AGRICULTURE TO ENERGY: IDENTIFYING SUSTAINABLE ENERGY SOLUTIONS FOR DEVELOPING NATIONS

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Many of the world's developing nations are crippled by fuel shortages. The urgent need for fuel for cooking and heating is resulting in the decimation of local forests and destruction of irreplaceable habitats. For example, deforestation and desertification are increasing rapidly in the Islamic Republic of Afghanistan, and endangered gorillas are being killed by charcoal producers who are illegally converting forest trees into household fuel in the Democratic Republic of Congo. Shortages in household fuels present an immediate obstacle to developing countries necessitating short-term renewable energy solutions. However, over the long-term, developing nations must adopt sustainable, renewable energy solutions in order to keep up with increasing energy demands. Unique energy solutions are needed to complement each developing nation's specific agricultural and environmental conditions. Two algorithms for identifying sustainable energy sources from local agriculture were created and customized to individual regions of the developing nations of interest. The first algorithm focused on the identification of readily available, native and naturalized plant species capable of producing biomass for household fuel. Results of this algorithm were intended as short-term solutions to escalating household fuel shortages. A second algorithm focused on long-term renewable energy solutions by identifying native as well as nonnative plant species ideal for cultivation as energy crops in selected regions. Conversion technologies suited to developing nations for processing biomass into more readily available forms of renewable fuels were examined for both long-term and short-term energy solutions.