

<b>FORUM:</b>	Environment Commission
<b>ISSUE:</b>	Measures for Mitigating Environmental Destruction Caused by Nickel Mining on New Caledonia Island
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## Introduction

Nickel is a necessary metal that plays an important role in various industries and daily life. Its primary applications are diverse, including stainless steel production, battery manufacturing, alloys, electric vehicles, energy storage, and even more. Due to its extensive range of uses, the consumption of nickel is also high. According to the United States Geological Survey (USGS) 2023 Mineral Commodity Summary report, global nickel production was approximately 3 million tons in 2022. With the advancement of the electric vehicle industry, the demand for nickel continues to increase.

Despite its many advantages as a resource, nickel mining has been a major contributor to environmental pollution. The extraction of nickel produces harmful substances that adversely affect the environment.

Nickel mining often involves deforestation, destroying natural habitats and negatively impacting local ecosystems. Additionally, the nickel smelting process releases vast amounts of greenhouse gases. Finally, there is water and soil pollution from wastes and runoff generated from mining and smelting, which contaminates both water sources and soil.



Deforestation caused by nickel mining activities

## Background

New Caledonia has the oldest mining history among the Pacific islands, with mines for copper, cobalt, and other minerals in addition to nickel. In 1864, the engineer Jules Garnier discovered nickel oxide, which primarily exists in the mineral form of garnierite. The nickel reserves are estimated to be around 200 million tons, and New Caledonia is believed to possess 40% of the world's nickel resources. Nickel mining in New Caledonia began in the late 19th century, with significant operations starting in the Houaïlou and Canala regions. Initially, mining was small-scale, with miners using basic tools like shovels



and pickaxes to manually collect nickel. By the early 20th century, large-scale mines were established in Bourail and Thio. Over approximately 100 years, 110 million tons of nickel ore have been mined, yielding about 2.5 million tons of pure nickel. Consequently, nickel mining has become a major industry in New Caledonia.

New Caledonia heavily relies on nickel mining, which accounts for 5.6% of global nickel production, 20% of its GDP, and 90% of its exports. Despite these significant economic benefits, nickel mining brings substantial environmental challenges. The enormous extraction operations are considered a major cause of carbon emissions, contributing to New Caledonia's environmental pollution issues.

Economic development often comes at the cost of environmental destruction. Vegetation has been burned for mineral exploration, and wood has been burned for transporting minerals, causing fires that have damaged the flora and fauna in southern New Caledonia. When cyclones or heavy rains occur, old mines erode and collapse. This causes sediments to pollute rivers and eventually flow down to the beach.

These sediments have damaged the

coastal coral reefs and lagoons.

Furthermore, the nickel factory

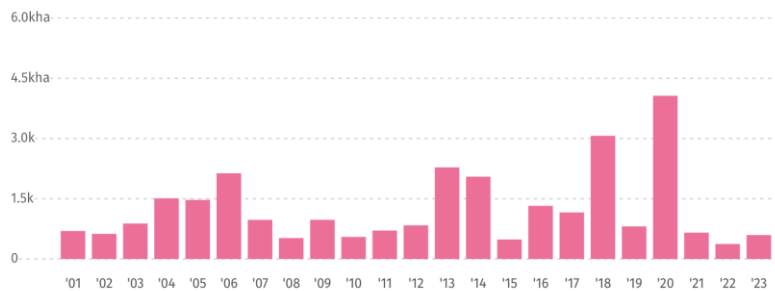
continuously emits smoke, polluting the

air. Although nickel mining is a major

industry, it comes with environmental

destruction and remains a significant

issue.



Tree cover bar graph in New Caledonia

## Problems Raised

### *Ecosystem destruction due to Deforestation*

According to Conservation International (CI), New Caledonia is currently listed among the top 10 most threatened forest hotspots in the world. The extensive deforestation conducted for nickel mining has led to significant losses in ecosystem services. Before the industrialized era, a considerable portion of New Caledonia was covered in forest, but it has lost more than 80% of its habitats. As reported by Global Forest Watch, New Caledonia lost 28.1 kilohectares of tree cover from 2002 to 2023, which is equivalent to a 1.9% decrease in tree cover since 2000 and 13.1 metric tons of carbon emissions. The ongoing forest diversions have severely and adversely affected the ecosystem.

The destruction of habitats has significantly diminished the biodiversity of New Caledonia Island. Not only does habitat destruction play a major role, but pollution from nickel mining also has a substantial impact. New Caledonia is renowned for its unique species found nowhere else in the world



and boasts some of the highest levels of endemic species globally. These unique species are under threat as the island's forests disappear, with the flattening caused by nickel mining having a particularly severe effect. To preserve this biodiversity, it is crucial to restore and protect their habitats.

### *Environmental Pollution*

The nickel extraction sites not only cause damage to nearby flora and fauna due to the massive disposal of waste, but also result in extensive amounts of material being washed away by water, leading to flooding in riverbeds. The Thio River in New Caledonia has an accumulation of sediment along its bank, blocking a major waterway. Additionally, to the north of New Caledonia's mining areas, the Dothio River valley also receives significant amounts of waste from various ravines. These wastes are discharged into the river, and, similar to the Thio River, water pollution from sediments has been observed.



Flooding in Houaïlou, New Caledonia

As severe as the water pollution is, air pollution is also caused by the nickel mines. The nickel plant near Nouméa continuously emits red and black smoke. Nouméa, being the capital of New Caledonia and a tourist area, is often covered by this smoke when the wind blows. In 1981, tests on the nickel plant effluent at Baie de Koutio revealed high levels of nickel, arsenic, and lead, as well as the presence of phenol, hydrocarbons, hydrogen sulfide, PCBs, and pyralene. Additionally, elevated levels of nitrites, nitrates, and phosphates were detected upstream, exceeding environmental standards.

## **International Actions**

### *National Legislation on the Ecosystem and Environment*

New Caledonia has enacted legislation to address its environmental pollution issues and preserve its ecosystems. The legislation on nature conservation covers key areas, including protected areas, ecosystem protection, and species protection.

For protected areas, the types have been aligned with the International Union for Conservation of Nature (IUCN) protected area categories, and existing protected areas have been reclassified into new categories. In terms of ecosystem protection, new provisions offer protection for ecosystems of heritage value, with guidance and educational resources made available to the public. Moreover, regulations have been updated and strengthened to safeguard native and endangered species.

## *Package of Demands*

On July 25, 1996, a package of demands signed by representatives of the two customary districts, Thio and Borendy, was submitted to SLN, the representative of the French central government in New Caledonia, and the Congress of New Caledonia. The demands included the return and compensation of arable land and funding for the restoration of environmental damage caused by nickel mining. On August 6, 1996, an agreement was signed in response to the demands initiated in July. According to the agreement, provisions were made for the resettlement of people located in flood-prone areas due to sedimentation of the Thio River caused by mining activities, and SLN would provide compensation to local farmers for any damage that had occurred.

## **Key Players**

### *France*

In 1853, under the rule of Napoleon III, the island became a French territory and is now one of France's overseas territories. France is helping to address New Caledonia's financial difficulties and stabilize its social system. It is also involved in the nickel mining industry and is assisting with environmental issues. Its long-term goal is to reduce environmental pollution and produce nickel in an environmentally friendly way. France currently views itself as having a significant and decisive impact on the future of New Caledonia's nickel industry.

### *United Nations Educational, Scientific and Cultural Organization (UNESCO)*

In 2008, the lagoons of New Caledonia were designated as a World Heritage site, home to various marine species. However, the region's coral reefs are under threat from sedimentation and overfishing, which are also linked to rising ocean temperatures. To protect these World Heritage-listed reefs, a Reef Resilience Plan has been launched. This program is a global initiative spanning six years and involves collaboration with UNESCO and other organizations.



Reef resilience strategy team

## **Possible Solutions**



## *Eco-friendly Mining Techniques*



Machine for Hydrometallurgy

The extraction process of nickel can result in environmental pollution, but the introduction of new technologies could be effective in preventing such pollution. Hydrometallurgical processes are techniques for extracting nickel from nickel-containing ores, primarily using aqueous solutions to extract nickel metal from the ore. This technology can be more environmentally friendly compared to traditional smelting and refining processes. It features eco-friendly characteristics and allows for the recovery and recycling of the leach solutions

used to extract nickel from the ore, which can then be reused for additional extraction.

Another technology is biomining. This method is also environmentally friendly, uses less energy, and generates minimal microbial by-products such as organic acids and gases. Biomining utilizes microorganisms to extract nickel from the ore. Currently, it is being implemented in countries such as Finland, Chile, and Uganda. The adoption of these environmentally friendly technologies is expected to help address the environmental issues in New Caledonia.

## *Cooperation with International Organizations*

Partnerships can be established through cooperation with international organizations to protect the environment and ecosystems. This includes conducting campaigns and global programs to safeguard various plants and animals, especially indigenous and endangered species. In addition, cooperation with international organizations can facilitate the sharing of information related to environmental issues. Lastly, international cooperation can promote cross-border efforts to effectively manage New Caledonia's environment.

## **Glossary**

### *Deforestation*

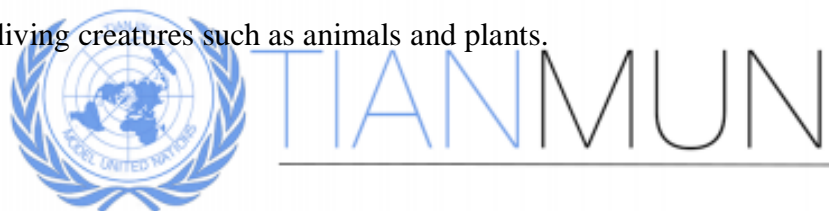
Cutting down a forest or tree in an area.

### *Ecosystem*

A biological system in which living creatures and their surroundings interact.

### *Biodiversity*

A variety of living creatures such as animals and plants.



*Sedimentation*

A natural process in which sediment being settled or deposited by water, ice, or wind.

*Accumulation*

An amount of something that has been acquired or collected.

*Hectares*

A measurement unit equivalent to 10000 square meters.

*Flora*

All the plants in particular area.

*Fauna*

All the animals in particular area.



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