



Biofuel by Decree

**Unmasking Burma's
bio-energy fiasco**



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Methodology

Fifteen researchers from Burma conducted field surveys and 131 interviews in a total of 31 townships in all seven states of Burma between November 2006 and April 2008 for this report. Several official government documents, including from the ruling regime's State Peace and Development Council Central Committee and the Department of Agriculture, were also obtained by the researchers. Existing media and other reports about the program in Burma were extensively examined and a review of literature on jatropa projects around the world was conducted.

About the authors

The Ethnic Community Development Forum (ECDF), comprising seven community development organizations from Burma, was founded in 2004 to promote grassroots, participatory, and sustainable development. The members of ECDF are the Karen Office of Relief and Development, Karenni Social Welfare and Development Centre, Kachin Development Network Group, Shan Relief and Development Committee, Mon Relief and Development Committee, Network for Chin Community Development, and the All Arakan Students and Youth Congress.

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Mass planting of jatropha in Shan State; an armed police officer oversees planting

Executive Summary

In December 2005, Burma's Senior General Than Shwe ordered the start of a nation-wide campaign to plant the toxic bush-like tree, *Jatropha curcas*, for biodiesel production. The country was to plant eight million acres, or an area the size of Belgium, within three years. Two years on, this report documents how Burma's people have endured forced labor, confiscation of farmlands, loss of income and threats to food security under the program. At the same time, testimonies of crop failure and mismanagement from all of Burma's states expose the campaign as a fiasco.

Each of Burma's states and divisions, regardless of size, are expected to plant at least 500,000 acres. In Rangoon Division, 20% of all available land will be covered in jatropha. In Karenni State, to meet the quotas, every man, woman and child will have to plant 2,400 trees.

Army commanders and state officials have organized mass meetings extolling the virtues of jatropha. Photos of senior officers with watering cans and shovels have appeared in the newspapers; progress reports from around the country have been announced daily. Signboards, advertisements, and pamphlets have bombarded the nation.

Since 2006, all sectors of Burma's society have been forced to divert funds, farm lands, and labor to growing jatropha. Teachers, school children, farmers, nurses and civil servants have been directed to spend working hours planting along roadsides, at schools, hospitals, offices, religious compounds, and on farmland formerly producing rice.

This radical program was started despite growing international concern about the negative impacts of biofuel production, especially when implemented rapidly or on a large scale.

Field research from 32 townships in each of Burma's states, including 131 interviews with farmers, civil servants, and investors, reveals how people have been fined, arrested, and threatened with death for not meeting quotas, damage to the plants, or criticism of the program. One result of the excessive demands for farmlands and labor is a new phenomenon of "jatropha refugees" of whom nearly 800 have already fled from southern Shan State to neighbouring Thailand.

Plantations up to 2,500 acres in size have ignored local climate and soil conditions and been planted haphazardly, leaving up to 75% of the plants dead. Improper processing of the oil has left engines damaged and raised serious questions about the existence of adequate infrastructure to realize domestic biodiesel production. A complete ignorance of harvest yields, price, or market for the oil has left farmers and even businessmen cynical about any potential benefits of the program.

Burma's agricultural sector is the backbone of the country's economy and society. Policies impacting the sector should be considered carefully and implemented cautiously. However, with disturbing echoes of China's "Great Leap Forward" to increase steel production in the 1950s, Burma's generals are forging ahead with an ill-conceived draconian campaign, ignoring its negative impacts.

This report highlights the urgent need for political reform in Burma so that agriculture is not left to the whims of generals. Sustainable agricultural policies are needed that can ensure land rights and human security and allow communities to manage their own natural resources.



Jatropha plants in a house garden in Karen State; jatropha fruits not yet ripe

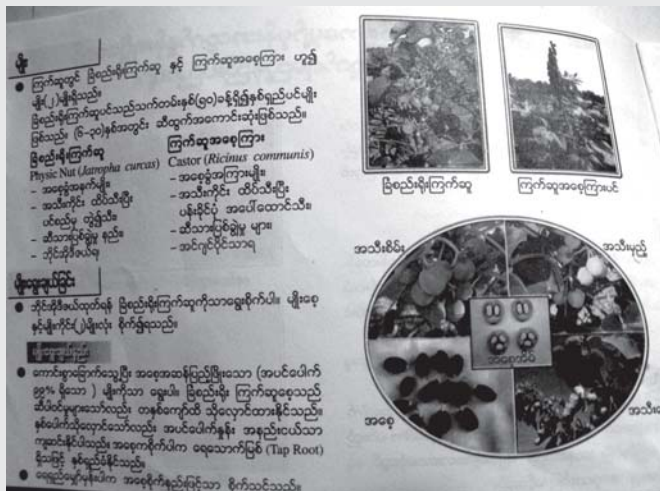
What is jatropha?¹

Jatropha curcas is a small tree - or shrub - in the family of Euphorbiaceae. Although *Jatropha* is actually a genus comprising 175 known species, the name is usually used to refer to the particular species *Jatropha curcas*. In Burma jatropha is sometimes called the “castor oil plant” because it has a similar appearance to castor (*Ricinus communis*) and both plants are commonly referred to as “physic nut” plants. Castor, however, is a distinct species that should not be confused with jatropha.

Jatropha originates from Mexico and Central America, but has spread all over the world and is mostly used for hedges to protect crops from animals. The tree can grow up to 6 meters in optimal conditions; it has a straight trunk with thick branches and green leaves. If grown from seed, it has one tap root and four lateral roots. The fruits have an oblong shape of about 40 mm length, each containing 3 seeds (on average), which look like black beans. The seeds contain more than 30% of oil by weight. Jatropha is a fast-growing tree and can live potentially up to 50 years.

The name jatropha comes from the Greek iatros, meaning doctor, and trophe, meaning food, which alludes to its uses in traditional and folk medicine. These uses also explain the term *physic nut*. Although it has medicinal properties, jatropha is toxic to animals and humans. The toxicity of the seeds is mainly due to the presence of curcin, a toxic protein, and diterpene esters. Curcin is similar to ricin, of the castor bean, which in its pure form is one of the most potent toxins in the plant kingdom. Poisoning causes acute abdominal pain and nausea about half an hour following ingestion.

Jet suu



Jet suu is the Burmese term for physic nut. *Jatropha curcas* (jatropha) and *Ricinus communis* (castor) are both called physic nut and both are being cultivated throughout the country. It is jatropha, however, that is most commonly used for biodiesel production. After describing the different appearance of the two species’ seeds, a technical instruction manual published by the Department of Agriculture and Irrigation advises “choose only *Jatropha curcas* for bio-diesel production.”

Local media and those interviewed for this report have used the terms castor, jatropha, and physic nut interchangeably. This report will use the term jatropha as it is the species being promoted for biodiesel.

Biofuels: A global debate

The recent explosion of oil prices, the diminishing reserves of fossil fuels and concerns about greenhouse gas emissions affecting climate change, have all spurred a growing biofuel industry. Global production of biofuels – fuels made from biomass or plant matter – has doubled in the last five years, and is expected to double again in the next four years. The rapid expansion has led to a worldwide debate about the benefits and risks of these fuels, including biodiesel from jatropha.

The benefits of biofuels and the promise of jatropha

Biodiesel is one type of biofuel that is a clean and renewable energy source; it can be used as a pure fuel or blended with petroleum in any percentage. It has substantially low pollution-causing emissions compared to petroleum diesel. This is especially important in mitigating global warming and acid rain. Biodiesel presents itself as an attractive option to our dependence on fossil fuels and a potential means of reducing harmful emissions. Biodiesel, and biofuels in general, could help stabilize oil prices, diversify energy supplies, and create jobs for the rural poor.

Over the last 2 to 3 years the plant species *Jatropha curcas* has again generated the interest of many actors in the field of bio-energy. Many excellent characteristics, including high yield ability, high oil content, resistance to drought, and good quality of the plant oil, have been attributed to this plant. However, the exact expression of these characteristics is still not well understood nor validated or researched. Preliminary findings show some of these to be true, others are exaggerated, while most will be valid only under specific conditions.²

Jatropha has been called the “wonder plant” the “biodiesel tree” and “a tool to combat energy poverty” due to its multiple uses, most notably the production of biodiesel from oil in the seeds of its fruit. Jatropha seeds yield more oil per hectare than other biofuels while jatropha oil produces one-fifth the carbon emissions of traditional fossil fuels. The plant can grow on marginal soils; therefore it does not need to directly compete with food crops.

Proponents refer to the “Jatropha System” which has four parts: renewable energy, erosion control, the promotion of women, and rural income generation. Renewable biodiesel can be used in diesel engines that run farm machinery, generators, pumps, and vehicles, or in modified lamps and stoves for lighting and cooking. The tree can restore degraded lands by using its roots to stop erosion; if used as a living fence it can also protect crop lands from wind erosion. Local production of soap from jatropha oil is a small-scale cottage industry that can benefit women; freeing women from collecting firewood is also a benefit. Jatropha’s various products, such as the nutrient-rich fertilizer made from the seed cake after oil is extracted, have the potential to provide valuable income in rural areas.

Several African, Central American and Asian countries, including the Philippines, Indonesia, India and China, are moving ahead with jatropha initiatives. However, commercial production has not started in most cases and conclusive results are still forthcoming.

The risks of biofuels

Several disadvantages and serious concerns have emerged since the sudden and rapid promotion and expansion of biofuel crops, including risks to food security, harm to the environment, and increasing inequity.

Food security: The competition between biofuels and food crops

The use of land, water, and other resources for biofuel instead of food crops impacts food supplies and prices. For example, farmers in the United States are selling their corn to make biofuel, causing huge increases in world corn prices. During 2007 the price of wheat doubled in one year. The price of corn was nearly 50% higher and rice 20% more expensive than the previous year. In the first four months of 2008, rice prices in Asia have doubled.³ Global wheat reserves are at their lowest in 25 years and supplies of other crops are dwindling to the extent that the World Food Program is considering stopping or rationing food aid and is appealing for more donations. Biofuel production is one contributing factor to the current spike in prices and dwindling stocks of food. High prices and shortages particularly affect the poorest in the world and could lead to a social crisis that involves food riots; China and Russia have already implemented food price controls to prevent such a situation. In June 2007 China also limited biofuel development to non-grain energy crops amid concerns over rising food prices.⁴

The environment: More damage than good?

“A primary concern is the potential for agrofuels to actually accelerate climate change rather than combat it.”⁵

The felling and burning of forests – sometimes virgin forests – to establish biofuel plantations creates more carbon dioxide and therefore more greenhouse gas emissions which are the cause of global warming. The destruction of remaining global forests is also accelerating the loss of biodiversity, threatening the survival of endangered species such as the orangutan. In some cases the energy used to produce fuel from plants can actually exceed the energy gained from the plants. Scientists from the Smithsonian Tropical Institute have concluded that some biofuels could have a greater environmental impact than burning fossil fuels.

Equity: Who will benefit and who will lose?

“At their worst, biofuel programmes can result in concentration of ownership that could drive the world’s poorest farmers off their land into deeper poverty.”⁶

Biofuel programs that encourage or employ large plantations can push smaller farmers off their land or to utilize lands being commonly used by legally landless farmers. Biofuels, particularly jatropha, can also push poor livestock farmers off common grazing lands. These trends are especially damaging to indigenous peoples. In the larger context of equity, biofuels will allow those that can afford to drive cars to benefit at the expense of rising food prices and decreasing land access for the world’s poorest.

The downside and uncertainty of jatropha

As mentioned above, jatropha is toxic and can be fatal when ingested (the seedcake therefore can not be used as animal feed). Certain engines can use jatropha oil directly but others need modification. At the same time, improperly refined oil can damage engines due to carbon deposits; technicians therefore need to be trained in advance. Jatropha can take up to four years to reach optimal harvests and farmers can suffer financial losses in the meantime. Finally the process of expelling the oil with hand presses is labor intensive while trans-esterification, or the chemical production of biodiesel through reaction of the vegetable oil with alcohol, can be expensive and dangerous.

One of the biggest unknown factors of jatropha is the actual yield of fruit and amount of oil that can be generated per hectare. Predictions of bumper yields by jatropha proponents have not been substantiated and results vary widely. This is directly related to a lack of research and development into jatropha seed stock; both wild and domesticated varieties are being planted without standardization or field trials. In addition, planting on marginal soils necessarily produces marginal yields. There are not established markets for jatropha yet; the level and stability of the price it could garner therefore also remain uncertain. In 2006 researchers from the University of Amsterdam evaluated existing jatropha projects in several countries. They found that:

To date, there have not been many examples of truly successful projects involving sustainable cultivation of *Jatropha curcas* as a source of biofuel. The main reasons why projects seem to fail are: 1) No or insufficient income generation due to a low profit margin and/or low yields; 2) Projects participants are insufficiently involved in setting up the project, and/or roles and responsibilities of the various actors are unclear; and 3) Farmers are insufficiently informed, leading to inappropriate farming practises and unrealistic expectations.⁷

A call for caution

*“First understand, first take initial steps, first see results.”*⁸ – Chinese premier Wen Jiabao on biofuels

*“The economic, environmental and social impacts of bioenergy must be assessed carefully before deciding if, and how rapidly, to develop the industry and what technologies, policies and investment strategies to pursue.”*⁹ – UN-Energy

UN-Energy, a group of twenty UN agencies, the EU Environment Commissioner, the United Kingdom government, the International Water Management Institute, and others have all warned against rushing into biofuels. In August 2007, 250 non-governmental and indigenous people’s organizations from around the world called for a scientific risk assessment and moratorium on biofuels.

The uncertainty of jatropha is so well-recognized that a global analysis of the crop and its performance is underway and will be carried out during 2006-2010 at Wageningen University in the Netherlands. In March 2007 an international seminar of over eighty participating researchers and practitioners from all over the world cautioned governments to base their plans on realistic data and to ensure that projects are sustainable in the long-term. The group recommended “not to engage in large scale plantations now” but to start with small scale endeavors (less than 100 hectares) to verify conditions and potential. The group warned that “At this stage it is still particularly important to distinguish between ‘reality’, ‘promises’, and ‘dangerous extrapolations.’”¹⁰ This caution is echoed by UN agencies that recommend it is “best to start with modular, experimental, and/or demonstration projects...”¹¹ These recommendations stand in stark contrast to how Burma’s regime is implementing its jatropha campaign.

All the people, locals to carry out growing physic nut as a national duty Lt-Gen Maung Bo attends physic nut plant growing ceremonies in Kawthoung Township

YANGON, 3 May — Member of the State Peace and Development Council Lt-Gen Maung Bo of the Ministry of Defence, accompanied by Chairman of Tanintharyi Division Peace and Development Council Commander of Coastal Region Command Maj-Gen Mmang Maung Swe and officials, attended the ceremony to grow physic nut plants of regiments and units in Kawthoung Station on 30 April. Lt-Gen Mmang Bo and Maj-Gen Mmang Maung Swe presented physic nut saplings

use fuel within limits. With the famintedness, Head of State Senior General had given guidance on extending cultivation of physic nut plants on a commercial scale so as to produce bio-diesel.

Therefore, all the people and locals are to carry out growing physic nut as a national duty. Physic nut oil can directly be used in diesel engine. Hence, it will supply fuel requirement of the region. Production of bio-fuel can save a half cost of imported fuel. The money saved can be spent on con-

Lt-Gen Maung Bo presents physic nut saplings to regiments and units of Kawthoung Station through officers.
MNA



Burma's generals embrace jatropha



Senior General Than Shwe

The Senior General's command

On an upcountry tour on December 15, 2005, Senior General Than Shwe, the head of Burma's military and the state's ruling State Peace and Development Council (SPDC), told a meeting of leaders that all "States and Divisions are to put 500,000 acres under the physic nut plants each within three years, totaling seven million acres during the period." His speech was broadcast on state television.¹²

Since that time, the Ministry of Agriculture and Irrigation has said that the cultivated area would extend up to 8 million acres (3.2 million hectares), or the size of Belgium.¹³

The undifferentiated allocation of 500,000 acres in each state and division does not take into consideration the total land area available, the population, or the climatic and soil conditions of each area. This invariably puts the smaller and less populated states and divisions at a disadvantage and poses huge questions about the wisdom of the campaign. According to the General's plan, Yangon Division, comprising 3,927 square miles, will have to cover nearly 20% of its entire land area with jatropha. Karenni State will have to convert 17% of the entire state and each man woman and child will have to cultivate two acres each if the target is to be reached.¹⁴

A manual produced by the Ministry of Agriculture specifies that 1,200 trees should be grown per acre. If the targets are reached, the plan therefore requires every man, woman, and child in Burma to plant 177 plants each within three years.¹⁵

In his annual address on Peasant Day in March 2006, the General confirmed his plans and spoke directly to the people:

In the energy sector that plays an important role in the drive [to further enhance the State economy], bio-diesel can be obtained from physic nut that grows naturally in abundance in Myanmar. So, the government is urging extensive growing of physic nut across the nation. In this regard, I would like to exhort you peasants to cultivate physic nut, which is easy to grow and beneficial as an import-substitute crop....”¹⁶

Unlike the Chinese government, which has stipulated that jatropa be planted only on barren lands, Than Shwe made no such specification of where the “wonder tree” should be planted, just that it should be done.

Detailed minutes from a September 2006 meeting of the country’s thirteen regional military commanders confirm that the SPDC Central Committee has ordered jatropa to be planted in every village, every township and every district of all thirteen military command areas by any means. The project is to be monitored by district SPDC authorities and the military commanders. The meeting minutes recorded that action would be taken against any command area that could not grow 500,000 acres within three years and that reports must be submitted if the assigned tasks cannot be carried out.¹⁷

The campaign begins

“Wherever you point your finger, you can find jet suu.” (Interview 69)

“Every corner and every farmland has been occupied by jet suu plants. No empty space is left... commercials [for planting jatropa] are everywhere. It is always on TV and popular celebrities advertise it.” (Interview 19)

The words of the Senior General set off a frenzy of propaganda to reach the stated objectives as a “national duty.” The state-run newspaper *The New Light of Myanmar* urged all the people of Burma to carry out the jatropa project as a national cause. All civil servants were instructed to plant jatropa at government department offices, schools, and hospitals. Army battalions were allotted acreage to implement military farms. Village and township level plantations were initiated as well as massive “greening” projects along highways and roads. House gardens, church yards, monastery compounds, and cemeteries have not been spared – jatropa should be planted “in all empty spaces.” On January 16, 2006, the Minister of Industry-1, Colonel U Aung Thaung delivered a speech in which he claimed that the cultivation of physic nut and the production of biodiesel was the only way out of the oil crisis gripping Burma.¹⁸

To demonstrate the importance of the General’s exhortation, a series of high-profile ceremonies were conducted between March and July 2006. For example, in southern Shan State, an opening celebration for a jatropa plantation was conducted on July 1, 2006 by the Commander of Tenasserim Division. In his opening speech the Commander called the area “a golden jatropa field.”¹⁹

In June 2006, a plantation ceremony was staged in Shwe Yin Aye village to kick start the project



Signboards promoting jatropha in different states



Pamphlet from Agriculture Department

Agricultural mismanagement in Burma

Myanmar is an agricultural country and the agriculture sector is the back bone of its economy, contributes 44% (2002-2003) of GDP, 34% (2001-2002) of total export earnings, and employs 61.4% (2002-2003) of the labor force. The agriculture sector remains basic in the national economy of Myanmar. 75% of the total population reside in rural areas and are principally engaged in agriculture, livestock and fishery sectors for their livelihood.²² (Food and Agriculture Organisation)

Although agriculture employs more than half the population and contributes significantly to the country's economy, over the years the regime's agricultural policies and initiatives have had negative consequences for farmers and have decreased crop productivity. In one case study from Mong Nai Township in Shan State, researchers found that rice production had dropped 56% from 1994 to 2005 due to the regime's policies.²³

In an analysis of the development of Burma's agriculture sector after the transition to a more open economy in 1988, a Japanese researcher found that "production of crops that had a potential for development showed sluggish growth due to policy constraints, whereas there has been a self-sustaining increase in the output of those crops that have fallen outside the remit of agricultural policy."²⁴ In other words, crops that did not fall under the regime's influence increased in productivity, and conversely, where the regime imposed its policies, crop production stagnated.

The worst example of this is the state procurement of rice that required all farmers to sell a portion of their rice harvest to the government at prices considerably below the market rate. Those that did not fulfill the quota were prevented from milling or selling their rice. Farmers had to provide the quota regardless of natural disasters or bad harvests. They were therefore forced to purchase rice at market prices and sell it to the government at slashed rates, some eventually winding up in debt, landless, or migrating. Although the procurement system was officially abolished in 2003, it is still in practice in many areas, especially since all army battalions have been given the directive to be "self-sufficient." This has led to battalions taxing adjacent communities in the form of rice.

The self-support policy of the army has also led to battalions initiating their own plantations either for food or income generation. Existing productive farms are confiscated by the battalion; lands are either then rented back to the owners or farmers are pressed into service for the military's benefit.²⁵

In addition to the procurement system and self-support policy, the forced production of summer paddy has disrupted natural harvest cycles, depleted water resources, and degraded soil, actually decreasing overall rice yields in some areas. While the government did invest in irrigation infrastructure in the central dry zone, making summer paddy more feasible there, it still required other regions without that infrastructure to plant the summer crop.

The government's New Destiny project, aiming to substitute opium with a hybrid rice strain from China called Shin Shweli in northern Shan State, has resulted in consecutive years of poor har-

vests, driving farmers into debt or out of rice farming altogether. The rice variety requires fertilizers and pesticides which have not been provided; the government has also not given any technical assistance. In Lashio Township, the Agriculture Department produced a pamphlet on how to grow the rice but only in English.²⁶

After extensive study the Japanese researcher concluded that "...if it is examined dispassionately, the genuine [agriculture] policy objective of the government seems to consist of the following two elements: avoidance of social unrest and sustenance of the regime....The stabilization of essential agriculture prices at a low level conforms with the main objective of avoiding social unrest. This explains why agriculture policies have a strong inclination towards production increases for their own sake while paying rather less attention to farmers' income and welfare."²⁷

in Maung Daw Township, Arakan State. Five hundred people were forced to attend the ceremony in the rain, losing valuable time needed to plant their own rice. One of the attendees remarked "I am only a clothing shop keeper. I have nothing to do with the castor oil industry. But I was afraid of reprimand if I was not there. Many other people also attended out of fear."²⁰

Throughout 2006-2007, regional and battalion commanders as well state, township, and district level officials visited plantations, mills, and mass meetings to extol the virtues of jatropha, enforcing the command of the Senior General, and checking on progress. Photos of higher-ups with watering cans and shovels appeared in the newspapers; daily progress reports from around the country were announced on the nightly news and in the print media. A "flash show" after the news hour explained to viewers the benefits of the plant and instructed how to cultivate it. Sign boards, advertisements, and pamphlets bombarded the nation.

In August 2006, cultivation reached the one million-acre mark. According to an official at the Ministry of Agriculture and Irrigation, the updated plan in mid-2006 called for physic nut to be grown on 2.3 million acres in 2006-2007, 2.68 million acres in 2007-2008 and 3.38 million additional acres in 2008-2009. This would bring the total to 8.36 million acres.²¹

Motives behind the plan

According to public statements by SPDC officials, the purpose of the jatropha campaign is to produce biodiesel as a fuel substitute because engine oil and fuel supplies are insufficient and expensive in Burma. U Myint Oo, the chief research officer for the state-owned Myanmar Oil and Gas Enterprise told news agencies in July 2006 that the country hoped to replace all of its 40,000 barrels per day of conventional oil imports with domestically-produced jatropha oil within a few years.²⁸ The ruling military stated that it would like to decrease its dependence, and spending of millions in foreign exchange on the more than 200 million gallons (900 million litres) of oil it imports annually.²⁹ State-run media has also extolled the virtues of physic nut as a way to "narrow the development gap between the states and the plains as well as urban and rural areas" and for farmers to gain extra income and to contribute to the "greening" of the country.³⁰

Avoidance of social unrest

Unprecedented demonstrations in August and September 2007 against fuel price hikes in Burma indicate the critical importance of fuel prices to Burma's fragile economy. Fuel prices affect not only transportation and commodity prices but also the availability of electricity, as many in Burma run diesel-operated generators to generate electricity. The regime must keep fuel prices in check in order to maintain social stability and its control over the population. Burma has some of the largest reserves of natural gas in Asia which could be used for domestic consumption. The regime is instead exporting these resources for cash.³¹ Therefore domestic production of biofuel is an appealing alternative.

Sustenance of the regime

Domestic production of biodiesel would further allow the regime to remain isolated from world markets and political pressure. However, although the stated purpose of the massive push to plant jatropha is to use biodiesel as an import substitute, in fact the regime is planning to export the fuel. At a forum held in Singapore in August 2007, Director General of the Energy Department U Soe Myint said that "a large portion of the biodiesel produced is likely to be exported to other countries."³² He further explained "by this time next year we hope to have seven million acres (2.8 million hectares) of jatropha plantations in full swing and a large amount of biodiesel for export in the future...the jatropha project should earn some foreign exchange income."³³

Foreign investment

In addition to the military enforcing the planting of 7-8 million acres across the nation, the ruling regime is also enlisting the help of Burmese and foreign companies to further its objectives. Foreign interest includes land purchases by Thai investors for jatropha cultivation as well as Singaporean and British involvement in a 100,000 acre plantation in Irrawaddy Division. Malaysian and Indonesian companies are also reportedly in talks to set up processing plants.

In June 2006, Serge Pun and Associates (SPA), a long-standing Burmese group of companies with interest in real estate, established Myanmar Agri-Tech Ltd. According to SPA's website, "under the auspices of Ministry of Agriculture and Irrigation, the company is undertaking to plant Jatropha Curcas and Rubber to a minimum of 100,000 acres." Agri-Tech then granted the company Myanmar Plantation Resources exclusive rights to manage, operate, and sell produce from the project, called the Maw Tin Estate situated in Irrawaddy Division. In February 2007, Singapore-listed SPA affiliate Yoma Strategic Holdings bought a majority stake in Myanmar Plantation Resources, boasting that it would be the "first to venture into Jatropha Biodiesel" in Burma.³⁴

The massive Maw Tin plantation has also attracted the attention of UK-based Sindicatum Carbon Capital Limited for its potential to qualify for carbon credits. Speaking on behalf of the company, Mr Anthony Moody, Advisor to the Board, said: "*As a leading greenhouse abatement developer globally we are encouraged by the ability of South East Asian countries and their peoples to gear up quickly and respond rapidly to the potential of 'carbon credits'.*"³⁵

The state-run Myanmar Industrial Crops Enterprise will jointly implement a bio-research center in Rangoon's Lay Daung Kan area with Haejohyub Bio Energy Myanmar Corporation of South Korea. According to a Memorandum of Understanding, 150,000 *hectares* of jatropha plantations will be established "using a more than 300,000 work force."³⁶ The Indian company Agora Ventures is also planning to invest US\$500,000 in a two thousand hectare jatropha plantation close to Rangoon.³⁷

Superstitious significance?

“We were told to grow jet suu as a magic spell for the longevity and promotion of their [the military’s] ranks.” (Interview 60)

“They grow jet suu to keep the uprising calm by means of yadaya spell annulment.” (Interview 76)

According to traditional practice in Burma, when there is a bad omen or prophecy, one can avoid misfortune by performing any number of rituals or spells referred to as *Yadaya*. The noun *Yadaya* is defined as “something done in keeping with an astrologer’s advice to avert impending misfortune or to realize what one wishes.” The verb form *Yadaya-che* means to follow an astrologer’s advice on what one must do to avert an impending event or to achieve what one desires. *Yadaya* is very commonly practiced today in Burma.³⁸

A particular type of *Yadaya* is the *get gin nyay*, or the utilization of a diametrically opposed name according to astrological significance. In Burmese, physic nut is known as *jet suu*, which in astrological terms can denote Monday-Tuesday, while democracy leader Aung San Suu Kyi’s name (pronounced *suu jee*) can mean Tuesday-Monday. Therefore the act of planting jet suu qualifies as a *get gin nyay* to neutralize Suu Kyi’s powers.

Jet suu also means “noisy chicken” in Burmese, which is reminiscent of the Burmese proverb, “*jet suu, luu ma suu,*” which translates as “when chickens make noise, people will not.” Accordingly, the mass cultivation of physic nut will, through inexplicable astrological influence, silence the people and quell political opposition.³⁹

Policy based on astrology

On November 6, 2005, at the auspicious time of 6:37 a.m., a military convoy left the capital of Rangoon. After years of speculation and secrecy, all civil servants in Rangoon had been ordered to immediately move to the new capital of Nay Pyi Taw some 400 kilometers to the north. Foreign embassies were left behind. Than Shwe had built his new bastion – believed to cost millions of dollars to construct – fashioning himself after Burmese kings of old who had built their own capital cities. A combination of paranoia, siege mentality, and superstition all played a role in his decision. The shape of the ministry buildings has been likened to scorpions, which according to some believers is a preventive measure to ward off ill fate.⁴⁰

Than Shwe’s astrological decisions echo those of his predecessor, General Ne Win, who famously abolished the 25, 35, and 75 bank notes in 1987, making sixty to eighty percent of Burma’s money in circulation worthless overnight. He introduced two new notes, the 45 and 90 kyat, on the advice of his astrologer because both notes added up to 9, his lucky number.⁴¹ In 1970 the General decreed that everyone must drive on the right side of the road, even though all cars in the country were made for left-side driving.



Students forced to grow jatropha for opening ceremony of a “model village” in Shan State

“In June 2006, Infantry Battalion 66 from Nam Zarng in Shan State summoned the local residents and ordered them to clear 2,500 acres of farmlands. Each household was required to plant 500 seedlings within 3 days. Again in March 2007 each household was required to plant an additional 70 seedlings. We took it in rotation to guard the young seedlings from animal encroachment; an order was issued by the battalion that if any animal destroyed the plants, the household responsible on that day would be fined 1,500 kyat. Villagers from this area have fled to Thailand due to the forced labor and fines.” (Interview 114)

Mass mobilization

“Our village has to keep a 200-acre plantation in addition to every household planting 50 trees at home. The authorities threatened that we would be punished if we failed to do it. We never received wages for our work and we had to buy the seeds from the authorities. At every monthly meeting they require a progress report on the plantation.” (Interview 36)

Every level of society is being mobilized to plant jatropha. First, the military is instituting model plantations at the village, township and district levels. These plantations range from 3 up to 2,500 acres and involve land confiscation and forced labor. Second, communities are being forced to plant jatropha along highways and in public places. Third, civil servants are being forced to plant jatropha at all offices and schools. Salaries are deducted for non-compliance; children are taken out of class to participate. Finally, quotas have been set for each household to plant the trees in their own gardens or house compounds. This directly competes with household food crops and poses a special risk to children as the seeds of the tree are toxic.

Quotas vary in different areas. In some places people are required to plant 5-10 trees at their homes and contribute volunteer labor to larger community plantations or roadside plantings, in other areas each household is required to plant up to 1,500 plants along hedges or in vacant areas. Villages may be required to plant a certain amount of acreage per village or farmers a certain amount of acreage per land farmed or based on the number of family members. Civil servants are required either to grow a certain number of plants or acres depending on the area.

Citizens are forced to purchase seeds, branches or seedlings, “contribute” their labor, farm tools and land, and are threatened or fined for non-compliance. They must sow seeds in nursery fields, water and weed the young plants, protect them from harm, and substitute any plants that die.

Township and village authorities as well as military commanders, the police, and officials from various government departments have been mobilized across the country to establish jatropha plantings and model villages to fulfill the Senior General’s command since early 2006. In some areas supervisory committees have been formed to check on progress. Most orders come from the State Peace and Development Council’s Central Committee to township and village-level councils, and then to particular departments or village headmen who inform villagers of their duty. Village headmen usually must organize the people into “voluntary” work groups. This leaves headmen in an impossible situation:

In our village, nobody wants to be village head. They cannot stand the orders from the SPDC soldiers and from the township chairperson. When the village head tells the villagers what the soldiers ordered them to do, the villagers don’t like or trust the village head. At the same time, if he doesn’t obey the soldiers he lives in fear. There is no peace living between them. Since starting the jet suu, every time the authorities or soldiers enter the village they check the plantations. Everyone is living in fear.” (Interview 17)

Translation of official order to plant jatropa

Township SPDC office, Kyang Taung Town

No.5.1-12/SPDC office 6

Date: 23.February.2007

Subject: To form sub-township committees for supervising the planting of jet suu

1. It has been assigned to grow 12,602 acres of Jet suu in the Kyaing Taung Sub-township in 2007. A supervisory committee is hereby formed with the following members to oversee the cultivation of land for Jet suu in community compounds and farms:

Kyaing Taung Sub-township Jet suu Supervisory Committee

- (a). U Win Min Kyaw, Sub-township officer – Chair member
- (b). Police Chief Aung Maung, Ma Na Ya – Member
- (c). U Toe Toe Aung Immigration Chief – Member
- (d). U Tun Tun Land Survey officer Chief – Member
- (e). U Aye Lwin, Sub – Township Electricity Chief – member
- (f). U Khun Kyaw Hpe, Municipal Chief
- (g). U San Kyaw Nyunt, Communication
- (h). U Tin Maung Soe. Forestry Chief – member
- (i). U Sai Leik Kham, USDA Secretary member
- (j). U Myao MinThan, Agricultural Department – Chief member

Duties

- (a) To supervise Jet suu areas in order that the assigned quantity is grown in respective villages and village tracts
- (b) The supervisory committee shall oversee the model Jet suu village according to the three basic rules.
- (c) To supervise the Jet suu area of 100-300 acres along consecutive fences.
- (d) To get things ready for demonstration and exhibition in time of observation visits by the authorities.
- (e) To supervise the Jet suu farms undertaken by the government departments so that those of the previous year may be seen successful and promising.

2. In order that the above-mention supervisory committee may be able to work, committees are formed and assigned the responsibility to assist the supervisory committee:

Sub-Committee (1):

- (1) Township police chief, Chair member
 - (2) U Toe Toe Aung, Immigration, Chief member
 - (3) U Naing Win, Telecommunications, Chief member
 - (4) U Sai Leik Kham, USDA secretary
 - (5) Assistant head Kyaw Min Htwe Township Police Dept
 - (6) Chairman and one member No.1/2 village SPDC
- Assigned Field: Quarter 1 and 2 and USDA farm

Duties

- (a) No.1/2 community farm and Pyay Khaing Phyto farm be made ready for checking
- (b) Every household in the Quarter plant nursery fields to fully grow in the assigned acres.

- (c) Ensure Jet suu is grown along both sides of the main roads leading to Quarter No.1 and 2
- (d) Every community shall keep records of castor oil plantation along the fences and conduct surprised checking.

(e) Sub-Committee (2)

- (1) U Tun Tun, Land Survey / Record Chief – Chairman
- (2) U Tin Maung Soe, Forestry Chief-member
- (3) U Khun Kyaw Pe, Township Municipal chief member
- (4) U San Kyaw Nyunt, Communication chief member
- (5) U Zaw Oo, Land Survey Department
- (6) U Maung Maung Myat, USDA
- (7) Village Head and 1 member of Quarter 3 and 4

Assigned fields: Quarter 3 and 4, farms and community farms

Duties

- (a) To supervise that the villages have land for the plantation and keep nursery farms.
- (b) To supervise the community in order that each person may carry out the assigned tasks.
- (c) To supervise the plantation in Quarter (3) and (4) that old plants be replaced, the plantation areas be extended, and the fences be done accordingly.
- (d) To prepare community model plantation farms for occasional supervisory visits by the authorities.

(e) Sub-Committee (3)

- (1) U Myo Min Than, Township Agricultural chief chair member
- (2) U Aye Lwin, Township electricity chief member
- (3) U Aung Naing Win, Township municipal chief member
- (4) U Sai Tum Aung, Agriculture Dept chief member
- (5) U Yaw Han, Payay Khaing Hpyo
- (6) Village head and one member of Quarter (5) and (7) and farms

Assigned Fields: Quarter (5) and (7) and farms

Duties

- (a) To supervise that every person in the community may carry out the plantation up to the assigned quantity and every household may keep nursery farms for the plants.
- (b) To see that Jet suu is grown in the house compounds and farms of the slash and burn farmers.
- (c) To supervise that the community farms and nursery fields may be properly guarded so that they may be ready when the authorities come and check them.

- 3. The above-mentioned sub-committees are to do survey and supervise the plantation, and the progress reports are to be submitted to this office every Friday by the Sub-committee chairmen.

Township Admin Officer
(Win Min Kyaw Pa/4050)

Distributed to all persons assigned

Copy to:

- (1) Army Chief Office, Kyaing Taung Township Admin Officer
- (2) District SPDC Lin Khur (3) Office file (4) Personal file

Concerns of the United Nations

United Nations agencies in Burma have expressed reservations about the regime's jatropha program. A Rangoon-based UN official contended that there is "concern over the impact on rural dwellers' already precarious food security" and that "the biggest weakness is the way it [the project] is being undertaken." According to the official "A lot of latitude is being given to the military to deploy for jatropha production, with little understanding of its impact in other areas such as basic community food security." The Food and Agriculture Organisation (FAO), which conducted a quick assessment of Burma's jatropha programme, says it has urged the government to study the suitability of the plant for Burma's diverse agri-environments.⁴² These concerns echo recent statements by the FAO and the World Food Program about how global production of biofuels is one of the factors contributing to rising global food prices.⁴³

A jatropha model village - an ongoing saga

In January 2006 Na Khan village in southern Shan State was upgraded to a sub-township and declared a "Model Jet Suu Village." At an inauguration ceremony residents were forced to wear traditional dress to welcome VIP guests, attend ceremonies, and plant jet suu seedlings along roadsides under supervision. Government servants were also required to plant trees at their department offices by a quota system. At the ceremony, dignitaries opened a new school and clinic, declaring that since Na Khan was now a model village, it would prosper.

During the ceremony, jatropha oil was poured into tractor engines and the tractors driven around on display. After the ceremony, some farmers bought the new oil and used it in their tractors, but after a short time the engines stopped working.

One month later, two battalions of soldiers came back and forced people to dress up in ethnic costumes, and once again plant jatropha seedlings around the village, including along the highways. Those that did not attend the ceremony would be punished with a 2,000 kyat fine, leaving people with no choice but to attend.

Again in 2007, officials returned and forced the village to establish another plantation. They again inspected the progress of the plantings, and ordered villagers to establish a new plantation 300 acres in size. Each family was supposed to plant a further 1,500 seedlings, buying seedlings for 15 kyat apiece. (Interview 115)



Promoting jatropha at the model village



Bewildered farmers forced to attend presentation

A nation-wide fiasco

Crop failure

“Only 40 out of 100 plants grown survive. Even the surviving plants have not yielded fruit. When they do bear fruit, we will have to sell it to the government.” (Interview 42)

“We grew 100 plants. Only 30 survived. It has been one year now but no fruit is seen. I don’t expect success.” (Interview 34)

Jatropha was grown throughout 2006 and 2007 across the country and yet reports from the field indicate a wide variance (25-70 percent) of success rates. An agriculture official in Arakan State said that as far as he knew the jatropha project “was only 45% successful, due to bad weather and lack of knowledge”⁴⁴ A government employee in Karen State reported that only 70% of the trees survived in his area while a school teacher noted that only 1 in 4 plants survived of those he and his students planted in the school’s yard. Interviews from Karenni State note survival rates ranging from 25-50%.

Lack of knowledge and haphazard growing techniques

“I don’t think this project will be successful even if they plan for ten years. The reason is that they forced the people to do the job and so people are doing it just to obey the orders.” (Interview 21)

“I grew plants along my hedges systematically at the early rainy season so they are successful. But those grown by the order of the SPDC did not survive. They forced the people to grow and so it was done carelessly. People cut immature branches into two or three pieces and planted them before the right season so they all withered. Even if we grow the plants properly in our farms, the army will come and cut all the branches to transplant in their project farms [to fulfill their own quota].” (Interview 32)

“Their plantations are not successful. Even their own soldiers don’t grow the plants well. They just leave the job as it is. You think they can do it – no way. Just see how careless they are, they dig the holes and drop the plants in. But there is a lot of work to clear the weeds. How can we weed so many?” (Interview 22)

The jatropha campaign is being implemented without proper field surveys, techniques, or estimations of outcomes. In order to reduce costs, people are forced to buy the seeds and grow the plants by free volunteer labor. Although there is plenty of hype and promotion of jatropha, practical knowledge and growing techniques are still lacking, as well as sufficient fertilizers or seeds. Due to lack of incentive, the project is being implemented quickly and haphazardly simply to avoid punishment and comply with orders, not to ensure success. Said one farmer: *“We don’t care if this succeeds or not – we just grow it to obey the order.”* (Interview 75)

“The local authorities don’t tell us the proper growing methods. We don’t know what kind of seed is good or how to look after the plants. People said just that the plants will get oil but no one taught us how to grow them. We heard that people living in the city said the plant has to grow three feet apart, so we did like they said.” (Interview 120)

“They told us to transplant the branches. But these must be grown from nursery plants. The branches failed and we were required to grow them again. It was not successful because they didn’t know the technique.” (Interview 16)

“They required us to use fertilizers but the people cannot afford it so they grew the plants as they are.” (Interview 35)

“The military dictators required us to grow 60 acres of jatropha plants. But they sold us only 16 baskets of seeds. That is not enough for 60 acres. The authorities required us to fulfill the assigned plantation. If we do not grow the plants, we will be punished. And if the plantation does not succeed, we will be required to plant again. How can we manage?” (Interview 103)

Ignoring local growing conditions

“Jet suu has to be planted alongside the road, where the authorities can see. Yet the fertility of the soil there has not been tested. The project will not succeed.”⁴⁵

“The plants we grew in 2006 were not successful. Many died because it rained continuously. They cannot endure too much rain.” (Interview 33)

The indiscriminate planting of jatropha regardless of regional climatic or soil conditions is resulting in failure:

While climatic conditions in some parts Burma are ideal for cultivating physic nut, the environment in many regions where the project has been implemented is far from suitable. According to the Centre for Jatropha Promotion and Biodiesel, the optimal annual rainfall for the cultivation of jatropha ranges from 300 to 1,000 mm. Much of Burma, however, receives far higher annual rainfall levels than this. According to the BBC weather service, in Akyab of Arakan State where the average annual rainfall is 5,156 mm, the optimum annual rainfall is exceeded in each of three consecutive months during the wet season. Likewise, the rainfall for Rangoon far exceeds the ideal growing conditions, receiving 2,610 mm of precipitation annually. Other sources state that Toungoo in Pegu Division receives an average of 2,370 mm of rainfall each year, while Ye in Mon State receives 4,641 mm. It would therefore seem ill-advised to attempt to cultivate the crop in parts of Burma experiencing annual rainfalls either in excess or short of this range and thus comes as no surprise that so many plants are dying due to the unsuitability of the climate.⁴⁶

Arbitrary seed – arbitrary results

Township and village authorities are primarily concerned with reaching quotas passed down by higher authorities. Therefore they force people to plant whatever kind of seed or branches are available, without regard for quality. Seed is found wild in jungles, harvested from existing hedgerows, or bought from government officers; in western Burma seed is purchased from markets in India as there is not enough domestic supply to meet the planting requirements. Branches are also hastily cut from existing trees to fulfill planting quotas.

One of the biggest uncertainties about the potential of jatropha worldwide is the variability in seed stock and therefore fruit yield. Researchers have called for improved seed trials and a certification process in order to better guarantee oil production. If low quality or unsuitable seeds are planted on marginal lands, the amount of oil extracted per acre may be so cost-inefficient that the biodiesel would not compete with conventional fuel sources.

An analysis of jatropha in southwest China by the World Agroforestry Centre stressed the importance of “intensive research to better understand the potential cost and benefits before scaling up jatropha acreage.” The authors noted that “developing an improved seed base might require another five years, for instance, but could mean the difference between an expensive program that is ultimately abandoned and a viable jatropha biodiesel industry.” Apparently the generals in Burma do not have that kind of time.

The arbitrary nature of procuring seed stock in Burma illustrates how agriculture policies are not based on sound research and methodic practice but rather on the necessity to please the Senior General. This will again have negative consequences for farmers. The Chinese study concludes: “rapidly increasing jatropha acreage with low quality plant stock could lock farmers into low oil content and seed yields in the medium term in a market where refiners are likely to put downward pressure on prices.”

Just for show

“We were required to grow jet suu because our house is close to the main road. They don’t care if the plants grow well or not. On our part we just have to obey and plant it.” (Interview 58)

“They are just growing to show when the authorities pass by.” (Interview 76)

Village and township authorities are forcing residents, civil servants and soldiers to plant jatropha along main roads and highways, at the entrance to villages, at railway stations, post offices, schools, hospitals, and department offices to fulfill General Than Shwe’s call to national duty. As explained earlier, the thirteen regional military commanders were warned that if they could not fulfill the target of 500,000 acres of in their respective areas, their positions would be in jeopardy. They therefore have a strong incentive to show that they are implementing the program. Growing

jatropha along highways makes it easy for the commanders to show motorcades of VIPs that their area is fulfilling the duty. Military officers aren't considering the long-term success of the campaign either but rather are merely interested in fulfilling assigned quotas. A farmer in Loikaw said: "*The Na Wa Ta (SPDC Chairman) ordered us. He said 'I don't care whether it's successful or not, just grow the plants!'*" (Interview 22)

One villager in Arakan State stressed the importance of showing off for higher authorities, putting into question the success of the project: "*Once you grow the plants for show, they won't care. We are required to plant jet suu, but the most important thing is to install a billboard stating the name of the place and plantation. Once you do that, it's finished.*" (Interview 131)

Civil servants have to prepare progress reports on the jatropha plantings for their superiors. Given the pressure to reach targets and lack of accountability mechanisms, it is likely that these reports are inflated or falsified to ensure job security. A civil servant from Shan State recalled how falsifying reports in his office was quite common:

I was a servant of the Ministry of Home Affairs for nearly ten years. The regional military commander ordered farmers in my hometown to grow summer paddy. The farmers knew that it was not possible to grow because of the lack of water and soil conditions. The agriculture and irrigation department had already tested and implemented summer paddy crops without success. Still, the commander ordered people to plant it. Everyone had to follow the commander's order; if anyone was against it, they would be punished.

One time I had to go with the strategy commander and chairperson of the Township Peace and Development Council to record the situation of summer paddy. I saw that it was not succeeding but my leaders ordered me to write a report that it was growing well. I understood my leaders' situation because if they reported that the summer paddy did not succeed, they would have a problem for their promotion, so they have to lie on paper. (Interview 130)



Pouring jatropha oil into a tractor

Improper processing

If jatropha oil is not properly refined, carbon deposit build-up can damage engines. This is already happening in some areas. A resident from Loikaw explained that although jatropha oil is on sale in the town, car owners do not want to purchase it because the thick oil blocks fuel lines and filters, making it necessary to clean them often. Others report that vehicles using the oil cannot drive up inclines because the engine sputters and stops.

Villagers are quick to see through the ceremonial promoting façade jatropha:

“We had a good laugh during our festival. They tried to demonstrate how a small tractor could run by jet suu fuel. The man filled the tank and started the engine. After a while the engine stopped running. He tried to restart it again and again but it failed. The audience all laughed.” (Interview 19)

A villager in Kachin State had a similar experience: *“They said it was for fuel but I’ve never seen a vehicle run by jet suu oil. Even at the exhibition the vehicle with jet suu oil failed to function.”* (Interview 75)

While the authorities conduct ceremonies to show vehicles running on jatropa oil, it is still not clear how the oil will actually be extracted once fruit harvests begin. A Mon farmer noted that: *“grinding machines have not been seen anywhere – we only saw them on the TV.”* (Interview 53)

Despite all these failures, one villager speculated that the project would go ahead anyway as long as the authorities want it to: *“They said it was a three-year project. If the plantation fails within 3 years, it is likely that we will be required to do it all over again.”* (Interview 42)

Uncertain markets

“No one knows where to sell the crop at which price.” (Interview 94)

“The price and the market to sell are not known. No one can guess the possible income so they have no incentive to grow the plants.” (Interview 32)

“The soil is good and the seeds will grow well. But we do not know where to sell the yield.” (Interview 87)

Although the regime boasts that jatropa will be a source of income for farmers, villagers don’t know if they will be able to sell the fruit, to whom, and for what price. One farmer from Loikaw, when asked if he thought he’d be able to sell the fruit to earn money, answered *“We don’t dare to hope that. We just planted it to obey the order - I don’t think it will be successful.”*(Interview 22)

Even businessmen that see the potential of jatropa as an investment opportunity have found disillusionment. A businessman who invested in a 5-acre seed nursery at the urging of government authorities in Chin State lamented:

“The problem is that I don’t know where to sell these seeds at which price. The authorities told me not to sell the seeds elsewhere so I just keep them. I have been wasting my money and time investing in this plantation.” (Interview 113)

Even if the price and market were known, it is not clear whether people will have the right to sell the fruit at all:

When the plants bear fruit we don’t own it. The government owns all of it. They alone have the rights to pick the fruit. It is so because the land and highway belong to the government.” (Interview 52)

Impacts

Soon after the first speeches and ceremonies initiating the jatropa campaign, reports began to emerge from across the country of forced cultivation, land confiscation by the military, loss of income due to the forced purchase of seeds or seedlings, and punishments for non-participation. Threats to security from the implementation of the campaign became clear and migration patterns due to the hardship caused by forced plantings have begun to emerge.

Forced labor

“The village head told us that all the empty spaces along the main road are to be used for planting jet suu. One person from every household had to go and clear the ground. If we could not find a substitute, we had to pay 500 kyat. They supervised us while we planted to make sure that we did it.” (Interview 60)

“In our village one member from each household must go and plant jet suu. The community leaders said that those who failed to go would be fined. I had to leave my own farm work to go there. Some old people who could not go by themselves sent their grandchildren. We had to grow the plants in straight lines as they installed the sticks. Before planting, we had to clear the bushes and vines to make the ground ready.” (Interview 52)

Villagers across Burma are forced to “contribute voluntary labor” to jatropa plantations and highway plantings on a one person-per-household basis. They must bring their own food and tools for the day and face reprisal for refusing to go. Most often if they cannot go they have to pay someone else to go as a replacement. This usually ranges from 1,500-2,000 kyat (less than US\$2).

“One person from every household must contribute volunteer labor and grow the plants for the government on the land which the authorities allotted. We can’t stay without doing that. We had to grow along the roads downtown and in front of our houses.” (Interview 44)

“The community leaders called me and said they would fine me 3,000 kyat (US\$2.50) if I failed to turn up. We were forced to plant the whole day and we had to bring our own lunch from home.” (Interview 64)

Forced labor is utilized not only for planting jatropa, but also for the construction of oil processing factories. On August 3, 2007, Infantry 524 summoned local residents and forced them to clear the land along the highway between Kali and Ta Kaw villages in central Shan State for the construction site of a jatropa oil factory. Although the villagers had to provide fuel for lawnmowers to clear the ground, the army collected additional money for fuel. Community Ward 5 of Kali village has 80 households and each household was required to contribute 1,500 kyat (approximately one day’s wages) for a fuel contribution. This case shows that it is likely that forced labor will continue to be employed even after the planting phase of the program, for harvest, oil extraction, or other activities.

Prison labor

Prisoners have also been forced to cultivate land for jatropha production. One ex-SPDC soldier who became a prisoner told how he and fellow prisoners had to plant a 50-acre plot allotted for Infantry 250 in Karenni State with shackles on their feet:

“I was in the army for nine years. Our army commanders ordered our Infantry to grow corn and sesame plantations but they failed and we earned nothing. Seven of us fled because of that, but three of us were caught. I was imprisoned for eight months. During my prison term I was sent out to work most of the time. We were forced to clear the land and cultivate jet suu. We had to work all day long with shackles on our feet.” (Interview 30)

Magwe residents file complaint with ILO

In June 2007 a group of 20 villagers from Pwint Phyu township in Magwe division filed a forced labour complaint with the International Labour Organization. Ko Kyaw Khine Shwe, one of the signatories to the complaint, said that the local authorities had forced them to work on a five-acre physic nut plantation owned by the Burmese military.

“There were about 100 men and 75 women who had to dig 800 cubic-foot holes in the ground from 7am in the morning until about noon. They didn’t even let us have a break for water. They told us we would have to come back the next day also,” Ko Kyaw Khine Shwe said. The authorities then forced the group to work for four more days on the site or pay 1,200 kyat (US\$1) as a fee.

Within one month after sending the complaint, villages had been questioned five times by local officials. “We are getting scared because they have been calling on us and pressuring us. We can’t even mind our daily duties anymore,” Ko Aye Lwin Oo said.

Officials with the Pwint Phyu Township Peace and Development Council said that they were not guilty of forcing the villagers to work because tending jet suu plants was the peoples’ legal responsibility.⁴⁷

Land confiscation

The law in Burma does not permit outright private ownership of land and private rights to land are contingent on the land being used ‘productively,’ as defined by the State....The 1953 *Agriculture Land Nationalisation Law* and the 1963 *Tenancy Law* empower the state to stipulate what crops villagers grow. Non-compliance with this and other conditions set by Village/Ward and Township Peace and Development Councils can result in the authorities confiscating land.⁴⁸

“The TPDC and village SPDC took ten acres of my land for a jet suu plantation and I didn’t get a single cent in compensation. Worse than that, we have no time to do our own work when we are forced to work on their plantation.” (Interview 27)

Reports of land confiscation for conversion into jatropha plantations or as punishment for not planting jatropha have been documented across Burma since early 2006.⁴⁹ Lack of land rights enables confiscation to occur in an arbitrary manner. Individual farms, grazing lands, and community areas have been confiscated by township and village authorities with the help of army soldiers and local police for the purpose of planting jatropha. It seems that those with influence who want to plant jatropha can also confiscate lands for that purpose:

“The Army Veterans’ Association confiscated 100 acres of our community land for a jet suu plantation. If someone wants to grow jet suu plants, he can grow them in anybody else’s land without any permission and possess the land plot.” (Interview 79)

In 2007 North-East Commander Brigadier Aung Than Htut ordered the confiscation of 1,000 acres of lands belonging to farmers in Man Mao village near Muse in northern Shan State. The lands were then granted to local pro-SPDC militia with the stipulation that they grow jatropha there.

“I have three farm fields, 25 acres in all. I was supposed to grow jet suu in all these plots but I grew the plants in only one, preserving the remaining two. Because I didn’t follow the order exactly the authorities came and confiscated all three lands. I had to sell my bullock cart and purchase a new place - but that land was also confiscated. Now I have nothing left.” (Interview 25)

The loss of lands is leading to food insecurity and environmental degradation. A farmer from the Loikaw area in Karenni State explained:

In 2006 the regional military command confiscated about 1,500-2,000 acres near our village. No compensation has been paid. They said the land belonged to the government so we couldn’t do anything. They said we could farm for ourselves but we didn’t have the right to own the land. That’s why the land owners weren’t given any compensation.

Meanwhile, we cannot cultivate on this side of the slope and the western part of

the hills anymore. Now we have to go beyond this mountain range to farm. It's very far from here so we spend the night there but then we're susceptible to malaria because there are many mosquitoes and we're away from our houses.

This is the problem: we are required to grow the jet suu. But we don't have the land to grow it on. When they take our main fields we have great trouble. But when we go to those hills and cultivate there we face punishment for spoiling the environment.

That regional commander, Colonel Hla Min Hswe, has been promoted and moved to another place because he succeeded in planting so much jet suu, but we are left here with all the trouble. (Interview 24)

Loss of income

Forced Purchase

"We farmers and daily wage earners live from hand to mouth. When they required us to grow the plants we had to squeeze out money to buy the seeds. We are facing financial troubles." (Interview 38)

"We bought the plants when the authorities came to our village. Every house had to buy at 400 kyat per plant. Some villagers had no money and had to borrow from others to pay for the plants." (Interview 43)

While there have been some reports of villagers in different parts of the country being told to find the seeds and seedlings themselves, the majority have been ordered to buy them directly from the authorities at exorbitant prices. In some cases, such as in Keng Tung Township of Shan State, those who were able to acquire the quota of seedlings themselves were still ordered to purchase the allotted 450 plants from the Township Peace and Development Council (TPDC) authorities. Complicity of TPDC and VPDC authorities in the forced purchase of jatropha and castor seeds and seedlings was observed across the country during 2006, many of whom relied on village registration lists to exact their demands. There was no apparent standardization dictating the cost charged for seeds and seedlings and prices were set by local authorities on an *ad hoc* basis. This accounts for the wide variations seen in the prices charged in different parts of the country.⁵⁰

Citizens are forced to purchase seeds, seedlings, and branches of jatropha, impacting their household income. Sale is done by various units, either per seedling, branch, or by packet, tin, basket, or kilogram of seed. In one instance, those living in a relocation site were required to purchase an entire truckload of seed.⁵¹ In another, villagers were forced to find wild seeds, sow them in a nursery, and then buy back the seedlings they themselves had nurtured. In addition to seeds, farmers in Karenni State were forced to purchase an instruction manual on how to properly plant the trees.

In Kachin State, the state government allotted the jatropha seeds to the township Agriculture Department which distributed the seeds in turn to township and village SPDC authorities to sell to the local people. But some local businessmen bought the Jatropha seeds cheaply in towns and sold them at high prices in villages. The government authorities did not monitor who exploited whom, but emphasized only the importance of the success of the plantations. Mostly, young plants and seeds are stocked in Township SPDC offices which then sell them to village SPDC, local businessmen, or local residents. The price of these plants and seeds are not the same in towns and in villages. A young plant costs 38-40 kyat in towns, but 150 kyat in villages. A basket (pyi) of seeds costs 2,000 kyat in towns but up to 6,000 kyat in villages.

Fines

“Every household was to grow 300 plants. An order was issued to fine 1,000 kyat for every household that refused to grow the plants.” (Interview 32)

“I had to grow for the military plantation on land that they confiscated beside the main road east of Nam Zarng. If I couldn’t go to plant my quota, I had to pay 2,000 kyat per day to the headman of my ward and he would give the money to the local authorities.” (Interview 121)

In addition to forced purchase, fines are exacted for refusing to plant, if plants die, for not appearing at work when ordered, and if cattle are deemed to have encroached into a plantation. Failing to show up to work when ordered results in fines of anywhere between 300 and 2,500 per day of work missed. Churches in Kachin State are fined if they don’t have jatropha planted in their compounds. In Karenni State village headmen and village tract chairmen were threatened with fines if their villages did not grow the allotted amount. In one village, farmers were threatened that if a jatropha planting were destroyed by fire they would be fined 200,000 kyat per acre damaged.

Dysfunctional social service system given new burden

Failure by the regime to adequately fund public services has led to a serious deterioration of the country’s health and education systems. There are insufficient schools and public health facilities, particularly in rural areas. Where they do exist, they are understaffed and poorly supplied. Within this context, Burma’s military is forcing teachers and medical workers to plant and maintain jatropha at all state-run schools and hospitals.

Health workers

Burma’s health system is ranked among the worst in the world.⁵² It has one of the highest rates of TB worldwide;⁵³ other key health indicators are well below neighboring Thailand (see Table 1). Medical personnel often have to work privately to supplement their meager incomes. Adding to these burdens, health workers in state hospitals are now required to spend their time maintaining jatropha plantations. A nurse in Kachin State complained:

“Every hospital employee is required to plant jet suu. We were out pulling weeds the whole day. Each of us is supposed to plant 500 seedlings, but no one can grow that many.” (Interview 78)

Table 1 Infant and child mortality rates, life expectancy at birth, and GNI per capita: comparison between Burma and Thailand (2004)

	Burma	Thailand
Infant Mortality Rate (under 1), per 1,000 live births	76	18
Under-5 (Child) Mortality Rate per 1,000 live births	106	21
Life expectancy at birth (years)	61	70
GNI per capita (US\$)	220	2,540

Source: UNICEF 2006

Teachers and students

“Each school is assigned to grow a certain amount. Every primary school, middle, and high school must comply. Money was collected from the parents to buy the seeds from the Regional Agriculture Department.” – A school teacher in Karenni State (Interview 40)

“Every school teacher is required to grow one acre of plants. The students must also help fulfill the quota set for the school compound. The authorities come to check it and take photographs.” (Interview 2)

“All of us from Grade 5 to Grade 9 had to sow the seeds in the school compound and the football ground. Our teacher told us it was an order from the headmistress.” (Interview 65)

“They told us to water the plants in the morning and in the evening every day. The students fear the principal so they do the job. I pity my students so whenever the principal goes to a meeting I don’t ask the students to fetch water.” (Interview 59)

The World Bank estimates that only 40% of students ever enroll in secondary school in Burma.⁵⁴ The costs of attending school are too high for most rural families. As for the teachers, an average primary school teacher makes just 22,000 kyat (US\$17) per month; a middle school teacher makes US\$23 per month. Accordingly, teachers solely paid by the state may not teach for the entire term but show up sporadically. One parent explained: *“Government-employed teachers come and teach a crash course for just a few months before the final exams. The teachers don’t have enough time for teaching the classes; sometimes they cannot be found in the school. How can the students learn their lessons well?” (Interview 37)*

Despite this, the military is still requiring teachers and students in schools across the country to plant jatropha during classes. A member of a parent-teacher association in Karenni State reported that children under the age of 11 were forced to plant jatropha during class time. University students are also not spared. In July 2007, forty students from each department of Moulmein University had to attend a “cultivation celebration” near the university campus, and those who did not attend were punished by their professors.⁵⁵

Employees that do not comply are threatened with losing their job or salary deductions:

“A younger sister of mine is a school teacher. She has to grow the plant and submit progress reports every month. The statistics are a headache for her and her fellow teachers. The authorities told them that they would not be paid their salaries if the plantations are not successful.” (Interview 11)

Other civil servants

“Every month the government employees must attend a meeting and there they are given instructions about jet suu.” (Interview 1)

Since 2006 government departments have been required to maintain jatropha plants at their offices. In northern Shan State, each department has a plantation quota of 2,000 acres while government servants in Chin and Kachin States have to grow 1 acre per person. A civil servant in Kachin State reported that in March 2006 an order came down from the General Administration Department through Provincial, District and Township SPDC offices that each of the seventy employees at a township court was required to grow one acre of jatropha plants. (Interview 68)

A civil servant working in government department offices makes a meager 15,000 kyat (US\$11.50) per month. Neither the minimum wage nor the higher wages earned by senior officials provide a worker and family with a decent standard of living (and therefore foster corruption).⁵⁶ Yet even with such low wages, the civil servants are further forced to provide free labor to plant jatropha.

“There are plants in the army compound and in front of the health department, the civil hospital, the immigration office, the USDA office, and the post office.” (Interview 45)

Toxicity: A danger to children

“In some cases, children who eat its fruit suffer from mental sickness...” (Interview 75)

“No one dares keep the seeds in their house because they worry that their children will eat the beans.”⁵⁷

Both jatropha and castor are generally considered to be potentially dangerous crops and thus should not be grown in close proximity to homes where children may eat the seeds.⁵⁸ The seeds of *Jatropha curcas* are toxic and ingestion can cause vomiting, fever, headache, diarrhea, dizziness, and depression and are a common cause of accidental poisoning among children in southern India.⁵⁹ Despite this potential danger, jatropha is being cultivated in house compounds, school yards, and on hospital grounds. Several children in Dooplaya District of Karen State were reported to have almost died from severe diarrhea after eating just one of the seeds.⁶⁰

In the capital of Karenni State, people are now forbidden from keeping pet dogs due to the number of “mad dogs” roaming the streets. The dogs have apparently eaten jatropha seeds and are acting as if they have rabies. According to one resident: “they ordered people not to keep dogs and now all the dogs are gone.” (Interview 21)



Jatropha planted in a school yard in Karen State



Jatropha plants nearly obstruct the entrance sign to MytKyina University, Kachin State



Jatropha seedlings in front of government office in Arakan State



Students forced to plant jatropha in Shan State



Jatropha and castor planted close to homes pose a risk to children and take up space used for household kitchen gardens

Food security

“They said it would be a 3-year project. The plants will bear fruit when they are three years old. But what are we going to eat in the meantime?” (Interview 25)

“We suffer from lack of farmlands for cultivation. We cannot work for ourselves properly. We have to grow jet suu. If we don’t want to grow they collect 2,500 kyat per acre from each of us. Our time is limited and now we have to go far away to work and have no time to weed our paddy.” (Interview 27)

“We have 47 villages in our township. In every village each household must grow half an acre of jet suu, so they lose part of their paddy fields.” (Interview 17)

“Castor oil plantation will take up all the time and there will be no time left for other work needed to be done for subsistence.” (Khonumthung, April 13, 2006)

While jatropha can grow on marginal soils and therefore does not necessarily need to directly compete with food crops, the implementation of the jatropha campaign in Burma is threatening the food security of farmers. First, jatropha is being cultivated on existing farm lands and in house gardens, directly competing with food crops in terms of soil and water resources. Second, the confiscation and use of lands near population centers for jatropha forces farmers to seek cultivation areas further from their homes, decreasing productivity and putting new pressures on the environment. Third, due to the requirements on farmers to leave their own fields to establish and tend jatropha plantings, farmers have less time to spend tending their own crops. Some also report that other crops grown too close to jatropha do not grow well.

Punishment

Failure to cultivate the assigned number of seeds/seedlings attracts a fine or punishment. For instance, townspeople from Bhamo in Kachin State were told that they would not only be fined 3,000 kyat for not taking part in the project, but also that should they complain or criticize the project they would be arrested and prosecuted in accordance with Act 118 of the criminal code. In July 2006, villagers from Thangtlang Township in Chin State were warned that any comments critical of the jatropha project would attract the death sentence.⁶¹

“In February (2007), our village head came and informed us that the authorities would come and arrest those who had not paid for the seedlings.” (Interview 83)

In addition to being fined, people have been threatened, arrested, and imprisoned for not planting jatropha. In southern Shan State (Mong Pan Township) people who refused to grow jatropha were arrested for one week as an example to “encourage” compliance by others. A civil servant in Kachin State witnessed a man sentenced to six months in prison for uprooting and trampling on jatropha plants.

“The SPDC ordered our villagers to grow 100 acres of jatropha. Now we have planted 50 acres and we have to watch over the plantation carefully. The au-

thorities told us that we would have to grow another 100 acres if this present 50 of the plantation is not successful. We were threatened with the death sentence if any plant was destroyed.” (Interview 91)

Beating during plantation establishment

On September 27, 2007, Lieutenant Colonel Maung Maung Myint of Infantry 524 ordered 75 people from three villages in Kunhing (central Shan State) to grow jatropha in the rain. While patrolling around the fields supervising the planting, the soldier in charge noticed one man lying down. When the soldier approached, one farmer used a word play in Shan language to protest the forced work. (He pronounced the Shan word for jet suu differently to mean “Burma will break apart.”) The soldier set upon the farmer, hurling accusations that he was avoiding his duty while beating him unconscious with a bamboo stick. When he regained consciousness, the soldier forced him to go and work again. That same month in Mong Sat another soldier from Infantry 524 beat a 30 year-old farmer because he took a rest when he was supposed to be planting jet suu. (Interview 118)

Forced migration

“We are not sure whether to stay or migrate. We will not be able to survive without food if the authorities force us to stop farming. We might be forced to migrate.”⁶²

In February 2006, soldiers from Light Infantry Battalion (LIB) #515 instructed villagers in Lai-Kha Township in Shan State that they would be fined 500 kyat for each plant that died. Some villagers, recognising this as a threat to their livelihoods, fled the village soon after, knowing that there is insufficient time to tend to their fields as well as ensuring the physic nut plants survived.⁶³

The hardship of forced labor, land confiscation, loss of income, food insecurity, and fear of punishment caused by the jatropha campaign is taking its toll on people and resulting patterns of migration are beginning to emerge. A community-based relief organization assisting Shan refugees in Thailand has documented that during 2006-2007, fourteen percent of new arrivals from southern and central Shan State fled specifically because they were forced to plant jatropha.⁶⁴

A jatropha refugee's story

I came to Thailand in August 2007. I was the headman of my village in southern Shan State. When I was there my villagers had to grow jet suu by the order of Major Myint Htan of Light Infantry Battalion 576. It started in March 2006 and is still going on.

First, every family had to grow one acre for each member of the family over the age of four, regardless of if they owned any land or how much land they had. Each family was to plant their quota on empty land in the sub-township. The township police captain would come house to house to check that we fulfilled our quota. Second, as a village we were required to establish and maintain a ten-acre plantation in Nong Heng on land that was owned by the government. The police chief would come and check the plantation periodically and if any plants had died we were required to go and replace the plants.

In our town, all villagers, all government servants and all students and teachers in primary, middle, and high schools also had to grow jet suu. The students at the primary school had to grow 2 acres. The middle school had to grow 5 acres and the high school had to grow 10 acres. For the teachers, they had to grow 1 acre per teacher. Local authorities would take photos to send to their superiors while students and teachers were busy planting.

The police chief threatened villagers that if they didn't grow the jet suu they would be arrested and put in jail. Villagers were too afraid to refuse. Even I also had to follow the order. No one had time to work for their own jobs because they had to grow so many jet suu trees. The villagers had to buy seedlings for about 50 kyat per plant or 2,000 kyat per basket (pyi) of seed. Those who couldn't afford to buy had to look for wild plants by themselves.

Before jet suu, the military ordered us to grow banana in 2004 and after that, tamarind in 2005. I was very confused about this situation so I went to the temple and asked the monks about it. The monks said that the SPDC military government is doing *Yadaya che* (following astrologer's advice for a "counter-spell" – see page 13). I also think that is what's going on, because after we had to grow tamarind, the jet suu plantation was coming and we have to grow it. I think it is only *yadaya che* because I don't see any benefit from jet suu.

In 2004 my village had over 800 villagers from 240 households. Now in my village there are 130 villagers from 40 households. Since 2004, eighty percent of the people in my village have run into Thailand because of the SPDC.

One thing that I would like to say is that the local authorities are very clever. When they displayed how jet suu oil can be used in tractors, they filled the engine with diesel oil first without the villagers knowing. Before they started the demonstration, they ground some dried jet suu seeds to get the oil and put the oil into the tractor engine and then they drove the tractor to show the people. But it was already filled with diesel. After the diesel finished and only jet suu oil was left, the tractor engine stopped.

In May 2007, Lieutenant General Taung Aye from the eastern command headquarters arrived in Larng Kher district and ordered two hundred people from the TPDC, government departments and the public to attend a meeting. He presented about jet suu and ordered people to increase the amount growing. He also said that he would buy the jet suu fruits from the villagers but until now I did not see that he is buying any.

Defiance

Threatened with fines, arrest, and even death, villagers are still finding ways of avoiding or defying orders. A high-ranking civil servant in Karenni State admitted that many people refuse to grow the plant. Some buy seedlings as ordered but then don't plant them, others plant less than ordered. Signboards promoting jet suu have been defaced.

Villagers also take advantage of the inability of authorities to check certain areas. One farmer explained *"Since our ward is not near the main roads, many people don't grow the plants."* (Interview 53)

At the documentation stage there is also non-cooperation and falsification:

"The SPDC authorities themselves have never come and checked the plants here. But they inquired about the plantations at the meetings and we gave them false progress reports....The authorities also required us to take photographs and bring the photos to the township SPDC office. But we haven't done it." (Interview 35)

Civil servants are also complaining and giving up their posts rather than planting jatropa:

"Among the government employees you can hear a lot of complaints about the jet suu every day. We went to the assigned farms to work and could hear all kinds of complaint. Some office workers said they would quit their jobs." (Interview 30)

"When the jet suu plantation was imposed, the government employees were summoned very often so they got upset and grumbled. Many quit their jobs." (Interview 15)

Conclusion

"In my opinion, it will not be successful. You see, the soldiers carry guns. They don't know anything about agriculture." (Interview 31)

Agriculture is the backbone of Burmese society and economy. Policies impacting the sector should be considered carefully and implemented cautiously. World leaders and scientists are saying the same of biofuel initiatives. However, Burma's dictatorship is forging ahead recklessly with a jatropa campaign that is unprecedented in scale. Not only is the campaign showing signs of failure, it is threatening the livelihoods of farmers. In order to realize a better development process, the rights to manage natural resources and to participate in decision-making about sustainable development projects, need to be ensured in Burma. Sustainable agricultural policies are needed that can ensure land rights and human security and allow communities to manage their own natural resources. The rights of women and indigenous peoples must also be ensured.



A jet suu signboard destroyed by stones hurled at it in the middle of the night



The popular comedy troupe Dee Lay Dee has crafted several jokes poking fun at the generals' ludicrous jatroptha campaign

Footnotes

- ¹ This section draws on several references which are listed at the end of this report.
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- ⁴ *Biofuels in China: An Analysis of the Opportunities and Challenges of Jatropha Curcas in Southwest China*, ICRAF Working Paper Number 53, 2007. Hereafter referred to as ICRAF 2007.
- ⁵ *Agrofuels - Towards a reality check in nine key areas*, Biofuelwatch, Carbon Trade Watch/TNI, Corporate Europe Observatory, Econexus, Ecoropa, Grupo de Reflexion Rural, Munlochy Vigil, NOAH (Friends of the Earth Denmark), Rettet Den Regenwald, Watch Indonesia, June 2007.
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- ⁷ *Size does matter: The possibilities of cultivating Jatropha curcas for biofuel production in Cambodia*, Expertise Centrum voor Duurzame Ontwikkeling (ECDO), Universiteit Van Amsterdam, December, 2006.
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- ¹⁰ *Position Paper on Jatropha curcas*, Fuels from Agriculture in Communal Technology (FACT), June 2007.
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- ¹² <http://www.mrtv3.net.mm/open/151foru.html>
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- ¹⁵ Based on an estimated population of 54 million in the country (there has not been a census since 1983).
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- ¹⁷ Minutes of SPDC quarterly meeting on 16 September 2006.
- ¹⁸ *Human Rights Yearbook 2006*, Human Rights Documentation Unit, National Coalition Government of the Union of Burma, 2006. (Henceforth noted as HRDU 2006)
- ¹⁹ The Kantarrawaddy Times, July 16, 2006.
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- ²¹ “All the people, locals to carry out growing physic nut as a national duty,” *New Light of Myanmar*, May 4, 2006.
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- ²³ See *Deserted Fields: The Destruction of Agriculture in Mong Nai Township, Shan State*, Shan Relief and Development Committee, 2006.
- ²⁴ Discussion Paper No. 63 *Agriculture Policies and Development of Myanmar's Agriculture Sector: An Overview*, Institute of Developing Economies, June 2006.
- ²⁵ See *Displacement and Dispossession: Forced Migration and Land Rights in Burma*, The Centre on Housing Rights and Evictions, 2007 and *Deserted Fields: The Destruction of Agriculture in Mong Nai Township, Shan State*, Shan Relief and Development Committee, 2006.
- ²⁶ “Seedlings of evil growing in Myanmar,” Asia Online, August 23, 2007.
- ²⁷ Discussion Paper No. 63 *Agriculture Policies and Development of Myanmar's Agriculture Sector: An Overview*, Institute of Developing Economies, June 2006.
- ²⁸ “Myanmar aims to substitute oil imports with nuts,” Reuters, July 27, 2006.
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- ³⁰ <http://www.mrtv3.net.mm/open/151foru.html>
- ³¹ See *Supply and Command*, Shwe Gas Movement, 2007.
- ³² “Myanmar outlines alternative energy strategy,” August 29, 2007 at energycurrent.com/index.php?id=3&storyid=4822
- ³³ “Myanmar to export jatropha-based biodiesel,” *The Brunei Times*, August 28, 2007.
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- ³⁶ “Myanmar, South Korea to build bio-research center,” Xinhua, March 13, 2008.
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- ³⁸ *The Road to Naypyitaw: Making Sense of the Myanmar Government's Decision to Move its Capital*, ARI Working Paper No. 79 Asia Research Institute, 2006.
- ³⁹ HRDU 2006
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- ⁴¹ *Outrage: Burma's Struggle for Democracy*, Bertil Lintner, 1990.
- ⁴² “Concern over Burma’s leap of faith on biofuel,” Amy Kazmin, *Financial Times*, November 23, 2007.
- ⁴³ See for example “UN Warns of Biofuels’ Environmental Risk,” Associated Press, January 23, 2008.
- ⁴⁴ Narinjara News, February 17, 2007.
- ⁴⁵ Khonumthung News, April 13, 2006.
- ⁴⁶ HRDU 2006
- ⁴⁷ “Magwe residents file complaint with ILO,” Democratic Voice of Burma, July 27, 2007.
- ⁴⁸ *Displacement and Dispossession: Forced Migration and Land Rights in Burma*, The Centre on Housing Rights and Evictions, 2007.
- ⁴⁹ Reports compiled in HRDU 2006. See also reports from Narinjara News, Khomunthung News, The Mon Forum, Independent Mon News Agency, Mizzima News, Shan Human Rights Foundation, Shan Herald Agency for News, Kaladan News, DVB, and Rhododendron News.
- ⁵⁰ The cost of one bowl (1.5 kg / 3.5 lb) of seeds varied from 3,300 kyat in Karen State to as much as 12,000 kyat in Shan State. Similarly, the prices charged for seedlings varied across the country, with prices starting around 200 kyat for three seedlings in Shan State, up to 350 kyat each in Mudon Township of Mon State (HRDU 2006).
- ⁵¹ “People in Relocation Site Forced to Grow Physic Nut/Castor-Oil Plants in Kun-Hing,” *SHRF Monthly Report*, SHRF, April 2006.
- ⁵² *World Health Report 2000: Health Systems – Improving Performance*, World Health Organization, 2000.
- ⁵³ *The Gathering Storm: Infectious Diseases and Human Rights in Burma*, University of California, Berkely and Johns Hopkins Bloomberg School of Public Health, 2007.
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- ⁵⁵ “Moulmein University students forced to cultivate physic nut,” IMNA, July 5, 2007.
- ⁵⁶ Country Reports on Human Rights Practices, US Department of State, 2007. Viewed at <http://www.state.gov/g/drl/rls/hrrpt/2006/78768.htm>
- ⁵⁷ *Development by Decree*, Karen Human Rights Group, 2007
- ⁵⁸ *Setting Up the Systems of Repression: The progressive regimentation of civilian life in Dooplaya District*, Karen Human Rights Group, September 2006.
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- ⁶¹ HRDU 2006
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- ⁶³ HRDU 2006
- ⁶⁴ According to monthly data of refugee arrivals, during nineteen months of 2006-2007 there were 5,785 refugees. 790 of those cited forced planting of jet suu as the reason they fled their homes.

Appendix: List of interviews

No.	Township	Age	Sex	Occupation	Date of interview
	Karen				
1	Kyar Inn Seik Gyi	33	M	School teacher	7 Nov 2006
2	Kyar Inn Seik Gyi	40	M	School teacher	11 Dec 2006
3	Wei Yee	25	M	Civil servant	29 Dec 2006
4	Kyar Inn Seik Gyi	40	F	Rice farmer	12 Jan 2007
5	Pha Yar Thoun Su	45	M	Village headman	25 Jan 2007
6	Kyar Inn Seik Gyi	45	M	Betel & coconut farmer	7 Feb 2007
7	Kyar Inn Seik Gyi	33	M	Civil Servant	8 Feb 2007
8	Kyar Inn Seik Gyi		M	Village headman	
9	Kyar Inn Seik Gyi	30	M	Farmer	
	Karenni				
10	Loi Kaw	60	F	Local trader	1 Nov 2006
11	Demawso	41	F	Rice farmer	23 Dec 2006
12	Bain Khit	25	M	Soldier (pro-SPDC militia)	2 Jan 2007
13	Demawso	80	F	Upland farmer	8 Jan 2007
14	Pha Lu Soo	22	M	Upland farmer	8 Jan 2007
15	Demawso	21	F	Upland farmer	21 Feb 2007
16		25	F	Rice farmer	25 Feb 2007
17	Kay Lahy	35	M	Civil servant	5 March 2007
18	Loi Kaw	28	M	Civil servant	15 March 2007
19	Loi Kaw	26	M	Daily worker	19 March 2007
20		22	F	Upland farmer	29 March 2007
21	Loi Kaw	35	M	Upland farmer	10 Dec 2006
22	Loi Kaw	29	M	Upland farmer	15 Dec 2006
23	Loi Kaw	30	M	Upland farmer	24 Dec 2006
24	Loi Kaw	43	M	Upland farmer	3 Jan 2007
25	Loi Kaw	33	M	Upland farmer	9 Jan 2007
26	Loi Kaw	26	M	Upland farmer	13 Jan 2007
27	Loi Kaw	21	M	Upland farmer	20 Jan 2007
28	Loi Kaw	30	M	Upland farmer	13 Feb 2007
29	Loi Kaw	40	M	Upland farmer	17 Feb 2007
30	Loi Kaw	26	M	Daily worker	21 Feb 2007
31	Loi Kaw	42	M	Upland farmer	4 March 2007
32	Loi Kaw	42	M	Village headman	14 March 2007
33	Loi Kaw	35	M	Village headman	18 March 2007
34	Demawso	30	M	Farmer	25 Nov 2006
35	Demawso	50	M	Farmer	3 Dec 2006
36	Demawso	32	M	Farmer	7 Dec 2006
37	Demawso	38	M	Volunteer servant	12 Dec 2006
38	Demawso	30	M	Farmer	18 Dec 2006
39	Demawso	45	M	Village leader	27 Dec 2006
40	Demawso	24	F	School teacher	4 Jan 2007
41	Demawso	30	F	Midwife	23 Feb 2007
42	Demawso	27	M	Village headman	3 March 2007
	Mon				
43	Joun Toe	49	M	Farmer	16 July 2007
44	Ye	55	M	Farmer	14 July 2007

No.	Township	Age	Sex	Occupation	Date of interview
45	Tan Phu Za Yard	40	F	Farmer	25 June 2007
46	Tan Phu Za Yard	42	F	Shopkeeper	18 Dec 2006
47	Tan Phu Za Yard	52	M	Farmer	21 Dec 2006
48	ABoun	37	F	Shopkeeper	6 June 2007
49	ABoun	29	M	Farmer	27 Nov 2006
50	ABoun	42	F	Farmer	26 June 2007
51	Ye	28	M	Taxi driver	17 April 2007
52	Mu Toun	54	M	Farmer	30 May 2007
53	Khaung Soun	50	F	Farmer	5 Oct 2006
54	Ye	28	F	Shopkeeper	23 June 2007
55	Ye	22	F	Student	12 May 2007
56	Ye	24	F	Student	
57	Ye	23	F	School teacher	
58	Khaung Soun	47	F		20 April 2007
59	Ye	25	F	School teacher	21 June 2007
60	Mu Toun	19	F	Student	5 June 2007
61	Ye	72	M		18 Dec 2007
62	Ye	48	M	Farmer	
63	Ye	30	F	Market seller	
	Kachin				
64	Myitkyina	25	M	Upland farmer	23 Jan 2007
65	Myitkyina	15	F	Student	29 Jan 2007
66	Myitkyina	27	M	Civil servant	23 Feb 2007
67	Myitkyina	31	F	Nurse	28 Feb 2007
68	Myitkyina	60	M	Civil servant	11 July 2007
69	Myitkyina		M		11 July 2007
70	Myitkyina	28	F	Civil servant	11 July 2007
71	Myitkyina	24	M	Civil servant	12 July 2007
72	Myitkyina	40	M	Civil servant	12 July 2007
73	Myitkyina	39	F	Civil servant	12 July 2007
74	Myitkyina	42	M	Daily worker	12 March 2007
75	Myitkyina		M	Pastor	13 July 2007
76	Myitkyina	25	F	Shopkeeper	13 March 2007
77	Myitkyina	18	F	Youth	13 March 2007
78	Myitkyina	26	M	Seller	14 March 2007
79	Waimou		M	Farmer	7 July 2007
80	Waimou		M	Pastor	5 July 2007
81	Myitkyina		M	Shopkeeper	12 Feb 2007
82	Myitkyina		M	Village leader	15 Feb 2007
83	Myitkyina		M	Village leader	15 Feb 2007
84	Myitkyina		M	Daily worker	16 Feb 2007
85	Waimou		M	Pastor	5 July 2007
86	Myitkyina		M	Civil servant	17 Feb 2007
	Chin				
87	Pa Let Wa	35	F	Farmer	12 Jan 2007
88	Pa Let Wa	41	F	Farmer	18 Jan 2007
89	Maputi	32	F	Farmer	5 Feb 2007

No.	Township	Age	Sex	Occupation	Date of interview
90	Htan Ta Lan	45	M	Government clerk	28 Dec 2006
91	Htan Ta Lan	45	M	Farmer	7 Jan 2007
92	Htan Ta Lan	38	M	Farmer	10 Jan 2007
93	Htan Ta Lan	30	F	Civil servant	7 Feb 2007
94	Falam	35	M	Farmer	3 April 2007
95	Falam	35	M	Farmer	3 April 2007
96	Htan Ta Lan			Civil servant	18 Jan 2007 1 Feb 2007
97	Htan Ta Lan	37	F	Civil servant	16 Jan 2007
98	Htan Ta Lan	49	M	Government servant	16 Jan 2007
99	Htan Ta Lan	47	M	Pastor	16 Jan 2007
100	Htan Ta Lan	50	M	Government servant	17 Jan 2007
101	Yay Zao	20	F	Civil servant	21 Jan 2007
102	Yay Zao	55	M	Farmer	21 Jan 2007
103	Yay Zao	37	F	Civil servant	21 Jan 2007
104	Yay Zao	39	F	Civil servant	22 Jan 2007
105	Yay Zao	38	M	Government servant	22 Jan 2007
106	Yay Zao	52	F	Nurse	22 Jan 2007
107	Yay Zao	32	F	Government servant	23 Jan 2007
108	Yay Zao	38	M	Government servant	23 Jan 2007
109	Yay Zao	42	M	Government servant	23 Jan 2007
110	Yay Zao	28	F	Government servant	23 Jan 2007
111	Htan Ta Lan	24	F	Trader	17 Feb 2007
112	Htan Ta Lan	40	M	Government servant	17 Feb 2007
113	Htan Ta Lan	40	M	Farmer	28 Feb 2007
	Shan				
114	Nam Zarng	45	M	Farmer	15 Nov 2007
115	Mong Nai	38	M	Farmer	12 Oct 2007
116	Keng Tawng	36	M	Farmer	27 July 2007
117	Mong Ton	39	M	Farmer	18 Nov 2007
118	Kun Hing	43	M	Farmer	30 Sep 2007
119	Lashio	31	M	Student	13 Oct 2007
120	Mong Pan	18	F	Student	12 Dec 2007
121	Nam Zarng	32	M	Upland farmer	31 March 2008
122	Nam Zarng		M	Upland farmer	31 March 2008
123	Keng tawng	47	M	Village headman	31 March 2008
124	Kar Lei	22	M	Upland farmer	1 April 2008
125	Kun Hing		M	Upland farmer	1 April 2008
126	Mong Ton		M	Upland farmer	1 April 2008
127	Keng tawng		M	Upland farmer	1 April 2008
128	Nam Zarng		M	Upland farmer	1 April 2008
129	Mong NOUNG		M	Upland farmer	1 April 2008
130	Mong Pan	35	M	Government servant	25 March 2008
	Arakan				
131	Kyauk Phu	27	M	Student	27 Dec 2007

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Excerpt from a Dee Lay Dee comedy skit:

First comedian: We must pray to be free of the Three Big Chickens (in Burmese, chicken = Jet)

Second comedian: What are these Three Big Chickens?

Third comedian: Don't you mean the Three Dangers (Disease, Hunger and War)?

First comedian: No, now that we are developed, we don't have the Three Dangers anymore,
we have the Three Big Chickens

Second comedian: So what are these Three Big Chickens?

First comedian:

Hey, I'll tell you, we must be free from

- 1) The Bird Flu (*Jet Thoad Kwe*)
- 2) Onions (*Jet Thun Nii*) - which are so expensive now, we can't afford to buy them
- 3) Jatropha (*Jet Suu*) - which everyone is being forced to plant