



# **A lesson from New Zealand to Nepal: Hydroelectric Power Utilization**

Bimal Bhattarai  
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# Overview

- Both Countries background information
- HydroElectric In New Zealand
- Nepal's energy crisis
- Nepal's HydroElectric Potential
- Lesson for Nepal from New Zealand



# Background Information

## New Zealand

- Population: 5 million
- Area: 103, 483 sq. miles
- GDP: \$199 Billion
- GDP per capita: \$40,266

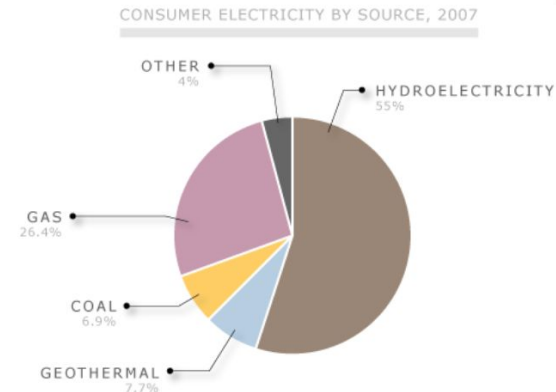
## Nepal

- Population: 29 million
- Area: 56,827 sq. miles
- GDP: \$84 billion
- GDP per capita: \$2,842

- Two diverse countries, both in terms of economic and culture
- Both share similarities in potential in Hydroelectric
- While New Zealand has been able to effectively use hydro power, Nepal has not
- There is a lesson to be learned for Nepal from New Zealand

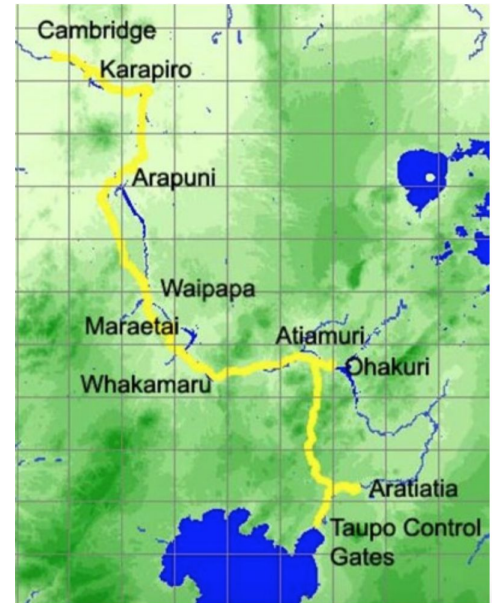
# Hydroelectric in New Zealand

- Started to build hydroelectric in early 1900s due to enormous potential
- Has 100 hydroelectric generating plants
- Last 10 years, Hydroelectric provides 50-60% of electricity for the country
- Provided 82% of the electricity generated from the renewable sources
- In 1980, peak production provided around 84% of the country's electricity



## Prominent Power Stations: Waikato River Stations

- Longest river in New Zealand
  - 264 miles in length, and runs through North Island
- Has 8 dams and 9 hydro electric powers stations with combined power capacity of 1000 MW
  - Power scheme begins from lake Taupo to last power station at Karapiro
- Power stations along the river generated approx. 4000 GWh electricity annually
  - provides approx. 13% of New Zealand's electricity



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# Prominent Power Stations: Manapouri

- Located in the South Island, build in 1964 and operational fully in 1972
  - Country's biggest hydro station
  - 2nd biggest power station
- Has seven 122 MW generating units, which operate at max. Output of 800 MW
  - enough to power 619,000 avg. homes in NZ annually





# Energy Background in Nepal

- Nepal Electricity Authority, government authority owns and operates the national grid
- Approx. only 60% of the 30 million people have access to regular electricity
  - rest of 40% population relies on primitive form of power
- Annual consumption of electricity in the country per person is about 100 KWh
  - consumption rate is considerably lower compared to New Zealand's 8,240 KWh
- The country need to meet the growing demand for power, which is rising by 10% each year
- Hydroelectric power could be a solution for the country's growing need for more power

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# Hydro Availability in Nepal

- Nepal has huge potential for hydropower due to many perennial rivers
- Start from the himalayas, which are 8000 m high in the north and flow through towards southern plains
- Sources of such water flow is due to snow melt, glacier and rainfall
  - Nepal receives annual avg. rainfall of 1,500 mm
- Country has the hydro potential of 80,000 MW
  - As of 2018, only 1,000 MW of hydro capacity installed





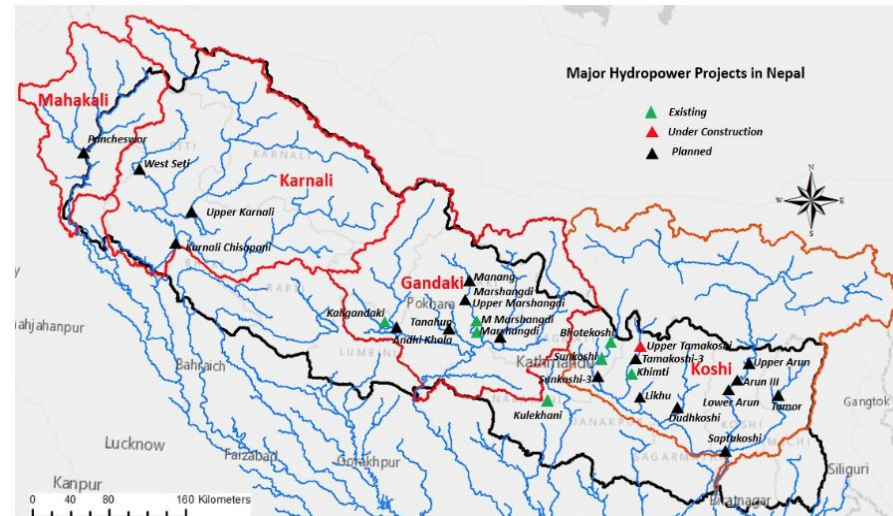


# Four Major Hydro Contributors

- There are four major rivers that could significantly contribute to hydro power generation in Nepal
  - Karnali and Mahakali rivers combined have potential of 36,000 MW
  - Gandaki has the potential of 20,650 MW
  - Koshi river has the potential 22,350 MW
  - Other small rivers combine have 4,110
- However studies conducted estimated only half of the total potential is economically feasible

# Current and Future Projects

- Figure shows existing, under construction, and planned hydropower projects
- Seven plants already exists, which generate less than 1,000 MW of power
- One in under construction with peak potential Of 456 MW
- While severals other are still in the planning Phase, some withheld due to political reason





# Lessons to be Learned: A way forward

- Due to enormous hydroelectric potential, Nepal can learn from New Zealand regarding hydroelectric power
  - Four major rivers in Nepal have more potential than Waikato
  - Nepal should build series of power stations along one of the four major rivers just like Waikato
  - Any one of the four could provide an answer to solving energy problems within the country
- Government needs to invest more in the infrastructure of the country to transmission of power easier
- Gov. could also establish a better policy to renewable energy
- Look for private investments as well
- If Nepal can harness even half of  $\frac{1}{4}$  of its total hydroelectric potential, it could considerably lessen the energy crisis



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