Biofuels and its Implications on Food Security, Climate Change, and Energy Security: A Case Study of Nepal
By Shikha Poudel

Biofuels

The solution to the problems of poverty and unemployment is to become more efficient in our use of energy, which in advanced economies can be achieved through mass transit systems and energy-efficient appliances. In developing countries, the need still remains in providing affordable, reliable, and accessible energy through diverse sources.

Biofuels can play an important role in supplying energy in rural transport sector without negatively affecting food security and the environment. The key is to distinguish between large-scale biofuel production that diverts water, labor, land, and food crops like maize and sugar cane away from food to fuel and small-scale medium-scale local biofuel production for local energy needs using non-food crops, crop residues, and land where there is minimal employment opportunities.

Research Background

The world faced its worst food crisis in 2008 since the 1970s. Of the factors that are widely accepted as having led to the rise in food prices, biofuels are possibly the most controversial. Biofuel production is charged with diverting land, food, and fuel away from food to fuel. Additionally, Colón et al. (2008) argue that biofuels offer only a very small gain in energy efficiency and their production minimally reduces air pollution. A study by Cramer et al. (2007) shows that some biofuels can contribute as much or more to climate change as fossil fuels. However, before dismissing biofuels as leading to food security and environmental degradation, it is important to make the distinction between large-scale biofuel production that diverts water, labor, land, and food crops like maize and sugar cane away from food to fuel and small-scale medium-scale local biofuel production for local energy needs using non-food crops, crop residues, and land where there is minimal employment opportunities. The former relates to the way biofuel production can be pursued in developing countries, under poor policy conditions.

Biofuels and Food Security

Biofuels have been defined as any fuel of biological and renewable origin, including biomass. Much of the public debate has focused on rapid biofuels for transportation, namely bioethanol and biodiesel. Biofuels currently come in two forms:

1. Ethanol: Ethanol can be made from sugars (e.g., sugar beets, sweet corn and sweet sorghum) and starches (such as rice and wheat), as well as from cane sugar.
2. Biodiesel: Biodiesel can be manufactured from the transesterification of vegetable oil. It can be blended with diesel to reduce the consumption of diesel.

Why Biofuels?

"No country in modern times has substantially reduced poverty in the absence of massive increases in energy use." - (UN-Energy, 2007, p. 7, 6)

The alternative energy sources in Nepal focus primarily on rural electrification through micro-hydro power and solar energy and on cooking and heating through biogas and biomass. However, there has been very little focus on alternative energy for transportation. Because diesel-run irrigation pumps and tractors are important input in agriculture and are cheaper than electric or solar vehicles, this makes biodiesel a popular alternative fuel for vehicles. If we ensure that land, water, and food crops are not diverted away from food, then the negative impact of biofuels on food security could be mitigated. Furthermore, small-scale local production done in a sustainable manner will reduce GHG emissions.

Trade-Offs Associated with Biofuels

The trade-offs associated with biofuel production are as follows:

1. Cost-Benefit Analysis of Biofuel Production in Nepal

- Cost
  - Diversion of food and land may come to food prices rise
  - Fuel prices increase
  - Small-scale production in a way that does not compromise food security
- Benefits
  - Women's health and nutrition may improve
  - Pro- Food Security Approach
  - Small-scale production of biodiesel could meet energy needs of a village while providing employment opportunities

- The Nepalese Scenario

  - Agricultural productivity, low productivity, food security and energy security.
  - Agriculture characterized by small scale and variable growth and low productivity.
  - Energy security can be improved through biodiesel production:
    - Food security and energy security.
    - Biofuel production could improve food security and mitigate climate change.

- The Nepalese Context

  - Pro- Food Security Approach
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    - Small-scale production in a way that does not compromise food security

Research Objective and Methodology

This research was undertaken to examine the case of biofuels in Nepal and to provide recommendations on pursuing biofuel production in a way that does not compromise food security. The research was carried out through extensive literature review, interviews with key stakeholders, cost-benefit analysis of biofuel production, and case studies of existing biofuel projects in Nepal.

What are Biofuels?

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Jatropha Cultivation in Nepal

The seeds of jatropha curcas may contain up to 35% percent oil, which once processed into biodiesel and blended with conventional diesel can be used in diesel engines.

Potential of Jatropha Cultivation

- Jatropha is found widely in the wild and over 70% of the wild plants in Nepal. High oil yielding Jatropha is found in all tropical and subtropical districts up to 1200 m. Rural communities can cultivate their own Jatropha trees in the community wastelands or as hedges in their private land.

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