COMOROS

Geothermal potential in the Comoro Islands

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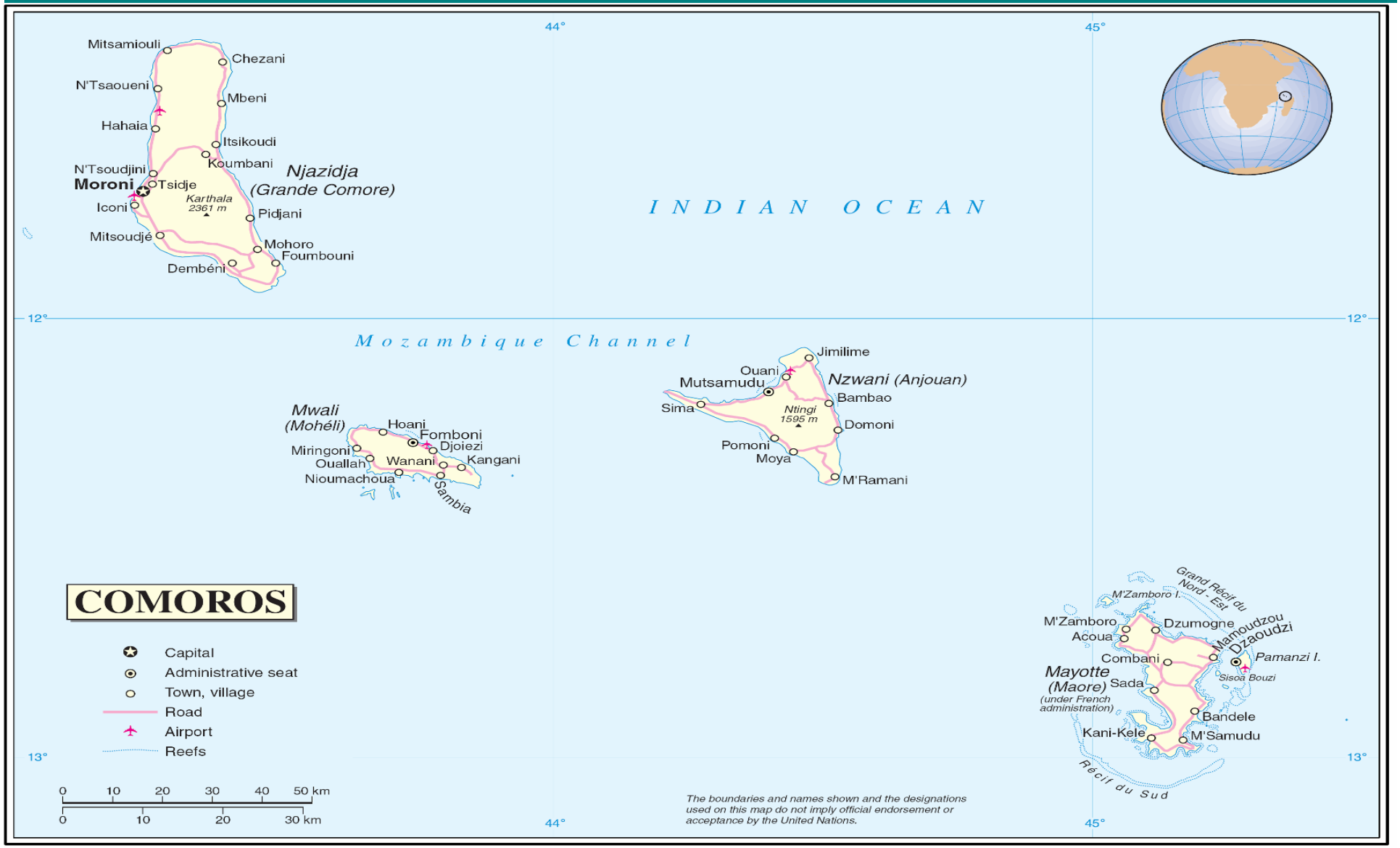
Location of Comoro Islands

The Comoro Islands



Map No. 4088 Rev. 1 UNITED NATIONS
January 2004

Department of Peacekeeping Operations
Cartographic Section

Comoro Statistics

- 4 volcanic islands archipelago in north access of Mozambique Channel, Indian Ocean
- Population: ~750,000
- Total land area 2236 km^2
- Official languages Arabic, French
- Capital: Moroni
- Per capita GDP: $600
- Major exports: vanilla, cloves, essential oils
- Major gov't focus on tourism development requiring dependable, affordable electricity

Comoros Electricity Sector

- 19.74MW installed capacity
- 9.3 MW available capacity, all diesel using imported fuel. Approx. 10 MW baseload
- 46 % of population with electricity access
- Petroleum importation is heavy drain on economy
- Present electricity cost ~330FC (approx. $ 0.93 US)/kWh
- Geothermal can provide indigenous power source, expand industry, exports, tourism, safeguard environment

Comoran Volcanism

- Ngazijda (Grand Comore) has active volcano
- Grand Comore dominated by Karthala, Massif de la Grille volcanoes
- Karthala active, erupted >20 times since 1800, latest 2005

Karthala, La Grille Volcanoes on Grande Comore

Environmental Concerns

- Prevent further deforestation
- Protect unique animal species including:

- Livingstone Flying Fox – Fruit bat found only in Comoros w/wingspan > 4 feet
- Insects, more than 12 Comoran bird species threatened with extinction
- Coelecanth – 400 million year old, “missing link” fish living in Comoro waters

Government Energy Priorities

- Add additional 10-15 MW soonest to satisfy demand, reduce outages
- Reduce electricity cost to increase affordability, promote industry, tourism, employment
- Promote energy independence, decrease petroleum imports
- Preserve environment
- Gov't hopes geothermal can provide 10-15 MW baseload power within 3-4 years
- Additional capacity to be added as demand increases and resource better understood

Work Done to Date

- Geological map prepared
- 9 day technical assistance by 3 KenGen geothermal experts. Geological, geochemical, geophysical info collected at Karthala, La Grille, La Grotte volcanic areas.

Conclusions

- Possible geothermal reservoir occurs between La Grotte and Karthala.
- Reservoir shallow between La Grotte and Karthala (<2000m) and deeper at La Grille.
- Reservoir and heat source deeper at La Grille
- Heat Source for the geothermal system occurs at depth of about 5 Km.
- Selected gas from fumaroles and water samples from springs were collected and analyzed for their composition.
- Water sampled from selected boreholes do not show signature of geothermal system.
- Gas sampled from fumaroles indicates geothermal sources with reservoir temperatures of 250-300°C.

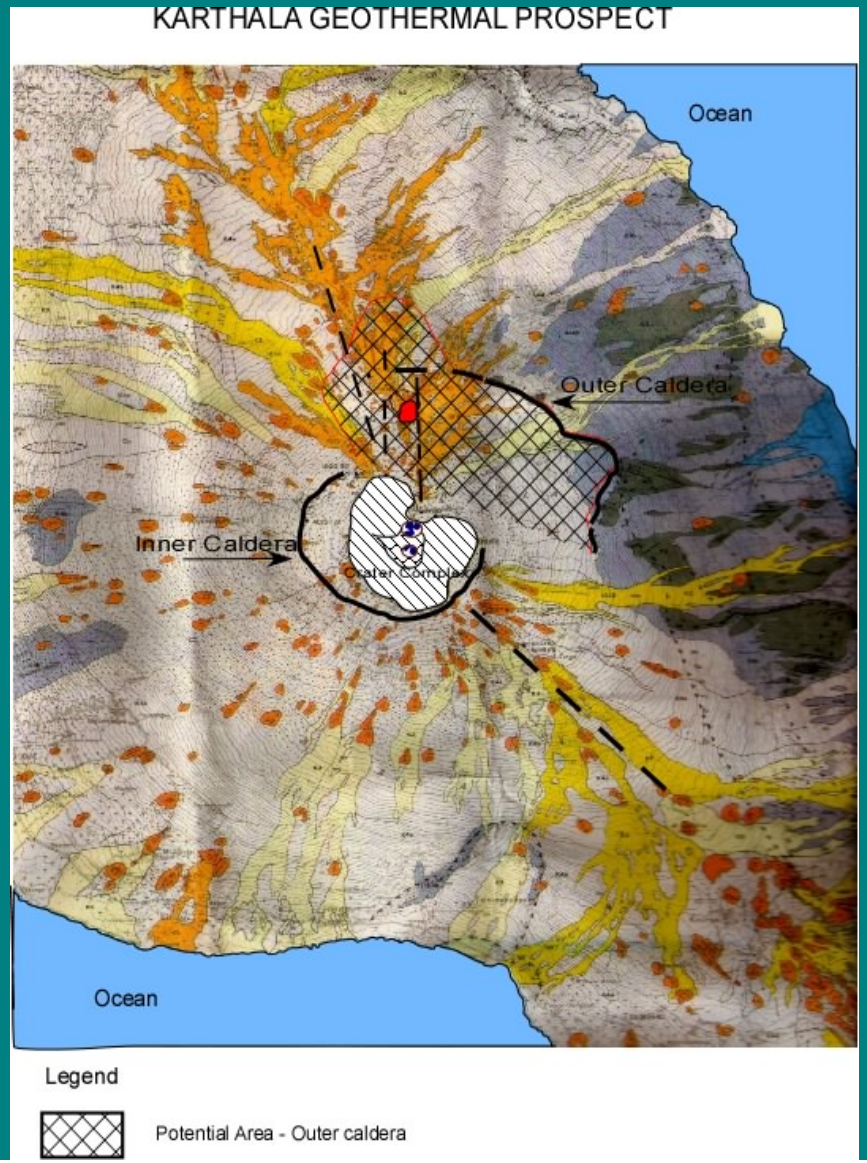
Conclusions

- Fumaroles
  - Water/hot rock interaction
- Recent volcanic activity
  - Heat source at high temperature
- High temperature fumaroles - sulfur Temp > 3000C

Conclusions

- Recharge
  - Along fractures
- Reservoir
  - Fracture and contact permeability
- Size
  - > 10km2 at Karthala

- Geothermal reservoirs exists at Karthala Volcano
- Large geothermal potential
- Temperatures >300^0 C



Assistance Needed

- Review already-existing proposal, budget, schedule for geotechnical surface analyses at prospective sites on Grand Comore to complement KenGen study
- Assess present and future market for geothermal power
- Assess Comoran institutional resources, gov't policy, possible additions, financing options to promote geothermal

Proposed Next Steps

- Comoros to apply for ARGeo membership
- Obtain ARGeo assistance to explore public vs private (or combined) geo development strategies
- Obtain financing to carry out followon geothermal surface studies, temperature gradient drilling
- Continue contacts with international geothermal companies, financiers

Resources Identified, Required

- Gov’t assembled host country teams to assist KenGen geoscientists and work with GDA expert
- Gov’t to provide in-kind support for initial geo surface assessment work
- If initial surface assessment results promising, Gov’t optimistic support can be obtained from Gulf sources for follow-on exploration drilling and plant equipment

Thank You

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