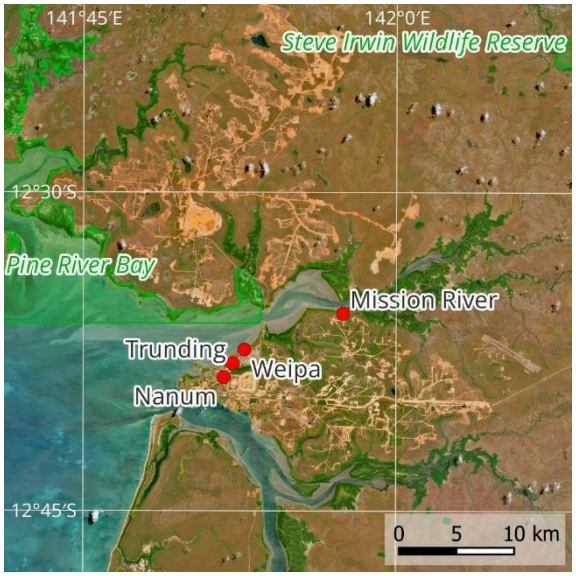
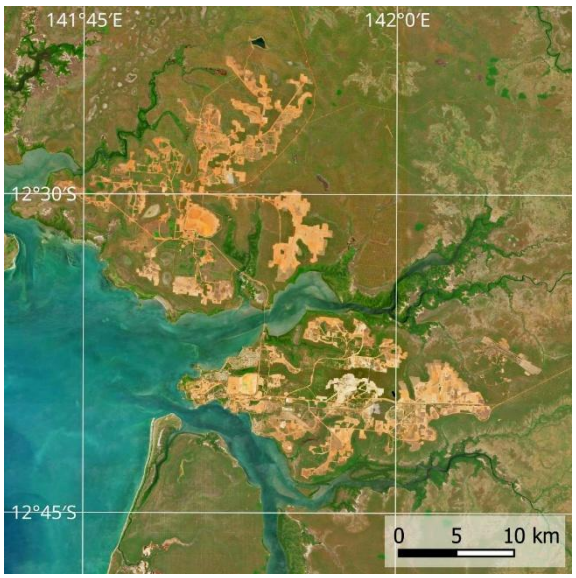
LIT09.3

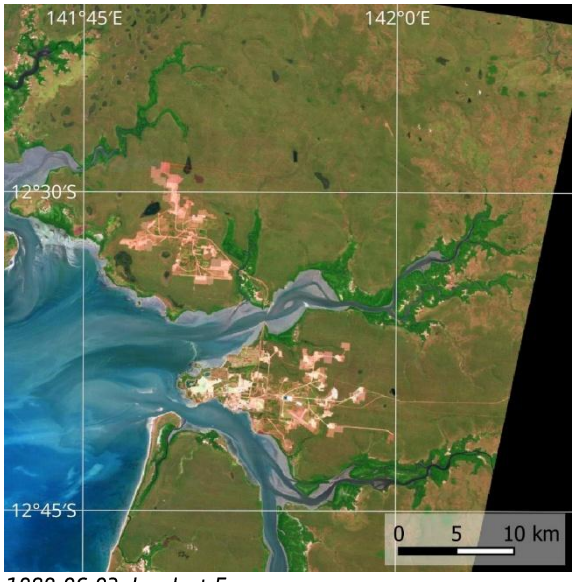
Weipa – Bauxite for Aluminium



2025-10-05, Sentinel-2



2015-12-07, Sentinel-2



1989-06-03, Landsat 5

Located on the western side of Cape York Peninsula in northern Queensland, Australia, Weipa is a coastal town with a population of about 4,000 people. It is one of the most important mining towns in Australia due to rich deposits of **bauxite**, the main raw material used to produce **aluminium**.

The land around Weipa was traditionally owned and managed by Aboriginal peoples, particularly the Alngith people. Large bauxite deposits were discovered in the 1950s, and mining started in 1963. Weipa was built to support the mining industry, with housing, schools, a hospital, an airport, and a deep-water port. Several thousand jobs are directly or indirectly linked to bauxite extraction, transport, and port operations. Mining activity has shaped the infrastructure and daily life of the town. Although Weipa is remote and sparsely populated, it plays a key role in the global economy. Each year, tens of millions of tonnes of bauxite leave its port.

Bauxite and Aluminium

Bauxite is the primary source of aluminium. To produce **1 tonne of aluminium**, about **4–5 tonnes of bauxite** are required. Aluminium is widely used because it is lightweight, durable, and recyclable. The bauxite reserves near Weipa are among the largest in the world. The Weipa mining area produces roughly **35 million tonnes** of bauxite per year, making it one of the biggest bauxite mining operations globally. Australia is the world's largest exporter of bauxite, supplying major economies such as China, Japan, and South Korea.

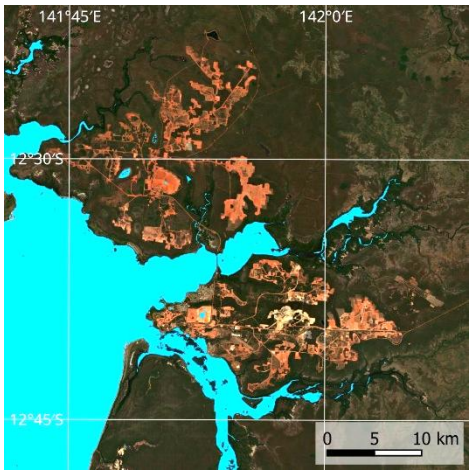
Bauxite mining in Weipa is mainly open-pit mining, which requires clearing large areas of land. Individual mining sites can cover several square kilometres, affecting ecosystems, soil quality, and water systems. In Weipa, **rehabilitation programs** aim to restore vegetation within 5–10 years after mining is completed. Native plant species are replanted, and satellite monitoring is used to track recovery. Indigenous land use agreements play an important role, providing employment, training, and decision-making opportunities for local Aboriginal communities.

Satellite data is a valuable tool for managing mining activities and reducing environmental impacts. Earth-observing satellites, such as those in the Sentinel program, collect images of the same area every few days, allowing scientists and authorities to measure changes in land cover, vegetation health, and water quality over time.

Exercises

- Describe the satellite maps from 1989, 2015, and 2025.
- Which landscape structures and land cover classes can you identify? Think about water bodies, forests (mangroves along the rivers), bushland, and mining areas.
- Which differences can you identify between the satellite maps? Focus on the reddish areas of mining activities.
- Using the scalebar in the maps, try to estimate the area affected by mining activities.
- Look at the NDSI map below and check for what this information could be helpful.
- Which human activities are related with these differences? Are there only changes related directly to mining activities?
- Can you identify natural changes in the landscape, too? Think about seasonal changes; note that the region is located several degrees south of the equator.

Additional Material



The mining activities in the Weipa region in a NDSI map (normalized difference soil index) highlighting the bare soil, left, and a photograph of a bucket wheel excavator used in the mine (photograph: Urbain J. Kinet), right.

Links and Sources

- https://eol.jsc.nasa.gov/Collections/EarthFromSpace/printinfo.pl?PHOTO=STS073-759-93 – an astronaut's photo of the region, taken in 1995
- https://capeyorkweekly.com.au/weipa-space-base-has-great-national-significance-morrison/16002/ – article about Weipa Space Port
- https://science.nasa.gov/photojournal/weipa-queensland-australia/ – TERRA/Aster satellite image of the Weipa region