

PROVIDING ALTERNATIVES TO FOSSIL FUELS IN NEPAL

Sustainable Development Goal (SDG) 7 is to 'Ensure access to affordable, reliable, sustainable and modern energy for all'. However, inadequate energy supply continues to hinder social and economic development in Nepal. Despite a wealth of renewable energy potential – particularly with hydropower but also solar and biomass – sustainability and access remain major challenges. A research project led by the University of Leeds, with partners in Nepal and the UK, identified indigenous oil seed plants as an alternative, more environmentally friendly energy source than fossil fuels. The project has led to the creation of an international [Clean Energy Research Alliance \(CERA\)](#) with partners in Uganda, Congo-Brazzaville, Tanzania, Indonesia and India.

THE CHALLENGE

People need energy for basic needs such as cooking and heating, as well as for improving agricultural productivity and allowing for mechanisation, irrigation and post-harvesting processing, among other critical livelihood activities. In Nepal, firewood is the predominant household energy source, accounting for more than 70 per cent of consumption nationally (and is almost the sole source of fuel in some districts). However, its inefficient use poses a threat to the country's forests as well as to the health of approximately 22 million Nepalese who are regularly exposed to household air pollution. The Clean Cooking Alliance estimates that such pollution contributes to the death of nearly 20,000 people in Nepal each year, nearly a quarter of them children.

THE RESEARCH

Between 2013 and 2015, a research team of geographers, sociologists, economists, botanists and engineers collaborated on the ESRC-DFID project Energy Gardens for Small-Scale Farmers in Nepal: Institutions, Species and Technology. The project aimed to enhance energy access for poor farmers and communities.



Cover photo: Devi prepares a cooking fire at her home in Dhoderi village, Nepal. Credit: © James Morgan/Panos Pictures.

Energy Gardens are an alternative way of creating sustainable community-based bioenergy provision for rural communities. They use previously unused lands, field bunds, and community forests to grow indigenous plant species for energy generation. The concept is based on work by Professor Balakrishna Gowda and his team at the Hassan Biofuel Park in southern India, where indigenous Indian oil seed trees were planted by smallholder farmers. The Nepal team visited the Biofuel Park to share knowledge and build capacity, while Professor Gowda gave presentations at the Energy Garden project and at other meetings in Nepal, which were attended by a wide range of stakeholders from village to ministry levels.

The fieldwork took place in three rural villages – Lakuri Danda (Dolakha), Khudi (Lamjung) and Hamsapur (Gorkha) – in the mid-hills region of central and western Nepal. Research methods included household surveys to obtain information on household and community-based management of biomass and acquisition of energy. The Nepal team used traditional *Dohri Song* duets at village meetings as an innovative way to help explain the technical concepts and rationale for the research.

The findings showed that there are many native oil seed trees in Nepal that smallholder farmers could use to provide energy and other multi-purpose benefits, including maintenance of biodiversity. Planting oil seed trees in field bunds and along paths means that agricultural productivity is not affected, and fuel production does not compete with food crops – an aspect of some biofuel production systems that has attracted criticism. With its focus on inclusive village governance for energy provision, such as cooperative collection and marketing of oil seeds, the Energy Garden is a concept that encourages participation of all community groups, including traditionally excluded groups such as Dalit women. In this way, it can create further opportunities for employment and income.

THE IMPACT

Securing the participation of multiple stakeholders enabled the project to start discussions to formulate relevant policies and programmes that would help achieve its goals of reducing rural poverty and providing opportunities for diversification of livelihoods.

Through forging a long-term research collaboration with local non-governmental organisations (NGOs), the project team worked closely with the government of Nepal. In 2014, Dr Bishnu Pariyar, the project post-doctoral researcher, met with the Minister for Agriculture, Hari Prasad Parajuli, and briefed him on the project. He also presented a special edition of the BGjournal, which featured an article on the Nepal Energy Gardens project.

His Excellency Andrew Sparkes, the then British Ambassador to Nepal, spoke at the project's launch in March 2014 and shared the UK government's support for renewable energy interventions, emphasising that the 'investment in and promotion of renewable energy is an important key to Nepal's development'.

In April 2015, the devastating Nepal earthquake required the government to change its priorities. In the same year, government attention was also focused on a blockade of fuel imports across the border with India, which resulted in a national fuel shortage. The project team collaborated with the World Agroforestry Centre in a high-level multi-stakeholder meeting in Kathmandu in November 2015 and developed a concept note on Strategies and Options for Nepal's Bioenergy Potential. This work provided the background to the formulation of the Nepal Biomass Energy Strategy 2017.

Following completion of the Nepal project, the team transferred the idea to Africa and received funding of £1.2 million from the Royal Society-DFID Africa Capacity Building Initiative to continue their investigation and build capacity for renewable research and stakeholder engagement in Uganda, Tanzania and Congo-Brazzaville. Further grants – of £1.3 million from the Engineering and Physical Sciences Research Council's Global Challenges Research Fund (EPSRC-GCRF) for research on electricity mini-grids, and £1.7 million from the Biotechnology and Biological Sciences Research Council's Global Challenges Research Fund (BBSRC-GCRF) for research on bioenergy from the invasive water hyacinth plant – have enabled the project team to build South-South links with Indonesia and India. In June 2019, the team held an international

conference, at the Royal Botanic Gardens, Kew, in the UK on Plant Power to showcase the ongoing research and demonstrate the potential of bioenergy.

Four years on, there is continued interest in and renewed funding for Energy Gardens as an alternative to fossil fuels. As the global community strives to address the climate crisis, enabling poor rural communities to generate their own energy, close to home, could prove central to efforts to find alternatives to fossil fuels.

FURTHER READING

Botanic Gardens Conservation International (2014) *BGjournal* Special Issue 11.1 'Exploring Energy Gardens: Botanic Gardens and Biofuels', www.bgci.org/resources/bgci-tools-and-resources/bgjournal

Clean Cooking Alliance (2015) 'Country Profiles: Nepal', <http://cleancookstoves.org/country-profiles/59-nepal.html>

Clean Energy Research Alliance (CERA), <https://cera.leeds.ac.uk>

Government of Nepal, Ministry of Population and Environment (2017) *Biomass Energy Strategy 2017*, Kathmandu, Nepal: Government of Nepal, Ministry of Population and Environment, www.aepc.gov.np/documents/biomass-energy-strategy

Hammerton, J. *et al.* (2018) 'Characterisation of Biomass Resources in Nepal and Assessment of Potential for Increased Charcoal Production', *Journal of Environmental Management* 223: 358–370

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Energy Gardens for Small-Scale Farmers in Nepal: Institutions, Species and Technology

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THE IMPACT INITIATIVE




For International Development Research

The Impact Initiative seeks to connect policymakers and practitioners with the world-class social science research supported by the ESRC-DFID Strategic Partnership, maximising the uptake and impact of research from: (i) the Joint Fund for Poverty Alleviation Research, and (ii) the Raising Learning Outcomes in Education Systems Programme. We seek to identify synergies between these programmes and their grant holders, support them to exploit influencing and engagement opportunities, and facilitate mutual learning. The Impact Initiative is a collaboration between the Institute of Development Studies (IDS) and the University of Cambridge's Research for Equitable Access and Learning (REAL) Centre.

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CREDITS

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