





















Loyauté

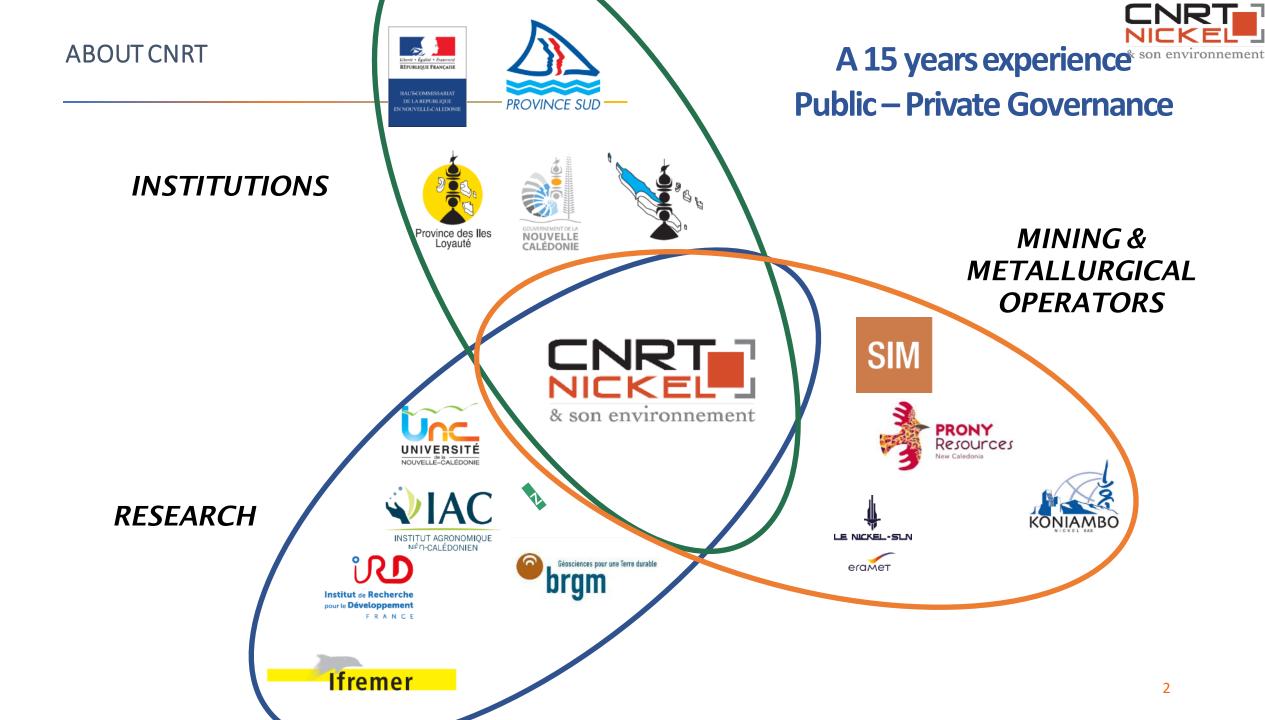














[3 RESEARCH AREAS BASED ON NEW CALEDONIA'S SOCIAL, ENVIRONMENTAL AND TECHNOLOGY ISSUES

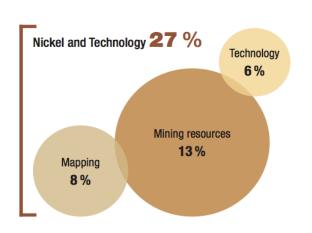


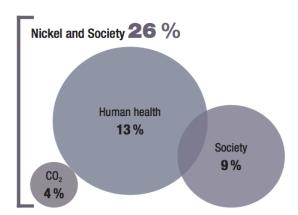


Nickel and Environment



Nickel and Society





budget allocations (%)

2D-3D mapping

Mining resources

Mining technology

Natural environment - quality and impact monitoring, offsets

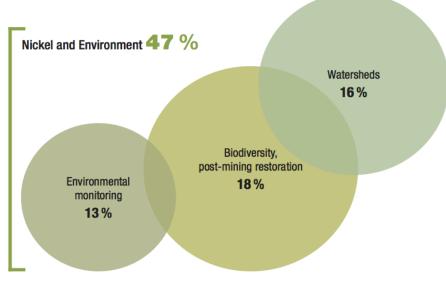
Conservation and restoration

Watersheds

Climate change mitigation

Human health hazards (metals and asbestos)

 Social interactions and innovation / Corporate social responsability

























INTO THE FIELD OF NICKEL AND

TECHNOLOGY



NICKEL AND OTHER MINERAL RESOURCES (SCANDIUM)

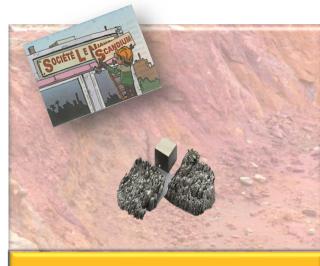
2D-3D GEOLOGICAL MAPPING AND SPATIALISATION OF MINERAL **DEPOSITS**

DEVELOPING METHODS FOR ENHANCING MINING TECHNIQUES

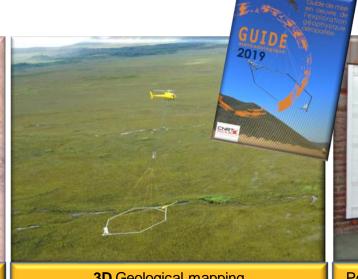
CLIMATE HAZARDS REDUCING CO₂ EMISSIONS



Increasing knowledge of laterite minerals



SCANDIUM, a new mineral resource What potential for New Caledonia?



3D Geological mapping Airborne electromagnetic exploration Collaboration with Univ. Aarhus (DK)



Potential of HYPERSPECTRAL technology Corescan™ in New Caledonia Collaboration with CSIRO - Perth (Au)



INTO THE FIELD OF NICKEL AND THE **ENVIRONMENT**



MINE WATERSHEDS SURFACE AND GROUND WATER

METHODS FOR ASSESSING ENVIRONMENTAL QUALITY AND MONITORING IMPACT

PRESERVING BIODIVERSITY

ENHANCING SITE RESTORATION **TECHNIQUES**



TRANSLOCATION OF **PETRELCOLONIES A PILOT OPERATION**

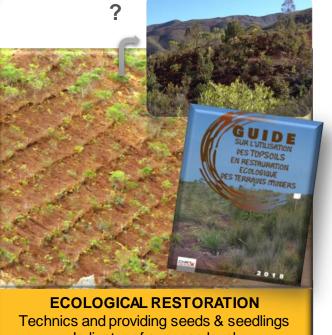
Collaboration with NZ (DOC & Auckland univ).



Managing of the mining pollution legacy & REMEDIATION Over-accretion and sedimentation



ENVIRONNEMENTAL DNA INNOVATIVE TOOL FOR **BIODIVERSITY MONITORING**



Indicator of success level



A POOL OF COMPLEMENTARY PROJECTS TO STUDY THE DISPERSAL OF METALS AND HUMAN EXPOSURE (2015 - 2018)

ABIOTIC COMPARTMENT

Dispersal of Metals

- Modeling of dust dispersion from mines and industrial sites (ultramafic context)
- ✓ Pollution mapping Development of a lichen bio-indicator
- √ Reactivity of dust (depending on size and) environmental conditions)



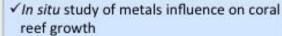
- ✓ Metals fluxes in freshwater and sediments:
 - hydrology (water flow and watershed modeling)
 - water and SPM chemistry
 - metal speciation in sediments and SPM
 - monitoring of sediment inputs toward the lagoon (by remote sensing)



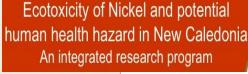
√ Potential for remobilization of Ni, Co and Cr from lateritic soils, in river and lagoon sediments

BIOTIC COMPARTMENT Ecotoxicology

- √ Potential accumulation across the successive trophic levels (watershed lagoon)
- ✓ Experimental Ni trophic transfer (biofilm to grazer fish)
- ✓ Development of a bio-indicator of metal explosure (transcriptomic analysis of biofilms - diatoms)



- ✓ Monitoring of planktonic primary production (by remote sensing)
- ✓ Experimental use of bioaccumulator bivalves (Modiolus sp. / the rock oyster Saccostrea echinata) as an indicator for metal contamination
- √ Toxicity tests on tropical marine invertebrates (embryos)











HUMAN EXPOSURE Risks assessment

- √ Maping the metal contamination of local communities
- ✓ Influence of geological setting and mining activity
- ✓Identifying the main sources of contamination (dust, food water...)





Research programs are carried-out by consortiums of research bodies and specialized engineering firms based in New Caledonia, France and Canada

2024: CNRT to become CNRTEC, the New- Caledonia Competitiveness Center





A 3 pillars reorganisation

→ Purpose of CNRTEC: « Support the competitiveness of New Caledonia mining & metallurgical sector in a sustainable and responsible way ».

 Research: application-oriented research on Social issues (culture legacy, discriminations, values), environnement (preservation, restoration, Biodiversity Resources), Technology (benchmark, POCs) and Public policies (Resource development scheme & mining policy advocacy).

Research Governance: activities managed with a scientific advisory committee

- <u>Technical Development</u>: Scoping studies for decision making, then pilot project to derisk nex technologies in the array of energy transition, mining & metallurgy technology, mining productivity, environnement & social innovation
- <u>Human Development</u>: Ongoing training coordination, talent development for New Caledonia industry, Knowledge and know-how transfer, Industrial culture enhancement across the ecosystem (contractors)

Development Governance: activities managed with a competitiveness advisory committee

CNRTEC Business model

New tools

Pilot projects with

new technologies

Technical

Consortiums de

partenaires locaux,

régionaux, nationaux

Development



Value Creation (Social, économics, Environnemental)

Know-how Skills

Transfert & Human Développement

Consortiums de partenaires locaux

Deployment

Entreprises Institutions

Knowledge, Data

Research

Consortiums de partenaires locaux, régionaux, nationaux

Specific additional needs

Co-funding CNRTEC + project Partners (public/private, consultants, engeneering, start-up

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Members Contributions

CNRTEC funding
Partners (cofunds et/or scientific collaborations)

TRL 1 TRL 2

TRL 3

TRL 4

TRL 5

TRL 6

TRL 7

11

TRL 8

TRL 9





Industrial competitiveness: performance development & cost-kill through breaking innovations, skills development, optimisation through inter-entreprise collaboration, advocacy & international labeling

Environment & risk
management: watershed and water
resources management, ecosystems
preservation

Waste reduction & Co-product valorization: develop low grade ores, metallurgical slag and CO2 based applications with a circular economy approach

Energy transition: alternatives to fossils (H2, Biomass, PV...) développement

Social acceptance



Scoping stuties 2023-2024

- 1. The small haulage truck (electric, hybrid, ...)
- 2. Ore moisture reduction at mine site
- 3. Maintenance skills enhancement for metallurgy
- 4. Creating value from metallurgical slag applications
- 5. Perspective for natural H2 in New Caledonia
- 6. Old mine sites as Renewable energies production opportunities
- 7. Nickel Mine & Metallurgy process alternatives / optimizations
- 8. Geological control & mining decisions through in situ real time analysis
- 9. Dust Control with polymers

6 juillet 2023





FORMATER project

- Ridge to Reef modeling approach on material/chimical dissemination
- Models compilation and connexion
 - Erosion (mining and non mining surface)
 - Transport (river, lagoon)
 - Sedimentation (river, laggon/reef)
- Decision aid systeme
 - Australien example right
 - Data input/platform shared with Seaclopedia deliverable
 - Ability to predict and prescribe actions
- → Toward better watershed management for tropical island; especially with coral reef protection under climate change

