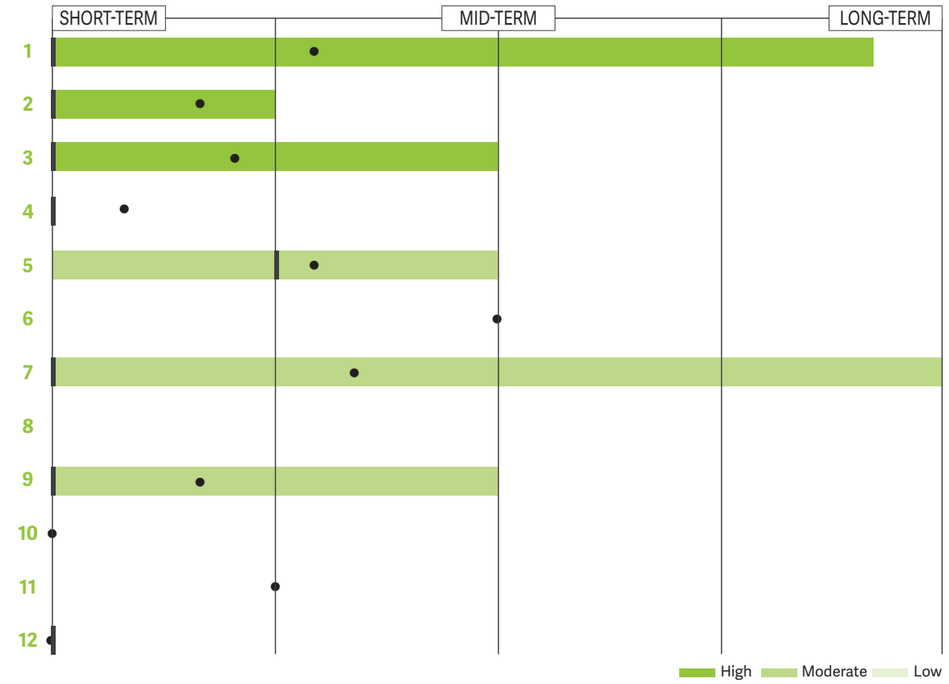
Risk Horizon



1 Required compliance with the Regulations for Consulting Indigenous Peoples or Tribes to Obtain Their Consent and Participation for the Company
2 Mineral extraction quantity restricted
3 Installation of environmental monitoring systems to ensure compliance with the EIA standards in the environment and water quality
4 Market value or brand value of the Company impacted due to nature-related negative news
5 Disturbances to nearby residents owing to business activities of mines or plants (disputes between fishermen and port/power plant)
6 Reduced visitors to the open factory and the port
7 Damage to habitats of flora and fauna, ecological environments, and indigenous communities caused by mining
8 Damage to the environment and equipment in mines and plants caused by typhoons and extreme weather events
9 Search and redevelopment of another mine if the mineral source is depleted
10 Increased costs from adopting more alternative materials

Short-term: 0-3 years; mid-term: 3-5 years; long-term: over 5 years

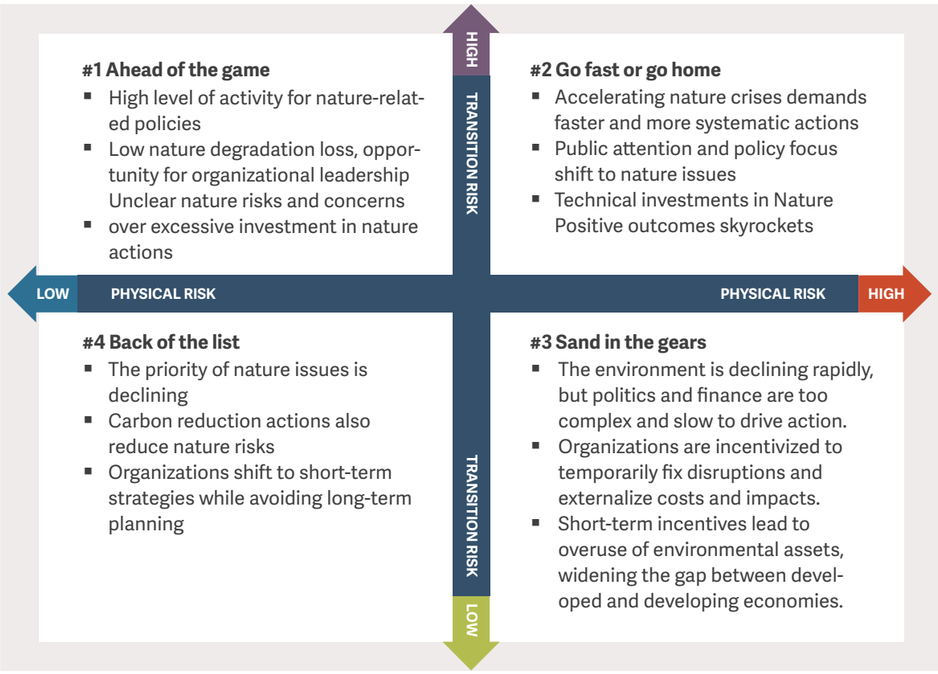
Opportunity Horizon



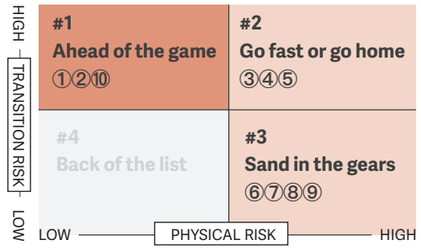
1 Development of new alternative raw materials to reduce mineral demand and equipment energy consumption
2 Restoration of indigenous plant species in mines, increasing the number of indigenous species planted
3 Collaboration with KBCC and universities on restoration projects
4 Increasing the reuse and recycling of natural resources through recycling mechanisms
5 Execution of the Ho-Ping Ark Ecological Program and Soil and Forest Carbon Sink Projects
6 Natural environmental protection and Nature-based Solutions (NbS) to achieve Nature Positive
7 Monitoring the natural environment at operation sites using new technologies, reducing manpower burden and promoting technology replication
8 Soil substrate improvement to increase the survival rate and growth rate of restoring plants
9 Use of renewable resources to establish infrastructure, e.g., solar power PV and microirrigation systems
10 Joining nature-related initiatives and obtaining nature-related certifications
11 Application for mines and port to be OECMs as ecological tourism and education zones
12 Low-carbon product development and eco-friendliness to access green funds, bonds, or loans

Aside from recognizing the significance of nature-related risks and opportunities, TCC also integrated the potential future changes in the natural environment, business, and regulatory landscape for a comprehensive assessment and consideration, identifying the most likely risks and opportunities in each scenario.

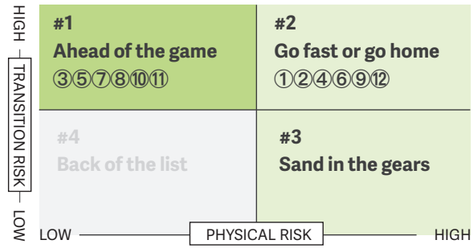
Utilizing the four scenarios in the official TNFD Recommendations, with physical risks (ecosystem services) and transition risks (market forces) as two major variables, TCC delineates four scenarios: Ahead of The Game, Go Fast or Go Home, Sand in The Gears, and Back of The List.



TCC Scenarios and Corresponding Risks



TCC Scenarios and Corresponding Opportunities



After discussion among Biodiversity Group members, it is determined that TCC is in the "Ahead of the game" scenario and may face "Go fast or go home" and "Sand in the gears" scenarios in the future. Based on the results, the potential risks and opportunities that may arise in the current business are examined, and the likelihood of occurrence and the level of potential impact are assessed.

1.3.4 _ Prepare

Response Strategies for the Risks and Opportunities

After identifying nature-related risks and opportunities, TCC coordinated related departments to jointly discuss and develop corresponding response strategies.

Nature-related Risks

Type	Risk	Potential Impacts	Response Strategies
Transition Policy and Legal	Required Compliance with Regulations for Consulting Indigenous Peoples or Tribes to Obtain Their Consent and Participation	▪ **Mining operations disruption** The inability to mine limestone could disrupt TCC production and impact revenue. ▪ **Impact on contractors and employees** Operation disruption will impact the livelihoods of contractors and employees.	▪ **Local employment for co-prosperity** Employ local residents and organize events with local features to raise residents' sense of identity. ▪ **Ongoing communication with local communities and tribes** Engage with local communities via communication and interaction to explain the mitigation and restoration efforts during operation, and continues to support tribes with resources and assistance for their development.
	Mineral Extraction Quantity Restricted	▪ **Business impact from material supply disruption** A restricted extraction quantity may lead to material supply disruptions and impact local supply chains.	▪ **New material sources development** Keep using alternative materials and minimize the use of virgin minerals.
Transition Technology	Installation of Environmental Monitoring Systems to Ensure Compliance with The EIA Standards in The Environment and Water Quality	▪ **Environmental impact reduction required for transformation** The installation of environmental monitoring systems may affect natural ecology and require more resources to avoid environment impact. ▪ **Increased operating costs** The installation of monitoring systems drives operating and labor costs.	▪ **Investment in water treatment equipment** Upgrade water treatment equipment at operation sites to lower environmental impact and ensure compliance of the treated water quality with regulatory requirements

Type	Risk	Potential Impacts	Response Strategies
Transition Reputational	Market Value or Brand Value of The Company Impacted Due to Nature-related Negative News	▪ **Impact on brand image** Negative news may reduce investor confidence. If negative public opinion continues to evolve, it may lead to market boycotts. ▪ **Client cooperation ceased** Nature-related negative news may result in client cooperation reduced or ceased. ▪ **Investment plans hindered** Investors may divest due to negative news.	▪ **Communication with competent authorities** Keep tabs on regulatory amendments and participates in feedback to avoid violations. ▪ **Better product information labeling** Ensure all products comply with regulations and are eco-friendly to boost investor and consumer confidence. ▪ **Improvement of environmental quality** Keep strengthening environmental management in mines and strengthen partnerships with government, industry, and academic experts.
Transition Market	Disturbances to Nearby Residents Owing to Business Activities of Mines or Plants	▪ **Impact on stakeholder rights/interests** Protests at a site can cause hindered investment or operational difficulties.	▪ **Mitigation measures for local residents** Keep providing local residents with employment counseling and backup sites to avoid conflicts. ▪ **Rail and road transportation** Consider alternative means of transportation.
Physical	Reduced visitors to the open factory and the port	▪ **Impact on stakeholder rights/interests** A drop in port visitors for tours or environmental education will reduce local residents' income.	▪ **Support to local residents** Assist local residents in organizing traditional activities to ensure their economic well-being and promote their culture. ▪ **Organizing Nature-related activities** Organize more nature-related activities to enhance the attractiveness of the factory and the port for recreation.
Physical	Damage to Habitats of Flora and Fauna, Ecological Environments, and Indigenous Communities Caused by Mining	▪ **Ecological environment damage** Mining may lead to animals migrating to other habitats. ▪ **Invasive alien species** Alien species, such as White Popinac, threaten indigenous plants and result in a monotonous forest form, leading to ecological imbalance.	▪ **Mine restoration projects** Conduct ecological survey and assessment before mining, collect seedlings, and immediately restore the area after mining. ▪ **Alien species removal** Collaborate with the public sector and local groups to remove alien species and promote forest restoration.
	Damage to The Environment and Equipment in Mines and Plants Caused by Typhoons and Extreme Weather Events	▪ **Significant increase in production costs** Extreme weather events can lead to rising raw material costs or increased investment in disaster prevention. ▪ **Operational disruptions** Extreme weather events can damage plant buildings, machinery, power facilities, and communication systems, or cause transportation disruptions.	▪ **Inventory allocation management** Based on weather forecasts, establish safe raw material and product inventories before typhoons to meet shipping or manufacturing needs. ▪ **Implementation of decarbonization strategies** Reduce GHG emissions via equipment improvements, process optimization, and the use of alternative raw materials/fuels to mitigate climate change and global warming. ▪ **Microirrigation system, windbreak, and detention pond installation** Install microirrigation systems, rainwater harvesting, and shaft water reclamation to cope with climate change. Set up windbreaks to mitigate damage to plants by strong winds. Build detention ponds to tackle heavy rainfall. ▪ **Use of drones for disaster relief** Engage in drone procurement and pilot training to speed up rescue and equipment repair.

Type	Risk	Potential Impacts	Response Strategies
Physical	Search and Redevelopment of Another Mine if The Mineral Source is Depleted	▪ **Significant increase in production costs** Depletion of mineral sources will lead to production disruption and increased costs. ▪ **Impact on the ecological environment** Developing a new mine will render environmental impact and require additional investments. ▪ **Impact on the rights /interests of local stakeholders** Developing new mines will cause local noise and air pollution.	▪ **Joint mining** Adopt a joint mining model to reduce the volume of residual walls. ▪ **Product formula adjustment** Optimize the cement product formula to reduce the demand for clinker, thereby reducing the use of limestone and extending mine lifespan.
Transition Market	Increased Costs from Adopting More Alternative Materials	▪ **Increased product prices** Product prices rise due to increased costs. ▪ **Need to find new supply partners** Adopting alternative materials by new suppliers will increase operational and labor costs.	▪ **Ongoing development of new material sources** Develop new material sources to reduce reliance on a single type of material source. ▪ **Strengthening product R&D and equipment retrofit** Develop and test product quality to ensure product strength and safety. ▪ **Promotion of low-carbon products** Promotes low-carbon and environmental benefits, encouraging clients to consider not only price but also carbon reduction together with TCC.

Nature-related Opportunities

Type	Opportunity	Potential Impacts	Response Strategies
Resource Efficiency	Development of New Alternative Raw Materials to Reduce Mineral Demand and Equipment Energy Consumption	▪ **Extended use of natural resources** Diversify raw material sources and extend the lifespan and use of natural resources of mines. ▪ **Reduced environmental impact** Lower mineral and coal demand.	▪ **Replacing limestone and clinker with alternative raw materials** Recycle waste materials and reduce the demand for natural resources. ▪ **Testing new alternative raw materials** Invest in equipment and talent to maintain product safety through testing, despite potential quality impacts from low-carbon alternative raw materials. ▪ **Ongoing development of new raw material sources** Research new raw material sources to reduce the demand for natural raw materials. ▪ **Feasibility study of alternative fuels, wood pellets, biomass gasifiers, etc.** Study different ways to use alternative fuels, such as adding gasifiers to generate synthetic gas for energy. ▪ **Promotion of low-carbon products** Promote clients to use low-carbon products made from alternative raw materials.
Ecosystem protection, restoration and regeneration	Restoration of Indigenous Plant Species in Mines, Increasing The Number of Indigenous Species Planted	▪ **Restoration to optimal or original ecosystems** Restore ecosystem services in mines and increase biodiversity. ▪ **Gain of stakeholder recognition** Enhance the value of local eco-tourism and the corporate image and promote stakeholder recognition.	▪ **Nature-based restoration strategies** Engage in restoration right after mining, restore the original ecology, plant indigenous species, and promote natural succession. ▪ **Collaboration with external stakeholders for conservation and restoration** Collaborate with governments, academia, and NGOs on restoration, ecological surveys, and research projects. ▪ **Revitalization of operation sites** Add hiking trails in the Shoushan Land; design constructed wetlands at the Hoping EcoPort, revitalizing site spaces to gain natural benefits.

Type	Opportunity	Potential Impacts	Response Strategies
Sustainable use of natural resources	Increasing The Reuse and Recycling of Natural Resources Through Recycling Mechanisms	▪ **Reduced dependencies on natural resources** Reduce the use of raw resources to lower dependencies on nature and impacts on ecosystem. ▪ **Diversified material sources** Transit to a circular economy model, recycle industrial waste, and strengthen resource use efficiency.	▪ **Use of recycled materials and reclaimed water** Implement water reclamation and construction waste treatment systems to lower water usage and recycle waste, boosting income via waste disposal. ▪ **Fly ash as alternative raw material for cement** Supply Hoping Power Plant's fly ash to the cement plant as an alternative raw material, reducing the use of natural resources and avoid preventing ash ponds that harm marine ecology.
Ecosystem protection, restoration and regeneration	Monitoring The Natural Environment at Operation Sites Using New Technologies, Reducing Manpower Burden and Promoting Technology Replication	▪ **Enhanced monitoring efficiency** New monitoring technologies can increase the number and accuracy of monitoring items while reducing costs. ▪ **In-depth understanding of the natural environment** Utilize new technologies to capture anomalies in real-time and carry out response measures promptly. ▪ **Improved stakeholder relationships** Advanced monitoring technologies aims to reduce and address pollution incidents.	▪ **Restoration experience replication and expansion** Replicate the restoration experience to assist peers in mine restoration and promote exchanges. ▪ **Expansion in the monitoring items at the port** Hoping EcoPort plans to implement a 3-5-year monitoring item expansion project and enforce more conservation measures.
	Collaboration with KBCC and Universities on Restoration Projects	▪ Partnerships to promote habitat restoration Work with academic institutions and environmental groups to accelerate restoration	▪ **Collaboration with multiple parties** Consult and collaborate with KBCC, professors, Eco-Angel Environment Conservation Association, and Taiwan Forestry Research Institute experts.
Sustainable use of natural resources	Execution of the Ho-Ping Ark Ecological Program and Soil and Forest Carbon Sink Projects	▪ **Nature positive impact** Invest resources in research and restore the health of soil and forest ecosystems. ▪ **Obtain carbon credits** Increase carbon removal at operation sites and apply for project-based carbon credits, restoring ecosystems while reducing GHG emissions.	▪ **Implementation of soil and forest carbon sink projects** Investigate carbon sink data of operation sites, increase soil and forest carbon sinks, and restore biodiversity.
	Natural Environmental Protection and Nature-based Solutions (NbS) to Achieve Nature Positive	▪ **Adoption of NbS** Integrate sustainable resource use and climate change mitigation methods in the manufacturing process to achieve Nature Positive.	▪ **Co-processing to handle invasive White Popinac** Handling White Popinac by co-processing in high temperatures cement kilns removes alien species and substitutes coal, aiding in climate change mitigation. ▪ **Restoration with indigenous species** Uphold the principle of restoring while mining, adopt indigenous species locally, and continuously expand restoration areas.
Ecosystem protection, restoration and regeneration	Use of Renewable Resources to Establish Infrastructure, e.g., Solar Power PV and Microirrigation systems	▪ **Installation of infrastructure that benefits nature** Reduce carbon emissions in products, decrease reliance on purchased electricity, and enhance resilience to power crises. ▪ **Improved restoration effectiveness** Restoration facilities assist restoration efforts and increase effectiveness.	▪ **Installation of renewable energy generation and storage equipment** Install solar PV systems and energy storage cabinets at the operation sites and implement diverse renewable energy generation strategies. ▪ **Establishment of solar-powered microirrigation systems** Green power combined with microirrigation systems reduces manpower demands, increases irrigation efficiency, and minimizes resource waste.

Type	Opportunity	Potential Impacts	Response Strategies
Capital flow and financing	Application for Mines and Port to Be OECMs as Ecological Tourism and Education Zones	▪ **Elevated corporate image** Adopt proactive measures to protect ecosystems and increase brand value. ▪ **Enhanced value of ecological education and tourism** Promote environmental education and tourism and increase job opportunities for local communities. ▪ **Increased willingness and interests of multiple stakeholders** (1)Environmental groups: Collaboration opportunities for OECMs (2)Suppliers and partners: Collaboration promotion as a model (3)The public sector: Joint investment of resources to conserve marine ecosystems (4)Local residents: Increase in educational resources	▪ **Mines with indigenous species restoration established as OECMs** Engage in restoration efforts towards mines of indigenous species as OECMs, achieving the 30 by 30 goal and restore ecosystem. ▪ **Establishing tourism and educational parks** Promote OECMs and establish educational parks, such as providing local communities with job and tourism opportunities, exchanging practices with governments or academic institutions, and securing government funding or subsidies. ▪ **Promoting eco-friendly loading /unloading signs** Plan to promote eco-friendly loading/unloading practices at Hoping EcoPort over the next 1-3 years, highlighting how each transaction at Hoping Port aids in coral restoration. ▪ **Establishing a marine education platform** Plan to establish a marine education platform for OECMs in Taiwan, gathering marine education resources. ▪ **The plan for guided tours to the history and culture of mines** Combine the development history of TCC mines, the in-situ preserved production facilities, and historical buildings for cultural tours.
	Low-carbon Product Development and Eco-friendliness to Access Green Funds, Bonds, or Loans	▪ **Access to capital infusion** Secure funding for nature conservation through green and sustainable financing from banks and international capital markets. ▪ **Collaboration with the value chain** Help downstream clients reduce carbon footprint by selling low-carbon products.	▪ **Development of lower-carbon products** Develop low-carbon cement products using alternative raw materials/fuels to reduce carbon footprint. ▪ **Access to green funding** Plan sustainable finance to secure green credit lines and green ECBs. The green credit lines of NT$95.7 billion and green ECBs of NT$13.5 billion have been secured.
Sustainable use of natural resources	Joining Nature-related Initiatives and Obtaining Nature-related Certifications	▪ **Ongoing monitoring the latest nature conservation trends** Track international trends and optimize biodiversity management practices. ▪ **Offering positive impact on the value chain** Communicate the latest nature-related initiatives with value chain partners and contribute to Nature Positive.	▪ **Extending influence to enhance the positive impact of the value chain on nature** Extend nature issues to the value chain, exerting its influence to broaden the attention of all sectors to nature issues.
Ecosystem protection, restoration and regeneration	Soil Substrate Improvement	▪ **Restoration promotion** Improved healthy soil can promote plant growth and enhance restoration effectiveness. ▪ **Increased carbon sink** Healthy soil can establish a decent ecosystem, increase the proportion of organic matters and carbon sinks in soil.	▪ **Use of organic fertilizers for soil improvement** Retain soil during mining and backfills the restoration area, using organic fertilizers to improve soil properties.

Applying the Methodology for the Net Impact Assessment of Biodiversity in the Cement Sector
Aim for Net Positive Impact by 2040

The Hoping Mine initiated a long-term restoration project in 2016. To assess the restoration progress, TCC referred to the GCCA Sustainability Guidelines for Quarry Rehabilitation and Biodiversity Management and employed the Methodology for the Net Impact Assessment of Biodiversity in the Cement Sector (NIA) released by the World Business Council for Sustainable Development (WBCSD) to analyze the changes in biodiversity index curves since mining began in, and predict the trends of, the Hoping Mine.

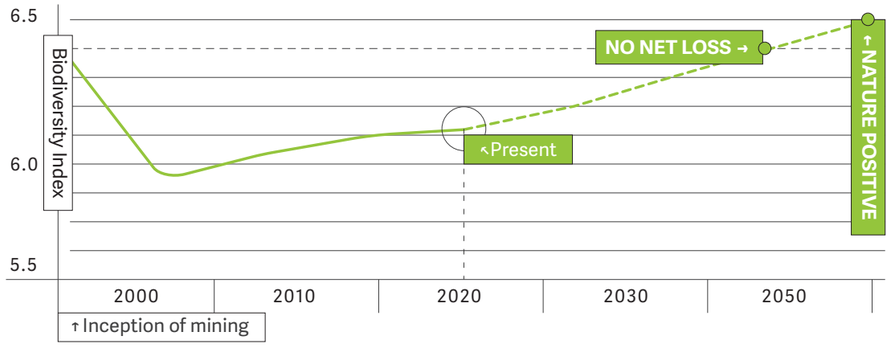
STEP 1
Use GIS software to interpret aerial photographs since the start of mining and classify the area of a mine into different types of habitats such as high-, medium-, and low-density forests, rocky habitats, extraction areas, restoration areas, farmland, and buildings.

STEP 2
Utilize EIA reports and ecological monitoring reports to assess the importance of habitats in mine, from both perspectives of location and species. If the habitat is located in a protected area or contains endangered and rare flora or fauna, the habitat importance is rated higher.

STEP 3
Assess the habitat condition using EIA reports and ecological monitoring reports, in terms of 4 main aspects: maturity and structure, likely species diversity, invasive species, and degree of threats.

- Maturity and structure: Assess the stability, complexity, and diversity of the habitat.
- Likely species diversity: Compare and assess the biodiversity of the habitat with similar surrounding environments.
- Invasive species: Assess the proportion and number of invasive species in the habitat.
- Degree of threats: Assess the level of disturbances in the habitat.

STEP 4
After calculating the biodiversity index for each type of habitat in terms of area, importance, and condition, a weighted average is calculated and summed to obtain the overall biodiversity index for the mine.



Note: The biodiversity is calculated as: ∑(habitat area × habitat importance × habitat condition) ÷ mine area

After starting mining at the Hoping Mine, biodiversity decreased due to mining activities. TCC began restoration in 2016, reintroducing native species and focusing on pollution control and soil and water conservation. TCC has continuously monitored the environment and ecology since mining began. Results show increasing biodiversity at the mine. Based on current data and trends, TCC continues to increase the area of restoration and forests, improving habitat conditions, aiming to achieve No Net Loss (NNL) by 2040, Net Positive Impact (NPI) thereafter.

TCC plans to successively and comprehensively introduce NIA for the operation sites across Taiwan and Mainland China to assess, track, and monitor the changes of biodiversity index in mines in a scientific and quantitative manner, while continuously reflecting on and improving the execution of restoration works.

The SBTN AR3T Action Framework

Transform

Transform the Shoushan Plant into detention basins
TCC collaborated with the Kaohsiung City Government to establish flood control facilities like detention basins, open channels, and pumping stations at the old Shoushan Plant, transforming it into a flood detention park. Additionally, hiking boardwalks were constructed to provide an ecological recreational space for citizens.

Scholarships, disadvantaged grants, and the Cement Academy
TCC values the co-prosperity with stakeholders, providing local communities with scholarships, student transportation subsidies, and emergency relief funds. TCC also cares for students' sustainable education through the Cement Academy and the Carbon Reduction Parent-Child Bankbook.(RCA).

A Circular Economy with Waste Management
TCC actively practices waste recycling. Apart from assisting in the disposal of industrial and household waste, TCC also develops means to converting waste concrete into recycled concrete aggregates (RCA).

Regenerate Restore

Indigenous plant restoration
Hoping mine collaborates with KBCC for restoration on the principle of selecting species fit for the area and reduce human disturbances and encourage natural succession.

Nesting box installation
TCC installs nesting boxes varied in size for bird reproduction and restoration.

Soil regeneration and carbon sinks
TCC uses natural organic fertilizers in the restoration areas to improve the physical and chemical properties of soils for regeneration and to increase carbon sinks, thereby promoting plant growth in mines.

Reduce

Wastewater treatment facilities
Wastewater from plants is treated to meet standards before being discharged, reducing water pollution.

Invasive species removal
TCC endeavors to work with the public sector and relevant parties to remove White Popinac and mitigate the threats of alien species to original habitats.

Slope Protection
Slope protection and windbreak nets are set up at Taibaishan Mine to mitigate soil erosion and the impact of strong winds.

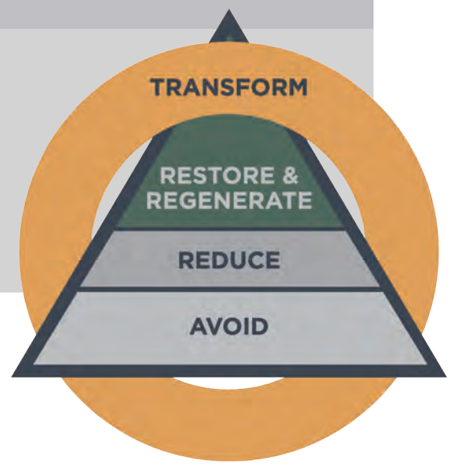
Light and noise pollution reduction
An automatic switch system at the Hoping Mine adjusts streetlights based on sunrise, and lights in the manufacturing area are centrally controlled based on need to minimize light pollution.
Plant equipment such as blowers and exhaust fans have silencers, and green belts and embankments near main roads are used to lessen noise transmission.

Vertical shaft transport
A vertical shaft transport system is installed at the Hoping Mine to cut emissions and reduce air pollution, fugitive dust, and disturbances caused by truck transportation.

Avoid

Use of reclaimed water
TCC actively installs water reclamation system and improves water use efficiency. Hoping Mine has set up a vertical shaft tunnel rainwater reclamation system. Hoping Plant has initiate water reclamation from branch lines and the MBR system to filter sewage. Taibaishan Mine has built rain harvesting ponds. Suao Plant reclaims effluents and wastewater from power generation by waste heat recovery.

100% EIA passed, with no mining in protected areas
Both Hoping Mine and Taibaishan Mine have passed EIA. TCC is committed to no mining within national protected areas and to the restoration and rehabilitation of the mine ecology to ensure a sustainable use of resources.



1.4 _ Stakeholders

The official TNFD Recommendations emphasizes that human society is an integral part of nature, and a company's positive/negative impacts on nature will also affect relevant stakeholders. Hence, assessing a company's impact on nature-related stakeholders is a crucial step towards the harmony between humans and nature.

TCC operates in Hualien and Taitung, closely connected to the tribes and heavily reliant on local talents. Referencing the TNFD Guidance on Engagement with Indigenous Peoples, Local Communities and Affected Stakeholders, TCC identified nature-related significant stakeholders in its business activities through a nature-related significant stakeholder workshop. The identification process for the nature-related significant stakeholders for TCC is as follows:

- List the nature-related stakeholders of TCC with reference to domestic and international nature-related trends, the TNFD framework, and TCC operation conditions;
- Identify important stakeholders in line with the three principles, Responsibility, Influence, and Diverse Perspectives, from the AA1000 Stakeholder Engagement Standards (SES);

Assessed Facet	Definition
Responsibility (TCC → Stakeholders)	The company currently, or in the future, may have responsibilities towards these stakeholders in the areas of natural environment conservation, prevention of biodiversity loss, and protection of habitat or living environment's rights/interests
Influence (Stakeholders → TCC)	Stakeholders who can have a nature-related impact or have decision-making power over the company
Diverse Perspectives (Stakeholders → TCC)	Different opinions from stakeholders give the company new insights into special conditions or introduce opportunities

- Select the top 2/3 of nature-related stakeholders as the nature-related significant stakeholders in terms of the relationship, importance, and level of impact of the nature-related stakeholders.

2023 Nature-related stakeholders for TCC

LEVEL OF RELATIONSHIP: HIGH / LOW

1. Government Agencies
2. Local Communities/Indigenous Peoples
3. Advocacy Organizations with Influence
4. Non-profit Organizations
5. Academic Institutions
6. Financial Institutions
7. Employees

High Correlation of Analysis Results and Operation, Meeting Stakeholder Expectations

The nature-related significant stakeholders consider that TCC risk analysis results are consistent with actual operating conditions. Most of the stakeholders believe that the risks identified are highly correlated with the operating activities, except for local communities/indigenous peoples, who consider that the correlation is low except for the Regulations for Consulting Indigenous Peoples or Tribes to Obtain Their Consent and Participation.

Category	Addition of environment monitoring system to ensure compliance with EIA standards	Mineral extraction quantity restricted	Required compliance with the Regulations for Consulting Indigenous Peoples or Tribes to Obtain Their Consent and Participation	Market value or brand of the Company impacted due to nature-related negative news	Disturbances to nearby residents owing to business activities of mines or plants
Government Agencies	M-H	M-H	M	M	M-H
Local Communities /Indigenous Peoples	L-M	L-M	M-H	L-M	L-M
Advocacy Organizations	H	M-H	H-VH	H-VH	H
Non-profit Organizations	H	H	H	M	M
Academic Institutions	H	M-H	M-H	M-H	M-H
Financial Institutions	M	M-H	M	M-H	M
Employees	M	M-H	M-H	M-H	M-H

Category	Development of new alternative raw materials to reduce mineral demand and equipment energy consumption	Collaboration with KBCC and universities on restoration projects	Restoration of indigenous plant species in mines, increasing the number of indigenous species planted	Increasing the reuse and recycling of natural resources through recycling mechanisms	Execution of the Ho-Ping Ark Ecological Program and Soil and Forest Carbon Sink Projects
Government Agencies	M-H	M-H	H	M-H	M-H
Local Communities /Indigenous Peoples	M-H	M-H	M-H	M-H	M-H
Advocacy Organizations	H-VH	VH	VH	H-VH	H
Non-profit Organizations	H	H	H	H	VH
Academic Institutions	H-VH	H-VH	H-VH	H-VH	H-VH
Financial Institutions	M	M	M	M	M-H
Employees	M-H	M-H	M-H	M-H	H

Note: VH: Very high; H: High; M: Moderate; L: Low; VL: Very low

Regarding nature-related opportunities, all nature-related significant stakeholders consider that the results identified by TCC have a highly correlation, suggesting that TCC takes into account the needs and perspectives of the stakeholders while identifying its own nature-related opportunities, which is highly aligned with future strategic directions in nature-related mitigation, adaptation, and protection.

Stakeholders recognized TCC's conservation efforts and suggested collaborating with the national park on OECMs, holding local activities, transparently disclosing species restoration, using a cloud system for timely updates, advancing "blue carbon" verification at Hoping EcoPort, and improving media collaboration.

TCC aims to create better communication with stakeholders, fostering mutual understanding and collaboration for sustainable ecological development.

TCC Stakeholder Feedback

1.5 Nature-related Financial Impact & Ecosystem Services Value

As part of nature, TCC considers mitigation and restoration of natural environment as one of its core business values. Aside from addressing the potential nature-related risks it may face, TCC proactively creates various nature-related opportunities that have positive impacts on nature. Also, through assessment and disclosures of the financial impacts from nature-related opportunities, TCC aims to provide its stakeholders, various industries, and society with a comprehensive understanding and evaluation of the actions and financial performance of TCC in relation to natural value creation.

The nature-related opportunities TCC has invested are categorized as follows:

ALTERNATIVE RAW MATERIALS	Reduce the dependencies and withdrawal of natural resources with cross-industrial circular economy of symbiosis, including the use of recycled materials to replace the natural raw material in cement—limestone—to raise the proportion of alternative raw materials.	
ALTERNATIVE FUELS	Reduce the use of fossil fuels and carbon emissions with cross-industrial circular economy of symbiosis, including the increase in the proportion of alternative fuels to reduce air pollution and carbon emissions.	Construct reclamation facilities for rainwater, process water, and wastewater, including construction of vertical shaft water reclamation, membrane bioreactor (MBR), and rainwater harvesting systems for water recycling.
ALTERNATIVE ENERGY	Reduce the use of grey energy and carbon emissions, including installation of solar and wind energy systems, active investment in the feasibility study of using renewable energy like geothermal energy, small hydropower and OTEC for power generation, and use of 100% power generation by waste heat recovery in the cement manufacturing process.	WATER RECLAMATION
NATURAL ECOSYSTEM CONSERVATION	Restore and conserve natural environments and species and invest in social and environmental education, including the monitoring and collaboration programs, the hydroseeding on the residual wall slope at the Taibaishan Mine, the restoration program of industrial-academic collaboration with the National Ilan University, Ho-Ping Ark Ecological Program, the coral rehabilitation project at Hoping EcoPort, the survey of the marine ecology nearby the Hoping Power Plant with the National Taiwan Ocean University, fund for KBCC since 2007, etc.	

TCC has chosen nature-related opportunities for financial assessment due to their long-term investment potential. By quantifying these efforts, TCC aims to showcase its performance in reducing natural raw materials, energy, and resources, while using alternative raw materials, fuels, energy, and water reclamation to create new opportunities and enhance competitiveness. Additionally, investments in ecosystem conservation not only fulfill environmental and social responsibilities but also have positive financial impacts.

Comprehensive Description of Nature-related Financial Performance

TCC is committed to the research, development, and application of nature-related opportunities, in which it has invested huge monetary and human capitals. The financial assessment was carried out with 5 nature-related opportunities, i.e., alternative raw materials, alternative fuels, alternative energy, water reclamation, and natural ecosystem conservation:

Nature-related revenue
over
NT$40.5 billion
accounting for 37%of total consolidated revenue

In 2023, a revenue of NT$39,279,069 thousand generated from low-carbon-related products, NT$496,301 thousand from renewable energy trading revenue, and NT$748,807 thousand from industrial waste and domestic waste services, totaled NT$40,524,177 thousand, accounting for 37% of the consolidated total revenue of NT$109,314,335 thousand.

Internal cost savings
over
NT$2.7 billion

This encompasses cost savings of approximately NT$2,791,036 thousand in raw material sourcing, electricity bills, and water bills through reduced use of limestone, coal, solar power generation for self-consumption, power generation by waste heat recovery, and increased use of reclaimed water.

Pro forma
TAIWAN Carbon Fee Cost
MAINLAND CHINA
Carbon Trading Revenue
over
NT$500 million

In Mainland China, the reduced carbon emissions from using alternative fuels is estimated to be converted into a carbon trading gain of NT$336,042 thousand; the reduced carbon emissions from using alternative energy is estimated to be converted into a carbon trading gain of NT$153,023 thousand; in Taiwan, the pro forma carbon fee cost savings from using alternative fuels and alternative energy reached NT$47,972 thousand, totaling a pro forma revenue of NT$537,037 thousand.

Ecosystem Positive Impact Value

Approx. NT$108 million worth of ESV of the Jinchang Quarry, Hoping Mine

The Hoping Plant of TCC worked with Associate Professor Chyi-Rong Chiou from the School of Forestry and Resource Conservation, NTU, in 2020 to perform an ecosystem services valuation for the Jinchang Quarry, including the carbon sink, water conservation, air purification, and supportive services, extending to prevention of soil and sand loss, biodiversity, and other items, in which the ecosystem services value (ESV) within Jinchang Quarry was estimated at NT$ 108,371,802.

2.2 million metric tons of carbon reduced internally/externally

The internal coal use reduction and power generation by waste heat recovery is equivalent to a reduction of 1.05 million metric tons of carbon emissions, while the adoption of alternative resources, circular economy practices, and renewable energy products and services have contributed to a reduction of 1.15 million metric tons of CO_2e.

Plant conservation for pro bono sharing to create priceless benefits

Plant DNA is provided free of charge for R&D, academic, and medical institutions, creating whole new values for human living and life. Take the brain injury drug patent of the NTHU for example. If the new drug is successfully developed, it could potentially benefit 4.45 million individuals, who seek medical treatment for neurological diseases annually, according to the latest data from the Ministry of Health and Welfare. Calculated in terms of the National Health Insurance costs, it could potentially reduce societal costs by NT$2.2 billion.

Summary of Natural-related Opportunities Financial Evaluation	
Evaluation Period	2023
Scope	TCC Group Holdings and its subsidiaries Group organization, Dr. Cecilia Koo Botanic Conservation Center
Unit	NT$ thousand

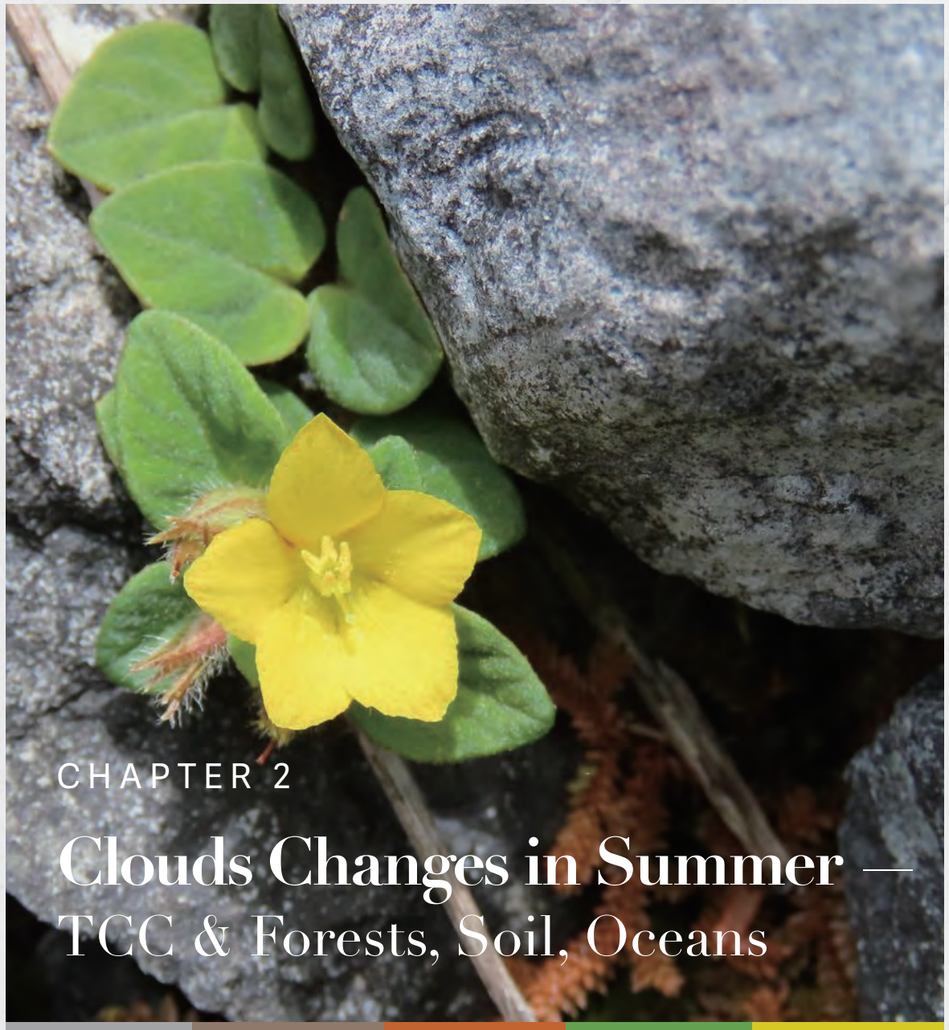
TCC shall continue to invest in natural conservation, restoration, and regeneration efforts, actively participate in organizations and projects dedicated to sustainable natural resources, as well as elevate human well-being and create ecosystem benefits and values.

Nature-related Opportunity	Costs and Expenditures	Cost Savings	Revenues	Positive Impacts on Ecosystem[1]
Alternative Raw Materials Reduce the dependencies and withdrawal of natural resources with cross-industrial circular economy of symbiosis	NT$2,021,922 thousand as the costs for the access of recycled raw materials	An estimated NT$38,769 thousand saved through the reduced use of natural resource of limestone	Operating revenue from low-carbon related products: NT$39,279,069 thousand **See CH7.7 in the 2023 Annual Report** Low-carbon products include: • Portland Type I cement and Portland Type II (MH) cement with carbon reduction labels and Low-carbon Recycled Materials certification by the Ministry of the Interior • Portland limestone cement; Portland limestone cement concrete • Cementitious materials with cement accounting for 50% or less in ratio • Low-carbon concrete with carbon reduction labels and green building material certification • Low-carbon cement with the low-carbon cement certification of Mainland China	• 223,226 metric tons of limestone usage saved • Approximately 1.09 million metric tons of avoided emissions delivered by low-carbon products **See P.17 in the 2023 Sustainability Report of TCC Group Holdings**

Nature-related Opportunity	Costs and Expenditures	Cost Savings		Revenues		Positive Impacts on Ecosystem[1]
Alternative Fuels Reduce the use of fossil fuels and carbon emissions with cross-industrial circular economy of symbiosis	NT$959,893 thousand as the expenditures for the access of alternative fuels	1,190,466 thousand in the coal procurement costs saved after reducing the usage of coal	Pro Forma Carbon Fee in Taiwan: An estimated NT$38,554 thousand of carbon fee costs saved [2]	NT$748,807 thousand in operating revenue, as the result of increased services of industrial waste and domestic waste services in 2023 ,	Pro Forma Potential Revenue from the Carbon Trading in Mainland China: An estimated gain of RMB 336,042 thousand in carbon trading converted from the reduced carbon emissions [3]	➧ Approximately 537.2 thousand metric tons of coal usage saved ➧ An estimated 650,635 tCO_2e reduced
Alternative Energy Reduce the use of grey energy and carbon emissions	➧ NT$11,539,175 thousand as the capital investment for the installation of alternative energy like renewable energy See CH7.7 in the 2023 Annual Report ➧ NT$27,226 thousand as the costs for marine energy and small hydropower ➧ NT$366,975 thousand for power generation by waste heat recovery	Electricity Bills: NT$1,560,313 thousand saved with the use of alternative energy, reducing the dependency on purchased electricity **See CH7.7 in the 2023 Annual Report**	Pro Forma Carbon Fee in Taiwan: An estimated NT$9,418 thousand of carbon fee costs saved [2]	NT$496,301 thousand of revenue from renewable energy trading **See CH7.7 in the 2023 Annual Report**	Pro Forma Potential Revenue from the Carbon Trading in Mainland China: An estimated gain of RMB 153,023 thousand as the revenue in carbon trading [3]	➧ 60,000 tCO_2e of avoided emissions with renewable energy installation **See P.17 in the 2023 Sustainability Report of TCC Group Holdings** ➧ An estimated 452,064 tCO_2e reduced with power generation by waste heat recovery
Water Reclamation Construct reclamation facilities for rainwater, process water, and wastewater	NT$50,162 thousand as the equipment costs to enhance resiliency and adaptability **See CH7.7 in the 2023 Annual Report**	NT$1,488 thousand of water bills saved as the result of water recycling to lower the expenses of using external water resources at TCC		--		➧ 72,392.31 megaliters of water reclaimed in total **See P.168 in the 2023 Sustainability Report of TCC Group Holdings**
Natural Ecosystem Conservation Restore and conserve natural environments and species and invest in social and environmental education	NT$169,941 thousand as the investment	--		A total of NT$428,276 thousand of revenue generated from TCC DAKA Open Eco-Factory, with partners, Market, and guided tour itineraries included, from 2020 to May 2024; a portion of the funds contributed by partners, along with the income from the DAKA Market and the guided tours, 100% invested in the Hualien Heping Elementary School Education Fund from 2020 to 2022; the Hoping Sustainability Charity Foundation, established in August 2022, for the purpose of emergency relief in Heping **Please see:** **https://www.tccgroupholdings.com/en/esgSocialEngagement.html**		➧ NT$550 thousand of emergency relief funds in total contributed by the Hoping Sustainability Charity Foundation to support 21 individuals of children and households encountering emergencies, domestic calamities, or livelihood difficulties in 2023 ➧ A cumulative total of 6,500 medicinal materials provided, and a gene bank of 62 plant families preserved, as of 2023, by KBCC **See P.113 in the 2023 Sustainability Report of TCC Group Holdings**
Subtotal	**NT$15,135,294 thousand**	**NT$2,791,036 thousand**	**NT$47,972 thousand pro forma**	**NT$40,524,177 thousand**	**NT$489,065 thousand pro forma**	

Note [1]: The positive impacts on ecosystem encompass beneficial impacts on ecosystems and humans, such as lowered withdrawal of natural resources, reduced CO_2 emissions, increased water recycling rate to reduce water withdrawal, and assistance to stakeholders.
Note [2]: The cost savings are calculated as the reduced carbon emissions with the use of alternative fuels at TCC in Taiwan × the carbon fee rate (estimated at NT$300 per metric ton)

Note [3]: The estimated revenue is calculated as the reduced carbon emissions with the use of alternative fuels in Mainland China × the closing price of the carbon trading market in Mainland China on 2023/12/29 (RMB 79.42 per metric ton), converted to NT$ at an exchange rate of 4.396.



Lysimachia nigropunctata / Baolai Quarry

CHAPTER 2

Clouds Changes in Summer — TCC & Forests, Soil, Oceans

MINERAL GREY

STEMS BROWN

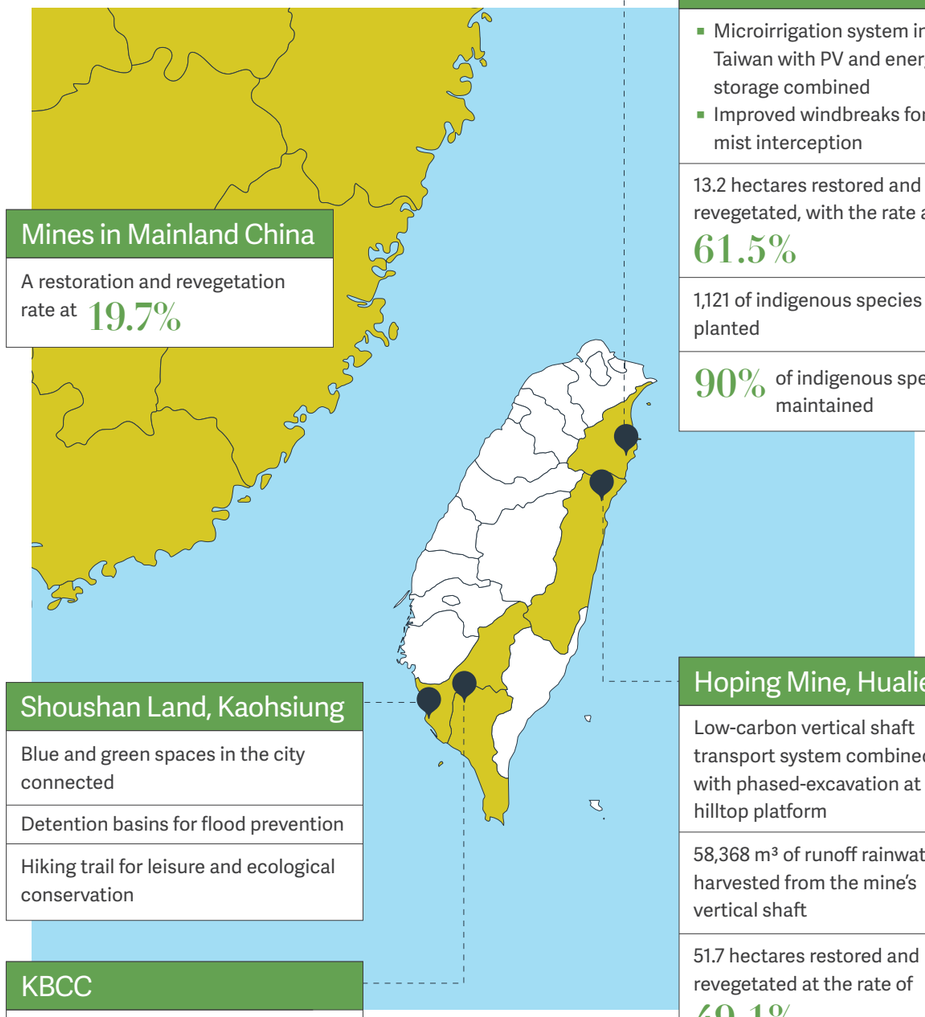
PUBESCENT REDDISH BROWN

LEAVES DUSTY GREEN

FLOWERS YELLOW COROLLA

2.1 _ Forests

2.1.1 _ TCC Forest Map – 2023



Mines in Mainland China

A restoration and revegetation rate at **19.7%**

Taibaishan Mine, Suao

- Microirrigation system in Taiwan with PV and energy storage combined
- Improved windbreaks for mist interception

13.2 hectares restored and revegetated, with the rate at **61.5%**

1,121 of indigenous species planted

90% of indigenous species maintained

Shoushan Land, Kaohsiung

Blue and green spaces in the city connected

Detention basins for flood prevention

Hiking trail for leisure and ecological conservation

KBCC

34,646 taxa
of plants conserved (endangered species included)
| as of March 31, 2024

6,500 medicinal supplies from 62 plant families provided
| as of March 31, 2024

Hoping Mine, Hualien

Low-carbon vertical shaft transport system combined with phased-excavation at hilltop platform

58,368 m³ of runoff rainwater harvested from the mine's vertical shaft

51.7 hectares restored and revegetated at the rate of **49.1%**

24,955 indigenous species planted

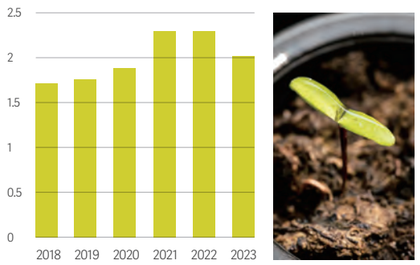
88% of indigenous species maintained

TOC % in the soil of restoration area raised by **1.3 times**
| 3 years of restoration

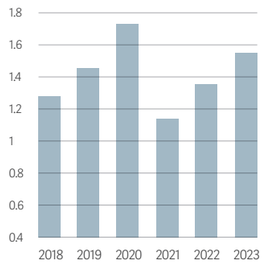
The biodiversity index

the Shannon-Weiner Species Diversity Index adopted (H'), as H' between 2 to 3 indicates a certain level of biodiversity.

Biodiversity Index of Plants



Biodiversity Index of Mammals

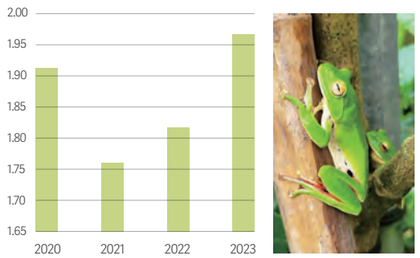


Note: The H' for the mines slightly declined in 2023, possibly due to seasonal dormancy of plants or the fluctuation of species in the natural environment.

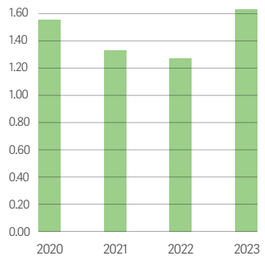
Biodiversity Index of Birds

Biodiversity Index of Butterflies

Biodiversity Index of Amphibians



Biodiversity Index of Reptiles



Note: The index is caculated for the Hoping Mine and the Taibaishan Mine

2.1.2 _ Biodiversity Plan

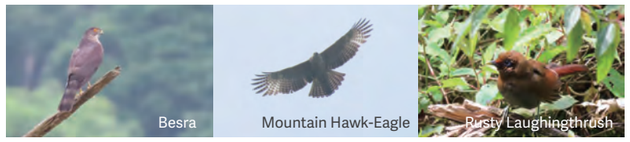
Upholding the principle of restoring while mining, TCC cultivates indigenous species in mines, and leveraging natural succession to promote biodiversity. The flora and fauna in mines are monitored on a regular basis. The biodiversity index of mines is calculated using international methodologies to evaluate the effectiveness of restoration efforts. The ecosystems in the mines are gradually recovering, aiming for the goal of No Net Loss to Net Positive Impact.

With the analysis using the Criterion I and Criterion II in the phase of Locate of TNFD for areas with high nature or species sensitivity and with potential species in the Hoping Mine (Hualien), the Taibaishan Mine (Suao), the Shoushan Land (Kaohsiung), and the Hejiayuan Mine (Anshun, Guizhou), the practices for nature and biodiversity restoration in force as well as the results and future plans are elaborated as follows.

The Hoping Mine — Hualien

Conducted the terrestrial ecological survey of the mine in 1997, passed EIA in 1999, commenced mining in 2003, with ecological monitoring performed quarterly, and implemented the forest restoration and biodiversity plan in 2016.

TNFD Locate	Responses of TCC
Ecosystem Sensitivity (H) The mine is located in the geologically sensitive area and the Environmental Conservation Zone, making it ecologically sensitive.	➧ Rigorously adherence to the red line for the mining area with no operations beyond, as the long-term monitoring results show that nearly 90% of the indigenous plant species in the mine have been maintained ➧ The soil and water conservation plan established upon commencement of mining operations ➧ Berm ditches, drainage ditches, and large silting basins created in the mine in response to the potential landslides and soil erosion caused by heavy rainfall ➧ Physical rock embankments over 2 meters high constructed on slopes to prevent direct runoff due to heavy rainfall ➧ Limestone transported with a vertical shaft system to avoid surface and human disturbances

TNFD Locate	Responses of TCC
Species sensitivity (VH) Prediction was made based on the model of the Ministry of Agriculture for the potential distribution of 9 threatened species, flora and fauna, including Eurasian Jay, Formosan Bulbul, Long-tailed Shrike, Mountain Hawk-Eagle, Lilac Daphne, Beach Morning-Glory, Rubus sumatranus, Depressed Orange, and Heptapleurum ellipticum var. ellipticum	SPECIES INFORMATION ➠ Threatened species observed in the quarterly ecological survey of the mine: including Mountain Hawk-Eagle, Rubus sumatranus, and Depressed Orange ➠ Protected species like Formosan Serow, Crab-eating Mongoose, Formosan Yellow-throated Marten, Black Eagle as well as Small-leaved Distylium, Lycopodium sieboldii Miq., and Taiwan Cow's-Tail Pine observed in the monitoring report, besides the list of potentially threatened species  Besra Mountain Hawk-Eagle Rusty Laughingthrush MEASURES ➠ Ecological ponds established as amphibian habitats and source of water for wildlife ➠ Nesting boxes for birds varied in size set up for bird reproduction

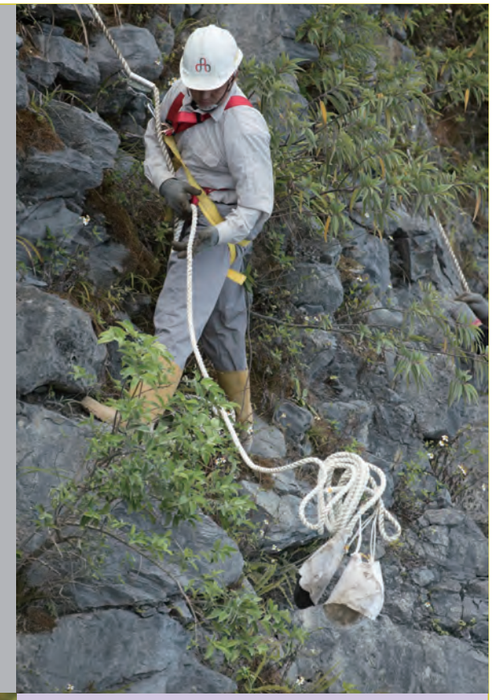
TCC has extensively cultivated indigenous species at the Hoping Mine. In collaboration with TCC-funded KBCC, plants like Yunnan Bletilla, Oriental Chain Fern, and Common Free Ferm, are restored.

In 2023, 24,955 plants were grown for restoration, with large indigenous tree species such as Formosan Alder, Ring-cupped Oak, and Formosan Ash being the majority. These plants are pioneer species in forest succession, capable of adapting to the alpine climate and accelerating soil nitrogen fixation. In addition to plant restoration, ecological monitoring and survey are carried out for the mine quarterly. Besides documenting species listed in the database of the Ministry of Agriculture, dozens of protected species, including Crab-eating Mongoose, Formosan Serow, Mountain Scops Owl, and Crested Serpent Eagle, were observed as well. Since 2022, the humid climate has been leveraged to cultivate ferns. Also, boardwalks connect ecological ponds, enhancing environmental education, where visitors can see butterflies in spring and fireflies in early summer.


Luciola cerata in Hoping Plant Pit 1

Yunnan Bletilla

Yunnan Bletilla is a rare orchid species endemic to Taiwan and native to the Hoping Mine of TCC in Hualien, which thrives on rocky slopes kissed by the sun. To restore the original ecological landscape to the mine, the mine restoration personnel of TCC replanted Yunnan Bletilla seedlings on the rock walls. Under the professional guidance of KBCC, the restoration efforts were conducted using ropes throughout a challenging process. In 2020, TCC partnered with KBCC to promote the restoration of the indigenous Yunnan Bletilla, with the aim for it to flourish once again at the Hoping Mine.



KBCC first employed the aseptic seeding technology to cultivate approximately 2,000 seedlings, which were then transferred to pots for cultivation in the nursery of the Hoping Mine for at least 6 months to adapt to the local climate. Then, in October 2020, 300 Yunnan Bletilla seedlings in good condition were selected for manual replantation back onto the rock walls of their native habitat on the principle of replantation for every five meters of mining.
TCC will continue to work with KBCC to cultivate seedlings and select suitable locations for transplantation and restoration, expanding the population and area of Yunnan Bletilla to restore the mine to its original ecological landscape.

The Taibaishan Mine

Yilan

Passed EIA in 2003, with ecological monitoring conducted every 6 months, and initiated the ecosystem restoration project in 2017.

TNFD Locate	Responses of TCC
Ecosystem Sensitivity (H) The Taibaishan Mine is located in the geologically sensitive area and the Environmental Conservation Zone, making it ecologically sensitive. Also, the strong winds for years at the Taibaishan Mine, and the karst topography, present harsh conditions for restoration.	• Rigorously adherence to the red line for the mining area with no operations beyond, as the long-term monitoring results show that nearly 90% of the indigenous plant species in the mine have been maintained • The soil and water conservation plan established, with protective netting installed on slopes to prevent soil erosion • The first-of-its-kind microirrigation system integrated with PV and energy storage; rainwater harvesting ponds • Windbreak set up to protect restored plants and enhance ecological resilience • Enhanced plant resilience with nurseries and acclimatization facility established down the mountain for replantation of flora back to the mine upon maturity
Species sensitivity (M) Prediction was made based on the model of the Ministry of Agriculture for the potential distribution of 2 threatened species, such as Rubus sumatranus and Small-leaved Distylium.	SPECIES INFORMATION • Ecological survey of the mine carried out semiannually, with no potential distribution of threatened species found • Protected species like Formosan Serow, Crested Goshawk, Crested Serpent Eagle, Lycopodium sieboldii Miq., and Taiwan Cow's-Tail Pine observed in the monitoring report, besides the list of potentially threatened species  Formosan Serow | Lycopodium sieboldii Miq. | Taiwan Cow's-Tail Pine MEASURES • Food sources for mammals, with crops such as pumpkin, sweet potato, potato, yam, taro, and chayote interplanted, as temporary distraction to keep animals from gnawing on saplings

The Taibaishan Mine faces strong winds and water scarcity due to its location and karst topography. Since 2017, TCC and Professor Ji-Wei Huang from National Ilan University have used innovative methods for restoration, including Taiwan's first microirrigation system with PV and energy storage, windbreaks, and rainwater harvesting ponds.

Initial efforts included microclimate studies and soil improvement with mushroom compost. Indigenous species were selected for restoration. The Suao Plant repurposed an old tennis court for acclimatizing seedlings. By 2023, 1,121 trees, mainly wind-resistant and drought-tolerant species, such as Subcostate Crape Myrtle and Autumn Maple Tree, were planted. An increased wildlife activity has been observed. 5 taxa of medium to large mammals, 24 taxa of birds, and 9 taxa of amphibians were detected by infrared thermal imaging cameras in 2023. Among the protected mammals, Formosan Serow is the most frequently observed species, while bird species, such as Crested Serpent Eagle, Crested Goshawk, White-tailed Blue Robin, and Green-backed Tit, have also been observed.

The Shoushan Land — Kaohsiung

Ceased mining in 1992 and became the Chaishan Flood Detention Park in 2017.

Source: Shu-Qi Yang and Keng-Yu Ku from the Landscape Architecture Department of TungHai University

TNFD Locate	Responses of TCC
Ecosystem Sensitivity (H) **Species Sensitivity (VH)** Part of the land of the Shoushan Land is located in the geologically sensitive area and the urban planning area, making it ecologically sensitive. Also, prediction was made based on the model of the Ministry of Agriculture for the potential distribution of 18 threatened species.	SPECIES INFORMATION ➟ Ecological surveys conducted before and after the transition into a flood detention park in 2013 and 2017, with the potential distribution of 1 threatened species found: Fan Palm ➟ Protected species like Crested Serpent Eagle, Taiwan Hwamei, and Brown Shrike observed in the ecological survey, besides the list of potentially threatened species ➟ An increasing species diversity of birds, fish, and aquatic insect species, gradually forming an ecosystem and a complete food chain MEASURES ➟ Mining ceased and restoration initiated in 1992 ➟ Detention basins established to mitigate flood and connect blue/green spaces in the city ➟ Hiking trails created for recreation and eco-tours ➟ Assessment for working with the Kaohsiung Wild Bird Society to continue the bird survey

At the Shoushan Land, the concept of in-situ conservation is adopted to plant indigenous plants and bring back indigenous animal species like Formosan rock macaque, along with diverse species. In recent years, Shoushan Land has undergone environmental improvements, creating the Chaishan Flood Detention Park and the Chaishan Hiking Boardwalk. Aside from being a recreational spot for Kaohsiung citizens, it offers an ecological corridor connecting the urban blue and green spaces like the Love River and Chaishan. Flooding issues in low-lying areas has been improved through the collaboration between TCC and the Kaohsiung City Government, which involved the construction of flood prevention facilities like detention basins, open channels, and pumping stations at the park, with a total flood detention capacity of 65,000 metric tons. The entire flood control project is based on disaster prevention, with the goal of transforming Kaohsiung into a livable city that puts people at the core. In addition to solving the flooding problem, the area of green spaces has been significantly increased by design to mitigate the heat island effect.

The Hejiayuan Mine — Anshun, Guizhou

Acquired the mining right in 2009 and passed the National Green Mine assessment of Mainland China in 2021.

The Hejiayuan Mine, Anshun, continues to green the mine environment and boost resource utilization efficiency, saving energy and reducing carbon emissions. It has passed the on-site review of Green Mine in a row from 2021 to 2023. In addition to revegetation works, ecological farms, ecological ponds, and employee leisure facilities have been built in the mine to enrich the ecological environment of the area. In 2023, about 0.4 hectare of area was revegetated, and 4,500 plants were planted, with cumulative 6 hectares of area revegetated.

Biodiversity Risk Assessment	Responses of TCC
Potential Distribution of the Species on the List of Three Values An analysis of the Hejiayuan Mine, Anshun, using the BIA tool recommended by the TNFD, reveals the potential distribution of 11 species listed in the List of Terrestrial Wild Animals of Significant Ecological, Scientific, or Social Value (The List of Three Values), including Black-throated Tit, Grey-capped Greenfinch, Oriental Magpie Robin, White-browed Laughingthrush, White Wagtail, Green-backed Tit, Sparrow, Daurian Redstart, Pallas's Leaf Warbler, Brown-breasted Bulbul, and Collared Finchbill.	MEASURES ➟ Ongoing attention to the mine ecology by the Anshun Plant, although species listed in the List of Three Values are not species protected by the law in Mainland China ➟ A land reclamation plan formulated, and retain topsoil from mining for temporary slope protection before backfilling for revegetation after mining ➟ Accumulation of revegetation experience, identifying plants fit for the local environment and extensive planting, such as False Acacia, Willow, Chinese Coriaria, Diverse-leaved Creeper, and Shamrock ➟ Nitrogen-fixing plants grown, and use of chemical fertilizers avoided, to restore the physical and chemical properties of soil AREA OF IMPROVEMENT ➟ A lack of species monitoring report; environmental and ecological survey of the mine required

2.1.3 _ Carbon Sink Survey & Findings

High Forest Coverage in Mines with A Growing Density

Following international conservation trends such as Nature Positive and NbS, TCC collaborated with Associate Professor Chyi-Rong Chiou's team from the School of Forestry and Resource Conservation, NTU, at the end of 2023 to conduct a survey on forest carbon sink in the Hoping Mine. By collecting metrics from the natural forest in the mine, TCC aims to establish the standards of NNL for restoration areas.

The project started with analyzing land use changes in mines, creating a matrix of land use changes since mining began, examining area changes and trends of forests, mining areas, and restoration areas in different periods.

Results show high-density forests covered 646.76 hectares (63.08%) in 2002, increasing to 788.58 hectares (76.92%) in 2022. Medium-density forests have decreased yearly due to conversion to high-density forests. Low-density forests increased slightly in 2015, then decreased annually. Bare land and grassland areas also declined, gradually returning to forest. Mine restoration areas have risen, with a 213% increase in 2022 compared to 2002.

The Carbon Stock of Natural Forests in Mines Higher than That of Asia Tropical Rainforests

After analyzing the past and present land use of mines, TCC started the survey of natural forest carbon sinks of mines. Due to the steep terrain, convenience sampling was adopted, randomly selecting areas easier to reach at varied altitudes as sample areas. The survey team set up 40 sample plots in the natural forests and restoration areas in the mines, among which 10 were selected for an expanded monitoring of plant growth to analyze carbon sink.

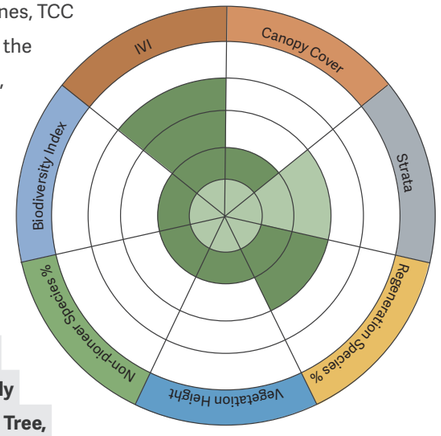
The preliminary analysis results show that the carbon stock of the Jinchang Quarry in Hoping Mine is about 123.21 tons per hectare, which is nearly twice that of Daan Forest Park and also higher than the average of 121 tons per hectare of the tropical rainforests in Asia.

REGION	CARBON STOCK (ton C/ha)
The natural forest in the Hoping Mine	123.21
Daan Forest Park[1]	39.49-65.84
Experimental forest in Liugui[2]	153.7
Tropical rainforest in Asia[2]	121
Tropical rainforest in Brazil, South America	137- 200

Reference
1: Lin, K., Duh, C., Hsu, C., & Huang, C. (2006). Aboveground Carbon Accumulation of Subtropical Natural Broadleaf Forests in the Liukuei Experimental Forest of Southern Taiwan.
2: Lin, Y. (2022). Carbon Sinks Potential of Urban Trees in Daan Park.

The Recovery Wheel Assessment System Introduced, Assessing Restoration Progresses with 7 Indicators

In addition to the survey of natural forest's carbon stock in the mines, TCC has introduced the "Recovery Wheel" assessment system by the Society for Ecological Restoration (SER). 7 localized indicators, i.e., canopy cover, non-pioneer species %, strata, vegetation height, regeneration species %, biodiversity index, and Important Value Index of Indigenous Species (IVI), were set based on survey results. With the indicators of natural forests in mines as a benchmark, the recovery status of restoration area is assessed.



13 years restoration area has shown grown in all indicators except strata compared to one year restoration

According to the analysis results, compared with the new restoration area at 1,020m, the canopy cover of the restoration area at 1,160 m after 13 years of restoration increased by nearly 50%. Non-pioneer species like Acuminate-leaf Eurya, Milk Fig Tree, and Largeflower Deutzia are observed. The growth percentage is nearly 20%. The IVI increased by 1.5 times, and the biodiversity index has risen from 0.93 to 1.75, indicating a significant restoration result.

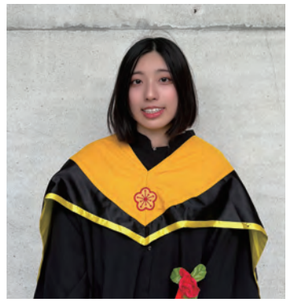
MINE ELEVATION	1,020 M (1 YEAR OF RESTORATION)	1,160 M (13 YEARS OF RESTORATION)
Canopy Cover The vegetation coverage in the sample plot (%)	**37%**	**83%**
Strata The vegetation composition in the sample plot is visually assessed to evaluate the strata structure. The more strata there are, the more conducive it is to the coexistence of different species in the same habitat, thereby promoting biodiversity.	**Two layers** (floor stratum; shrubs)	**Two layers** (floor stratum; shrubs)
Non-pioneer Species % Classify the shade tolerance of different species into level I to V and calculate the percentage of species with a shade tolerance level of III or above. The abundance of non-pioneer species symbolizes the length of forest succession. The more non-pioneer species there are, the more mature the succession is.	**10%**	**29%**
Vegetation Height The average height of vegetation with a DBH ≥ 5cm	**1.87 meters**	**6 meters**
Regeneration Species % It is calculated as the percentage of species with a DBH ≤5cm in the sample plot to the total number of species. A higher regeneration species percentage indicates that the sample plot is mainly composed of seedlings, with fewer large trees present.	**100%**	**71%**
Biodiversity Index Shannon-Weiner Species Diversity Index adopted	**0.93**	**1.75**
IVI The average coverage and frequency of indigenous species are calculated. A higher IVI indicates a greater number of indigenous species in the sample plot.	**65%**	**98.7%**

Reference: Yi-Hsin Rao (2024). Applying quantitative indicators to evaluate ecological restoration results in mining areas - A Case Study of Taiwan Cement Hoping Mining Area

Restoration Areas on the Path to Natural Forests

TCC will continue monitoring the 7 indicators to assess the performances of the restoration areas. The interim report shows the restoration area at 1020 m is mainly composed of Griffith's Ash, Tall Fleabane, and Summatra Fleabane, and the area at 1160 m is mainly Miscanthus sinensis var. glaber, Tuberous Sword Fern, and Large-flower Deutzia. A higher proportion of shade-tolerant species, such as Largeflower Deutzia and Acuminate-leaf Eurya, begin to appear and thrive at 1160 m. There are also seedlings of Milk Fig Tree and Chinese Spice Bush. The overall species composition is beginning to change. In the later stage, to increase the tree cover, species with a higher shade tolerance, such as Phoebes and Fagaceae may be considered. These dominant species of natural forests can serve as important references for restoration tree species, with the goal of gradually advancing towards natural forests, from NNL to NPI.

Since working on carbon sink investigation in the Hoping Mine, I have visited the mine nearly 10 times so far. I cannot help but marvel at the rich species composition of the forests in the mine. Although identifying tree species really takes quite an effort, it's also gratifying to see such a complex ecological makeup in this place. Sometimes, we even spot traces of Formosan muntjac and Formosan serow on the ground. I find it is very meaningful to be able to participate in the investigation and record the achievements of conservation effort.



Additionally, when I first saw the restoration area, I was quite taken aback. While mining operations were ongoing, the restoration on the cliffs had turned into an entire small mountain, which was quite astonishing at first glance. Every year, new seedlings are continuously planted, and the restoration has been ongoing for 20 years. It is evident that TCC has invested considerable effort, time, and money into restoration work. By conducting these investigations of the restoration areas, we can also provide specific suggestions on areas for improvement. Hoping that through the results of these surveys, we can contribute to the restoration efforts.

Yi-Hsin Rao, Graduate Student, School of Forestry and Resource Conservation, National Taiwan University

2.2 _ Soil

2.2.1 _ Mine Soil under Microscopes

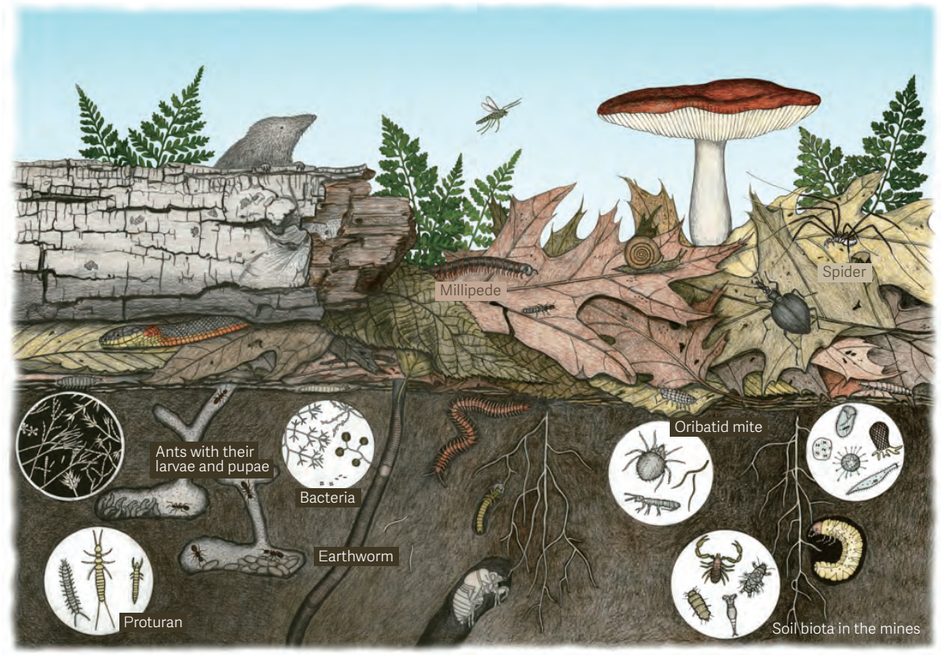
"We believe the lives of all living beings have always been interconnected, coexisted and codependent for survival. In the ecosystem, creatures such as germs, insects, animals and plants rely on one another to survive. Around the world, 95% of food are from the soil and there are 60% of biological species that were discovered within the soil. In a natural environment, one cubic meter of soil is the home to hundreds of billions of bacteria, hundreds of millions of protists, millions of nematodes, hundreds of thousands of mites, as well as insects, spiders, and earthworms."

"Furthermore, soil is the most important carbon sequestration source in the world, which we know little about, nevertheless."

~Nelson An-ping Chang, Chairman of TCC

Soil Invertebrates in the Mines – 2024 Survey Report

In the area at 1160 m that has been under restoration for over 10 years, the total organic carbon (TOC%) in the soil exceeds 5%. The presence of typical soil fauna such as earthworms and springtails indicates that the greening works have indeed restored part of the ecosystem services of soil.



Reference: Life in the Soil: A Guide for Naturalists and Gardeners. By James B. Nardi.

2.2.2 _ Soil Fauna & Survey

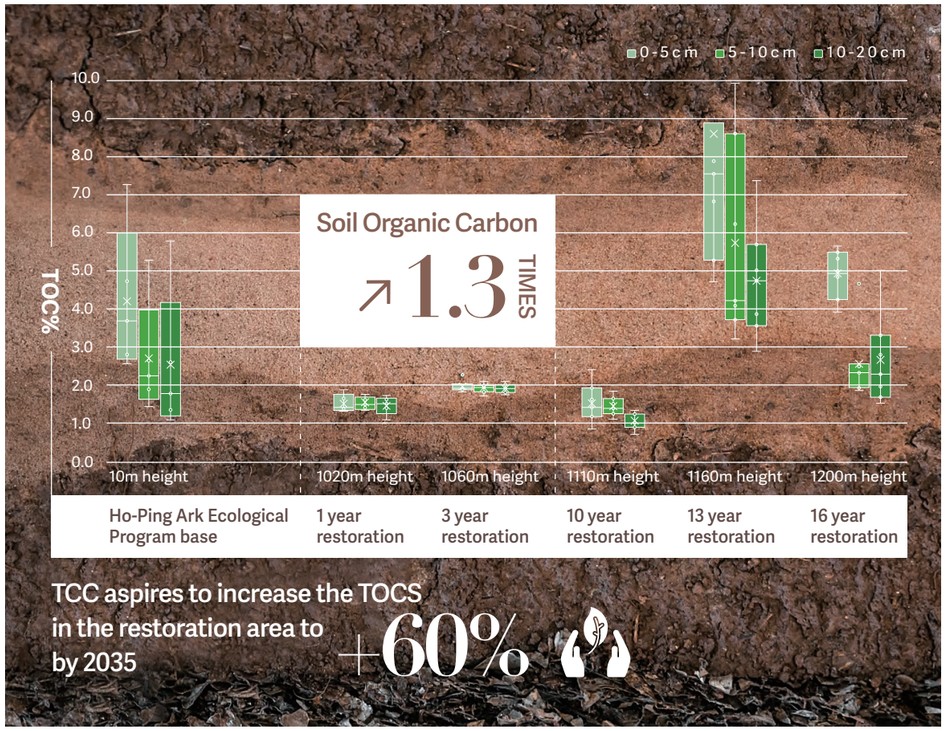
There are more living organisms in 1 teaspoon of healthy soil than there are people on Earth. Over 95% of our food comes from the soil. “Land degradation, desertification and drought are not only arid nation problems. They are global problems.” On World Environment Day 2024, Inger Andersen, Executive Director of UNEP, launched the “Generation Restoration” initiative, calling on states to pay attention to soil issues.

In 2022, TCC launched the globally rare Ho-Ping Ark Ecological Program at the Hoping Mine. Also, in 2023, TCC commenced the soil fauna and carbon sink survey in the mine. Soil fauna account for at least a quarter of all life on Earth (almost all of which are invertebrates) and provide critical solutions to issues in agriculture, environmental protection, climate change adaptation, human health, medicine, and pollution remediation. Soil biodiversity and the ecosystem services it provides are the most important keys to the success of the UN Decade on Ecosystem Restoration (2021-2030) and the Post-2020 Global Biodiversity Framework, announced in 2020, representing effective and truly NbS from the field to the world.

Establishing Base Year Data of Carbon Sink & Biodiversity

The soil survey in the Hoping Mine stemmed from the aim to capture the changes in soil after restoration following mining, hoping to tweak the benefits of restoration in line with soil properties. For over a decade, the mine restoration team has been constantly experimenting various techniques and methods for mine restoration, such as collecting the original soil and then reapplying it as a base for tree planting after mining, or using organic fertilizers to improve soil quality. In 2023, TCC worked with an expert team to investigate the soil carbon sink and biodiversity of the Hoping Plant and the mine, establishing their base year data.

At the project’s start, the expert team engaged in capacity-building training for employees executing BMPs, with an emphasis on sampling techniques. Then, at the Ho-Ping Ark Ecological Program base (10 meters elevation) as well as in the mine restoration areas(1,000-1,200 meters elevation, 1 to 16 years restoration), the project team collected soil samples up to a depth of 20 cm using the fixed-area core method, with 5 sets of samples collected from each sampling point. The samples underwent analysis for physical and chemical properties like soil bulk density, pH value, electrical conductivity, organic matters, total carbon and nitrogen concentrations, as well as the composition of soil fauna and microorganisms.

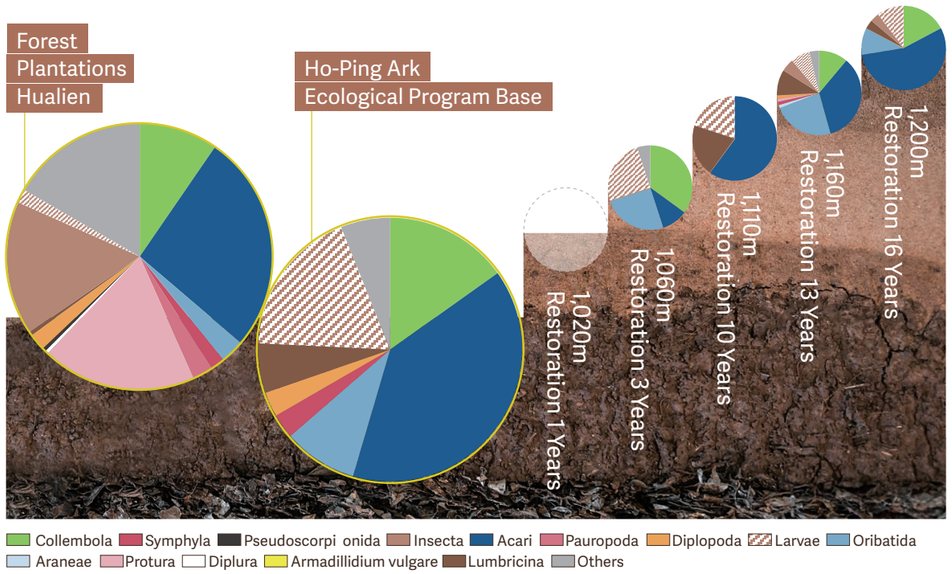


Soil Restoration in 2021-2023 with the TOC% Raised by 1.3 Times

The preliminary survey and analysis results in 2024 revealed that the soil of the Hoping Mine, which has been restored for 16 years starting from different years, has a higher TOC% compared to the urban park environment. In particular, the area that has been restored for 3 years, after topsoil coverage and revegetation, has seen an increase in the TOC% by 1.3 times compared to the latest restoration area, indicating enhancement of soil sequestration after restoration management. In addition to surface soil organic carbon, the project also probes into soil carbon stock. The analysis results show that the total organic carbon stock (TOCS) of the soil in the restoration area in 2023 is 31.2 tons per hectare. Aiming for 49.3 tons of TOCS per hectare in the Ho-Ping Ark Ecological Program base that is without human disturbances, TCC aspires to increase the TOCS in the restoration area to 60% by 2035.

Typical Soil Fauna Observed after 10 Years of Restoration, with a Biodiversity Index Close to That of the Forest Plantations in Hualien

Recent research highlights soil biodiversity as crucial for soil quality. To understand the composition and density of medium-sized invertebrates, sampling was done in secondary forests of the Ho-Ping Ark Ecological Program and 10 lowland forest plantations in Hualien. Safe sampling surveys were also conducted in natural forests near the mine. The 2024 interim report shows that, except for the 1020 m restoration area, where no soil fauna was found, longer restoration periods lead to more diverse soil fauna. The biodiversity index of the 13-year restored area reached 1.903, similar to Hualien's artificial forests. Symphyla, Pauropoda, and springtails were found. These typical soil fauna usually only appear in more complete soil ecosystems, suggesting that after years of restoration, the mine's ecological environment has improved, and the soil ecosystem services are gradually being recovered.



2.2.3 _ Ho-Ping Ark Ecological Program

TCC has been promoting the Ho-Ping Ark Ecological Program since 2022. Led by KBCC CEO and Professor Chia-Wei Li, the program invited the teams led by soil expert Dr. Chiao-Ping Wang and by Associate Professor Chih-Han Chang from the Department of Life Science, NTU to help establish a semi-closed experimental base in the Heping region. Innovative ecosystem modeling and studies, including monitoring changes in the physi-cochemical and biological properties of soil, understanding the interactions between soil and local flora, and the critical significance of soil's ecosystem functions in the material cycles, are carried out, with the aims to understand the role of soil in carbon and nitrogen cycles and accumulate long-term observation data as the foundation for future ecosystem restoration in mines. **Through the experimental ecosystem symbiotic model, the program may prevent ecological collapse and biodiversity loss, in quest of the ark for human survival amidst impacts of climate change.**

In 2023, alien species were removed from the base, skynets were set up, and a water system was deployed, in an attempt to create different micro-environments in the base. In particular, it has planned to introduce Arace-ae plants to the humid and semi-shaded environment in the base's peripheral. Taro, a member of the Araceae family, has been the staple food of the Austronesian people since ancient times and is an indigenous plant. In addition, Araceae plants present medicinal potential, such as promoting nerve repair after brain injury, which may promote human well-being. The program planned to introduce more than 100 taxa of Araceae plants into the ark.

In 2022,
KBCC transplanted 500 orchid plants
to the base and deployed
the water supply facility around.

In 2023,
the base removed alien species
and introduced 970 plants of 108 taxa to actively restore the local ecology, continue to observe the evolution of plants returning to the wild, in search of potential solutions for the human race and the environment.

The program site is approximately 1.45 hectares, located in a secondary forest in the Heping region. The basic site survey has been completed, and pillars and skynets have been installed. Over a hundred Taipower electric poles have been reused.
Increase the habitat heterogeneity utilizing dead branches and fallen woods within the base, observe the decomposition of different woods, measure the microbiota at different decomposition stages, and estimate the overall carbon sequestration.

Japanese Soil Fauna Expert Exchanges with TCC Team

Time	November 2023
Participants	Professor Satoshi Shimano, the soil expert from Japan; the team led by Dr. Chiao-Ping Wang from TFRI; the team led by Associate Professor Chih-Han Chang from the I the Department of Life Science, NTU; the restoration team of the Hoping Mine; the TCC Office of Responsibility and Sustainability

The Hoping Mine restoration team learned soil sampling techniques in early 2023 and expected to improve their abilities to identify and classify soil fauna. Therefore, TCC consulted with Dr. Chiao-Ping Wang and Associate Professor Chih-Han Chang, inviting Professor Satoshi Shimano, a Japanese expert in soil fauna taxonomy, to Taiwan to exchange with the restoration team of the mine.
During the 3-day workshop, Professor Shimano used samples of urban parks and botanical gardens provided by the teams of Dr. Chiao-Ping Wang and of Associate Professor Chih-Han Chang, along with soil samples from the mine, to introduce the teams to the taxonomy and specimen preparation of soil fauna. Employees also invited Professor Shimano to the Hoping Mine to observe the results of mine restoration and to seek advice on soil sampling. Professor Shimano also shared the habits of different soil fauna groups and suggested collection locations for different biomes. Through the 3-day workshop, the restoration team enhanced their soil fauna survey capabilities, hoping to further their soil restoration efforts in the mine.

2.3 _ Oceans

2.3.1 _ The EcoPort You Don't Know

2021-2024 ---------- FUTURE

Hermit Crabs' Home

Shell Exchange Station, planning extended to Hanben Ocean Station

Fish and Shellfish Survey Project

During the coral survey and transplantation, CITES-listed giant clams were found. Survey will be conducted, records compiled, and distribution maps created to develop future conservation plans.

Constructed Wetland Project

Little Tern Restoration Project

At the southern beach of the Heping River estuary, the Hoping Power Plant protects little tern nesting sites by blocking vehicle access, reducing disturbances to egg-laying and chick-rearing. This area is planned for little tern habitat education projects, making it ideal for conservation.

Hoping EoPort, part of the TCC 3-in-1 Park of EcoPort, Power Plant, and Cement Plant, originally featured a sandbar coastline. To preserve the eastern coastline, it was designed with inward excavation, making it Taiwan's only inward-dredged port. This design prioritizes environmental considerations, creating a habitat for corals and marine life.

The cross-industry symbiotic model of "3-in-1 Park" integrated the Hoping EcoPort, Hoping Cement Plant, and Hoping Power Plant, becoming a zero-waste, low-carbon production park rare seen in the world. Strict environmental controls are in force at the Hoping EcoPort.

The water quality at the Hoping EcoPort is Class-A Water certified by the Ocean Conservation Administration (OCA), which is equivalent to the waters of the Penghu Islands.

Certification of the Port Environmental Review System of EcoPorts (PERS) for the 3rd time in 2023

the APSN Green Port Award System(GPAS) certification

In the fish survey

a total of 207 species of 39 families of fish
were recorded across four seasons

In the shellfish survey

660 shellfish of 10 species from 8 families
were recorded across four seasons

IN 2023

+713 corals
newly transplanted

1,001 corals
restored at the Hoping EcoPort to date

An overall **rehabilitation rate** close to **90%**

2.3.2 _ The Coral Restoration & Rehabilitation

Corals cover only 0.2% of the ocean but provide a home for a quarter of marine life. TCC values coral restoration. Traces of coral were observed in Hoping EcoPort ten years ago. In 2020, Hoping EcoPort initiated a coral species identification survey and found coral fragments on the shallow-water dolosse in the port. It was inferred that this might be due to the lack of stable substrate in the growth area. Therefore, in 2021, TCC partnered with the Eco-Angel Environment Conservation Association. Combined with TCC's core business in cement, the Bio Cube Coral Creation Project was executed to expand the coral restoration area in the port.

Bio Cube Coral Creation Project

TCC collaborated with the Eco-Angel Environment Conservation Association in 2021 to deploy bio cubes at Wharf N2 with relatively small impact from wind and waves in the port. Utilizing the core industrial technology of TCC and its low-carbon cement as the base material, coral fragments broken off due to natural factors or port waves are transplanted to bio cubes. In addition to attachment opportunities for corals, the microporous nature of cement material also supports algae, serving as a food source for other marine life and enriching the marine ecosystem.

Coral Planting Project with Grating Plates

In 2023, the restoration team expanded the coral creation scope. By establishing elevated grating plates at the Wharfs S1, S3, S4, and N1 in the port, it provides a more stable base than the revetment, preventing coral from dying from silt coverage. By January 2024, all coral habitat creation works were completed, with cumulative 1,001 corals transplanted. The survival rate of coral seedlings reached 80% (some corals were eliminated due to competition for living space), with the restoration area expanded to 4 times. The elevated coral habitats are conducive to observing and documenting restoration results. Hoping EcoPort will also assess the possibility of allowing the public to participate in coral planting, encouraging people to engage in marine conservation issues.

After years of restoration efforts, the bio cubes' "inhabitants" have tripled, with 25 Acropora species dominating 38% of the area. Coral identification on grating plates is expected to conclude by 2024. Although restoration with coral fragments is of asexual reproduction, the project team reconstructed the home of corals, enabling corals to reproduce sexually. Working with the National Dong Hwa University, the Hoping EcoPort keeps tabs on the coral spawning in the port and observes coral growth quarterly.


Dendronephthya sp.

Sister Coral

Ying-Ling Chen, Secretary-General, Eco-Angel Environment Conservation Association

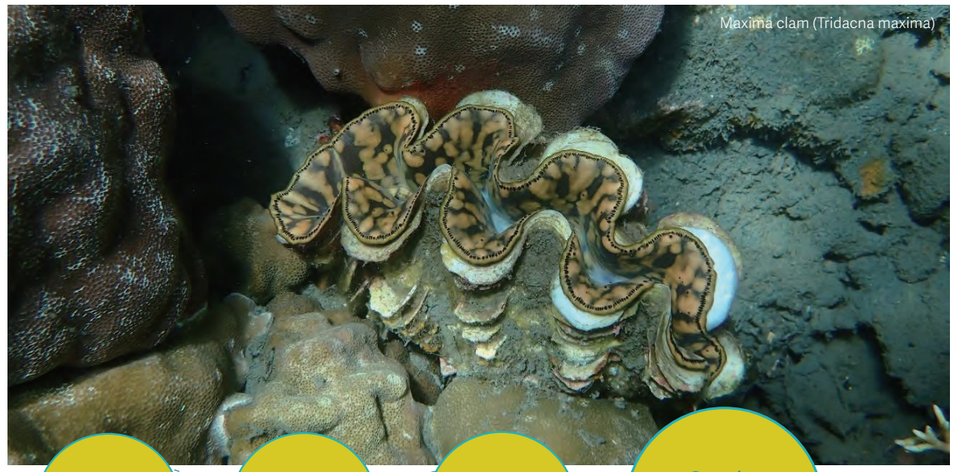
From the perspective of Earth's evolutionary history, climate change is a normal phenomenon.
The environment is constantly shifting, and all creatures are continuously growing.
Only through change can there be sustainability.

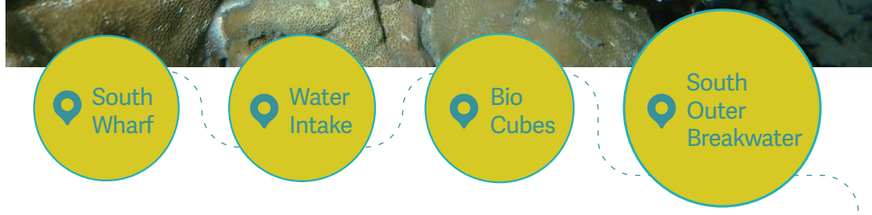
Situated amidst these changes, humans often feel compelled to take action, but the resulting impact is often beyond their control.
Having planted various corals, however, I would ask myself: What is the purpose of this endeavor?
To expect the world to remain as it was seems impossible!

However, I believe that when habitats are abundant, the mountains, forests, and oceans shall continue to nurture all life, including us the human race.
Since we must act, let us move towards the coexistence with life!

2.3.3 _ Survey of Fish & Shellfish

Tridacna (giant clam), the home for Ariel in the animation The Little Mermaid, is the largest bivalve mollusk in the world. It is also a crucial environmental indicator, primarily inhabiting coral reefs in clear, sunlit waters. Tridacnae were surprise visitors to the Hoping EcoPort, spotted at the section of bio cubes in 2023. To comprehend the ecology of the coral reefs in the port, Hoping EcoPort commissioned a team from TUMT to conduct an ecological survey of the fish and shellfish at the coral hotspots in March 2023. The quarterly ecological survey was carried out for four times in a year.

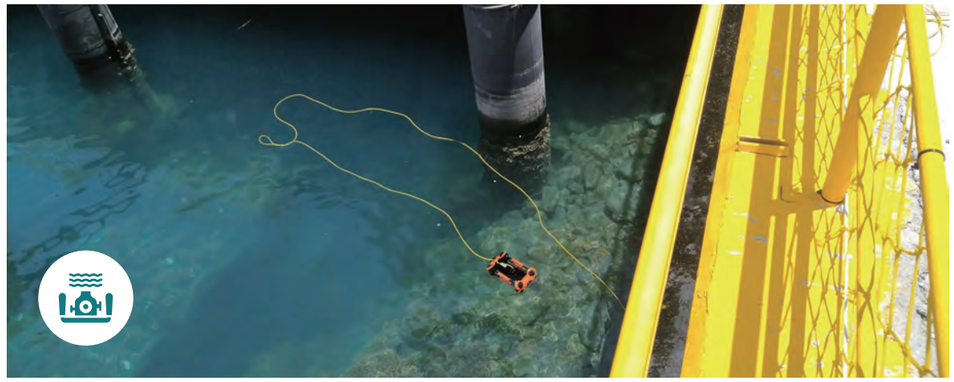

Maxima clam (Tridacna maxima)



Biodiversity Differences among Four Sample Sites

The research team set up four sample spots around the port: South Wharf, Water Intake, Ecological Block, and South Outer Breakwater, each representing different marine environments.

- The South Wharf, inside the port, is most affected by operations.
- The Water Intake, near the Hoping Power Plant, is less affected.
- The Bio Cubes, made of TCC's low-carbon cement, provide a habitat for marine life.
- The South Outer Breakwater, closest to the open sea, is least affected by operations.



The biodiversity Index is Highest at the Bio Cubes Site

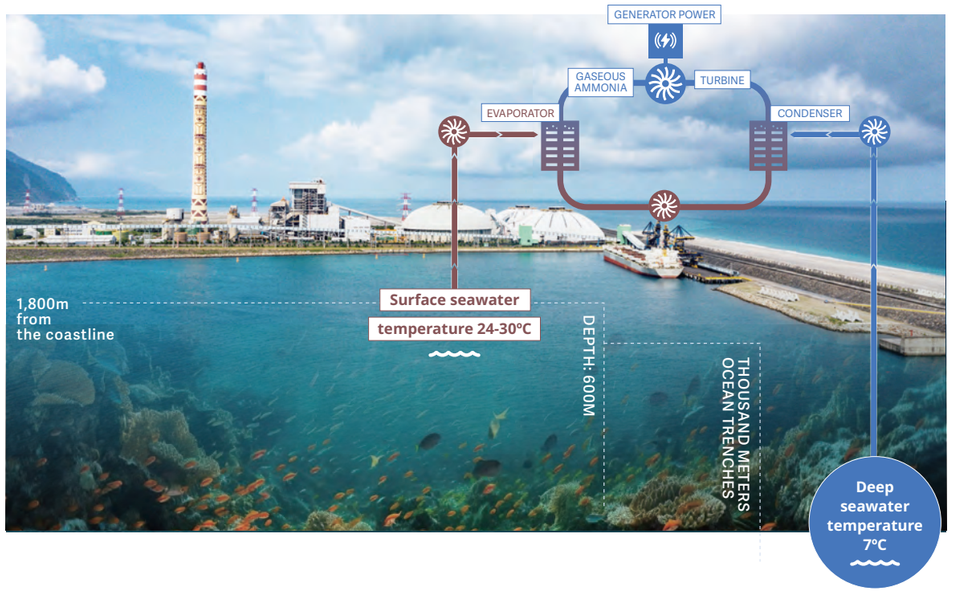
Survey personnel went scuba diving and used underwater visual census (UVC) as primary methods, with underwater cameras aiding species identification. Fish and shellfish were identified at each site, documenting species distribution and numbers. Results showed the South Wharf had the lowest biodiversity due to frequent cargo activities and ship berthing. The other three sites had similar species numbers, with the Bio Cubes showing the highest biodiversity index and most shellfish, indicating that the coral habitat restoration has successfully attracted more "residents" to settle in the Hoping EcoPort.

	FISH	SHELLFISH	Biodiversity index
South Wharf	1,789 fish of 127 species from 28 families	130 shellfish of 5 species	3.96
Water Intake	2,874 fish of 157 species from 32 families	129 shellfish of 6 species	3.75
Bio Cubes	2,791 fish of 158 species from 34 families	213 shellfish of 8 species	**4.03**
South Outer Breakwater	2,977 fish of 164 species from 35 families	188 shellfish of 4 species	4.00

2.3.4 _Development of Marine Resources

OTEC in Taiwan's Waters

Taiwan, rich in marine resources, sees ocean energy as a promising renewable source. Ocean Thermal Energy Conversion (OTEC) is particularly promising, operating continuously unlike solar and wind energy. Eastern Taiwan's unique coastline, with a 600-meter-deep trench just 1.8 km offshore, is ideal for OTEC. TCC and its subsidiary, Hoping Power Plant, are applying for Taiwan's first large-scale OTEC system. If completed, it will be the world's only MW-class OTEC plant, generating 24,000 kWh daily, enough for 2,000 households. The underwater cultural heritage survey is done, and the ecological survey for the EIA is ongoing. The first phase aims for 1-2 MW capacity, with grid connection by 2028.



Byproduct of Power Generation: Mineral-rich Deep Seawater

Deep seawater, untouched by sunlight, is rich in minerals and is the most nutrient-rich and pure water source on Earth. After being extracted for OTEC and discharged back to the ocean, it can drive the circulation of precious marine minerals and trace elements like magnesium, zinc, selenium, and germanium, vitalizing the food chain. Thanks to its purity, deep seawater can also be used for premium fish and lobster aquaculture. Furthermore, since its osmotic pressure is similar to human body fluids, deep seawater is easily absorbed and utilized, with applications in drinking water and skincare products. The value-added applications of deep seawater will be assessed and developed following a stable OTEC operation.

Lonchura striata / Jinchang Quarry

CHAPTER 3

The Moon Lofts in Autumn — TCC & Society

GREEN PLANTS LEAVES

MILKY WHITE RUMP

CHEST FEATHERS LIGHT BROWN

PRIMARILY BROWN PLUMAGE

"In the future, this land will have a lifeline connecting TCC, the tribes, and nature. It will link the dreams of every colleague and every villager."

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

In the TNFD framework, society is defined as part of nature, echoing the core philosophy of Chairman Nelson An-ping Chang that

"humans are part of nature."

TCC values social communication and practices the mutual benefit of industry and the tribes. In the Hoping and Suao mines, TCC proactively conducts tribal consultation and consent voting and regularly opens the mines for visits, allowing the community and tribes to participate in TCC's operational decisions. Additionally, TCC DAKA Eco-Factory (hereinafter TCC DAKA) was established in the Hoping Circular Production Park in 2020. The Hoping EcoPort within the park, highly regulated by the Industrial Bureau, began to open for public through the DAKA Circular Economy Tour. The Suao Plant integrated into tribal life and services through initiatives like "Dongyue Mothers' Class" and "Tribal Traditional Wild Vegetables Education." TCC's concept of social inclusion extends to Mainland China, where in 2021, the Shaoguan Plant became the first open factory in Mainland China.

TCC DAKA Open Eco-Factory

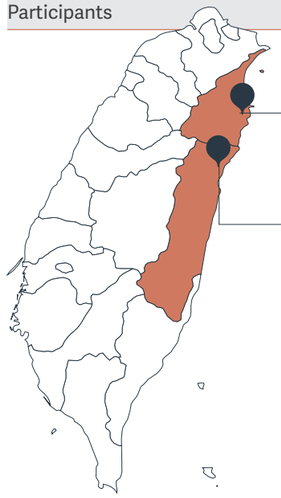
3.1 Mutual Care with Tribes

Indigenous peoples and local communities play a crucial role in nature conservation. In September 2023, the TNFD released the "Guidance on engagement with Indigenous Peoples, Local Communities and affected stakeholders," pointing out that indigenous populations make up less than 5% of the global population and manage less than 50% of the land landscapes and less than 33% of inland waters. However, they have successfully protected 80% of the world's biodiversity.

Initiating EU CSDDD Due Diligence Indigenous and Community Human Rights and Environmental Risk Assessment

To understand whether corporate operational activities have harmed the rights and interests of the local communities and indigenous peoples, TCC conducted a stakeholder opinion survey in March 2024. In response to the Corporate Sustainability Due Diligence Directive (CSDDD) passed by the EU in April 2024, TCC further initiated a "Human Rights and Environmental Due Diligence" in June 2024.

Participants



- Suao Cement Plant
  - Changan Village
  - Yongchun Village
  - Iyo Tribe

- Hoping Cement Plant
  - Heping Village
  - Knlibu Tribe (Heping)
  - Gukut Tribe (Hechung)
  - Qnragan Tribe (Heren)

Valid questionnaire recovery rate

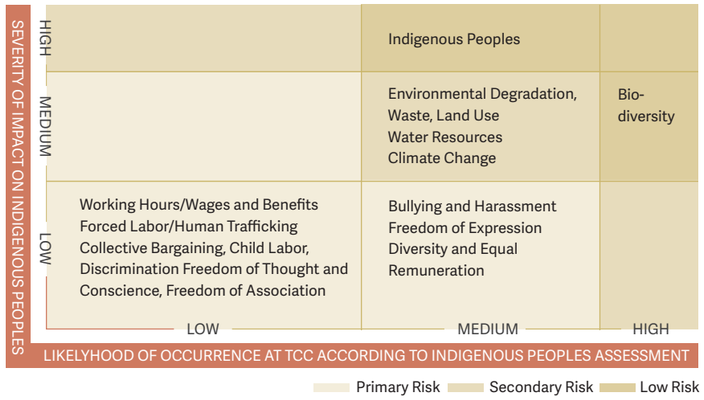
Community 84%

Indigenous peoples 86%

Specification of Indigenous Peoples' Matrix

Indigenous peoples focus on their own rights and communication aspects, biodiversity, environmental degradation/waste/land use, water resources, and climate change.

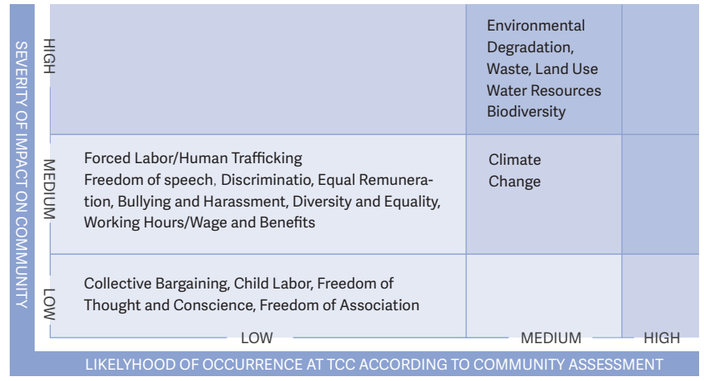
Human Rights and Environmental Risk Matrix: Indigenous Peoples



Specification of Community's Matrix

Community focus on environmental issues including environmental degradation/waste/land use, water resources, biodiversity, and climate change.

Human Rights and Environmental Risk Matrix: Community



Comprehensive analysis

Indigenous peoples concern about whether corporate actions may harm the rights of local indigenous communities, yet there has been no communication with them; community residents focus on issues related to the environment and waste. TCC has developed preventive and mitigation measures in response to identified human rights risks, while also promoting the spirit of sustainable industrial and urban development through diverse activities and community interaction.

Proactively engage in consultation and consent rights for indigenous peoples to participate in the operational decision-making process

In respecting the living spaces of indigenous peoples, TCC adopts thorough explanations and communications for mine development, and strengthens community safety, welfare, and conservation efforts.

Sustainable Hoping

In March 2022, regarding the mining of the Hoing Plant, TCC proactively applied for Consulting Indigenous Peoples or Tribes to Obtain Their Consent and Participation in accordance with Article 21 of the Indigenous Peoples Basic Law.
The Gukut and Knlibu tribes respectively convened consultation consent votes, with the Gukut tribe reaching an agreement vote rate of 82.2%, and the Knlibu tribe reaching 97.6%

The Voices of Heping Village Residents / Reference: Sustainable Hoping Kit

Dongyue. Iyo Hello

In December 2023, the mining of Suao Plant received tribal consultation consent with **an approval rate of 85%**

TCC celebrated
Mid-Autumn Festival with the tribe

台泥太白山礦區落實水土保持
新陽技術顧問 林崑龍技師：
沒有土石流疑慮

台泥蘇澳太白山礦區，位在東岳部落西北方。台泥蘇澳廠針對礦山的水土保持計畫極為嚴謹，並由宜蘭縣政府督導，每週專業技師固定到現地測量，確保開採中及開採後周邊區域安全無虞。

TCC implements Soil and Water Conservation in the Taibaishan Mine, Engineer Kunlong Lin from Sinyan Consultant: No concerns of landslides

Reference: Iyo Tribe Kit

Joining Hands with Tribal Communities for Just Transition
Providing timely needs and empowering development

Establish Tribe Common Good Ecosphere

The industry is a community member. TCC DAKA, a non-profit, directs fees from DAKA Market vendors, guided tours, and a percentage of revenue from Uni-President Group and Starbucks to the Heping Elementary School Education Fund. TCC recruits local youths and women, providing jobs, and organizes environmental activities like “Recycle with Peace (Hoping) Now!” to reduce plastic use and waste, encouraging everyone to become an EARTH HELPER. TCC also hosts events such as environmental carnivals, mine tours, and activities with tribal food and wild vegetables to build a family-like relationship with the community. The “Hoping Energization Interactive Sports Game” invites parents and children from Heping Elementary School and kindergartens for interactive experiences, introducing new energy development benefits and collecting villagers’ opinions through a wishing tree activity.

Implement Just Transition

TCC aims to drive the lifestyle transition in communities surrounding its plants. Continuing the interactive experience of DAKA, focusing on Hualien's Heping Village, a major production base in Taiwan, and recognizing that school education serves as the core for cultivating and disseminating sustainable concepts, TCC initiated the“Hoping Carbon Reduction Parent-Child Bankbook” with Heping Elementary School in Heping Village in 2023. This initiative provides eco-friendly courses, encourages recycling, and energy saving, rewarding parents and children for adopting green habits. Participants log their activities in a bankbook to earn “carbon coins,” exchangeable for eco-friendly products at the Hoping Plant. By 2024, the program extended to Dong Ao Elementary School near the Suao Plant in Yilan.

The Mysterious Giant in the Heping Village -An Exhibition of the Sustainable Hoping at Huashan

Establish Tribal Consensus Fund

To effectively address the potential disparities between "low to middle income households" and "households actually living in poverty" within the tribes and to provide more timely and appropriate support, the "Hoping Sustainability Charity Foundation" was established in 2022. Adopting a tribal co-decision system, the foundation invited the village head of Heping and three tribal leaders to serve as directors. The foundation operates on a tribal consensus model, led by the village leader and three tribal chairs. Additionally, the Hoping Emergency Relief Fund was created to ease financial hardships of the needs.

Cultivate Tribal Talent

Rural education resources are limited, and tribal children must travel for studies after elementary school. TCC uses Cement Academy resources to help Heping, Shih Min, Yongle, and Dong Ao Elementary Schools offer after-school classes in archery, dance, and indigenous drama to preserve tribal culture and language.

TCC funds the English Teaching Assistant (ETA) program, hiring foreign teachers for Heping Elementary since 2020. TCC also collaborates with Hualien Szu-Wei High School and National Dong Hwa University (NDHU) to provide specialized classes, professional teaching staff, and internships. Students with relevant certifications receive bonuses (NTD 5,000 to 30,000) and priority employment opportunities.

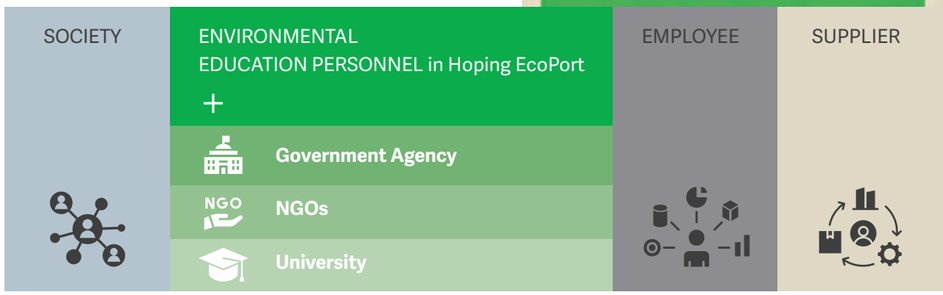
Establish Tribal Service Team

Leveraging cement plant expertise, a Home Repair Project Team was created to serve tribal areas. TCC also expanded the Heping Community Bus Service. In addition to the community bus that has been supported by the Hoping Power Plant Rebate for a long time, a "Hoping Care Bus" of a rehabilitation bus level has been introduced. This bus connects Heping with key locations in Hualien City, like markets and hospitals, to support the medical and care needs of the elderly living alone in the tribes.

3.2 Environmental Education & Interaction

Hoping EcoPort

Certified as Taiwan's first port-based environmental education facility in 2022, Hoping EcoPort offered "Tenants of Harbor" and "Big Boats Entering the Port" courses in 2023 and actively cooperating with industry, government, academic institutions, and NGOs, including the Hualien Environmental Protection Bureau, Eco-Angel Environment Conservation Association, TUMT, NTOU, and NDHU, etc. Collaborated with NDHU in 2023, Hoping EcoPort showcased its biodiversity and coral restoration e orts, with over 600 people participated. In 2024, NDHU professors were invited to share the latest international TNFD framework, and an outreach service to schools was initiated, engaging in biodiversity courses and exchanges with students on coral ecology and conservation.



TCC DAKA Eco-Tour Itinerary

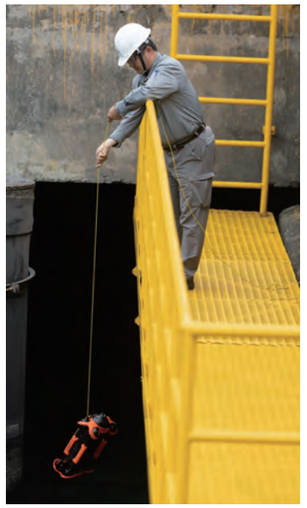
Offering online reservations or customized itineraries, TCC opens up for the public to deeply visit the DAKA Park's solar installations, delve into the Hoping Mine and Hoping EcoPort, explore TCC's efforts in environmental management, restoration, and its zero-emission, zero-pollution, zero-waste circular economy model. The DAKA Tower, opening in 2024, is an exhibition space showcasing TCC's core values.

Through text, images, videos, and interactive experiences, it highlights the three pillars of sustainability: "low-carbon construction materials," "resource recycling," and "green energy." The space will host events promoting local collaboration. It aligns with TCC DAKA Renewable Resource Recycling Center's plans and aims to receive environmental education facility certification by 2026.

Tribal Wild Vegetable Education

Urbanization leads to changes in land use, resulting in a large number of local and adaptive plants becoming endangered. Wild vegetables, having adapted to climate changes over a long period, are an important source of food for indigenous tribes. Cichorium endivia and Zanthoxylum ailanthoides are common wild vegetables in Hoping Mine and are also traditional ingredients of the Taroko tribe. In August 2023, TCC DAKA hosted a sustainable eco-tourism event on foraging wild vegetables, led by Liu Xi of Wild Rhyme Agriculture. Participants learned to make wild vegetable wraps, connecting with the environment and Taroko culinary traditions. The event highlighted Hoping Mine's ecological diversity, discovering over 40 edible wild plants, supporting the mining team's efforts in native species rehabilitation.

3.3_ Employee Engagement & Participation



In 2023, Hoping EcoPort employees formed the Water Environment Watch, conducting monthly water inspections, reporting pollution, and aiding in environmental education. Seventeen employees completed volunteer training and received certificates. The Watch removed 55.3 kg of waste during two beach cleanups. The goal is for 50% of employees to join by 2024 and to recruit contractors.

Since 2021, Hoping Power Plant and the Coast Guard Administration transformed the first floor of the security checkpoint near Hanben Beach into "Hanben Ocean Station" to support the Ocean Conservation Administration (OCA)'s "Salute to the Sea" policy. The station features permanent exhibitions, group tours, and environmental education activities, along with a "Convenient Beach Cleaning" tool rental service, promoting marine conservation and awareness about marine debris. In 2023, it hosted the "Oceanscape Exhibition" and participated in the Science Train Program promoting knowledge about marine debris, biodiversity, and OTEC. The station team also joined the OCA's Marine Conservation Volunteer Program, participating in various conservation activities and earning certifications. Hoping Power Plant plans to expand its environmental education space and apply for certification as an environmental education facility, focusing on energy-related topics. It has been training environmental education personnel.

OCEAN GUARDIANS TEAM

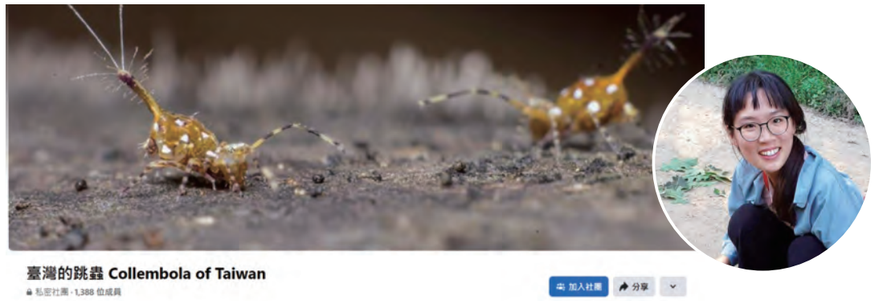
Hanben Ocean Station (Yilan, Taiwan): Owen Yu, Rielly Syu, Zhenhan zhang, and Suner Chieh
With a focus on cleaning, respecting, and preserving the ocean, the Ocean Guardians Sub-team conceived the "Express Beach Cleaning" initiative during the pandemic. The station is equipped with reusable beach cleaning tools, making beach cleaning as an easy action but large event. Everyone can come and join our list. Individuals, small families, or groups of friends can join us immediately when they visit or pass by the Hanben Ocean Station.

3.4_ Talent & Cultivation

Soil Research Awards & TCC 2024 Soil Ecology Winter Camp

Soil Research Awards

TCC launched the soil research awards in 2024 to allocate resources to encourage research on soil ecology and biodiversity and cultivate talents in the field of soil science.



Gold Prize | **Hsin-Ju CHENG, Institute of Ecology and Evolutionary Biology, National Taiwan University**

Springtails, once considered insects, have been reclassified into the Collembola class. Previously seen as pests, they are crucial for soil ecosystems, serving as predators and decomposers. Hsin-Ju CHENG, this year's Golden Prize laureate, expanded Taiwan's springtail species list from 26 to 58, adding 13 new species and boosting species richness by 123%. This work sets the stage for future research on springtails.

Gold Prize | **Hsiang-Yun LIN, Department of Life Science, National Taiwan Normal University**

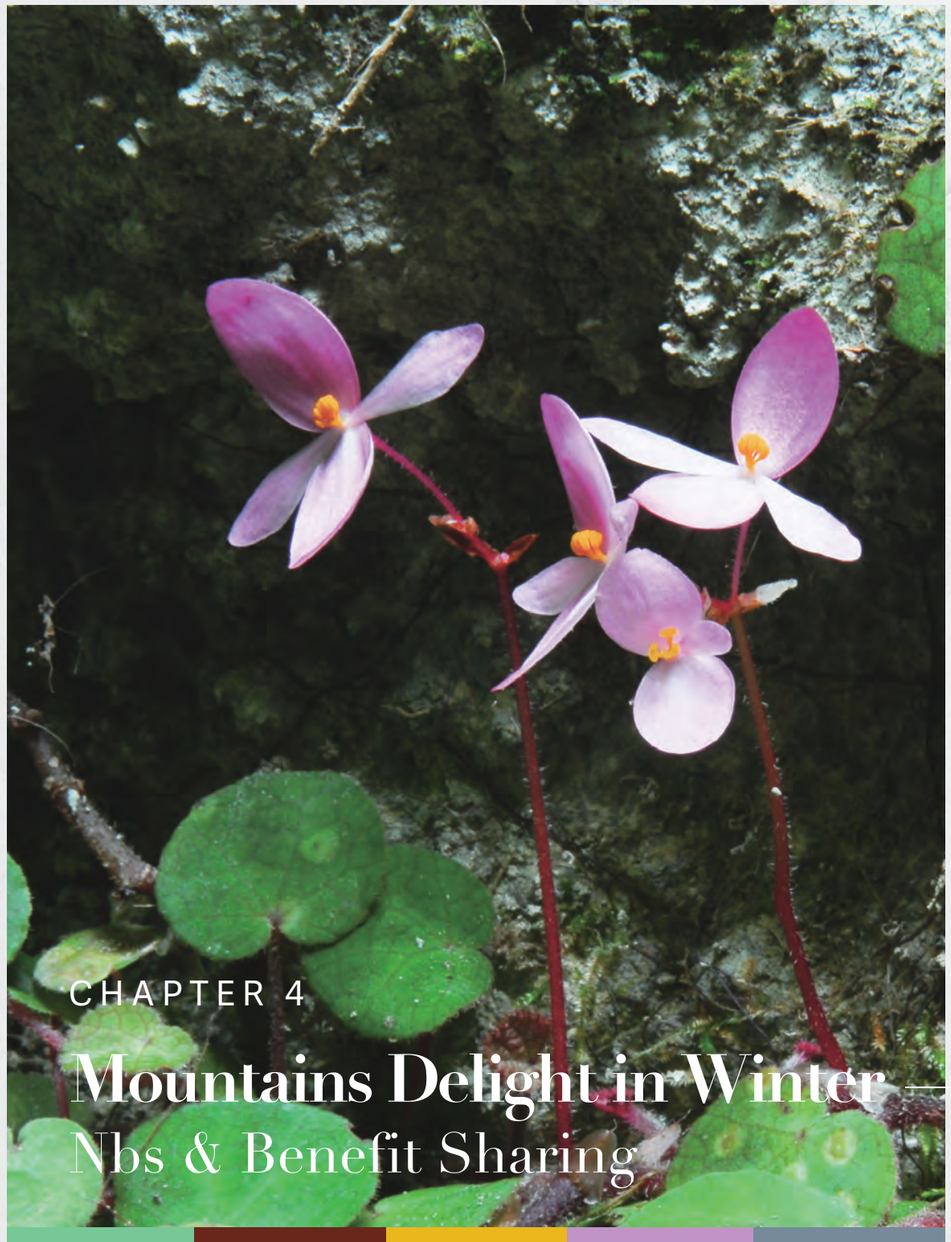
Since junior high, Hsiang-Yun LIN has been fascinated by pseudoscorpions, the carnivorous soil dwellers. For over 80 years, no new species were identified in Taiwan until Lin's work uncovered two new pseudoscorpion species and explored their symbiotic relationships with other insects, broadening the research field. Besides their research, both laureates lead Facebook clubs focused on springtails and pseudoscorpions, aiming to enhance and promote soil animal studies, aligning with TCC's goal to foster soil research.

Soil Ecology Winter Camp

"In the past, we call people 'earthy (old-fashioned)', or joke about 'eating soil (financially broken)' at the end of the month. I never imagined that earth and soil could be so full of depth!" TCC held the TCC 2024 Soil Ecology Winter Camp, selecting 20 applicants for issues on nature and biodiversity. Participants valued the camp, gaining insights through observation, activities, discussions, and presentations. They noted the overlooked richness of soil and its crucial role in climate regulation and food supply, highlighting the diversity of organisms like earthworms, springtails, and mites.

Soil Ecology Winter Camp Timetable

DAY 1	DAY 2	DAY 3
KBCC CEO/Chia-Wei LI The greatest challenge for humanity this century-Climate change and species extinction	**NTU Associate Professor/Chih-Han CHANG** Ecosystem Functions of Soil Biodiversity	Demonstration of Field Sampling
Exploring KBCC- Conversation with plants	**Teaching Assistant/Hsiang-Yun LIN:** Surviving in the Crevices	Student Reflections
Dr. Chiao-Ping WANG Knowledge Gaps and Challenges in Soil Biodiversity under Climate Change	**Teaching Assistant/Yi-Zhi XIA:** Soil Fauna of the Sky	
Student Grouping 1.Conservation 2.Biotaxonomy 3.Industry 4.Education/Promotion 5.Ecology	**Taiwan Seed Improvement and Propagation Station Director /Ting-Lin CHANG** Everyone Can Eat Three Meals a Day: Who Says It's Unrelated to Soil?	
	Assistant/Yong-Ren LU: Your Park Is Not My Park	
	Assistant/Bo-Wei YOU: From Linnaeus to E.O. Wilson	
	Dr. Chiao-Ping WANG What Is Soil Conservation? — From Science to Popular Science, From Popular Science to Scientific Inquiry	



Begonia zhuoyunii / KBCC

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:

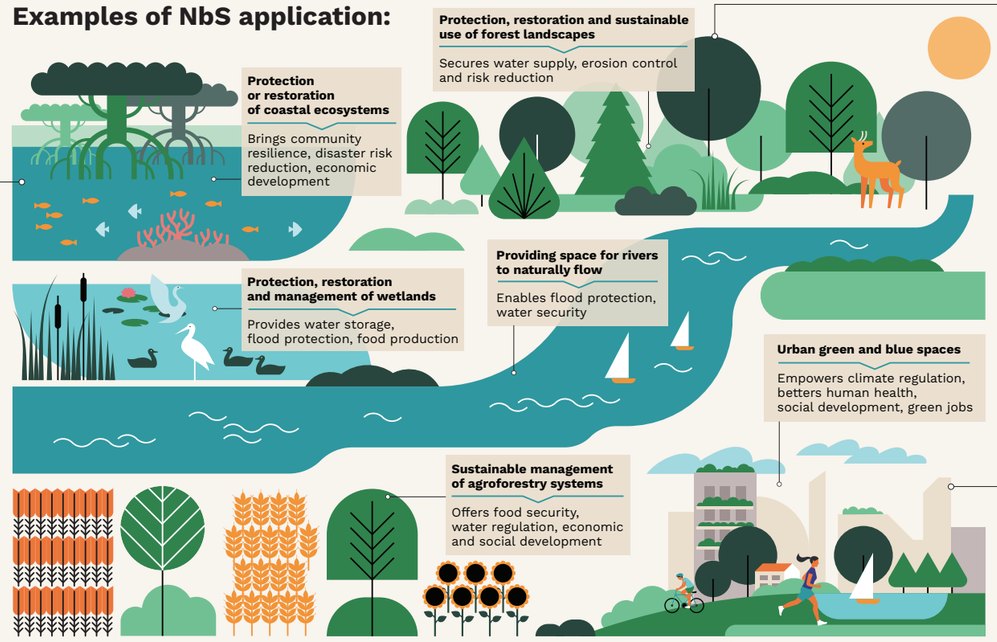
- climate change
- economic and social development
- human health
- food and water security
- disaster risk reduction
- ecosystem degradation
- biodiversity loss

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

- adaptation to climate change
- green jobs
- community resilience
- health benefits
- healthy and accessible food
- clean air and water
- disaster risk reduction
- ecosystem integrity
- biodiversity net gain

Reference: IUCN Nature-based Solutions

Examples of NbS application:



Reference: IUCN Nature-based Solutions

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.

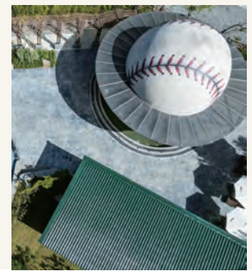
4.1.3 _ Vakangan Green Energy & Mutual Benefit

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.



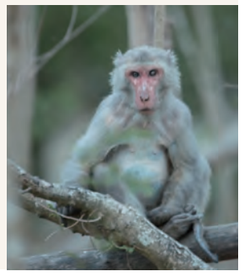
4.1.4 _ Shoushan Plant Flood Detention and Adaptation

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.

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

Through the efforts of KBCC CEO and NTHU Professor Chia-Wei LI, thousands of plant extracts have been collected for pharmaceutical use, making it the only large-scale repository of natural plant extracts for medicine in Taiwan.

Source: United Daily News

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

CHAPTER 5

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

Prunella vulgaris/ Taibaishan Mine

"Nature is no longer a corporate social responsibility issue,
but a core and strategic risk management issue alongside climate change."
TNFD

TCC is a green environmental engineering company focused on handling the complex relationship between civilization and nature. Chairman Nelson An-ping Chang believes that the most important thing for the future of humanity is a balanced and orderly nature, which is the sine qua non, or "essential condition," for human survival.

With a management philosophy centered on "nature as the subject and social benefit as the purpose," TCC has made initial progress over 15 years, from closely managing and monitoring the ecology of mines, operation sites, and ports, to conserving plant species, forest restoration techniques, coral rehabilitation, and soil biodiversity research. According to a survey report by NTU and expert teams: the carbon sink of forests and soil TOC% are both higher than those of urban parks, and the average carbon stock of mines is superior to that of Asian tropical rainforests, indicating that TCC's restoration efforts have indeed restored some ecosystem services.

The Nature and Biodiversity Project can not be achieved overnight; it requires long-term commitment and a high degree of professionalism. TCC collaborates with domestic and international partners across different fields to create a nature-positive map unique to TCC, accumulating positive energy for the global vision of nature and biodiversity.

Appendix

TNFD Data Sheet

GHG Emissions in 4 year | Unit tCO_2e

Item		2020	2021	2022	2023
Cement Plants					
Scope 1	Taiwan	4,411,086	4,797,296	4,312,390	3,457,601
	Mainland China	31,255,633	25,867,678	20,715,305	17,405,089
	Subtotal	35,666,719	30,664,974	25,027,695	20,862,690
Scope 2	Taiwan	202,312	212,407	210,273	186,576
	Mainland China	1,257,882	1,094,397	846,574	642,045
	Subtotal	1,460,194	1,306,804	1,056,847	828,621
Scope 1+2 Total	Taiwan	4,613,398	5,009,703	4,522,663	3,644,176
	Mainland China	32,513,515	26,962,075	21,561,879	18,047,134
	Subtotal	37,126,913	31,971,778	26,084,542	21,691,311
Scope 3	Taiwan	22,427	28,761	16,709	511,001
	Mainland China	-	-	-	1,104,573
	Subtotal	22,427	28,761	16,709	1,655,574
RMC Plants					
Scope 1	Taiwan	2,059	1,517	1,776	1,893
Scope 2		7,101	6,866	6,571	5,905
Scope 1+2 Total		9,160	8,383	8,347	7,798
Scope 3		-	-	181,053	266,736
Distribution Stations					
Scope 1	Taiwan &	-	-	-	4
Scope 2	Mainland China	-	-	-	1,451
Scope 1+2 Total		-	-	-	1,455
Operations Offices					
Scope 1	Taiwan	140	132	146	137
	Mainland China	-	-	-	19
	Subtotal	140	132	146	156
Scope 2	Taiwan	1,199	1,119	1,636	1,544
	Mainland China	-	-	-	110
	Subtotal	1,199	1,119	1,636	1,654
Scope 1+2 Total	Taiwan	1,339	1,251	1,782	1,681
	Mainland China	-	-	-	129
	Subtotal	1,339	1,251	1,782	1,810
Scope 3	Taiwan	-	-	719	5,499,459
Ho Sheng Ming Co., Ltd. (GRI 14)					
Scope 1	Taiwan	-	-	-	3,999
Scope 2		-	-	-	297
Scope 1+2 Total		-	-	-	4,296
Scope 3		-	-	-	297.04

Air Pollution Emissions on Cement Plants in 4 Years | Unit metric ton

Item	2020	2021	2022	2023
Taiwan				
NOx	6,164	6,473	5,427	4,923
SOx	106	113	65	97
VOCs	0.00457	0.00422	0.00428	0.00424
Particulate Matters	249	214	158	168
Total	6,519	6,800	5,650	5,188
Mercury Emissions	0.27546	0.27876	0.22635	0.16686
Mainland China				
NOx	12,089	9,908	8,207	5,053
SOx	1,293	997	1,096	962
Particulate Matters	827	569	317	402
Total	14,209	11,474	9,620	6,417
Mercury Emissions	-	-	-	0.024156
Mercury Emissions (Unit: mg/m³)	<0.0001	0.005	0.005	0.013

2023 Water Withdrawal from Water-stressed Regions

Item	2022	2023
Municipal Water	170.94	214.18
Industrial Water	455.50	782.08
Surface Water (rivers)	838.08	826.94
Mining Water	6.00	32.78
Rainwater Harvesting	-	76.44
Total water withdrawal from Water-stressed Regions	**1,470.53**	**1,932.42**

2023 Operating and Restoration Area in the Mines | Unit km²

Item		2023
Taiwan		
Total Surface Area Under Management		3
Total Disturbed Area		Mining 0.57
		In preparation for restoration 0.05
Total Restored Area		0.65
Mainland China		
Total Surface Area Under Management		13.23
Total Disturbed Area		Mining 4.76
		In preparation for restoration 0.19
Total Restored Area		1.24

Waste disposal in 2023 | Unit tons

Operation Sites		General waste (domestic waste)	Industrial waste	Valuable metal recycling
Cement Plants	Taiwan	176.35	4,212.10	2,941.75
	Mainland China	1,719.96	1,703.54	4,580.02
	Subtotal	1,896.31	5,915.64	7,521.77
RMC Plants	Taiwan	178.18	1,465.15	188.75
Operations Offices	Taiwan	32.50	0	0
	Mainland China	3.17	0	0
	Subtotal	35.67	0	0
Distribution Stations	Taiwan & Mainland China	3.75	3.93	0.02
Total		**2,113.91**	**7,384.72**	**7,710.54**

GRI Standards Reference Table

GRI Standards and Disclosure Item		Corresponding Section
GRI 101-1	Policies to halt and reverse biodiversity loss	Life | The Most Important Thing
GRI 101-2	Management of biodiversity impacts	1.3 The LEAP Approach
GRI 101-3	Access and benefit-sharing	4.3 KBCC Gene Bank & Application
GRI 101-4	Identification of biodiversity impacts	1.3 The LEAP Approach
GRI 101-5	Locations with biodiversity impacts	1.3 The LEAP Approach
GRI 101-6	Direct drivers of biodiversity loss	4.1 Nature-based Solutions
GRI 101-7	Changes to the state of biodiversity	2.1 Forests
GRI 101-8	Ecosystem services	1.3 The LEAP Approach & 1.4 Stakeholders

TNFD Core Global Disclosure Indicators Reference Table

TNFD Core Global Disclosure Indicators			Corresponding Section & Description
	Climate Change	GHG Emissions	TNFD Data Sheet
C1.0	Extent of land/ freshwater/ ocean-use change	Total Spatial footprint	TNFD Data Sheet
C1.1		Extent of land/freshwater/ocean ecosystem use change, restored or conserved, and sustainably managed	2.1 Forests & 2.3 Oceans
C2.0	Pollution/ pollution removal	Pollutants released to soil split by type	2.2 Soils
C2.1		Wastewater discharged	In 2023, the total discharge volume of Taiwan cement plants was 265.95 megaliters. At the Suao Plant, surface runoff and rainwater are collected and undergo purification process before being discharged into the Baimi River. The Hoping Plant treats its discharge to meet standards before discharging into the Pacific Ocean. Cement plants in Mainland China have zero external discharge and being disposed according to local regulations.
C2.2		Waste generation and disposal	TNFD Data Sheet TCC has no hazardous waste
C2.3		Plastic pollution	There were no plastic pollution issue at TCC
C2.4		Non-GHG air pollutants	TNFD Data Sheet
C3.0	Resource use/ replenishment	Water withdrawal and consumption from areas of water scarcity	TNFD Data Sheet
C3.1		Quantity of high-risk natural commodities sourced from land/ocean/ freshwater	TCC sourced high-risk natural commodities including cement, coal, iron, natural gas, aluminum, and gasoline
C4.0	Invasive alien species and other	Placeholder indicator: Measures against unintentional introduction of invasive alien species	4.1 Nature-based Solutions
C5.0	State of nature	Placeholder indicator: Ecosystem condition	2.1 Forests
		Placeholder indicator: Species extinction risk	1.3 The LEAP Approach

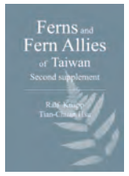
TNFD Core Global Disclosure Indicators			Corresponding Section & Description
C7.0	Risk	Value of assets, liabilities, revenue and expenses that are assessed as vulnerable to nature-related transition risks (total and proportion of total)	1.5 Nature-related Financial Impact & Ecosystem Services Value
C7.1		Value of assets, liabilities, revenue and expenses that are assessed as vulnerable to nature-related physical risks (total and proportion of total)	1.5 Nature-related Financial Impact & Ecosystem Services Value
C7.2		Description and value of significant fines/penalties received/litigation action in the year due to negative nature-related impacts	There were no related incidents in 2023
C7.3	Opportunity	Amount of capital expenditure, financing or investment deployed towards nature-related opportunities, by type of opportunity, with reference to a government or regulator green investment taxonomy or third-party industry or NGO taxonomy, where relevant	1.5 Nature-related Financial Impact & Ecosystem Services Value
C7.4		Increase and proportion of revenue from products and services producing demonstrable positive impacts on nature with a description of impacts	1.5 Nature-related Financial Impact & Ecosystem Services Value

Publications of KBCC

Asian Begonia 300 Species Portraits
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=387

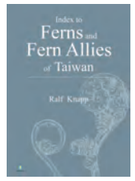
Field Guide to the Plants of Solomon Islands
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=270

Sol Amazing Lycophytes and Ferns of Solomon Islands
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=271

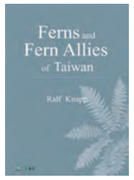


Ferns and Fern Allies of Taiwan - Second supplement
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=244

Species Begonias of the Eastern Himalayas of Arunachal, India
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=184



Index of Ferns and Fern Allies of Taiwan
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=85



Ferns and Fern Allies of Taiwan
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=81

Ferns and Fern Allies of Taiwan – Supplement
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=83

The Wild Orchids of TAIWAN
台灣蘭花
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=84

Guide to Lycophytes and Ferns of Balinsasayao, Negros, the Philippines
http://www.kbcc.org.tw/tw/announce_newsArticle.html?id=185

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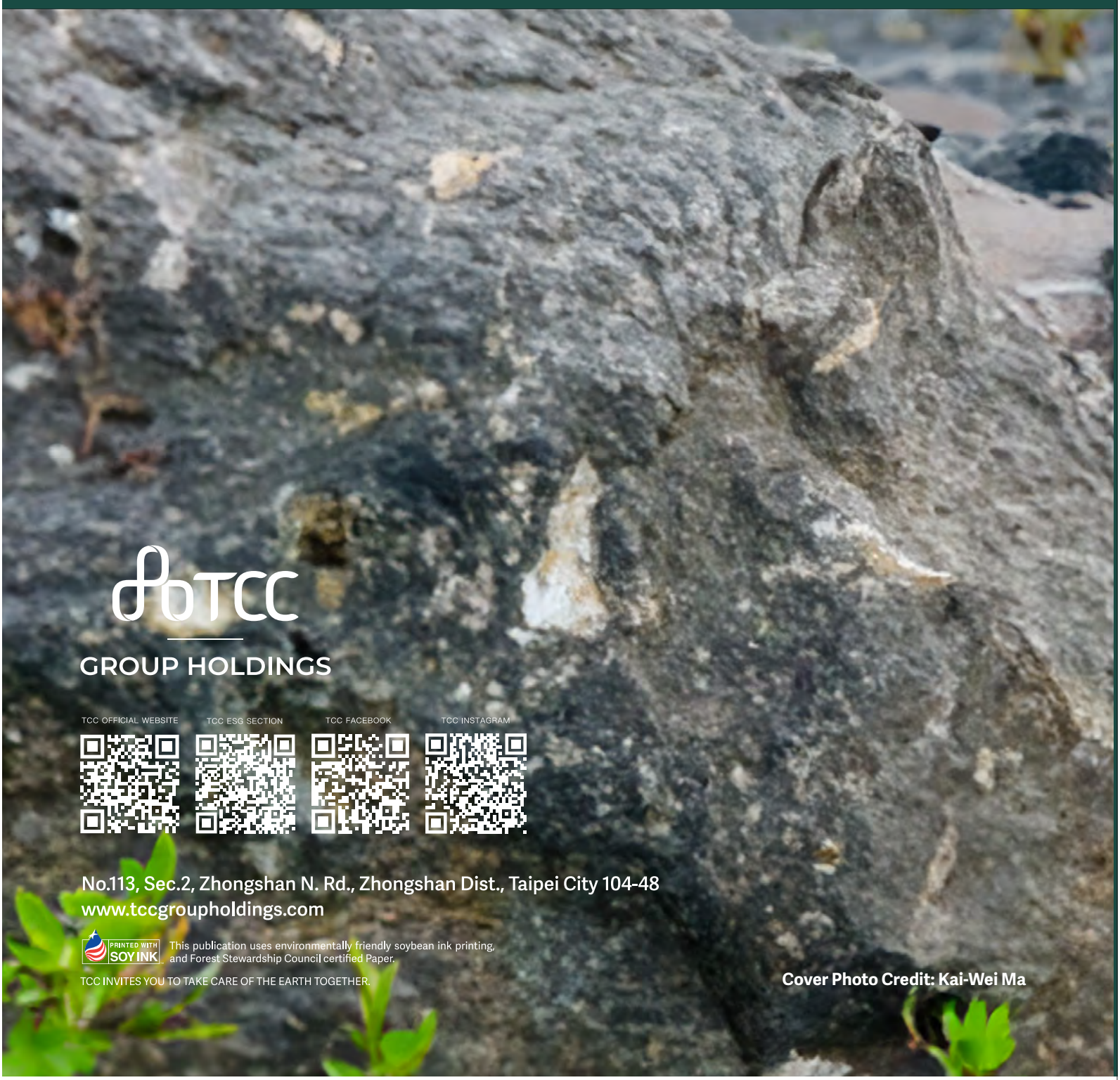

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