



Alliance *for* Tompotika Conservation  
Aliansi Konservasi Tompotika

## ALTO Update, February 2021

### ***How We're Connected: ALTO, Nickel, and You***

***Editor's Note: This Update is the first in a new series of occasional updates: How We're Connected. The series aims to illuminate some of the complex ways in which members of the Global Consumer Class--that is, most of us reading this--are directly connected to conservation in Tompotika through the things we consume.***

**"When we try to pick out anything by itself, we find it hitched to everything else in the Universe."**

**~John Muir.**

By Cliff Rice, PhD, ALTO-US Board Member

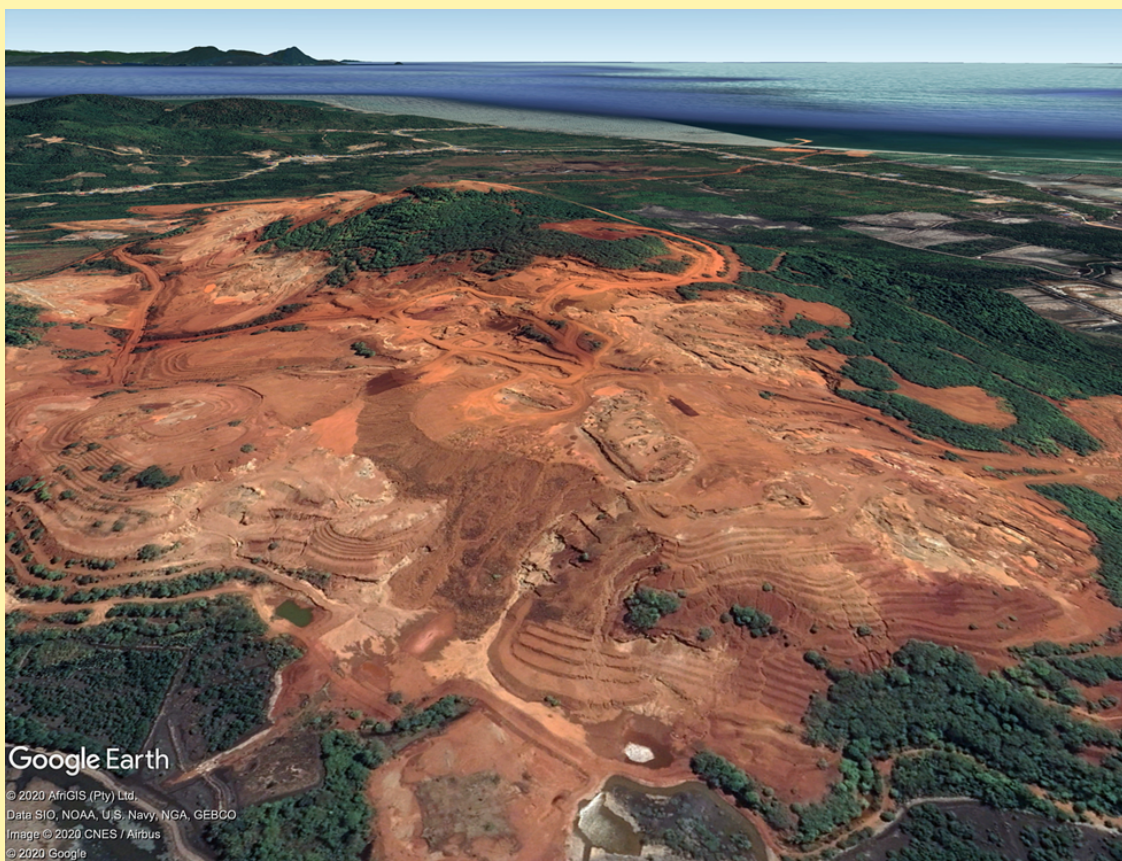
I want to tell you the story of the surprising connection between electric vehicle batteries and Tompotika. This is important because it is expected that the manufacture and sales of electric vehicles will surge in the coming years. Some project that by 2030, electric vehicles will constitute about 30% of the passenger car market, or about 30 million cars per year. General Motors has announced they plan to go completely electric by 2035. And while this will certainly help reduce climate-changing carbon emissions from new cars, all these cars will need batteries. Although there are various types of batteries and new configurations are under development, the consensus is that many of these batteries will contain substantial amounts of nickel – about 30 kg (66 lbs) of nickel in every car. That is a lot of nickel!

This is in addition to the many other uses nickel has. Because nickel is highly resistant to corrosion, it is often a component of stainless steel: there is some in every kitchen. Also, stainless steel is widely used in corrosive industrial environments. Nickel is also a component of superalloys – alloys that retain their strength at a high fraction of their melting point – think jet engines. There is more – nickel is used in electroplating and as a chemical catalyst well. And, it's a key ingredient in those rechargeable electronic devices that seem to be becoming ever more central to our lives.

Well, as it turns out, there is a lot of nickel around. At 1.8% of the earth's mass, it's pretty abundant. The problem is, most of that abundant nickel is in the earth's core and impossible to get to. In the earth's crust, nickel constitutes less than one hundredth of one percent of the mass. Of course, it is not evenly distributed, but occurs in particular geological formations, that is, ultramafic igneous rocks. Under favorable conditions, the nickel in these rocks was concentrated as they were solidifying out of magma, and those deposits are the targets of typical nickel mines.

However, there is another way nickel in ultramafic rocks can get concentrated. That starts with the weathering of these rocks over millions of years. Then, given suitable topography and hydrology driven by seasonal and abundant rainfall, combined with warm temperatures, nickel can become somewhat concentrated along ridges and shoulders of hills. This necessary combination of geology and climate is not common, but is prevalent in particular locales in Indonesia, the Philippines, the island of New Caledonia, and parts of Australia. In Indonesia, many of these locales are on the island of Sulawesi and this includes the Tompotika Peninsula. This is where the connection to AITo becomes important.

It is important to note two things about this type of nickel deposit. First, these deposits can be extensive in area, but the concentration of nickel is not all that high (1-2%). Second, the zone of concentration is usually 10 to 20 meters below the surface and concentration is highest just above the bedrock. So, when this type of deposit is mined, the only way to do this is to bulldoze the whole area and scrape off the upper layers of soil, along with everything living on it –commonly known as strip-mining.



Satellite view of a nickel mine on Sulawesi



Strip-mining anywhere is bad news environmentally, but strip-mining in the tropics is especially problematic. On Sulawesi, this often means bulldozing rain forest. Not only that, but the laterite soils that develop from ultramafic bedrock have a particular chemistry so that many plants that grow there are specialists for that soil type and are not found in other locations. So, this strip-mining is removing unique and highly diverse vegetation over a substantial area. Needless to say, the animals that live there do not fare well either.

Also, as noted, this type of nickel mining is only possible in areas of high rainfall and on ridges and hill shoulders. As a consequence, preventing erosion is virtually impossible, and revegetation is extremely difficult. Also, on these islands it is never very far to the ocean, so sediment carried by water is quickly taken to the ocean shoreline where it settles, smothering coral reefs.



Service Layer Credits: Source: Esri, DigitalGlobe, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, AeroGRID, IGN, IGP, and the GIS User Community

Sediment plumes from nickel mines on Sulawesi

This is all very concerning, because these tropical nickel mines are expected to constitute most of the growth in nickel production in the future. Substantial new discoveries of hard rock nickel resources are considered unlikely. Nevertheless, use of nickel in electric vehicles is expected to increase by about 30% every year. Other uses of nickel will likely grow along with the economy in general at about 4% per year. So, whether it is to feed into electric cars or to accompany general economic growth, the impacts from tropical nickel mines will surely increase.

The Tompotika Peninsula already hosts a number of nickel mines, though currently these are some distance from AITo's field conservation sites. However, over the years numerous test bores and mining claims have already been issued in areas of primary concern for forest and biodiversity conservation, and that process is expected to accelerate as the demand for nickel spikes upward. So far, mining in most of these areas has been averted, but this may not last. That is why AITo has been working with partners to achieve strong formal and on-the-ground protection for these crucial areas.



A nickel mine is planned on the slopes of Mt. Tompotika, near one of AITo's partner villages, Tanah Merah (lower right). Photo: Cliff Rice

So, sad to say, as desirable as they are for reducing carbon emissions from fossil fuels, electric vehicles have the potential to function to export our environmental impact. That is, the Global Consumer Class, especially in wealthier countries, will have cleaner air and lower carbon emissions, but at the cost of increased biodiversity loss and environmental degradation in Southeast Asia. What should a concerned citizen of the world do, then? While there is no silver bullet, we can all have a hand in making things better (or worse!).

***Here are some things we can do:***

- 1. Practice and promote policies that move us toward a steady-state economy rather than unending economic growth.***
- 2. Drive less and keep your existing car well-maintained and going as long as possible.***
- 3. If you must buy a new car, seek vehicles that use non-nickel batteries or have other sustainable energy systems (hydrogen).***
- 4. Demand recycling of battery components and support companies that practice this.***
- 5. Continue to support tropical forest conservation efforts (Thank you!).***



Alliance for Tompotika  
Conservation  
info@tompotika.org  
21416 86th Ave. SW  
Vashon, WA 98070

**AITo Prevents extinction, saves rainforests,  
and promotes the dignity  
of local communities  
while improving their relationship with nature**