Energy Mix in the Gandaki River Basin of Nepal

HI-AWARE
Himalayan Adaptation, Water and Resilience Research

Baglung District is endowed with an abundance of water resources. The district has become an example of how to implement microhydropower development and mini grid synchronization. An interconnection of six microhydropower plants was initiated in Baglung with support from the United National Development Project (UNDP) and Alternative Energy Promotion Centre (AEPC)/Renewable Energy for Rural Livelihood (REDP) Nepal with a total installed capacity of 107 kW. As a result, over 1,200 households now have access to reliable electricity around the clock. The Minigrid has helped uplift local communities and has led to the growth of local enterprises, including more than 25 poultry farms, 20 rice mills, six furniture industries, seven schools, and one mobile tower.

Without access to the national power grid, Bhorleni, a Tamang village of 131 households located along the Bagmati River in Makawanpur District, now produces its own electricity. A 25 kW wind-solar hybrid system was installed in 2015 with support from AEPC and active participation of the local community. It is the first such project set in motion by the Nepal government and handed over to the community. The installation of the wind-solar hybrid system has not only addressed the village's need for electricity, but also spurred hope that local economic prospects might improve. Locals are counting on end use diversification to drive economic activities in the village. Diversified electricity use for households and local industries is expected to not only decrease dependency on fuelwood, kerosene, and diesel, but also revitalize the rural economy with opportunities for growth and entrepreneurism.

Lomanthang, a trekking destination in Upper Mustang, has a solar microhydro mini-grid system. A 29 kW microhydro plant supplies electricity to 190 households in Lomanthang VDC. In 2015, a 70 kW solar power station with 300 solar panels was installed to fulfil electricity requirements in the winter. The community now has round-the-clock electricity. Locals use less than 30 % of the grid system's full capacity to fulfil their lighting, cooking, and entertainment needs.

About HI-AWARE

The Himalayan Adaptation, Water and Resilience (HI-AWARE) Research Consortium conducts research and pilot interventions, capacity building and policy engagement to enhance the climate resilience and adaptive capacity of poor and vulnerable people living in the mountains, hills and flood plains of the Indus, Upper Ganga, Gandaki and Teesta river basins in Pakistan, India, Nepal and Bangladesh.

HI-AWARE aims to influence policy and practice to aid the climate resilience and adaptation of poor and vulnerable populations in the region by generating evidence-based knowledge on geophysical, socioeconomic, gender and governance drivers and conditions leading to climate vulnerability, as well as monitoring and assessing adaptation measures. It focuses on identifying 'critical moments' when communities are most vulnerable to climate risks, 'adaptation turning points' when existing adaptation strategies no longer work, and "adaptation pathways", sequences of policy actions that address both short-term responses to climate change and longer-term planning. It looks at strengthening the expertise of researchers, students and science-practice-policy networks to conduct as well as use research on climate/social vulnerabilities, resilience, and adaptation.

HI-AWARE comprises of five consortium members: The International Centre for Integrated Mountain Development (ICIMOD), the Bangladesh Centre for Advanced Studies (BCAS), Pakistan Agricultural Research Council (PARC), The Energy and Resources Institute (TERI)-India, and Alterra-Wageningen University and Research Centre (Alterra-WUR).

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CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

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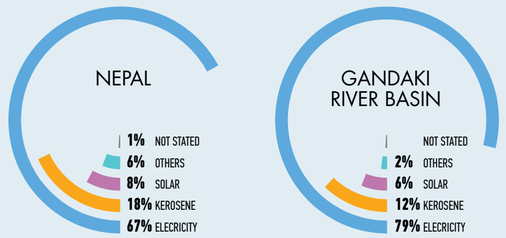
Photos: Himlal Shrestha, cover; Anju Pandit, all others

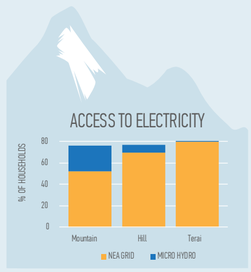
A 12 kW capacity solar-wind hybrid system, installed in 2011 as a pilot project, has been operational in Dhaubadi Nawalparasi District for the past five years. The 52 households in Dhaubadi's Magar village need 43.6 kWh of electricity per day. Prior to the installation of the system, villagers relied on fuelwood, kerosene, and batteries to meet their energy needs, with kerosene and batteries accounting for almost 12% of village household expenditure. Rural electrification through the wind-solar hybrid system has transformed Dhaubadi. The system's operation has reduced the village's energy expenses by one-third, and improved access to electricity has improved people's overall work performance, health, and children's education, as well as easing women's household chores.

ENERGY IN THE GANDAKI BASIN

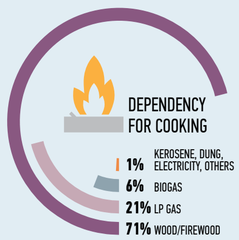
Reliable energy services support economic growth and underpin sustainable rural development. In the Gandaki River basin of Nepal, this energy comes from different sources – ranging from the national grid and imported fuels like kerosene and gas, to local, sustainable sources like biofuel, solar, and micro hydro.
Understanding the 'energy mix' – and gaps – will support policy and planning that leads to sustainable development in rural communities that are struggling to improve their lives and livelihoods in a time of uncertainty.

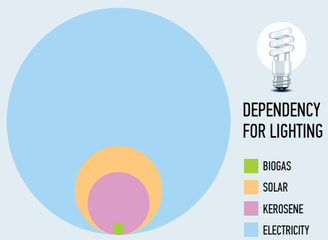


OVERALL ELECTRICITY PRODUCTION IN GANDAK RIVER BASIN (SOURCE: NEA, 2014)

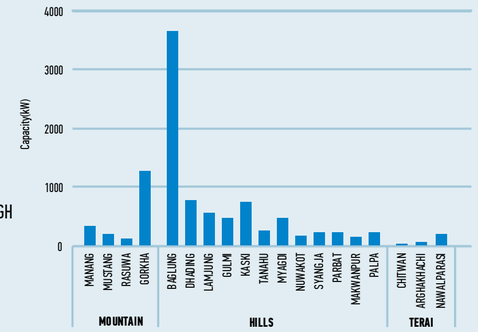


73% of households in the basin have access to the national grid for electricity, with 7% electrified by micro hydro. 20% still live in darkness without access to electricity, which is more common in the mountainous districts of the Gandaki basin.





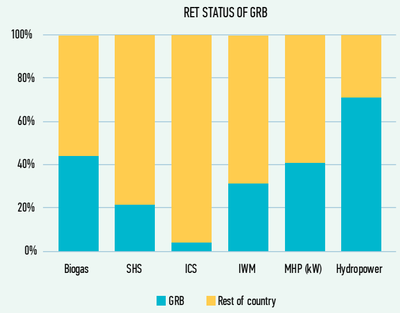
ELECTRICITY PRODUCTION THROUGH MICRO HYDRO



Concept: Anju Pandit

Source: NEA 2014, CBS 2011, AEPC 2014

The Gandaki Basin occupies 19% of Nepal and supports 19% of the country's population. Despite its small area, it contributes 26% of total water availability (WECS 2011). 523 MW, 10% the basin's total hydropower production potential (5,270 MW), has already been harnessed. In contrast to Nepal's economic feasibility of 42,133 MW, of which less than 2% (732 MW) has been harnessed.



HYDROPOWER PRODUCTION (MW)