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# What wastelands? A critique of biofuel policy discourse in South India

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ABSTRACT

Mirroring global trends in biofuel policy making, the Government of India recently enacted a policy restricting feedstock cultivation to 'wastelands', a government designation for marginal lands. This strategy, the government asserts, will help improve the country's energy security, mitigate climate change and reduce rural poverty through job creation. As other critical biofuels scholarship has documented, land categorizations like 'wasteland' are political constructs homogenously applied to indicate 'empty', 'unproductive' land 'available' for development. While claiming that such constructions mask socio-political relations on the ground, little evidence has been offered analyzing the impacts of these omissions or evaluating how wasteland constructions are sustained. This paper provides such an analysis through a case study of Jatropha curcas biodiesel promotion on wastelands in Tamil Nadu, India. I find that *Prosopis juliflora* on Tamil Nadu's wastelands currently supports a dynamic energy economy servicing both rural and urban consumers. The Prosopis economy provides substantially more energy services, jobs and economic development opportunities than would Jatropha biodiesel. Yet political relations amongst stakeholders obscure the Prosopis economy from biofuel policy dialogs. That Prosopis was originally spread throughout India as part of a wasteland development program of the 1970s underscores the deeply political nature of the concept of wasteland. These findings demonstrate that marginal lands, as currently constructed, do not exist. By extension, locating biofuels on such lands is not the 'win–win' strategy for simultaneously addressing energy security, climate change and rural poverty that advocates suggest.


## 1. Introduction

In 2009, after nearly a decade of policy wrangling, the Government of India (GOI) enacted a National Policy on Biofuels, which mandates the use of non-edible feedstocks grown only on 'wastelands', an official government classification for marginal lands (GOI, 2009). This policy mirrored trends in global biofuel policy making, originating largely in the global North, which called for restricting feedstock cultivation to marginal lands in order to avoid competition with food production and land use change (Franco et al., 2010; Gelfand et al., 2013; Levidow, 2013; Tilman et al., 2006). Claiming that marginal lands are largely found in the global South, advocates have also asserted that such policies would provide new development opportunities for developing economies. India's policy combines all of these themes. Restricting biofuels to wastelands, the policy attests, is a 'win–win' strategy for mitigating climate change, improving energy seurity and alleviating rural poverty through job creation and protecting food security.

Yet, as other critical scholars of biofuels have argued, the concept of marginal lands is a political construct (Baka, 2013; Bailis and Baka, 2011; Borras et al., 2011). Universally framed in policy documents as 'empty', 'unused' spaces, such designations frequently obscure the diverse land tenure and land use relations that exist on the ground. As other case studies of biofuel projects have documented, such ambiguities threaten rural livelihoods as local land use practices are omitted in these framings (Borras et al., 2011; Franco et al., 2010). However, these case studies do not rigorously analyze the impacts of these omissions nor do they examine the micro-politics at play shaping constructions of wastelands.

This paper provides such an analysis through a case study of *Jatropha curcas* (hereafter Jatropha) biofuel promotion on wastelands in Tamil Nadu, India. Instead of being 'empty', 'unused' spaces, I find that Tamil Nadu's wastelands are sites of a dynamic fuelwood energy economy that services both rural and urban consumers. This energy economy, derived from *Prosopis juliflora* (hereafter Prosopis), initially spread throughout India via a wasteland development program of the 1970s, currently provides substantially more energy security and economic opportunities than the country's proposed Jatropha economy would. However, policy makers now consider Prosopis an agent of wasteland creation rather than an means of wasteland elimination. As result, the Prosopis economy is excluded from biofuel policy documents. This shift underscores the political underpinnings of the concept of wasteland.

More specifically, government officials envision wastelands as economic landscapes that should be made more productive

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through wasteland development programs executed through corporate partnerships. According to government and corporate officials in charge of wasteland development, Prosopis no longer serves this purpose. At the village level, local government and NGO officials have little incentive to challenge these perceptions because of the potential economic and social returns from participating in wasteland development programs. Local land users are largely excluded from this political process with the exception of a growing class of land brokers. By revealing the political practices shaping wasteland construction and empirically documenting their effects, this study demonstrates that wastelands, as currently constructed in policy documents, do not exist. Further, efforts to locate biofuels on such lands are not 'win–win' solutions for addressing energy security, climate change and rural poverty.

## 2. Theoretical background

Deconstructing the language of policy and revealing its effects has long been a focus of political ecology. Such analyses are attentive to discourse, which constitutes the assemblage of "narratives, concepts, ideologies, and signifying practices" shaping how a topic is discussed (Barnes and Duncan, 1992: 8). Although discourses often appear as self-evident truths, they are rarely unified representations and are continuously subject to negotiation (Barnes and Duncan, 1992). It is thus important to analyze the political relations shaping discourses and to examine what alternative perspectives might be obscured.

Numerous political ecology analyses of land use change policy have confirmed this understanding. Various studies have revealed local knowledge to be at odds with and often excluded from policy discourse (cf. Blaikie, 1985; Dove, 2008; Robbins, 1998) causing landscapes to be 'misread' (Fairhead and Leach, 1996) and livelihoods to be placed at greater risk from policy intervention. Collectively, such policies attempt to create distinct boundaries between nature and society where in practice, none exist. Thus, as Dove (1998) argues, environmental discourses must be interpreted contextually by examining the economic, ecological, historical and societal relations shaping them.

Further, in a process Li (2007) calls 'rendering technical', the socio-political relations shaping policy are often obscured in the policy making process and policy is reduced to a technical, scientific problem solvable through expert planning and administration. This technical apparatus is also what Ferguson (1994) terms 'the anti-politics machine.' As both Li and Ferguson note, constructing policy in technical terms is an intervention itself with wide reaching effects. The process constructs artificial boundaries between experts capable of diagnosing and prescribing interventions and the subjects of such interventions. The process also perpetuates the longevity of 'the machine' by creating demand for technical experts and their assessments.

Similar criticisms extend to methods used to classify lands. Tools such as land censuses and remote sensing analysis help to shape and are shaped by political processes. As result, such tools often serve to 'fix' dominant interpretations of landscapes rather than to objectively clarify debates (Robbins, 2001). Further, they are examples of what Scott (1998) terms 'state simplification' because they attempt to distill complex processes into singular categories. Rather than improving livelihoods, as is often promised in policy documents, the result of such processes is to reinforce existing political hierarchies and often, to extend state power (Scott (1998)).

Within the biofuels literature, various scholars have critiqued the concept of marginal lands. Images of marginal lands circulating in policy documents frame such lands as 'empty' because of their low productivity and carbon storage capacity (Franco et al., 2010; Levidow, 2013). Remote sensing analyses have been used to reinforce these images and to provide estimates of the vast amount of marginal land 'available' for biofuels, primarily in the Global South (Campbell et al., 2008; Nalepa and Bauer, 2012). Yet, as (Bailis and Baka, 2011: 833) argue, the term has been applied in a "homogenizing way obscuring the wide range of land types, tenure relations, and social-ecological interactions that characterize lands falling under this broad category."

These framings simplify practices on the ground. In a comparative study of marginal lands converted to Jatropha biofuels in Brazil and India, Bailis and McCarthy (2011) find substantial differences in carbon storage capacity of the two sites. Bailis and McCarthy calculate the 'carbon debt' of land conversion, a carbon accounting method developed by Fargione et al. (2008). Converting marginal lands to Jatropha in Brazil results in a debt of 10–20 years while no debt is incurred in India (Bailis and McCarthy, 2011). Yet the lands converted to Jatropha at both sites were classified as marginal by their respective governments. This study complicates the low carbon storage representations of marginal lands.

Other studies challenge representations of marginal lands as 'empty' and 'unproductive'. A recent remote sensing analysis of the availability of marginal lands for biofuel production in the Midwestern US attempts to separate out the extent of marginal lands used for grazing activities (Gelfand et al., 2013). However, given the shifting and small-scale nature of land use, it is unclear whether such an analysis can be used in a developing country context.

As is well documented within the literature on common property resources, lands termed marginal by the state are often used by local communities for livelihood activities such as fuelwood and fodder gathering (cf. Ostrom, 1990). Borras et al. (2011) and Franco et al. (2010) document evidence of such activities on marginal lands targeted for biofuel production in Mozambique. Further, despite policies restricting biofuel production to marginal lands, Franco et al. (2010) find evidence that biofuel cultivation in Brazil has taken place on arable land, displacing food production and diverting natural resources to biofuels. The authors conclude that policy makers use the concept of marginal lands as a "narrative device for imagining a benign role for biofuel production in the Global South" (Franco et al. (2010): 674) while in practice, biofuels are reshaping agrarian relations in ways detrimental to livelihoods in developing economies.

The concept of 'wasteland' has also been critiqued both within political ecology and biofuels literatures. The term itself dates back to Locke who used it to refer to common property lands (Locke, 2011 (1680)). Claiming that the productivity of privately owned land would far exceed those of the commons, Locke recommended eliminating wastelands through privatization. Within India, the term has been used in land settlement schemes since the Mughal Empire to categorize lands that were, according to the state, degraded and unproductive (Yadav, 2011). The concept gained political potency in the colonial era when it was also used to negatively characterize wasteland users as backward, indolent and savage (Gidwani, 2008; Whitehead, 2010). Thus began the program of wasteland development that sought not only to reduce wastelands by putting the lands to more 'productive', state-defined uses but also to shape land user behavior. This program extended beyond colonial rule and numerous wasteland development schemes have been enacted to date (Saigal, 2011). Growing biofuels on wastelands is the latest iteration of this long-standing program.

As part of wasteland development, various classification processes have been implemented over time each using different definitions and methods and not surprisingly, yielding vastly different results (Eswaran, 2001). Despite this ambiguity, the program of wasteland development continues because as Gidwani (1992)

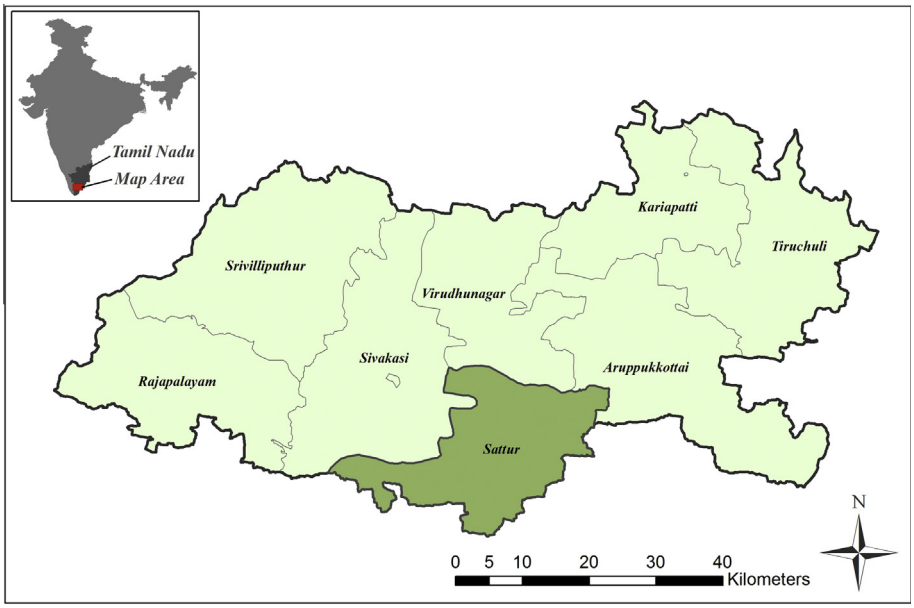


**Fig. 1.** Sattur Taluk, Virudhunagar District, Tamil Nadu.

notes, "everyone seems to agree that wastelands are 'bad' and should be dealt with" (PE-39). In their critique of wasteland discourse in India's biofuel program, Ariza-Montobbio et al. (2010) demonstrate the political malleability of the term. It is used in biofuel policy documents to refer to a host of land types, such as agroforestry and fallow lands, making it difficult to determine what lands will be converted to biofuels. In their field study of Jatropha promotion in Tamil Nadu, the authors find that farmers displaced food crops by growing Jatropha on agricultural lands (Ariza-Montobbio et al. (2010)). Further, (Baka, 2013) reveals how the ambiguity of wastelands has facilitated 'land grabs' in Tamil Nadu raising questions about the ability of agrarian communities to self-provision.

In summary, the existing biofuels literature demonstrates that terms such as 'marginal lands' and 'wastelands' are political constructions. What this literature does less well is to examine what land use practices these constructions mask and how they are sustained. I provide such an analysis below through a case study of Jatropha promotion on wastelands in rural Tamil Nadu.

After introducing the field site in Tamil Nadu and reviewing India's biofuel policy, I analyze the Prosopis energy economy and the political relations shaping wasteland constructions. I conclude with a discussion of why this economy is masked and what the impacts are.

## 3. Field site and methods

Fieldwork was conducted in Virudhunagar District Tamil Nadu from June 2010 to February 2011 (Fig. 1). This region was selected because of the high level of Jatropha activity that had taken place in the area in recent years. An evaluation of the Prosopis economy was conducted in Sattur taluk[1] because of the diversity of Prosopis activity in the area (dark section, Fig. 1).

According to the 2010 Virudhunagar Statistical Handbook, nearly two-thirds of Virudhunagar's population (504,401) is rural (Virudhunagar District Collector, 2010). Nearly three-fourths of the population of Sattur (89,685) is rural, the third highest percentage across the district. Although a breakdown by taluk is not available, nearly 27% of labor in the district is engaged in agriculture (Virudhunagar District Collector, 2010). The fraction of labor in Sattur engaged in agriculture is likely higher because the district's industrial centers are in Sivakasi and Virudhunagar taluks (Fig. 1). On the whole, the region has a long industrial history dating back to colonial times when the municipalities of Sattur and Virudhunagar were agricultural trading markets (Baker, 1984).

Average annual rainfall for Virudhunagar district is 830 mm per year (Virudhunagar District Collector, 2010). Based on recorded rainfall data, the region has experienced droughts in 11 of the last 12 years for which data is available. Just over 13% of the district is irrigated, which helps to explain the prevalence of dry land agriculture. The main crops in the region by area are rice, maize, cotton and pulses.

To analyze the Prosopis economy in Sattur, a material and energy flow analysis (MEFA) was conducted by surveying 158 household and industrial Prosopis users across 39 randomly selected villages in Sattur. Semi-structured interviews with 42 key stakeholders were conducted, which included village representatives (39) and biofuel company officials (3). A more detailed description of the MEFA study can be found in (Baka, 2012). This paper presents results on the labor and economic impacts of the Prosopis economy that are not included in the MEFA study.

To evaluate political relations shaping wasteland constructions, a stakeholder perception analysis was conducted in Virudhunagar. Semi-structured interviews were conducted with 32 key stakeholders at the district and state level: agriculture department (5), forestry department (4), Virudhunagar district collector's office (3), Tamil Nadu Planning Commission (3), biofuel companies (4), NGOs (6), academics (7). Further, fourteen villages in four taluks of the district were visited (Fig. 1): Rajapalayam (2), Srivilliputhur (6), Aruppukkottai (3), and Sattur (3).[2] These villages were selected because of their high degree of Jatropha activity, as stated in government documents detailing the distribution of Jatropha seedlings and project funds.[3] Further, the villages were a mix of forest (5) and

[1] A taluk is an administrative unit in India primarily used for land and fiscal governance.

[2] The names of the villages are withheld to protect the identities of informants.

[3] No database exists on the location of Jatropha activity in the state. The villages visited were selected purposively as government documents indicated they were main activity centers.

panchayat villages[4] (9) as Jatropha was promoted for cultivation on both forest and agricultural lands in policy documents (Government of India, 2003).

## 4. Indian biofuel policy history

In 2003, India unveiled a National Mission on Biofuels (NMB), which called for planting Jatropha on 17.4 million hectares (ha) of wastelands, roughly 4% of the total geographic area of the country (Government of India, 2003). Jatropha, a small tree/shrub that yields non-edible oilseeds that can be used to manufacture biodiesel, gained prominence in the early 2000s because of its alleged ability to grow on degraded lands under rainfed conditions (Francis et al., 2005). A wave of Jatropha investments resulted and by 2008, India was identified as one of the world's leading cultivators of Jatropha (GEXSI, 2008). Tamil Nadu enacted its own Jatropha biofuels program in 2007 and set a goal of cultivating Jatropha on 100,000 ha through contract farming (Government of Tamil Nadu, 2007b). The Jatropha industry study identified the state as one of the top cultivation regions in the India (GEXSI, 2008).

Citing insufficient research on seed technologies, growing requirements, financial and institutional support, experts around the world deemed Jatropha a failed experiment by the late 2000s (Kant and Wu, 2011; Kumar et al., 2012). Direct field observations (Almeida et al., 2011) and simulation modeling (Li et al., 2010) also challenged the viability of Jatropha to grow on degraded lands by demonstrating that yields improved with irrigation and fertilization. These factors help to explain why, when India passed its National Policy on Biofuels in 2009, no specific feedstocks were listed (Government of India, 2009). More generally, the policy mandates the use of non-edible oilseeds. However, the requirement of restricting feedstock cultivation to wastelands remained. According to the policy, this strategy of using non-edible oilseeds grown on wastelands would avoid competition with food production and help India improve its energy security and reduce rural poverty.

Yet, the policy did not define wastelands or discuss how such lands would be identified for biofuel cultivation. At present, multiple government wasteland classifications exist within India each using different definitions and assessment methods and yielding different results. The two main classifications, the Nine-Fold Classification and Wasteland Atlas, are based on agricultural census and remote sensing analysis, respectively.[5] Yet, it is unclear how, if at all, either assessment would be used in the biofuel program. While the 2003 NMB listed six wasteland categories totaling 13.4 million ha where Jatropha would be planted, none correspond to the categories of the Nine-Fold Classification or Wasteland Atlas.[6] The NMB also stated that an additional 4 million ha of wastelands would be available for Jatropha cultivation but provided no additional details on how these lands would be selected for biofuel cultivation.

As others have argued, the NMB and current land classifications frame wastelands as an economic and biophysical concept (Ariza-Montobbio et al., 2010) (Baka, 2013). The socio-political dimensions also shaping this land category are obscured. It thus becomes important to analyze what such constructions mask, a task I turn to in the next section with an examination of current land use practices on government classified wastelands in Sattur taluk.

## 5. Prosopis energy economy

According to the latest Wasteland Atlas, land with scrub biomass is the largest wasteland category throughout India and within Tamil Nadu (National Remote Sensing Centre, 2010). The category represents over 57% of wastelands across India and over 74% of wastelands within Tamil Nadu. Based on interviews with experts who produce the Atlas for Tamil Nadu, Prosopis is the most prevalent biomass on scrublands.[7] However, the tree's complex political ecology and current use as an energy feedstock for both rural and urban consumers challenge classifying Prosopis lands as wastelands. Yet, as result of India's wasteland centered biofuel program, biofuel companies in Tamil Nadu have been uprooting Prosopis to grow Jatropha. After reviewing the history of Prosopis promotion, the energy security and rural development impacts of replacing Prosopis with Jatropha are analyzed below.

Native to Central America, Prosopis was first brought to India in colonial times (Mwangi and Swallow, 2008). However, it rapidly spread throughout the country in the 1970s as result of a previous wasteland development program, Social Forestry (Mwangi and Swallow, 2008). Social Forestry was an international program financed in part by the World Bank/FAO to address the 'other' energy crisis of the 1970s, the perceived shortage of fuelwood supplies throughout the developing world (Eckholm, 1975). Prosopis is a fast growing, nitrogen-fixing mesquite tree species that is tolerant of arid and saline environments (Mwangi and Swallow, 2008). Thus, in theory, it was meant to address concerns over desertification and land degradation that also accompanied Social Forestry (Mwangi and Swallow, 2008).

In practice, Social Forestry has been widely criticized as an industrial rather than rural development program because trees promoted under the scheme were better suited for the pulp and paper industry than for fuelwood (Agarwal, 1986; Pandian, 1996; Shiva, 1986). Within India, juliflora was favored over native species of Prosopis for inclusion in Social Forestry in part for this reason. Further, it is highly invasive and has invaded millions of hectares of rangelands across India and throughout the world (Mwangi and Swallow, 2008).

At present, in Sattur, Prosopis is used as a feedstock for household fuelwood, charcoal production and electricity generation and is an energy source for a variety of industries including pulp and paper, oil mills, match manufacturing, brick manufacturing, and restaurants (Baka, 2012). Based on the MEFA analysis, over a 20-year period, the average lifespan of a Jatropha plantation, the Prosopis economy provides four to 15 times more useful energy[8] than would Jatropha biodiesel (Baka, 2012).[9] This range results from testing different scenarios of energy provision from Jatropha. In addition to producing biofuel from Jatropha oil, the seedcake residue that results from crushing Jatropha seeds can be manufactured into briquettes and used for energy provision. Additionally, the Prosopis that is cleared to grow Jatropha can also be used for energy provision. Yet, despite testing various scenarios of Jatropha energy provision, the energy provision of the current Prosopis system far exceeds the potential energy provision of Jatropha.

Prosopis also provides substantially more employment opportunities than would Jatropha. Based on a comparison of a Prosopis cutting crew to a Jatropha harvest, Prosopis provides seven times more jobs per hectare than Jatropha to a mix of men and women (Table 1). Further, the Prosopis jobs are for a 14 times longer

[4] A panchayat is a second administrative unit in India in charge of program administration.

[5] See (Baka, 2013) for a critique of these classifications.

[6] The six categories are: understocked forests (3 million ha), borders of agricultural lands (3 million ha), agro-forestry lands (2 million ha), cultivable fallows (2.4 million ha), wastelands participating in other poverty alleviation schemes (2 million ha), and public lands along railways, roads and canals (1 million ha).

[7] Interview with Anna University Department of Remote Sensing 18 November 2010.

[8] Useful energy is the amount of energy delivered to a system after combustion.

[9] Because the Jatropha economy was stalled at the time of fieldwork, a representative Jatropha economy was modeled for this study based on interviews with biofuel companies that operated in Virudhunagar district and through literature reviews.

**Table 1**
Prosopis and Jatropha labor comparison. *Source*: author's fieldwork.

| | Prosopis | Jatropha |
|---|---|---|
| Laborers (per ha) | TOTAL: 14<br>Male: 11<br>Female: 3 | TOTAL: 2<br>Male: 0<br>Female: 2 |
| Duration (days per year) | 216 | 15 |
| Wages (Rs. per day) | Male: Rs. 200<br>Female: Rs. 150 | Male: NA<br>Female: Rs. 100 |

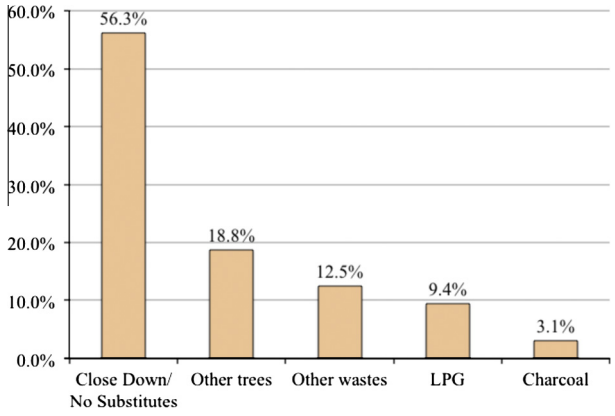


**Fig. 2.** Prosopis substitution analysis: What would you do if faced with a Prosopis price spike or shortage in availability? *Source*: author's fieldwork ($n = 33$).

annual duration and pay 50–100% higher wages per day than Jatropha.[10] As this comparison does not include the labor opportunities available in other industries currently using Prosopis, it is likely a conservative estimate of the labor differences between Prosopis and Jatropha.

Further, generational differences exist between the Prosopis and Jatropha laborers. Elderly women were hired for the Jatropha harvest. According to the women, other agricultural day labor, such as rice harvesting, was too physically demanding. They were no longer hired for such work. Harvesting Jatropha was a less taxing alternative. Younger generations worked on the Prosopis cutting crew. When interviewed, these laborers said they would not be interested in working on a Jatropha plantation due to the lower wages and duration. When asked what they would do if Prosopis jobs were no longer available, the laborers indicated they would look for jobs in nearby factories or migrate to the Middle East. Although replacing Prosopis with Jatropha seems to free up labor, laborers are migrating out of Sattur in search of new opportunities. On the whole, replacing Prosopis with Jatropha could create labor shortages and accelerate patterns of urban migration already being observed throughout rural India and within Tamil Nadu (Djurfeldt et al., 2008; Shah and Harriss-White, 2011).

Industrial users of Prosopis ($n = 33$) were asked how they would respond to a Prosopis price spike or drastic reduction in Prosopis availability. Over 56% of industries surveyed indicated that either no substitutes for Prosopis exist or that they would have to shut down their businesses if faced with a Prosopis shortage or price spike (Fig. 2). More specifically, the manager of the electric power plant, the largest user of Prosopis, stated he would substitute agricultural wastes for Prosopis. However, the availability and substitution quality of agricultural wastes is uncertain. Brick makers, charcoal makers and numerous restaurants indicated they would have to shut down if faced with a Prosopis price spike or shortage. These findings indicate that replacing Prosopis with Jatropha could negatively impact rural economies by impairing business operations. Energy security could also be reduced as result of reduced energy supplies and the lack of substitutes.

At the household level, 28% of households surveyed currently use a mix of Prosopis fuelwood and liquefied petroleum gas (LPG) for energy purposes. If faced with a Prosopis shortage households are likely to respond in one of two ways: substitute other biomass resources for Prosopis or accelerate their adoption of LPG. As mentioned previously, the availability of other biomass resources in the area is limited. Market forces would determine the viability of the latter strategy. Numerous households interviewed indicated that LPG is expensive and difficult to afford. If LPG prices were to rise because of increased demand, it is uncertain whether rural households could afford this transition. Further, as India already imports over 70% of its fossil fuel needs (Energy Information Administration, 2011), an accelerated transition to LPG in rural areas, where nearly three-fourths of India's population still lives (Government of India, 2001), could increase fossil fuel imports. This would perversely negate the potential energy security benefits of biofuels outlined in the National Biofuel Policy. Additionally, reducing energy supplies in rural areas could exacerbate energy poverty, defined as the lack of access to energy services for lighting, heating and cooking (International Energy Agency, undated). Collectively, these impacts cast doubt on the rural development and energy security opportunities of biofuel production.

## 6. Sustaining wasteland constructions: stakeholder perception and political relations analysis

Although the Prosopis economy provides more energy security and economic benefits than would Jatropha, it is not mentioned within biofuel policy documents. An evaluation of stakeholder perceptions of biofuels and the resultant political relations explains why this is. The analysis below examines local government, corporate, village and NGO stakeholder perceptions as these groups were the key groups influencing and influenced by India's biofuel program.

### 6.1. Government officials

Various government officials interviewed at the state and local level would often remark that there is no such thing as wastelands, only wasted lands. This comment has historic origins as it appears in the forward of the Dharia Commission Report, a 1995 government report reviewing the historic performance of India's wasteland development program (Government of India, 1995). The report concludes that past wasteland development schemes have performed "dismally" (Government of India, 1995: not paginated) because of a lack of a scientific approach to wasteland development. As a clear example of technically rendered policy (Li, 2007), the report recommended "proper planning, a scientific approach and efficient management to make both these lands and people productive" (Li, 2007: not paginated). That comments used to motivate wasteland development policies over a decade ago are still in circulation is evidence of the strength and longevity of the 'anti-politics machine.'

One high ranking member of Tamil Nadu's Planning Commission, the main state government agency shaping land use policy and governing the Nine Fold Classification, also used this comment when asked what wasteland are. When asked to elaborate, the offi-

[10] Prosopis data based on observing a Prosopis cutting crew (20 June 2010) and triangulating the findings with wood traders (23 January 2011). Jatropha data based on observing a Jatropha harvest in neighboring Ramnad District (23 January 2011). The company observed formerly operated in Virudhunagar District as well. The harvest manager confirmed that the labor requirements on the observed plantation would be representative of labor requirements in Virudhunagar.

cial explained that such lands "are not being used economically. They are not profitable to farm and the goal [of wasteland development] is to put the land to economic use."[11] When asked about non-economic characteristics of lands, such as ecological and social dimensions, the official stated that "money and power dictate [in land classifications], not ecology". Further, in the middle of describing the Nine-Fold Classification process, the official stopped and commented, "wastelands are whatever the government says they are." These comments underscore that wastelands are a political construction and also illustrate the primacy of economics in shaping land use policy. In other words, the category of wastelands can be invoked to help the state achieve its economic objectives.

Economics motivated government stakeholder perceptions of Jatropha and Prosopis as well. At the time of my fieldwork in 2010, most opinions of Jatropha were negative. As an agriculture department in Rajapalayam taluk stated, "there are no winners in Jatropha, not even companies, [because] it is not profitable to farm."[12] He further explained that the trees would require irrigation to be profitable. Another official in neighboring Theni district characterized Jatropha plantations on government owned *poramboke* lands, a Tamil word for common property lands, as "propaganda schemes" meant to encourage farmers to plant Jatropha on their private lands.[13] As Ariza-Montobbio et al.'s (2010) study demonstrates, farmers treated Jatropha as another cash crop on their private lands and tried to maximize yields by growing it on arable lands.

Regarding Prosopis, many government officials were aware of its significance to laborers and of its wide-ranging uses for energy production. During a previous field visit in 2009, an engineer in the Virudhunagar District Collector's office indicted that replacing Prosopis with Jatropha would disadvantage landless farmers.[14] However, the District Collector implemented a large-scale program between 2009 and 2010 to remove Prosopis from the district allegedly to plant other fruit trees. Yet the timing of this effort coincided with another government program aimed at converting dry lands from agriculture to industrial use (Government of Tamil Nadu, 2007a). Elsewhere I have documented how this program, along with India's biofuel program, have motivated 'land grabs' in Sattur taluk (Baka, 2012).

The Tamil Nadu Agricultural University (TNAU), a public university, was also heavily involved with Jatropha promotion in the state. In fact, the university was identified as one of the main agencies responsible for implementing the state's Jatropha policy (Government of Tamil Nadu, 2007b). The role of the university was to develop seed technologies and to conduct training with agricultural officers and farmers. To accomplish these tasks, the school established the Centre for Excellence in Biofuels and appointed Professor M. Paramathma to coordinate the school's Jatropha efforts. By the summer of 2010, Professor Paramathma and others at the school acknowledged that the Jatropha program was not going as planned. However, Professor Parmathma attributed the difficulties to seed varieties and was developing hybrid seeds in 2010.

Professor Paramathma and others at TNAU claimed to have no knowledge of Prosopis. He was also skeptical of the evidence I presented concerning the significance of Prosopis in energy provision. Regarding wasteland classification processes, other TNAU professors counseled me to be cautious of the government's numbers claiming that they are not "cross-checked" or updated regularly.[15]

### 6.2. Corporate stakeholders

By June 2010, one of the main biofuel companies operating in Virudhunagar had paused its Jatropha operations claiming that better seed varieties were needed in order to be profitable.[16] The company was in the process of converting its Jatropha plantations to food production. This transition complicates the food security claims of India's biofuel program because the lands acquired by the company, which it leased from local farmers, were formerly classified as wastelands and overgrown with Prosopis.

To prepare the lands, the company first uprooted Prosopis, a process the manager characterized as "beneficial" to local communities because the biofuel plantations would provide new job opportunities.[17] The manager claimed Jatropha plantations would provide 180 days of employment per year. However, the data presented in Table 1, which was gathered at a plantation in neighboring Ramnad district operated by this company, reveal this figure to be an overestimate. Additionally, the manager claimed that Prosopis use was in decline because villagers were in the process of transitioning to more "modern" fuels such as LPG. While the substitution analysis in the previous section confirms that households are adopting LPG, the ability of households to manage this transition is in doubt. Further, the previous analysis of the Prosopis energy economy highlighted the significance of Prosopis to the regional economy.

The company's land use practices raise larger questions about India's biofuel program. If lands classified as wastelands can be converted to food production, should growing fuels on such lands even be considered in the first place? As India continues to struggle with food security (Indo-Asian News Service, 2010), the company's practices of converting wastelands to fuel and/or industrial agriculture present a larger ethical challenge. Even though food is now grown on these plantations, market forces will determine what, if any, quantities are consumed locally within Sattur.

### 6.3. Village stakeholders

Stakeholder perceptions of Prosopis have long been mixed within India. In studies during the late 1990s in the Northwest state of Rajasthan, Robbins documented how government officials viewed Prosopis as a sign of successful afforestation while land owners and shepherds considered it a menace because of its invasiveness (Robbins, 2003). Gidwani (2008) found similar opinions in Gujarat. Based on the above analysis of government perceptions, I find that government perceptions of Prosopis have shifted since the time of Robbins' research. However, landowners continue to view it as a menace because it is difficult to uproot once established. Yet interestingly, landowners in Sattur were reluctant to call Prosopis lands wastelands (*tharasu,* in Tamil). Instead, they referred to the lands as *vellikadu*, a vernacular Tamil term meaning Prosopis lands.[18] When asked to explain, farmers claimed their lands could again be used for agriculture if the Prosopis trees were removed. The biofuel company's land use practices documented above confirm this land use strategy is possible. While the District Collector provided subsidies to assist with Prosopis removal in the region, only companies and not individual farmers qualified for this help.[19] This is another policy contributing to 'land grabs' of wastelands in the region (Baka, 2013).

More generally, village stakeholders often remarked that there was no such thing as wastelands in their villages because all lands

[11] Interview with Tamil Nadu Planning Commission Official, 07 October 2010.
[12] Interview 17 June 2010.
[13] Interview with Theni District Collector's Office official, 27 August 2010.
[14] Interview with Virudhunagar Drought Prone Area Programme engineer, 10 August 2009.
[15] Interview with TNAU economics professor, 5 August 2010.
[16] Interview with biofuel company manager, 21 June 2010.
[17] Interview with biofuel company manager, 16 March 2009.
[18] Literally translated, vellikadhu means fence lands. Velli is a vernacular word for Prosopis in Tamil.
[19] Interview with Srivilliputtur Business Development Office officials, 23 September 2010.

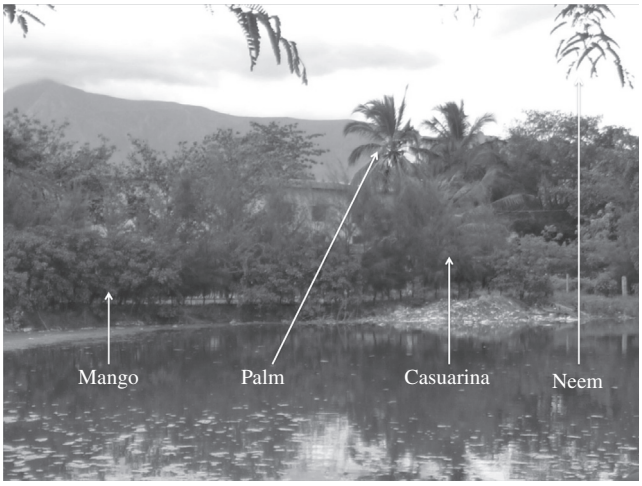


**Fig. 3.** Village Water Tank, Srivilliputtur Taluk. *Source*: author's fieldwork.

were currently in use. Fig. 3, which is a picture of a village water tank in Srivilliputtur taluk (Fig. 1), illustrates this claim. The sides of the water tank, which are *poramboke* lands typically used for animal grazing, are already densely cultivated with other tree species such as mango, palm, casurina and neem.

Despite this evidence, the Panchayat President in this village reported that the District Collector's office forced him to plant 2000 Jatropha saplings in the village in 2006.[20] Although the village planted the trees (around the water tank, amongst other places) and harvested some seeds, no one came to collect them. Thus, in early 2010, the village uprooted the Jatropha trees. In exchange for planting Jatropha, the village received Rs. 10,000, which does not account for the village's economic losses.

The District Collector's office first removed Prosopis, including around the water tank, to clear space for Jatropha trees in the village. Villagers formerly cut the Prosopis for fuelwood and to sell to brick makers. According to the Panchayat President, approximately 250 kilograms (kg) of Prosopis per day were cut in the village and sold to brick makers for about 9 months per year. Based on the MEFA survey data (Baka, 2012), brick makers purchased Prosopis at an average price of Rs. 2.82 per kg from wood traders and local cutters. Wood traders paid an average of Rs. 1.95 per kg to local cutters. Based on this price range, between Rs. 131,625 and Rs. 190,350 per year in revenue was flowing into the village from Prosopis harvesting, 13–19 times more than the village received to grow Jatropha. Despite this evidence, the President claimed that there were no protests in the village. Other evidence about Jatropha promotion and agrarian change in the region help to explain this outcome.

First, the Panchayat President reported how the District Collector has chosen his village to be a model village for Jatropha promotion. Between 2006 and 2009, numerous officials from different state and local government offices visited the village to hold promotional events for Jatropha. A signboard was also placed in the village to advertise the program. Further, government officials spoke of the profit potential of growing Jatropha and the possibility for farmers to obtain government loans if they grew Jatropha on their lands. As the President stated, "enthusiasm for Jatropha was high in the village."

At the same time, 'land grabs' of wastelands were occurring in neighboring Sattur taluk (Baka, 2013). Illicit collaborations between local land brokers and village officials operationalized these deals. Because of the potential increased economic and social status, some villagers in Sattur also became land brokers to facilitate the land deals. The land acquired in these deals is now being converted to real estate to support the Special Economic Zone (SEZ) expansion in the region. While the Panchayat President claimed no such deals were occurring in his village, the region is only 4 km away from the highways leading to the SEZs making it a possible target for similar land deals.

### 6.4. NGO stakeholders

Although two NGOs were selected by the Tamil Nadu government to implement the state's Jatropha program (Government of Tamil Nadu, 2009), neither NGO was willing to be interviewed at the time of my fieldwork. However, two other NGOs with knowledge of the program were willing to be interviewed. The NGOs will not be named to protect the confidentiality of the informants. One of the NGOs is based in Madurai (NGO-M) and one is based in Virudhunagar (NGO-V).

NGO-V had considered establishing Jatropha contract farming arrangements with local farmers. However, the organization felt that Jatropha was not suited for the climatic conditions of the region. Further, the NGO stated that other Jatropha companies had "gamed the system" by collecting seedling subsidies from the government and not distributing the funds to their contract farmers.[21] Thus, it would be hard to recruit new Jatropha contract farmers because of these past experiences. NGO-M had also considered Jatropha contract farming but concluded the tree is not economic for farmers "because it needs more water than companies let on."[22] Farmers would be better off planting fruit trees and other cash crops, according to this NGO representative. For these reasons, both NGOs considered Jatropha to be a failure.

While acknowledging that Prosopis is an invasive species, both NGOs emphasized the importance of Prosopis to village livelihoods. NGO-V was actively involved with improving Prosopis charcoal production efficiency and NGO-M established microfinance programs to help villages buy Prosopis lands. Yet, the importance of Prosopis is not considered in government land classifications, according to the NGOs. Instead, the government considers Prosopis lands to be "poor quality lands."[23] This in part helps to explain the recent increased interest in acquiring land in Virudhunagar. According to NGO-V, land brokers has been "alienating" farmers from their Prosopis lands by acquiring it at low prices and selling it to large-scale agriculture companies from North India (ibid). As result, similar to trends in other regions of Southern Tamil Nadu (Vijayabaskar, 2010), land prices in the region had increased rapidly in recent years.

### 6.5. Political relations amongst stakeholders

The above analysis reveals the fractured stakeholder perceptions underlying wasteland constructions in biofuel policy documents. However, the political relations amongst stakeholders help to explain why constructions of wastelands as 'empty' lands available for biofuel production prevail. The perceptions of elites, principally government and corporate stakeholders, shape the wasteland discourse because these stakeholders control and have the most access to political processes. The Tamil Nadu Planning Commission also governs one of the main wasteland classifications. The Prosopis economy is masked in this construction because elite stakeholders consider it a poor source of energy with declining demand and low profitability. Empirical evidence from Sattur negates these claims.

[20] Interview with Panchayat President in a Virudhunagar Village, 1 October 2010.

[21] Interview with NGO-V, 7 November 2010.

[22] Interview with NGO-M, 26 June 2010.

[23] Interview with NGO-V, 7 November 2010.

Additionally, this analysis also confirms the political malleability of the term 'wasteland'. Although Prosopis was introduced under a previous wasteland development program, government officials now consider the tree to be a cause of wasteland creation instead of a method of wasteland reduction. Based on shifting perceptions of Jatropha to date, it appears Jatropha may be following a similar trajectory. Yet, instead of challenging the concept of wasteland itself, the government is responding by introducing new wasteland development programs, namely, the government's SEZ policy.

Village and NGO perceptions complicate the wasteland discourse and help to reveal the micro-politics at work to sustain wasteland constructions. While acknowledging the importance of Prosopis to agrarian livelihoods, these stakeholders have little incentive to challenge the dominant wasteland constructions because of the rapidly changing land politics in the region and the potential economic and social gains from participating in these processes.

Amongst farming and landless laborer communities, the impacts of replacing Prosopis with Jatropha are not clear-cut. Landowners consider Prosopis a menace as it is difficult to uproot. Yet, as the Prosopis-Jatropha labor comparison (Table 1) demonstrates, elderly women could benefit from a large-scale spread of Jatropha. However, participants in the Prosopis economy could face job losses. As Prosopis laborers indicated, they would likely leave the area in response. These differential perceptions and responses also help to reinforce dominant perceptions of wastelands because those who would benefit the least from Jatropha would likely leave the area rather than taking time to protest the eradication of Prosopis.

## 7. Conclusion

Contrary to representations in biofuel policy documents, this study reveals that wastelands are not 'empty', 'unproductive' spaces. Instead, Tamil Nadu's wastelands are dynamic energy economies that serve both rural and urban consumers. However, the political relations shaping India's biofuel policy obscure the existing energy economy because elite stakeholders have little incentive to challenge dominant constructions of wastelands. This study empirically documents what is at stake if these constructions hold. Instead of improving energy security and reducing rural poverty, India's wasteland centered biofuel program threatens to weaken energy security by eliminating local energy supplies. Further, replacing Prosopis with Jatropha may exacerbate rural poverty by eliminating jobs and rural industries. Thus, this study demonstrates that wastelands, as presently constructed, do not exist. Attempting to locate development projects such as biofuels on such lands can alter agrarian livelihoods in unanticipated ways.

Further, these findings are not unique to Tamil Nadu or to biofuels. Prosopis is widely found throughout India and the country has a long history of implementing wasteland development programs to meet various policy objectives. At present, locating development projects on wastelands is a central focus of India's climate change and industrialization policies. Nor are these findings unique to India. Marginal land discourses are commonly found in land use policies throughout the world. In addition to advancing critical scholarship on biofuels, it is hoped that this study motivates similar studies in other geographic and policy areas. Such studies will help to unveil the political practices and impacts that dominant land use discourses obscure.

Lastly, this study also demonstrates the cyclic nature of development policy and the adaptive capacity of local communities. Prosopis was originally introduced during the 1970s to reduce wastelands and to improve rural energy security. Due to its invasiveness, the policy did not unfold as originally intended. Yet, as we are witnessing over 40 years later, local communities have adapted by developing an energy economy centered on Prosopis. Jatropha, also introduced under a wasteland development program with similar goals, could follow a similar trajectory given its potential use in village electrification (Gmuender et al., 2009) and in artisanal soap and honey manufacturing (Heller, 1996). However, the persistent characterization of wastelands as 'empty', 'unused' spaces void of local land users may inhibit the creation of such local adaptations by veiling their necessity. Thus, a more inclusive development strategy may be one that focuses less on land classification terminology and more on local land use practices.

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