



RESEARCH PAPER

**Empowering the Nations: Assessing the Energy Crisis-Post
Federalization: A Case Study of Bagmati Province in Nepal**

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ABSTRACT

This study aims to analyze the consequences of the energy crisis in the Bagmati Province. The Energy crisis is the most challenging issue at the global level. Energy production is most powerful in globalization, Nepal has many energy possibilities after the Federalizations with all three tiers of government focused on development. A mixed method applied following qualitative and Quantitative research. Through interview schedule, both public and private energy producers were interviewed, pre-tested in the study areas during Oct-Dec 2023. The infrastructure demands and materials due to urbanization have increased energy-electricity. After federalization, the local development work progressed and energy demand accelerated whereas production was recorded as insufficient. The lack of an input system and mechanization are the priorities in the farming sectors that resulted in crisis and shortage. The local resource utilization and distribution of energy to the need-based purpose are advised.

Keywords: Demands, Development, Electricity, Energy Crisis, Local Government, Supply

Introduction

Water is vital and natural resource of Nepal. To generate electricity, all required commercial fossil fuels (mainly oil and coal) are usually imported from India or from international markets routed through India. Fuel imports took over one-fourth of Nepal's foreign exchange earnings. Despite the hydro potential, hydroelectricity accounts for only some 1 percent of total energy supplies (Khan, et. al., 2022; KC et al., 2011; Afzal, et. al., 2020).

A study by Loyd, Richmond, and Clare (2008) puts a light that reliance on the fossil fuel is one of the major reasons of increased geopolitical tension round the globe. The books clearly indicating the world further divided into the two categories-energy surplus and deficit respectively. Countries like USA, China, Japan are well off. For energy concern global politics is one of the issues while distributing energies (Loyd et al., 2008).

Kalicki and Goldwyn (2013) review current foreign policy and energy experts and leaders to assess how the US can integrate its energy and national security issues. He explained the features of Security threat can affect and hampered the situation and regional and National security. In a review of the book, he highlights challenges and opportunities of the energy system and supply (Kalicki & Goldwyn, 2013).

Ebinger (2011) explores through books that the political issues like tensions between India and Pakistan; rivalry between India and China which are the main hurdles in the achieving of energy security for the region. The review suggests that regional cooperations and placement of energy expert to make influences are associate hence placement of the experts means a lot in the south Asia (K C, 2011).

Elgar (2013) also provides theoretical basis to the trans-boundary water issue. The major water resources of the world are under immense pressure and this fact is posing huge threat to the world peace and order. The unequal treaties between Nepal and India related to the sharing of water bodies coming through Nepal can be linked up with cases presented in this book having theoretical basis to the trans-boundary water issues on cases (Earle et al., 2011).

Literature Review

Shrestha (2017) highlights that interest groups play differently at different times, but the decision makers must be fair and be bold enough to decide correctly in a way favourable to the need of the country. It is, however, disgusting to note that even the most attractive simple type of moderate size projects needed to be kept for such purpose have been handed over to the outsiders for use outside the country, the Upper Karnali and Arun-3 projects. The Nepalese best resources are going to be used by India as Indian resources just by providing little lollipops like the royalty and some free energy to Nepal (Shrestha, 2017).

The Government of Nepal (2013) published 'National Energy Strategy of Nepal' providing different phases of Strategic program are being carried out for energy security in Nepal which presents the current energy scenario of south Asia that has direct relation with the Nepal's energy consumption. Nepal's consumption is one fifth of the world's average and less than half of the Asia average. Current energy issues energy Justice Issues of Nepal is also put forward in the report (GoN, 2013).

Acharya and Sadath (2019) highlight the applicability of different approaches and technologies and illuminates how household and commercial innovations occur (or fail to occur) within energy governance regimes. The case study of past 10 years are highlights belongs to the Bangladesh, China, India, Laos, Indonesia, Malaysia, Mongolia, Nepal, Papua New Guinea, and Sri Lanka (Acharya & Sadath, 2019).

Khalid & Mukhtar (2016) argues about the present scenario of Pakistan's Energy Security from Water and Power Distribution Authority (WAPDA) way of working to develop energy projects and the Indus Water Treaty proves as a turning point in the hydropower generation in Pakistan. The present energy and good governance activities are well explained (Khalid & Mukhtar, 2016).

Parajuli (2011) has mentioned the energy poverty situation of Nepal, explained the urban consuming more electricity through modern devices and minimum energy requirement were advised to the city dwells. The renewable energy recommended the only alternative for Nepal where no such foosil fuel sources are available till date and expect to mitigate energy crisis (Parajuli, 2011).

After the federalization system, all three tiers of government established namely federal, Provincial and Local Government to deliver service in Nepal. The Local Government (LG) played a vital role as service from the doorsteps were providing by the LG and Provincial Government taken the overall management of the province and allocated medium and large grants within the areas (Chhetri et al., 2020).

Bagmati Province considered one of the leading agriculture corridor, diverse, climatic variations and farming have challenges nowadays due to urbanization and lack of human in farming. The shortage of energy is the prime reason of low production and various climatic disturbances like erratic rainfall and low productivity are the day by day case of Bagamati Province. The local production is insufficient and depends on export through India and China (Chetry et al., 2022).

Upper Tamakoshi hydropower project is the leading project in Nepal located at Dolakha. The project is developing electricity that contributed to the local areas as well as to the National contributions. Similarly, Kulekhani and Trishuli are the most leading electricity project in Nepal contributing electricity. They are the nations pride hydropower projects producing energy and helping and establish many social and economic sectors in Nepal (NEA, 2021).

There are total of 119 Local Governmentants (LGs) and 13 district comes under the Bagmati Province covering three geographical belts all together Hills, Mountains and Terai in the same Province. Bagmati Province is considered as the representing sample of Nepal covering all 7 Provinces in Nepal due to its social, cultural and economic characteristics are not much distinct with other Provinces. Energy is one of the vital issue as the Nations Capaital Kathmandu valley covering all three district Kathmandu, Lalitpur and Bhaktapur consumes one of the largest electricty in Nepal (GoN, Province Profile, 2019).

Hence, the summary of Literature shows that energy is viable and essential in Nepal and the consequences of energy situation and crisis is a part of analysis,thus this study aims to analyze the consequences of energy crisis and its associated factors in the specified research area.

Material and Methods

Nature

This research is a cross-sectional study with qualitative and quantitative analysis followed by self-structured questions cross-verified with the commercial farmers questionnaires.

Population

Three representative districts namely Dolakha, Nuwakot and Makwanpur district was chosen (*See study area map*) representing all three belts of Mountains, hills, and Inner Terai. Similarly, in the selected district, National hydropower projects were ongoing generating electricity such as Upper Tamakoshi in Dolakha, Trishuli in Nuwakot and Kulekhani phase 2 in Hetauda, Bhimphedi.

Sample Size

Hence, a sum of 80 questions from employees (Dolakaha-30, Nuwakot-26, and Makwanpur-24) and similar 80 questions from farmers of the same area was interviewed. The Data was collected between November to December 2023.

Sample technique

A Self-structured questionnaire was prepared for the technical employee of the hydropower project (Middle to higher level of management) distributed with questions and it was again cross verified with the local commercial areas of the same area for depth analysis of energy crisis in the area.

Instrument

A questionnaire was prepared to find out field information from the farmers and it was cross-checked with energy producer agencies in 3 distinct project sites of Nepal. In addition, KII and FGD questions were prepared to capture the expert notes as well as collective information from the field following set objective.

Pilot Testing

As part of pre-test, both questions were tested (2 each for farmers and energy producers) in nearby Project site (Kulekhani hydropower, Phase II area) that reflected some pattern of the questions and ground reality were miss-matched, so it was again re-structured based on the response of pilot testing. The pilot testing teaches the gap of the questions which were missing that added further, and some of the unnecessarily questions was removed.

Validity and Reliability

After pre-testing, the questions was set into SPSS Vol 24 and each variables were set accordingly. After a validity teasting the Chronback alpha valus stands 0.85 that indicated that the reliability of both question was highly significant.

Data analysis Technique

The collected data was further analyzed and extracted into MS Excel and following graphs and tables were drawn based on the nature of the data. Some trendline were drawn stand appropriate to draw.

Ethical Consideration

As per the doctoral study on the energy Crisis, consent was taken from the surveyed respondents identities were not disclosed as it was committed during the survey. Apart from this fact, no ethical issue is a concern.

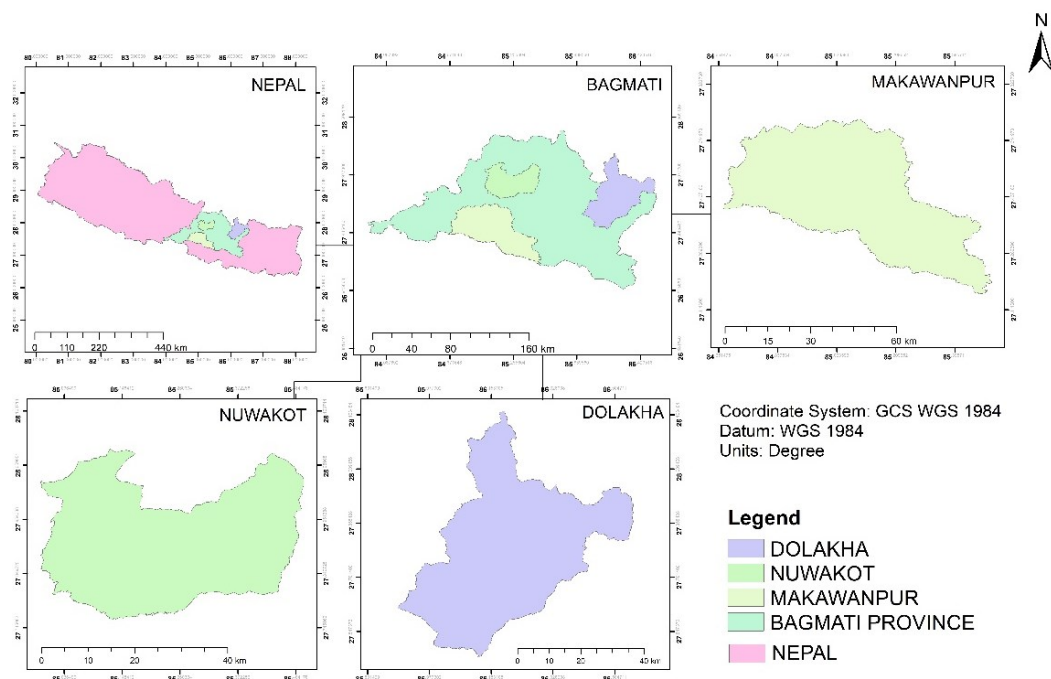


Figure-1, Study area Map

Results and Discussion

In this section, the qualitative and quantitative data collected from the field visit are deeply analysed and explained here.

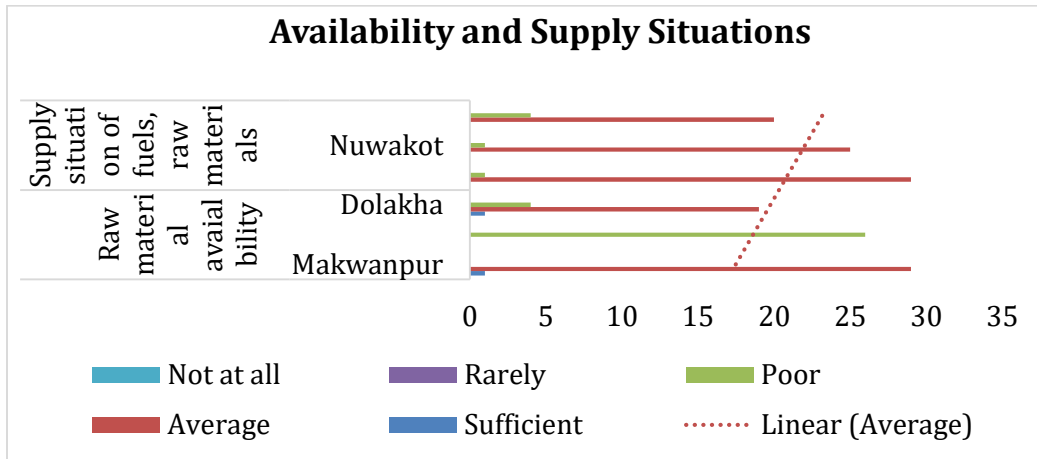


Figure-2, Availability, and supply situation of the study area

In cases of availability vs supply situation of electricity and other materials, the technical staff members have responded average majority in most of the district. However, the supply situations of fuel and raw materials like coal and other minerals are lacking and delayed as a result some has opted poor and overall average response is hiddenly indicating that the source of such materials is coming through the India most of the time as Nepal does not have a source of fuel and limited minerals available.

It was found that after federal system, the populations, urbanizations, and infrastructure demands are high and expectations from the LG and Provincial government is high and both Government are accelerating development rapidly considering infrastructure on the top followed by agriculture and education as a later most priorities.

KII (Key Informant Interviews) with Nepal electrical Authority said that *India provides raw materials through contractor as per bilateral contract between the countries and in such cases many times due to logistic delayed the availability is challenging.*

Expert also added that *to run a large hydro unit a big source of fuels and other minerals is required and without gathering all these the energy generations may not work on freely, Hence, this may be a cause of energy crisis that when the source is disturbed it affects the production and entire cycle.*

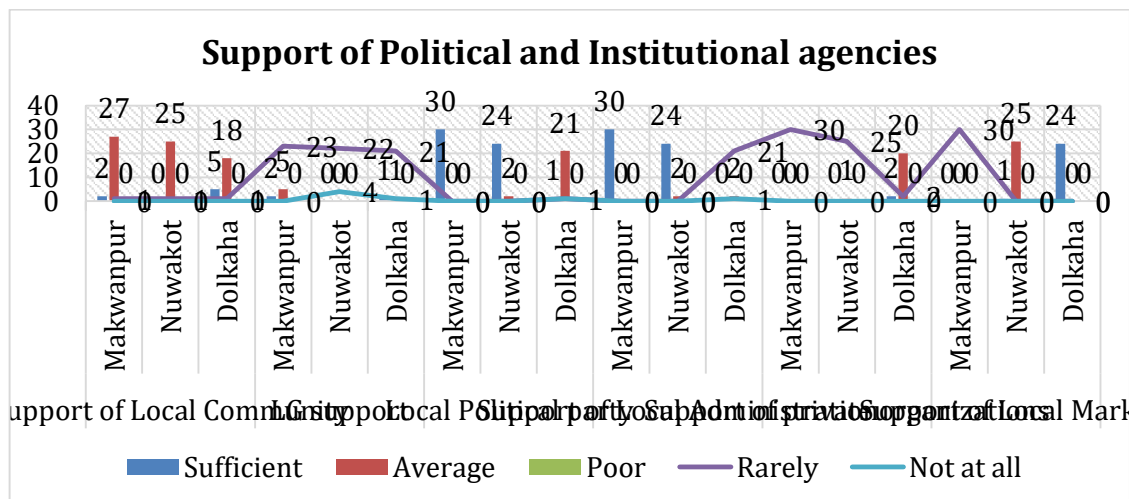


Figure-3, Support of political and institutional agencies

Local community mostly plays a vital role in the development through communication and involvement. Here, the data shows that the average support given in the electric generation (figure 3) this means the engagements of people is not massive to participate and support in the activities of hydropower company. In case of LG support, after federalization, LG moreover focused on the service providing unit for the people from the ground. The LG has a limited resources and lack of funding, and they usually manage such funding for the multi sectoral programs and support in energy sector is challenging from the local level hence the role of LG is limited.

The local political party roles in Makwanpur and Nuwakot recorded sufficient means they are participating and allowing projects to produce and manage work accordingly and controlling disputes at the local levels. Whereas in Dolkaha the support is average because disputes between some political parties sometime expands the timeframe and challenging for the large projects like Upper-Tamakoshi Hydropower (UTH), the political parties' roles are extremely important in the areas because many negotiations, there acceptance, there participation and involvement in social, economic and security level. Development is extremely important.

The support of local administration (Police, army Para Military and administration) is recorded sufficient. In most of the programs and during security concern the local administration is informed, and they provide support while need help to manage problems locally. The support of Private Organizations such as cooperatives, NGOs and private suppliers are limited in the area because 1all the hydropower agencies are following Government rules and private outsourcing is negligible. Thus private companies are less functioning which provides direct support.

In case of Market accessibilities, Upper Tamakoshi Hydro(UTH) is the largest hydropower agencies in Nepal and markets are established and functioning accordingly. But in Nuwakot and Makwanpur district the markets considered as local and average functional.

KII and FDG added that after federalization, local hydropower agencies have become the powerful source of development. LGs and local Political parties supported through infrastructure construction (rural road construction, market collection centres, health post and local community shelters and many more) support by the energy producer centres who either supports materials, cash, machines or fuels. Such support equally important for all stakeholders to influence native people, this is the reason the local support and politics also associated with these strategies.

Expert added that the distribution of resources is also challenging timely production and distribution is critical which affects the timeline and energy crisis.

Table1
Monitoring or visit by the Provincial Officials in the study areas)

Legend	District	Sufficient	Average	Poor	Rarely	Not at all
Monitoring or visit by Provincial	Makwanpur	0	30	0	0	0
	Nuwakot	0	23	0	1	2
	Dolkaha	0	3	0	21	0

The Provincial visit to the project sites is average and limited in Makwanpur and Nuwakot district and rarely (Table-1) in Dolkaha district. The Bagmati Province Head Quarter is located at Hetauda. The Dolkaha district is far away from the Hetauda and UTH project site is remotely located that required times to visit. In other side, the hydropower project site is a part of interest to the Federal Government and National leaders, so the Provincial and Local Government is not keenly interested to manage time for them. *KII with*

Province government official added that during donor agencies visit, Provincial government visit the project sites. And those areas are prioritized for electricity generation activities.

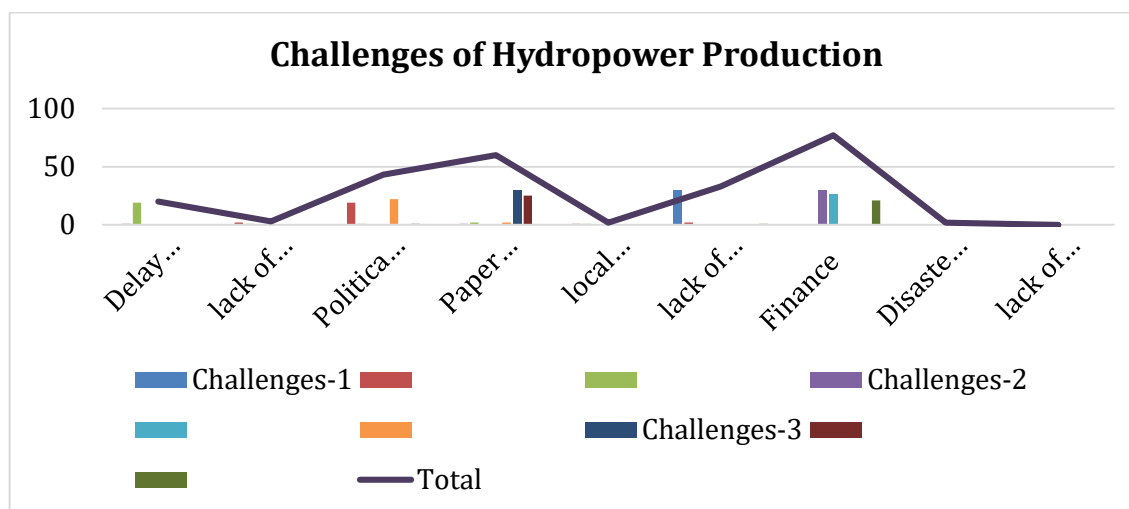


Figure-4, Challenges of hydropower production

Lack of finance, paperwork and political pressures are the three topmost challenges (figure 4) of the hydropower production. This is the ultimate reason of energy crisis because finance (revenue, development projects, aid, and local resources), bilateral laws and Policies and most importantly the political pressure means instability in politics are the basic reasons.

Political parties' representative told that frequent changing of government is the primary causes of energy crisis as the act, policy and agreements are immediately changed with the change in government which drastically change the entire things making work difficult to accomplish. KII added that the procurement and amendments of energy projects can only be done through Government channels, thus political interest and energy sectors has an indispensable relationship in between them.

Table 2
Challenges responded by farmers

Legend	1	2	3	4	5	6	7	8	9	10	11	12	District
Challenge-1	0	13	17	0	0	0	0	0	0	0	0	0	Makwanpur
	0	0	23	0	0	3	0	0	0	0	0	0	Nuwakot
	2	1	3	1	1	14	2	0	0	0	0	0	Dholakha
Challenge-2	0	0	0	0	4	0	0	0	0	0	26	0	Makwanpur
	0	0	0	0	0	0	0	0	0	25	1	0	Nuwakot
	0	0	20	0	0	0	1	1	2	0	0	0	Dholakha
Challenge-3	0	6	2	0	0	0	0	1	21	0	0	6	Makwanpur
	0	0	0	0	0	0	21	0	0	0	5	0	Nuwakot
	3	17	0	0	1	0	1	0	0	0	2	0	Dholakha

(1-Lack of Human resources, 2-Lack of Markets, 3-Lack of Input on time (fertilizer lack), 4-Lack of water availability on time, 5-Pest diseases, 6-Lack of mechanizations, 7-High demands and low capacity, 8-Eratic rainfall, 9-Lack of development support, 10-Lack of trainings and skills, 11-Lack of Mechanizations, 12-Lack of Markets) (Source: Field visit, 2023)

From the farmers perspectives, Table-2, the primary challenges are lack of input (Seed, fertilizer, machine and technical services) on time for Makwanpur and Nuwakot district as both are good producers of cereal crops (paddy and Maize) whereas in Dolkaha

district, lack of Mechanizations recorded as the district is located in mountains and substantial farming is challenging and traditional farming cannot produce enough production to service, and technical priority is less due to remote and cold area hence lack of Mechanizations recorded.

As a second most challenges, Mechanizations, skills, and input services remain the same problems. And the third most challenges are Lack of Development support, high demand and low capacity of the local production and lack of markets in the study areas.

The summary of Challenges stated that lack of inputs; mechanizations and market accessibilities are the basics problems/challenges for the farmers. To address all these challenges, energy is required for build infrastructures, manufacturing and fuels for the construction and transportation services. Hence, without energy generations this is not possible. *FGD of Farmers and NEA also stated that loadshedding is ongoing problems in Nepal because of low-capacity, Government is unable to supply the electricity as per the requirement and without generating enough electricity this is not possible.*

After federalizations the rise in demand of development activity created infrastructure development opportunity but due to limited electricity and energies nation has to depend to the neighbouring nations. From the internet service to the export services India and China are leading role in Nepal with lots of personal interest and bilateral benefits.

Conclusion

The study further concludes as all three surveyed national Hydropower plants in diverse locations are operational and producing electricity insufficiently due to various reasons of politics, financial problems, lack of human and technical resources and paperwork burdens. The supply and Demand sections are associated and demands levels are high. The major reason of lack of energy production is due to the political instability and lack of materials which either coming from India or other countries. Nepal has a plenty of water resources waiting for proper management, from the global and regional perspectives is still not complete and local requirements are somehow fulfilled but many political and Institutional factors are the challenging its smooth operation. From the farmers perspectives who are the actors of the state and facing a lack of Input due to lack of local fertilizer company and traditional export mechanism from India. Likewise many bilateral laws and policies directly indicating that Nepal needs a serious revision of existing power plans and revision of national and regional policies to manage the energy crisis.

Recommendations

A comprehensive sample for the further study is recommended in the sector for in-depth analysis of farmers' demands, causes of energy crisis and situations in the other sectors in Nepal. Similarly, alternative energy promotion and local resource availability at the ground level will be the well management mechanism for the government. The local promotion of agriculture and other energy generating activities should be prioritized this can be a sustainable way out for the long-term management of the resources at the local level.

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