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Dispatch: Gobar Gas¹

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Smart Moms raise smart kids.

Brunei, Afghanistan, Nepal, Cambodia, Laos, Vietnam
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A Gurkha Idea

Among the more interesting coalition forces fighting in Afghanistan are the legendary Nepalese Gurkhas. Trained and fielded by the British, as they have been since colonial days, Gurkhas are a

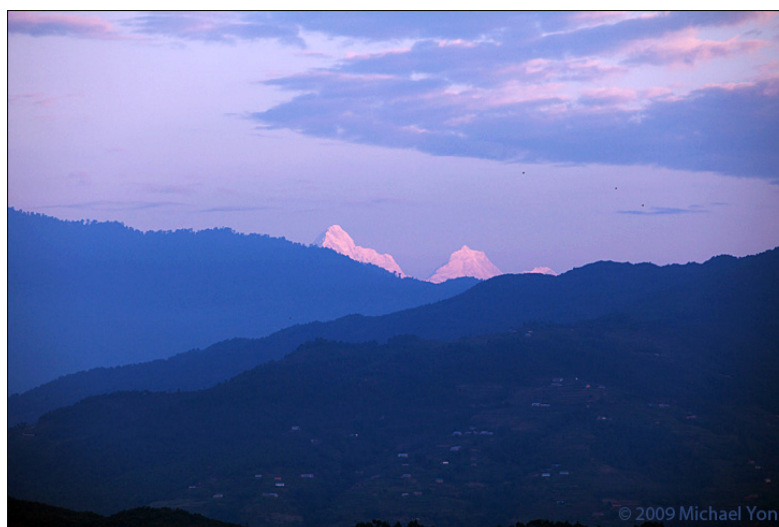
¹ This is an abridged version of a far more detailed dispatch that required months of intensive research in Afghanistan, Nepal, Vietnam, Cambodia, Laos, with a genesis in Borneo. Since I completed this research and matchmaking, SNV is seriously considering a biogas program in Afghanistan. Military force cannot win the war alone. Organizations like SNV, which raise the standard of living, can make significant contributions.

fascinating admixture: today, they are elite soldiers used to traveling the world. But many of them grew up barefoot and poor in remote and primitive mountain villages in the high Himalayas—places that closely resemble parts of Afghanistan, geographically and culturally. Forefathers of some of today's Gurkhas fought in the Afghan region during earlier wars. Gurkhas understand impoverished life in a harsh environment, though Nepal has enjoyed material progress in recent decades that is mostly unrealized in Afghanistan. Unlike forces from Europe or America, who often regard Afghanistan as an outpost of 13th Century life, Gurkhas can provide a link between primitive Afghan standards of development, and the possibilities for progress, with insights and connections that might elude most Westerners.

The insights of a Gurkha veteran named Lalit, whom I met in the jungles of Borneo, at a British Army man-tracking school, were particularly valuable. One day in the jungle Lalit began a conversation by announcing that many of Afghanistan's household needs could be solved if Afghans would adopt "Gobar Gas" production. Gobar Gas could improve the lives of Afghans as it had that of the Nepalese, he said, as he began to explain with great enthusiasm.

During Lalit's time in Afghanistan, he found nobody who had heard of Gobar Gas—even though Gobar Gas has been a quiet engine of ground-level economic transformation in Nepal and numerous other poor Asian nations.

After the man-tracking course ended I returned to Afghanistan, this time to the desert-like areas of Ghor, Helmand and Kandahar provinces, where most people have no electricity and often spend hours daily scrounging for bits of wood or whatever other fuel they can find on the deforested plains. Lalit was right about two things: No Afghan I met had heard of the Gobar Gas – by any name. Nor had most American development people on the ground. Second, Gobar Gas looked like a serious solution in some areas to the lack of available fuel to meet daily needs. Given its track record and its perfect applicability to Afghanistan's state of development, this was a match made in heaven. I flew back to Nepal to talk with Gobar Gas experts and users. (A full explanation follows shortly.)



Himalayan Range in Nepal.

Kathmandu, Nepal

Physically, Nepal and Afghanistan share similarities. Both contain great mountains and are difficult to navigate due to lack of roads, while existing roads are frequently impassable. The mountains and weather can be brutal. This is compounded by lack of electricity, transportation, communications technology and just about anything else associated with modern societies. Both countries have been saddled with weak and corrupt governments, universally mistrusted. They each have about 30 million people—80% of whom are subsistence farmers—living in small villages. The median age in both places is under 20, suggesting future crises. Half of the Nepalese are literate; perhaps a third of Afghan men can read, now, in the opening decades of the 21st century.

The desires, complaints and problems in both places often run parallel. Sizable populations are isolated for months each year by snow, rain and landslides—or just lack of bridges. Government influence in both countries mostly ends where the paved roads end. (Though Nepal actually has a government of sorts, and not surprisingly, far more roads.) In the hinterlands, life remains primitive, and in some cases, quite literally, prehistoric, except that outsiders note their existence. Government edicts and ideas issued from Kabul or Kathmandu are unheard or ignored—the words might as well come from Timbuktu or the Moon.



Main road just outside Chaghcharan, capital city of Ghor Province, Afghanistan. There was not a single meter of paved road in the entire province.

A remarkable difference in Nepal is that most ethnic and religious groups coexist reasonably well, and despite their recent civil war the Nepalese seem considerably less prone to warlordism, general violence, and especially violence directed toward outsiders. Even during peak wartimes I had no difficulties walking hundreds of miles through contested areas in Nepal. While Nepalese fought each other, all sides (other than occasional criminals) protected travelers. Travelers who want to visit Kathmandu and trek the Himalayas are the country's good fortune. Though Nepal is one of the poorest, least developed countries on Earth—and despite rampant corruption and recent war—progress is perceptible.

Nepal is arguably a half-century ahead of Afghanistan in governance, education, press, and certainly in tourism. Nepalese old-timers say that in the 1950s and 60s, for instance, few boys, and almost no girls outside the ruling elite, went to school. There has been steady progress in the numbers of citizens educated in Nepal. A visitor will see school children in many districts, even deep in the mountains, wearing uniforms and often walking 5-10 miles to school, as our grandparents once did in America. Democracy was first tasted in Nepal in the 50s, but did not truly take hold until 1990s. The democracy is struggling and fragile, but trend lines are good. (Educated Nepalese could mount valid arguments contradicting my statement.)

Though Nepal remains poor and underdeveloped by Western standards, if Afghanistan were to reach Nepal's level in a few decades, some might rightly consider that a great success. And so, for me, Nepal has become a sort of looking-glass for Afghanistan. It's a good place to search for insight and ideas that might be applied in Afghanistan. The Gurkha idea for Gobar Gas in Afghanistan was a pearl from Nepal.

Dung



Dung balls in Afghanistan are pearls from Nepal.

“Gobar” is the Nepali word for cow dung. The “Gas” refers to biogas derived from the natural decay of dung, other waste products, and any biomass. In Nepal, villagers use buffalo, cow, human, and other waste products for biogas production. Pig and chicken dung are used in some places, as are raw kitchen wastes, including rotted vegetation.

Gobar is typically mixed with a roughly equal amount of water, and gravity-fed through a pipe into an airtight underground “digester,” where naturally occurring bacteria feast on the mixture. This anaerobic process produces small but precious amounts of gas. That gas can be fed directly into a heat source, such as a cooking stove, and used to fuel it.



Diagram of "Gobar Gas" installation in Laos, where it's called "Gaz Sivulphap." In Cambodia “Gobar Gas” is called “Chiveak Ausman.”

The biogas is 50-70% methane by volume, similar to natural gas, and a convenient source of clean energy. The gas is easily collected and stored for lighting, cooking and other household uses. After bacteria digest the dung, the by-product is a rich organic fertilizer, sometimes called slurry, or bioslurry. That fertilizer is more effective than raw dung, with important benefits for hands-on farmers. For instance, it doesn’t smell bad, and almost all the pathogens and weed seeds have been destroyed. There is no downside. No waste. No poisonous residues or batteries. Few moving parts. Gobar Gas is an astonishingly elegant tap into “the circle of life” which environmentalists, economists, development people and humanitarians can all admire.

The Home Plant



Nepalese Gobar Gas: this installation begins at the blue outhouse. Human waste feeds to the underground “digester.”



Animal and raw kitchen waste is churned with water.



Both pipes meet underground in the digester. Normally this place is filled with tons of excrement. This digester was under construction. One pipe stems from the mixer, the other from the outhouse.



This cutaway is a training plant in Cambodia. The construction in every country is different due to local technical variance. Gas accumulates in the “collection dome” and is brought into the kitchen by the pipe at the apex.



Many sorts of digesters have been developed, including plastic bag and prefab fiberglass versions. The basics are the same: Waste in, gas and slurry out. Gas is collected from the vertical pipe at the top of the “collection dome.”

BSP-Nepal

According to Saroj Rai, the Executive Director of the Biogas Sector Partnership (BSP-Nepal) in Kathmandu, which oversees the Biogas Support Programme (BSP), the idea came to Nepal in 1955 when Bertrand R. Saubolle constructed a plant, and demonstrated the technology. In 1975/76 the Nepalese government installed 199 individual plants, but biogas truly developed when the Dutch launched a large program in 1992.

Today, an average-sized home installation might cost US \$530—big money in Nepal—but subsidy mechanisms and microfinance schemes have led to the installation of approximately 204,000 units in the last two decades. The BSP program estimates that, with subsidies, another 500,000 units should be built and installed.

It's not just Nepal. Other poor Asian countries have climbed aboard the biogas train. Biogas has become so popular in Vietnam that many farmers have it installed on their own, without subsidy. Subsidies vary greatly from up to 50% in countries like Laos, to 13.5% in Vietnam. The size of the subsidy required to persuade farmers to install the equipment is a reflection of both the relative wealth of farmers, and the priority they place on having a reliable substitute for wood, charcoal, other fuels—and the value of the fertilizer. (More details on subsidies in the unabridged version of this dispatch.)

About thirty million of Gobar Gas units are currently believed to be operating in India and China.

Women, Children and Trees



These women and children in a village near Bhaktapur, Nepal, used to spend hours a day collecting wood. Now the family has Gobar Gas. The two girls are 12 and 13 years old. They attend school and their English is good.

In Afghanistan and Nepal, poor women use wood-burning stoves to cook inside poorly ventilated homes, while their children crawl around the smoky, sooty rooms—a situation which leads to respiratory and eye problems. The homes are like smoke chambers in Nepal, and seem even worse in Afghanistan. Before coming to the biogas sector, Mr. Rai worked in photovoltaic. “Biogas has much greater socio-economic benefits,” said Mr. Rai in his Kathmandu office, “but biogas is not sexy like photovoltaic, which mostly helps men. Biogas mostly helps women—the men don’t really notice because they still get cooked food, so why would a man invest 25,000 rupees?” “But men will invest in photovoltaic because they get the sexy solar panel,” he said. “Even women sometimes will opt for photovoltaic solar power because they don’t realize the headaches, coughing and eye problems come from cooking.”



Subarna Budhathoki, a 52-year-old mother of five, was lucky and spent only about four hours per day collecting wood in the jungle, then hours cooking over wood in a smoky house. Now she uses that time to grow vegetables to sell in the market. She was proud to say her son just went to Japan.

“Forget about the environmental benefits,” said Mr. Rai. “People don’t see the value in saving the trees. Unless they are very enlightened they are reluctant to try biogas. It’s about social marketing. These types of products are not easy. But once you install a Gobar Gas plant, the woman typically says, ‘*Why didn’t you tell me about this twenty years ago!*’ Once they experience the benefits they are overwhelmed and social marketing is very easy.”

“Some women spend more than twelve hours per day, six days per week collecting firewood,” he said, “and children who could be in school are out collecting wood.” Those are extremes, to be sure, but as a rule, women and children spend hours a day collecting fuel. Given a choice, Nepalese mothers prefer their children go to school rather than haul wood. During walks in the mountains, it’s common to see kids of maybe six or seven out collecting wood in little baskets.



A Nepalese woman makes us tea with her Gobar stove. Efficient stove design is important to maximize the hours of cooking available. A huge biogas industry has developed in China and Chinese biogas appliances are exported worldwide.



**Success: the 18-year-old girl can go to school instead of fetching logs out of the jungle for cooking fuel.
Educated moms make educated kids.**

School is a Luxury



This family has Gobar Gas but the mom, as farrier, was having a hard time getting the little girl shod. The girl was no more helpful than a horse and she kept her eyes on me as if a giraffe had walked into the village. At first she was shy, then before heading off to school started modeling for the camera.



Going to school in Nepal. Their grandmother served us buffalo milk boiled over Gobar Gas. The boy is already in college and the girl also is in school.



In Laos, "Gobar Gas" is called "Gaz Sivulphap." The program is not sparking as well in Laos because, for instance, they still have many trees. Families don't have to walk far or pay for wood, but they are gnawing through the supply.



Australian Andrew Williamson from the Dutch SNV, and Bounthavy Sengtakoun, his Laotian compatriot, examine a biogas lamp in Laos. This house has electricity but biogas is cheaper. A biogas lamp, similar to an LPG camping lantern, can cost anywhere from US\$3 to US\$15 depending on quality.



Cambodia: Light in many homes is provided only by battery. A small business that uses a generator charges the village batteries. If a traveler needs a satphone or cell phone charged, they must only find one of these places and a local will charge your batteries while you have tea. In some places, including Iraq, people charge cell phones on motorcycles.

In addition to the health advantages of biogas for women and children, the rest of nature also benefits. Birds, and other creatures dependent on trees, do better when trees remain standing. In Nepal a single household biogas plant can save about 2,500 kilograms of wood per year. Trees anchor topsoil and prevent erosion. In some places, the wood is simply gone.

The people of Bhatti, Nepal—a village whose business is making moonshine—said they had heard about Gobar Gas but never wanted it. Wood for cooking and making raksi (rice whiskey) was plentiful. But they burned through all the wood, destroying the local economy. LP, kerosene and other fuels are too expensive to use in making moonshine. So the entire village of nearly a hundred people began traveling—up to three days to and fro—to buy permission from other villages to pull wood from jungle areas. Even the men had to spend their time scratching for wood. Gobar Gas started flowing in Bhatti in November 2009.

Lizard Hole



Dung piles in Karbasha Qalat, Afghanistan

Ghor Province, Afghanistan is similar to dry parts of Nepal. In Ghor there is a village called Karbasha Qalat (Lizard Hole) populated by sheep, horses, a cow, dozens of people, and thousands of lizards.

Villagers dry the dung in the sun and collect it into big stacks, as people do in India, Nepal, and across parts of the Third World. Karbasha Qalat (KQ) is like a dry Galapagos with all those lizards basking in the sun atop rocks and dung. Unlike the islands, KQ is not at sea level, but over 8,000 feet.

In some places Afghans tell stories about today's barren mountains having been blanketed by forests. If there ever were trees around KQ, they are gone. Any wild plants that can survive here must taste bitter to man and beast. There is no local wood. When the manure is burned, it chokes those nearby, and then it's gone. If KQ had a biogas generator, tons of manure would make gas while yielding slurry, to fertilize the now barren land. And there wouldn't be human and animal feces leaching around. The villagers in KQ had enough manure piled up to fuel a rocket with Gobar Gas.



Lizards atop dung cakes in Karbasha Qalat.

Ten kilos of dung yields roughly an hour of stove burning time, and one of those skinny cows produces about 12 kilos per day. KQ had a great herd of sheep—probably a couple hundred—kept in pens when not out feeding. Villagers scrape sheep dung from the pens, which they mixed with cow (I saw only one cow), mule and horse manure for cooking. A small stream runs through the village. Afghans will use greenhouses if taught; I've seen them in Helmand and Uruzgan, for instance. Slurry is used widely in greenhouses in Nepal.



An outside stove in KQ. Many Afghans cook indoors.

The bioslurry from the digester is so effective for growing crops that in some countries, according to Mr. Rai, biogas is not an energy program but an agricultural initiative, while in Vietnam it has been adopted for sanitation and economic growth. The biogas and the great sanitation benefits are byproducts in one place and impetus in another. In Karbasha Qalat, with a few greenhouses using the bioslurry, the standard of life could dramatically improve. There are thousands of “Karbasha Qalats” in Afghanistan.

SNV: The Dutch Connection

The more one learns about biogas, the more one sees the Netherlands Development Organization (SNV) humming in the background. SNV started working on biogas in Nepal in 1989, further adapting the Chinese technology, and developing an effective market-based program model. The Dutch could not be accused of looking for short-term solutions or following the crowd. Fifteen years in, SNV decided their domestic biogas program model was ready to replicate elsewhere in Asia. They started a program in Vietnam in 2003, and the Asia Biogas Program targeting 1.1 million beneficiaries in Vietnam (second phase), Bangladesh, Cambodia and Lao PDR in 2005.



Kitchens in Laos are better ventilated than many in Nepal or Afghanistan.

Good for Business

Biogas brings national-level benefits to countries such as Nepal, helping to spur business, and has created employment for about 9,000 Nepalese. These include jobs for local masons, who are trained as biogas technicians. The *real* magic for rural development professionals: biogas programs create a new, sustainable profession even in depressed rural areas.

Today, the challenges for Mr. Rai revolve around nurturing a holistic business sector by simultaneously prodding supply—including the development of biogas appliances—and demand. BSP-Nepal, with 30 employees, has a presence in 75 districts. Challenges remain, especially in remote areas, but the program is growing steadily.



Another Nepalese family with Gobar Gas

Incredible Return on Investment

For a typical Nepalese family, installing a biogas facility, even with subsidies, is expensive. But people feel that the investment pays for itself in a short time. Some women reported that Gobar Gas installations completely returned the investment within a year to 18 months. SNV figures are more conservative, but even conservative SNV figures show a complete return on investment after about three years. SNV figures were in all cases more conservative than what users told me in Nepal, Laos, Cambodia and Vietnam.

These rapid returns measure the financial cost against real financial gain, from new activities that are more likely to generate income, which take the place of the daily search for fuel to survive. For instance, in Nepal, Subarna Budhathoki said her Gobar Gas unit cost 35,000 Nepalese rupees after the subsidy, but she made 50,000 rupees the first year by selling vegetables. Subarna said, with a smile that hardly ended during the entire lengthy conversation, that she would have earned 200,000 rupees on tomatoes that year, but the tomatoes were victims of a hailstorm. Despite the hail setback, she cleared a real profit of 15,000 rupees in the first year.

Long Term Gains

It's important to consider the less easily monetized yet real benefits from using Gobar Gas. Saving 2,500 kilograms of trees per family each year has long-term economic value, and it keeps the birds and squirrels happy. Improved health from better sanitation and the absence of constant wood smoke in the home has clear economic benefits, as does the ability to send children, freed from the labor of searching for fuel, to school. These items, and many others, don't fit on a balance sheet, but they improve conditions for real, long-term economic and social development. Health and education are the foundations of human capital needed to sustain a wealthier, more advanced society.

In closing, Lalit the Gurkha soldier has created a chain reaction. After intensive research and talking with experts in various countries, Afghanistan is a clear candidate for Gobar Gas development. The wheels have started turning.

Thank you Lalit, and SNV.

Note: This abridged version of a far more detailed dispatch required months of intensive research in Afghanistan, Nepal, Vietnam, Cambodia, Laos, with a genesis in Borneo. The unabridged version will soon be published.

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