Introduction

Examining the Potential of Biofuels for Rural Development and Empowerment of Women

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Background
When we began considering local production of biofuels as a possibility for expanding access to energy in developing countries, there was much enthusiasm about the idea of homegrown energy, especially for rural areas where villagers are already engaged in small scale agriculture. United Nations studies show that available energy systems fail to meet the needs of poor communities, with 2.4 billion people relying on traditional biomass (wood, charcoal, dung and agricultural residues) and 1.6 billion without access to electricity. With prices for fossil fuels remaining high, and energy infrastructure investments for poor countries primarily focused on urban areas and industrial development, many people in rural areas are being left without basic energy services.

Gender considerations come into play because in many developing countries the current lack of energy in rural areas has a disproportionate impact on women. They are the ones primarily responsible for collecting and managing traditional biomass fuels. The long hours and distances travelled by women gathering wood or dung, carrying water, growing crops, processing food and caring for their families – all without electricity, motorized equipment or modern fuels – keep them from pursuing education, training and income-generating activities that could help lift them, their families and their communities out of poverty.

In addition, women are the main producers of food crops in many areas. If these women could grow oil-producing crops, sell them for income, and also use the oil for motorized power, electricity generation, household activities and profitable enterprises, this could open up exciting new opportunities for local economic development. Studies have shown that women can also profit by establishing and sharing in bioenergy processing operations.

At the 2007 session of the UN Commission on Sustainable Development (CSD), which included discussions and recommendations on energy for sustainable development, a number of governments announced that they were launching or expanding biofuels programs. Many highlighted the potential of biofuels as an option to increase opportunities for rural development, diversify energy sources, and reduce air pollution and greenhouse gas emissions.

Women's representatives at the CSD recommended that: “Governments…should explore investments in local production of biofuels for use in meeting the energy needs of the poor in an environmentally friendly way.” The women's group also urged governments to undertake documentation of best practices in biofuels production for guidance in adopting gender
mainstreaming approaches, and to place more emphasis on small-scale agriculture and informal income-generating activities in which women predominate.

**Sustainability of biofuels**

Biofuels soon were being viewed with less enthusiasm. Controversy erupted over sharply rising food prices, amid concerns that the diversion of agricultural production from food to biofuels was responsible, at least in part, for food shortages in countries already suffering from widespread poverty and hunger. United States subsidies for production of ethanol from corn came under attack, along with European Union policies promoting the use of biofuels for transportation. In Africa, civil society groups and unions called for removal of some food crops from the biofuels feedstock mix.

In addition to exacerbating food shortages and poverty, biofuels were being linked to deforestation, neocolonialism associated with the establishment of biofuels plantations on huge tracts of land in developing countries, and displacement of small farmers and indigenous people from their lands – as well as increased production of greenhouse gas emissions, due to the loss of trees and the use of fossil fuels in planting, fertilizing, harvesting and processing biofuels.

There were also concerns that women would be disproportionately affected by large-scale biofuel production if they were to lose access and rights to land and resources they relied on for collecting fuel and water for household needs, growing food, and gathering fodder, medicinal plants and wild food. An FAO report warned that the potential environmental and socioeconomic risks associated with large-scale production of liquid biofuels in developing countries might affect men and women differently, particularly due to inequalities in terms of access to and control over land and productive assets. In South Africa, for example, women smallholder farmers questioned whether men with larger farms would be favoured as suppliers of feedstock for biofuel processing operations, and more broadly whether women and other small farmers would be left out of the more profitable parts of the value chain of biofuels production.

Much international attention turned towards defining 'sustainable' production of biofuels, and a number of different processes were initiated to discuss standards and criteria for sustainability in relation to biofuels. Although earlier discussions focused on the benefits of biofuels in reducing overall greenhouse gas emissions from transportation vehicles, due to the growing concerns over food security and displacement of people from their traditional lands, calculations about biofuel production began to take a broader view. Social impacts began to be more closely analyzed and taken into account, in addition to impacts on biodiversity, ecosystems, soil degradation and water scarcity.

The multi-stakeholder process organized by the Roundtable for Sustainable Biofuels produced draft criteria that included an emphasis on protection of land rights, water rights, human rights and labour rights, as well as transparent, consultative and participatory processes for planning biofuels projects. The draft principle on rural and social development states that: “Biofuel production shall contribute to the social and economic development of local, rural and indigenous peoples and communities.”
Still, even when social impacts of biofuels programs are considered, women's particular concerns are rarely emphasized. In order to address this gap, ENERGIA has recently recommended that environmental and social impact assessments of proposed biofuels projects or programs should include an evaluation of gender-differentiated impacts – through consultative processes designed to ensure substantial participation of women – and that gender equity should be one of the principles considered in those assessments.

After reviewing information about a variety of different biofuels projects, it seems that village level projects have great potential in terms of sustainable fuel production and increased access to energy in rural areas of developing countries – if participatory processes are employed in the development and implementation of the projects. On a small scale, locally produced plant oils and biodiesel can successfully be used to power diesel engines and generators in rural villages – for agricultural processing, new enterprises, and income generation. These systems can also ease the burdens of women and foster women's participation in decision-making processes.

Moreover, although most of the threats related to biofuel production come from the operations of big plantations run on an agro-business model, it also does seem possible to try to protect the interests of small landowners and engage them as producers and processors of biofuels as part of a larger value production and supply chain.

The case studies
As part of a larger program of work on gender and biofuels, we began to look for concrete examples of projects and programs that linked biofuels production with rural economic and social development, and that had an emphasis or particular impact on the empowerment of women. One of the challenges was that most projects are just getting under way, and there was little data to analyze.

We found some projects that specifically target women and some that incorporate gender considerations but most lack a gender focus. The projects do show that it is possible for women to benefit from biofuels initiatives that are not particularly gender sensitive. However, because there are many differences and inequities in the traditional roles and rights of men and women, it is generally better for women if there is special attention given to constraints affecting women's participation. This can help ensure that women are not marginalized, or effectively excluded from training programs, extension services, or other critical benefits. In Cambodia, an entrepreneurial farmer is growing Jatropha and extracting oil from the seeds to run a diesel generator that supplies electrical power for a mini-grid servicing over 80 homes. The diesel generator has been adapted so it can operate efficiently using pure plant oil. Although it was a woman parliamentarian who encouraged the male farmer to switch from diesel to Jatropha oil, there originally was no special emphasis on gender equity with regard to the benefits of the biofuel-generated electricity. However, women did share in the benefits of lower-cost electricity, and in new opportunities for income generation related to growing and processing Jatropha. In addition, a follow-up project nearby is particularly targeted to support women’s income generating activities such as silk production and sewing activities.
In Nepal, community groups are collecting seeds from existing Jatropha plants, expelling the oil, and using the pure plant oil in place of diesel to run irrigation pumps to promote increased agricultural production. The project targets poor households, and does not address gender-based socio-economic differences. Nevertheless, women have been active participants in the community groups organized to execute the project activities, and women are expected to have a significant role in planning and decision-making on Jatropha oil collection, pricing, production and distribution.

In Ghana, a women’s group is growing Jatropha, extracting the oil from the seeds and mixing the oil with diesel (70% plant oil / 30% diesel) to fuel shea butter processing equipment, and as a kerosene substitute for use in lanterns. The project serves as a model for village-level biofuel production linked to the empowerment of women, and efforts are being made to finance similar projects in other villages.

In India, community groups in isolated villages are collecting local seeds from the nearby forest and using oil from the seeds to make biodiesel in a small pedal-powered processor. The biodiesel is used to run water pumps, an electricity generator, and a tiller. Women have participated in the seed collection and the planning and development of the micro-energy systems, but additional efforts are needed to strengthen women’s involvement in decision-making regarding management of the systems and development of new enterprises using the energy that is now available.

In Uganda, a pilot project installed four multifunctional platforms, two of which were used to test the potential for growing and using biodiesel. The purpose of the project was to evaluate implementation models prior to wider replication across the country. Women participated in all activities, and were invited to voice their views on the appropriateness of the project. At the implementation stage, women were able to participate in training programs for project beneficiaries, and learned to operate and manage the MFPs. They also took part in growing sunflower seeds for the production of biodiesel.

In Sri Lanka and Zimbabwe, the projects enlisted small farmers to grow Jatropha commercially to supply a biodiesel production plant. The Sri Lanka project is a relatively small-scale pilot project involving 21 farm families, and is designed to mix commercial fuel crop production with local energy applications. There is no specific gender focus, but there is a great deal of participation by women: women are the main suppliers of seeds for the biodiesel processing centre, and are participating in the training and decision-making on growing Jatropha. The locally produced biodiesel is expected to also expand their access to energy for lighting and water pumping, and possibly also for cooking and income generation.

In Zimbabwe, there is a countrywide project managed by the national oil company through contracts with participating farmers. Women’s groups are involved in the project, and more women than men are engaged in the Jatropha cultivation. However, women’s roles have not been carefully studied or documented. Gender considerations have not been systematically taken into account at the national level, including the constraints of women farmers with regard to access to land and the use of tractors.
The *South Africa* project is also a large scale initiative that involves soliciting and training farmers to grow feedstock for a biodiesel plant – in this case sunflower seeds and soya beans. It has been organized with the collaborative engagement of the government, the private sector and research institutions. Both men and women farmers are engaged as out-growers in an ‘incubation’ system that provides them with extension services, fertilizer, pesticides and access to tillage equipment. The project was aiming for 50 – 50 percent participation of men and women, but only 30 percent of the participants in the pilot phase are women, due in part to factors such as poor access to information, limits on women’s land ownership and water rights, and institutional gender discrimination.

**Some of the issues discussed in the case studies:**

1. **Potential for income generation**
   Although the global growth in demand for biofuels had been driven by concerns about greenhouse gases and climate change, the interest in biofuels in developing countries is primarily related to new possibilities for income – at the household, village, and country level. Rural villagers and farmers, large or small, are seeking new market opportunities – whether they are producing feedstock crops, pure plant oil, or biodiesel, or offering electricity or motorized power using biofuels, or providing goods and services with energy from biofuels.

2. **Women’s benefits from energy access**
   For women burdened with difficult and time-consuming agricultural and food processing chores, biofuels can provide welcome relief through access to fuel for motorized equipment or electrical power. But village level projects producing and/or processing biofuels can also require significant labour and organization, as well as training, management and financial investments. The promise and motivation is that this work will lead to the development of new income-producing activities, so that women can afford to send their children to school, feed their families nutritious food, provide better health care and living conditions, and have more power to make decisions within their households and communities.

3. **Adequacy of supplies and markets**
   In most of the cases, some new type of activity is required to provide plant oil, such as gathering previously unused nuts and seeds, using existing crops in new ways, or planting new crops. These are experimental activities; some are at the village level, and some are national in scope. It is not clear that the supplies of feedstock will be adequate for the new ventures, or will support significant expansion. Meanwhile, there are concerns about the marketing and distribution challenges, whether in terms of transporting goods out of remote villages, or establishing links to larger national and international markets.

4. **Impacts of large-scale biofuels production on small farmers and communities**
   Everywhere there are concerns about land. Will agro-business companies be allowed to buy up or control large tracts of land and displace or subjugate small farmers and communities? Government policies are needed to manage and regulate the development of biofuels industries, and ensure that small farmers are able to participate in, and benefit from, new business opportunities, rather than losing ground. In addition, more research is needed on the impacts of large-scale conversion of crop land to produce biofuels, on agricultural productivity and food
production, as well as on the consequences for existing ecosystems and biodiversity.

5. Financing/investments in rural energy access
Some biofuels initiatives that support rural economic development are financed by energy entrepreneurs, but in most cases there is considerable public funding or donor financing involved. Biofuels projects that are profitable may not be sustainable, and may in fact cause more problems for rural communities than they were already experiencing. There is some possibility that the carbon markets associated with climate change mitigation efforts will provide new funding for biofuels projects that provide rural communities with otherwise unaffordable access to energy.

Conclusions
The global demand for biofuels is expected to continue to increase due to petroleum prices (or shortages), and concerns about climate change and national energy security. The agro-business model for producing biofuels is likely to have profound impacts on land and labour relations in developing countries, as well as creating risks of food shortages and serious environmental damage.

Governments should develop and promote biofuels policies, regulations and programs that take into account the needs and interests of small farmers and people in rural communities. As women are the key producers of food and energy crops in many developing countries, special efforts should be made to allow for their effective participation and voice in decision-making about biofuels policies and programs.

Incorporation of gender equality as an objective of biofuel initiatives remains a challenge. Inequalities based on gender undermine women’s ability to participate in and obtain benefits from many types of development projects and poverty eradication strategies, and some policies can even make those gender inequalities worse.

For biofuels to promote the empowerment of women, it is important for women to be involved in planning and managerial decisions. A number of women have also expressed interest in having shares as co-owners or investors in biofuels production companies and processing operations, rather than simply providing labour as growers of biofuels feedstock.

Governments, managers and investors in biofuels projects should also incorporate gender equity as a key element in assessing potential benefits and impacts. Since comprehensive data that shows the differences between the roles and interests of men and women is often unavailable, new initiatives and pilot projects should make an effort to capture gender-specific information as one of the factors in determining whether or not biofuels projects are sustainable.

NOTES
2. Chairman’s Report, UN Commission on Sustainable Development, 2008
4. FAO, 2008. Gender and Equity Issues in Liquid Biofuels Production