Is there such a Thing as Wasteland? Biofuels and Wasteland Development in Tamil Nadu, India

Jennifer Baka

Abstract: India’s current biodiesel policy mandates the use of non-edible oilseeds grown wastelands so as to maximize benefits to rural welfare, energy security and environmental quality. However, the extent of wastelands, as well as their significance to rural livelihoods, is poorly understood. Through a case study of *Jatropha curcas* biodiesel production in Tamil Nadu, this paper highlights the ambiguities, contradictions and omissions embodied in the concept of wastelands. Multiple assessments exist, each yielding different results and each underplaying the linkage between wastelands and rural livelihoods. Stakeholders are united in the belief that there is no such thing as wastelands but with different corollaries. Government and corporate officials assert these areas could be put to better economic uses while village stakeholders claim there are no wasted lands within the village bounds.

Further, the wasteland areas targeted for biofuel production are currently cultivated with *Prosopis juliflora*, a drought tolerant tree presently used as a feedstock for a host of energy applications including fuelwood, charcoal, brick and electricity production. Prosopis coppicing also provides annual employment to marginal farmers and the landless poor. As result, the relationship between biofuel cultivation on Indian wastelands and rural livelihood warrants a more critical evaluation. Other countries’ biofuel policies targeted at marginal or degraded lands would similarly benefit from additional scrutiny.

Keywords: wastelands, Jatropha, Prosopis, energy security, livelihoods

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INTRODUCTION

Biodiesel produced from the non-edible oilseed *Jatropha curcas* (hereinafter referred to as Jatropha) gained prominence over the last decade in light of concerns over impacts of grain-based biofuels such as corn ethanol and soy biodiesel. Promoters of Jatropha touted the tree’s alleged ability to grow on marginal lands under rainfed conditions thus avoiding competition with food production, minimizing land use change impacts and improving the productive capacity of underutilized lands. Commonly found across the global South, Jatropha also provided opportunities for developing countries to participate in the small but growing global biofuels economy, which grew three-fold between 2000 and 2007 (International Energy Agency 2007).

However, most studies promoting the cultivation of biofuels on marginal lands in general and Jatropha in particular fail to adequately address the array of ecosystem and livelihood services such lands provide to agrarian communities (Fargione et al. 2008; Campbell et al. 2008; Rathmann, Szklo, and Schaeffer 2010; Tilman, Hill, and Lehman 2006; Francis, Edinger, and Becker 2005). In a developing country context, such lands are often common property resources used by rural communities for fuelwood and fodder gathering (Jodha 1986). Additionally, the lands may be lying in fallow to restore ecosystem integrity. Thus, locating biofuels on such lands could exacerbate the environmental and socioeconomic challenges they were introduced to improve.

India’s current biodiesel policy, focused exclusively on cultivating non-edible oilseeds on ‘wastelands’, provides the best case study for evaluating the impacts of biofuel production on marginal lands (Government of India 2009). The term wasteland is a formal land classification applied by the government to identify lands presently incapable of supporting agricultural production. Various government agencies at the local, state and central government levels classify wastelands using a variety of methodologies resulting in a multitude of competing assessments that are challenging to compare. Further, India’s wastelands are frequently common property lands (Kadekodi 2004), a factor often overlooked in wasteland assessments.

Despite these inconsistencies, in 2003, the Planning Commission of the Government of India called for cultivating Jatropha on 13.4 million hectares (ha) of wastelands throughout the country, roughly equivalent to 5% of India’s total land area (Government of India 2003). This announcement set off a wave of Jatropha investments in India, both public and private, and by 2008, India was the world’s leading cultivator of Jatropha with approximately 407,000 hectares under cultivation, nearly 45% of global production (GEXSI 2008). While India’s recently enacted biofuel policy backs off the exclusive promotion of Jatropha, it maintains the emphasis of growing non-edible oilseeds on wastelands (Government of India 2009).

This paper critically examines the linkages between biofuel production and wasteland development in India. After tracing the origins of wasteland development, current wasteland assessment procedures are critiqued to highlight the contradictions and omissions of existing land classification procedures. A case study of Jatropha promotion...
in Virdhunagar District, Tamil Nadu is then presented to reveal how stakeholders have used agricultural and forest wastelands to promote Jatropha. Additionally, the study analyzes the tensions between wasteland classification and land use. Key stakeholders from government, biofuel companies and civil society are united in the belief there is no such thing as wasteland but differ regarding what, if anything, can or should be done to remediate designated wasteland areas and what role biofuels can or should play in this process.

INDIAN BIODIESEL POLICY PROMOTION

Central government Jatropha promotion
Biodiesel program: 2003-2008

India established its biodiesel program in 2003 with the launch of the National Mission on Biodiesel (Government of India 2003). The Mission called for mandating a 20% biodiesel blending target by 2011-2012 using Jatropha as the primary feedstock. Although approximately 400 non-edible oilseeds can be found in India, the Committee selected Jatropha for the biodiesel program because of its higher oil content (40% by weight) and lower gestation period (2-3 years) in comparison with other oilseeds (Government of India 2003).

To meet a 20% blending target, the Committee recommended cultivating Jatropha on 17.4 million hectares of under utilized and degraded land (approximately 5% of India’s total land area), according to the following land types detailed below in Table 1.

Table 1: National Mission on Biodiesel Jatropha Cultivation Recommendation

<table>
<thead>
<tr>
<th>Land Type</th>
<th>Area</th>
<th>Percentage of Wasteland Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Forest Management (JFM) Forest lands</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>Agricultural border fences</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>Agroforestry schemes</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Culturable fallow lands</td>
<td>2.4</td>
<td>14%</td>
</tr>
<tr>
<td>Integrated Watershed Development wastelands</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Public lands along roads, railways, canals</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Government-designated wastelands</td>
<td>4</td>
<td>23%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>17.4</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>India total land area</strong></td>
<td><strong>328.7</strong></td>
<td><strong>5%</strong>*</td>
</tr>
</tbody>
</table>

* Percentage is targeted Jatropha cultivation area as a percentage of India’s total land area
Sources: (Government of India 2003; CIA 2009)

The Mission was to be implemented in two phases: a research and demonstration phase from 2003-2007 (Phase I) and an implementation phase from 2007-2012 (Phase
II). The main goals of Phase I were to bring 400,000 ha of land under cultivation, to establish a research network of 42 public universities and to enact a 5% blending target (B5). The program would be expanded under Phase II to achieve a 20% blending target (B20) by 2011-2012.

Although the biofuel blending targets were not codified, interest in Jatropha rapidly accelerated after the launch of the National Mission on Biodiesel. According to a global Jatropha market survey, India was the world’s leading Jatropha cultivator in 2008, controlling approximately 45% (407,000 ha) of global cultivation (approximately 900,000 ha) (GEXSI 2008). Further, the GEXSI study anticipated India would remain a leading cultivator and projected nearly 2 million hectares would be under cultivation by 2015.

Despite India’s initial progress in promoting Jatropha, the industry has experienced setbacks because of declining international oil prices and because of continued variability in the agronomic performance of the crop. To date, there remains considerable uncertainty surrounding the seed yields, input and maintenance requirements for the crop (Achten et al. 2008), all of which have inhibited market development. Additional concerns surrounding the land tenure implications and rural livelihood benefits have further stymied the industry (FOE 2009).

As result, India’s Integrated Energy Policy, released in 2006, recommended significant increases in research funding for Jatropha and Pongamia, another tree born oilseed (Government of India 2006). Further, the 11th Five Year Plan, which began in 2007, recommended a blending target of 5% biodiesel blends by the end of the 11th Plan in 2012, a significant reduction from the 20% target proposed under the National Mission on Biodiesel (Government of India 2007). In August 2008, a Group of Ministers decided to discontinue the National Mission on Biodiesel (Dey and Jayaswa 2008).

However, in September 2008, the Ministry of New and Renewable Energy (MNRE) resumed discussions on biodiesel and issued a draft National Biofuels Policy (Government of India 2008). The draft policy seemingly backed off the country’s exclusive promotion of Jatropha and instead called for using any non-edible oilseeds grown on marginal, degraded or wastelands. The draft policy also recommended establishing 20% blending targets by 2017 for both ethanol and biodiesel.

National Policy on Biofuels: 2009-present

On December 24, 2009, the government implemented the National Policy on Biofuels (Government of India 2009). The policy establishes indicative 20% blending targets by 2017 for both ethanol and biodiesel. The new policy is not feedstock specific, as was the case with the National Mission on Biodiesel. Instead, the policy calls for using non-food feedstocks grown exclusively on wastelands in order to avoid conflicts with food security. According the government, this provision will distinguish India’s program from other international biofuel programs. The policy does not mention Jatropha but instead

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2 According to the policy document, the targets will be revised and codified as additional research becomes available.
states the government will assess the potential of over 400 tree born non-edible oilseeds currently growing in India.

WASTELAND ASSESSMENT

The policy does not provide additional guidance as to the extent of wasteland areas in the country or the proportion targeted for biofuel cultivation. As this section reveals, various competing wasteland classifications currently exist in the country each using different assessment criteria. While sporadic one-time assessments have been conducted to examine the economic significance of common land access to rural livelihoods, such analyses are currently not included in wasteland assessment. Without addressing this dimension in wasteland classification, the efficacy of wasteland development schemes such as biofuels is questionable.

Wasteland assessment origins

Classifying wastelands in India is rooted in the Colonial land settlement process. The term was applied under both the zamindari and ryotwari settlement systems, the two dominant land tenure systems of the Colonial period (Gidwani 2008). It was broadly applied to various land types underperforming in terms of their revenue generating (ie. tax collection) potential (Gidwani 2008). A key function of land classification schemes in general, as both Gidwani and Gilmartin note, was to improve the productive capacity of lands and minimize efficiency loss (Gidwani 2008; Gilmartin 2003). Land classification hinged solely on the economic significance of a plot of land, thus minimizing any ecological, cultural or livelihood benefits it might also bestow on local communities and ecosystems.

The use of the term “waste” to describe underperforming lands is also indicative of the economic motivations of land classification. Gidwani traces the use of the term back to the 17th century writings of John Locke whose belief in the “inseparability” between personal property and freedom were a key influence on Colonial governance (Gidwani 2008: 23). Gidwani credits Locke with integrating a moral dimension to land assessment via his Second Treatise. The essence of good government and what it means to be human, according to Locke, is to improve the value of nature lying in waste (Gidwani 2008: 23 referring to Locke’s Second Treatise). Land privatization thus became the main vehicle for minimizing the amount of wasteland.

Recognizing that villages would need land to carry out village affairs, Colonial land settlement processes also designated a portion of lands as village commons (Gilmartin 2003). The commons were areas that could not be put to productive use and were the residual lands remaining after private property claims had been made in village (Chakravarty-Kaul 1996). The British often referred to the commons as village “waste”; hence, wastelands became legally synonymous with the commons (Gilmartin 2003).

While the British recognized the significance of wastelands to village livelihoods, the government’s desire to continuously improve land use efficiency often trumped these
realities (Gilmartin 2003). The extent of common lands was dependent on the land productivity and by extension, tax collection, in a given village. In underperforming villages, the British would redistribute wastelands to village estates in order to improve productivity (Gilmartin 2003). Thus, both the extent and tenure of common lands was a continuous subject of negotiation in the Colonial period. The process of classifying wastelands and implementing schemes to improve their productivity continue in much the same form today.

Post-colonial wasteland development

The Government of India began a centralized wasteland development program after the release of the National Commission on Agriculture Report in 1976, which estimated 175 million ha of wasteland, equivalent to one third of the country’s land area (Saxena 2001). This estimate was based on the productive (ie. economic) potential of land and sparked various criticisms and alternate assessments. Partly in response to this estimate and out of concern for evaluating the ecological factors of land degradation, the non-governmental organization, the Society for the Promotion of Wasteland Development (SPWD), was established in 1982, largely with funding from the Ford Foundation. In 1985, the Ministry of Forests and Environment also took up the ecological dimension of wastelands with the establishment of the National Wastelands Development Board (NWDB).

One of the first tasks of the NWDB was to develop a standardized definition of wastelands and the resulting definition incorporated both the economic and ecological dimensions of land degradation. The NWDB defined wastelands as “degraded lands which can be brought under vegetative cover with reasonable effort and which is currently lying under-utilized, and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes” (Eswaran 2001).

This is the same definition used today by the Integrated Wasteland Development Programme (IWDP), the NWDB’s predecessor agency now housed within the Department of Land Resources at the Ministry of Rural Development (Department of Land Resources 2010).

The IWDP coordinates efforts to both classify wasteland areas and implement development programs. Since the inception of the NWDB, many wasteland development programs have centered on tree planting in order to increase forest cover and improve ecological stability in degraded areas (Eswaran 2001). The Social Forestry Program begun in the 1970s at the behest of the National Commission on Agriculture Report is perhaps the most prominent tree planting scheme in this regard. A second wasteland development strategy has been to privatize and redistribute wasteland areas, often to the rural poor (Government of India 2009).
**Wasteland classification procedures**

Regarding wasteland classification, the IWDP sponsors the *Wasteland Atlas of India*, conducted by the National Remote Sensing Centre (NRSC).\(^3\) The NRSC uses remote sensing techniques to categorize wastelands into 8 broad categories with 15 sub-categories (ie 23 total categories) based on the ecological characteristics of the land (National Remote Sensing Centre 2010).\(^4\) Data is compiled by District for each State and Union Territory. The Atlas is updated every 5 years using remote sensing images captured five years prior to the date of publication (ie. the 2010 Atlas is based on 2005 data). Classifications are made by comparing three seasonal images of each plot taken over the course of one year. In addition, limited ground truthing is conducted for a sample of plots.

The definition of wastelands used for the Atlas is similar to the IWDP definition in that it hinges on both ecological and economic characteristics. It expands the IWDP definition slightly to better encompass the causes of degradation:

“Wastelands refer to degraded lands that are currently underutilized, and are deteriorating for lack of appropriate soil & water management or on account of natural causes. Wastelands develop naturally or due to influence of environment, chemical and physical properties of the soil or management constraints.” (National Remote Sensing Centre 2010: 4)

According to the 2010 Atlas, 47.22 million ha (14.91% of total land area) are currently lying in waste (National Remote Sensing Centre 2010). The five largest wasteland categories in the 2010 Atlas are: land with dense scrub (2.95% of total geographic area (TGA)), land with open scrub (2.89% of TGA), under-utilized degraded notified forest – scrub dominated (2.71% of TGA), barren rocky (2.19% TGA) and snow covered/glacial area (1.29% of TGA) (National Remote Sensing Centre 2010). Neither the National Mission on Biodiesel nor the more recent National Biofuels Policy provide guidance on the precise wasteland categories that would be targeted for biofuel cultivation. However, based on field visits to biofuel production areas, the likely categories are land with dense scrub, land with open scrub, degraded pastures and grazing lands and under-utilized and degraded forests, scrub-dominated. Collectively, these categories represent 8.78% of TGA (National Remote Sensing Centre 2010).

While perhaps the most detailed source, the Atlas is not the definitive source of wasteland classification within India. A second main source of wasteland classification is the Agricultural Land Use Statistics, commonly referred to as the “Nine-Fold Classification” because it categorizes land into nine land use categories (Directorate of

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3 The NRSC is also housed within the Department of Rural Development.

4 The eight broad categories are: gullied/ravinous land, scrubland (with or without scrub), waterlogged and marshy land, land affected by salinity/alkalinity, shifting cultivation, scrub forest (underutilized, notified forest land), sands (coastal/desert/riverine), mining/industrial wastelands.
The Directorate of Economics and Statistics within the Ministry of Agriculture compiles the assessment annually but there is a two-year publication gap (ie. the most recent statistics are from 2008). The agricultural land use statistics are based on village land settlement records (referred to as the A Register) maintained by the Village Administrative Officer (VAO). Settlements are conducted annually at a village-wide meeting (Jambanthi) held each May or June. The settlement records are passed along and consolidated at the District, State and Central government levels by the Directorate of Economics and Statistics. However, various stakeholders interviewed for this study expressed doubt regarding the validity and update frequency of village land settlement records.

The most recent Nine-Fold classification for Virudhunagar District, Tamil Nadu, the site of the case study presented in subsequent sections of this paper, is presented below in Table 2. The current classification also presents the assessment for the previous year. Seven of the nine categories were largely unchanged between the two years. The amount of current fallows, defined as cultivable lands that are not being farmed in the current year, nearly doubled. This resulted in just over a 10% decrease in the net cultivated area. The amount of cultivable and uncultivable wastes remained largely the same in this period. While not presented in this paper, the Nine-Fold assessment was also obtained for the Sattur taluk of Virudhunagar in the course of fieldwork for the same 2008-2010 period. The same trend was present. Seven of the nine categories were virtually identical while the amount of current fallows nearly doubled, which resulted in a decrease in the net cultivated area. Additional research is needed to examine the marked increase in fallow lands and how, if at all, this might relate to the amount of wastelands in future assessments.

Table 2: Nine-fold assessment for Virudhunagar district, Tamil Nadu

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Classification</th>
<th>Current Year 2009-10</th>
<th>Last Year 2008-09</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area (ha)</td>
<td>Area (ha)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Forest</td>
<td>26,466.000</td>
<td>26,466.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>B</td>
<td>Uncultivable waste</td>
<td>4,525.000</td>
<td>4,525.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>C</td>
<td>Non-agricultural uses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-- Buildings</td>
<td>10,613.070</td>
<td>10,609.220</td>
<td>3.850</td>
<td>0.04%</td>
</tr>
<tr>
<td></td>
<td>-- Roads</td>
<td>4,143.630</td>
<td>4,143.255</td>
<td>0.375</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td>-- Railway lines</td>
<td>828.000</td>
<td>828.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>-- Rivers</td>
<td>4,007.000</td>
<td>4,007.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>-- Canals</td>
<td>3,429.000</td>
<td>3,429.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>-- Check dams</td>
<td>25,850.000</td>
<td>25,850.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>-- Swamp area</td>
<td>202.000</td>
<td>202.000</td>
<td>0</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

The nine categories are: forests, area under non-agricultural uses, barren and unculturable land, permanent pastures and other grazing lands, land under miscellaneous tree crops and groves, cultivable wasteland, fallow lands other than current fallows, current fallows, net area sown.
The definition of cultivable wastes, the likely target area for biofuel wasteland cultivation within the Nine-Fold Classification is:

“land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings”

(Directorate of Economics and Statistics 2008: not paginated)

This definition also incorporates economic and ecological characteristics, similar to the Atlas, but the productive capacity of the land is the more crucial component of this definition. Unfortunately, statistics are not available for all states and thus, it is difficult to assess the classification for India as a whole. However, in 2005-06, the same year the 2010 Atlas is based on, 9.7 million ha of a recorded 217 million ha were classified as culturable waste (Directorate of Economics and Statistics 2010). This represents approximately 4.5% of recorded land area, about three-times less than the wasteland area percentage reported by the Atlas. Even if the definition of wasteland were expanded to include the other two classes of uncultivated land under the nine-fold classification, permanent pastures and grazing lands and lands under miscellaneous tree crops, the total wasteland area for 2005-06 would be approximately 19 million ha for reporting states, equivalent to about 9% of total reporting area. This is close to the wasteland area for the likely categories of the Atlas that would be targeted for biofuel production as discussed above. However, further guidance from biofuel policy makers as a well as Nine-Fold Classification statistics for all states in India would be needed to determine whether this similarity is valid. Further, based on the introduction to the 2010 Atlas, it does not appear the Nine-Fold Classification is used as a data source or as a

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| Social forestry | 235.000 | 235.000 | 0 | 0.00% |
| Others          | 21,202.600 | 21,206.825 | (4.225) | -0.02% |
| TOTAL           | 70,510.300 | 70,510.300 | 0 | 0.00% |

D Cultivable wasteland | 9,543.420 | 9,683.520 | (140.100) | -1.45% |
E Permanent pasture and grassland | 804.000 | 804.000 | 0 | 0.00% |
F Misc. tree crops & groves | 6,459.725 | 6,579.970 | (120.245) | -1.83% |
G Current fallow | 19,526.059 | 10,263.662 | 9,262.397 | 90.24% |
H Other fallow | 167,393.885 | 162,163.048 | 5,230.837 | 3.23% |
I Net cultivated area | 119,094.611 | 133,327.500 | (14,232.889) | -10.68% |
TOTAL | 424,323.000 | 424,323.000 | 0 | 0.00% |

Source: Virudhunagar District Collector’s Office, Department of Economics and Statistics.

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comparison point for the *Atlas* compilation (National Remote Sensing Centre 2010). This was broadly confirmed during interviews with government remote sensing experts in Tamil Nadu.\(^7\) A comparison of the *Atlas* and the Nine-Fold Classification is presented below in Table 3.

Table 3: Comparison of India’s *Wasteland Atlas* and Nine-Fold Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Wasteland Atlas</th>
<th>Nine-Fold Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wasteland definition</td>
<td>Wastelands refer to degraded lands that are currently underutilized, and are deteriorating for lack of appropriate soil &amp; water management or on account of natural causes. Wastelands develop naturally or due to influence of environment, chemical and physical properties of the soil or management constraints.</td>
<td>Land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings.</td>
</tr>
<tr>
<td>Responsible agency</td>
<td>National Remote Sensing Centre, Department of Land Resources, Ministry of Rural Development</td>
<td>Director of Economics and Statistics, Ministry of Agriculture</td>
</tr>
<tr>
<td>Assessment methodology</td>
<td>Remote sensing</td>
<td>A-Register land settlement reports compiled at village level</td>
</tr>
<tr>
<td>Update frequency</td>
<td>Every 5 years</td>
<td>Annually</td>
</tr>
<tr>
<td>Latest update</td>
<td>2010, based on 2005 images</td>
<td>2007-08 is latest year available online, based on previous year settlement. 2009-10 settlement obtained for Virudhungar district through field visits.</td>
</tr>
<tr>
<td>Geographic scope</td>
<td>National, statistics reported by district for each state</td>
<td>District-wise statistics for reporting states. Number of reporting states varies by year. Data for 13 states available for 2007-08.</td>
</tr>
<tr>
<td>Wasteland area for 2005-06 (% of India geographic total)</td>
<td>14.91% overall; 8.78% for scrublands and degraded pastures</td>
<td>9% for all uncultivated land categories; 4.5% for cultivable wastes</td>
</tr>
</tbody>
</table>

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\(^7\) Interview with Professor Sivasamy, Head of Tamil Nadu Agricultural University Remote Sensing and GIS Centre, September 3, 2010. Professor Sivasamy has co-authored a wasteland assessment using a remote sensing methodology similar to the Atlas methodology, (Natarajan et al. 2009)
In addition to the Atlas and the Nine-Fold Classification, numerous one-time wasteland classification studies have been conducted by other government agencies and NGOs. Each assessment has used different criteria and definitions and yields varied results (for a more comprehensive review see: Biswas, Pohit, and Kumar 2010; Eswaran 2001; Mohan Dharia Committee’s Report 1995). These assessments have similarly focused on the economic and ecological characteristics of land. Absent from most these studies is an examination of the land tenure and livelihood services provided by wasteland areas.

It is generally agreed a portion of wasteland areas are also common property resources (CPRs) (Kadekodi 2004; Chopra 2001). In his seminal studies examining the links between CPRs and rural livelihoods in semi-arid zones in India, NS Jodha found that poor communities derive between 15-23% of their household income from grazing animals, raising kitchen gardens and gathering fuelwood on CPRs (Jodha 1986). Further, Jodha found the total area of CPRs due to population pressure and land privatization (Jodha 1985). Subsequent studies have broadly confirmed these findings for other regions of India (Pasha 1992; Singh 1996; T. Beck and Ghosh 2000).

The 54th Round of the National Sample Survey (NSS) assessed both the magnitude of and rural dependence on CPRs throughout the country (NSS 1999). On average, the NSS estimated approximately 15% of India’s land area was CPRs and that 48% of households collected materials from CPRs. Roughly 58% of the products collected from CPRs was fuelwood (NSS 1999). These figures varied widely by geography and farmer class with Rajasthan having the largest magnitude of CPRs and landless and marginal farmers in hills and plains regions being the most dependent on CPR material collection (Menon and Vadivelu 2006; NSS 1999).

As evidenced by the above discussion, there is lack of agreement on the definition and extent of wasteland throughout India. Further, the ecological and livelihood services provided by these lands is under-researched. Finally, it is important to note that neither the National Mission on Biodiesel nor the National Biofuels Policy explicitly state how wastelands will be selected for biofuel cultivation and which, if any, existing assessment will be relied on. Without understanding the broader ecological, economic and livelihood context of wasteland areas, policies targeted at developing wastelands may threaten the welfare of communities they are introduced to improve.

The following section presents a case study of Jatropha wasteland cultivation in Southern Tamil Nadu to highlight these issues. The case study reveals the competing perceptions of wastelands amongst stakeholders and documents a regional energy economy already in existence using Prosopis juliflora (hereinafter referred to as Prosopis), a tree commonly found on the wastelands.
Tamil Nadu, a state in the southeast corner of India, began promoting Jatropha in 2002. The Centre for Excellence in Biofuels at the government-run Tamil Nadu Agricultural University (TNAU) is currently one of the world’s leading research centers on Jatropha and by 2008, Tamil Nadu was the third largest Jatropha cultivator in India with over 20,000 ha planted (GEXSI 2008).

In 2002, the AIADMK-led government initiated a wasteland development program in the state that allowed companies and self-help groups to lease up to 1,000 ha of government-owned wasteland for 30 years (Government of Tamil Nadu 2002). Jatropha projects were eligible under the program. The policy was modified after the 2007 state elections when the DMK, the AIADMK’s main rival, came to power. The DMK set a target of cultivating Jatropha on 100,000 ha between 2007-2012, primarily through contract farming (Government of Tamil Nadu 2009). The government provides a 50% seedling subsidy to participating farmers. The Agriculture Department is the nodal agency in charge of implementing the program and TNAU develops seed technology and administers the seedling subsidy (Government of Tamil Nadu 2009).

Despite the shift in the preferred mode of production, wastelands continued to play a significant role in Jatropha promotion because the Agriculture and Forest Departments raised Jatropha nurseries on forest and non-forest wastelands to support the program. The nursery seedlings were then distributed directly to farmers or provided to the 11 private companies selected by the Agriculture Department to begin contract farming operations (Government of Tamil Nadu 2009). Additionally, in numerous districts, the District Rural Development Agency (DRDA) raised Jatropha plantations on poramboke lands, the term for common lands in Tamil Nadu (Blaikie, Harriss, and Pain 1992). Poramboke lands are often classified as wastelands, according to interviews with key stakeholders. A DRDA officer in Theni District, the district to the west of this case study region, characterized poramboke plantings as “propaganda schemes” geared towards raising awareness amongst farmers and recruiting them for contract farming.

Concurrent with the Jatropha program, the Government of Tamil Nadu has also been running a wasteland distribution program, commonly referred to as the Two-Acre Program (Government of Tamil Nadu 2006). Under the scheme, up to two-acres of poramboke lands are redistributed to landless and marginal farmers. Three categories of land are identified for redistribution under the law:

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8 This component is not explicitly mentioned in the policy documents but was discovered in the course of field interviews with Agriculture and Forest Department staff at the state and district levels.
9 Interview with DRDA officer in Theni, August 27, 2010. Interview with Srivilliputtur Block Development Office (BDO) clerk, September 23, 2010. Interview with Member Secretary to the Planning Commission of Tamil Nadu, October 7, 2010.
10 Interview with DRDA Officer in Theni, August 27, 2010.
• Category I: government poramboke lands without encroachment
• Category II: government poramboke lands under encroachment by small and marginal farmers
• Category III: private patta\textsuperscript{11} wastelands of small and marginal farmers

Under the program, the Revenue Department selects lands and beneficiaries and the Department of Agriculture and the Tamil Nadu Watershed Development Agency (TAWDEVA) administer the program. As per the government order, these agencies develop restoration plans for the select lands, typically focused on tree planting schemes, pay for land preparation costs and provide saplings to farmers. The program does not mention whether Jatropha saplings would be distributed under the program but it is likely given the various government-sponsored Jatropha promotion efforts taking place at this time. At present, there is no comprehensive document detailing distributions under the program but beneficiary details are widely available on the websites of District Collectors’ Offices.

Tamil Nadu’s Jatropha program is operating similar to past wasteland development schemes. The government has initiated projects to improve the productive capacity of wastelands by raising plantations on government-owned lands and by redistributing wastelands to farmers. However, past programs, most notably social forestry, met with limited success and often reduced the amount of common lands available to village communities (Agarwal 1986; Pandian 1996; Arnold, Bergman, and Djurfeldt 1987; Shiva 1986).

To better understand the linkages between Jatropha and wastelands, a field study was conducted in four western taluks of Virudhunagar district in Southern Tamil Nadu, Rajapalayam, Srivilliputtur, Sivakasi and Sattur blocks (Figures 1 and 2).

\textsuperscript{11} Patta refers to private lands.
Figure 1: Tamil Nadu district map

This belt was selected because one of the 11 government-selected Jatropha companies, Saravana Bioventures, established Jatropha plantations in the Rajapalayam block and because of a high level of government-sponsored Jatropha activity in the region. Further, numerous companies, the most active of which has been the Australian-based Mission Biofuels, have established contract farming agreements with farmers in the region. Additionally, the Two-Acre program has been active in this region with 246 acres distributed to 262 beneficiaries (Virudhunagar District Government 2010).

The district as a whole receives between 800-1000 millimeters of rain per year making the district a dry land region (Government of Tamil Nadu 2010). Approximately 37% of the geographic area of the district is under cultivation but soil productivity is poor. Cotton, pulses, oilseeds and millets are the main dry land crops and sugarcane and paddy are grown in irrigated areas. Numerous textile mills are located in the region and Rajapalayam is the main center of cotton ginning activity for the country.

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12 Farmer surveys were conducted with 89 Jatropha farmers in the region. Data from the surveys is still being processed and not discussed in this paper.

13 Compiled from taluk-wise pdf files found on Virudhunagar District Collector’s Office website, http://www.virudhunagar.tn.nic.in/ last accessed on September 8, 2010.
**Methodology**

Fieldwork for this study began in June 2010 and will continue through February 2011. Three scoping trips to India between 2008-2009 also helped establish the foundation of the study. Additionally, between November 2009 and September 2010, the author’s research team has conducted surveys with 563 Jatropha contract farmers and 187 village officials in Southern Tamil Nadu to gather information on Jatropha cultivation practices, land use decisions and land classification. The survey data is still being processed and is referred to briefly in the sections below.

For this paper, visits were made to 11 villages in the Virudunagar District with a history of Jatropha cultivation.\(^{14}\) The objective of these field visits was to examine how wasteland areas are assessed, how they are used by communities and how key stakeholders in the biofuels industries perceive wastelands. These villages were chosen because they were either villages where the farmer survey was being conducted and/or because they were listed in government documents detailing the Jatropha program mechanics. At the village level, semi-structured interviews were conducted with village officials with direct knowledge or participation in Jatropha promotion schemes. This was often a current or former panchayat president. In villages with Jatropha farmers, the farmer survey was observed and an additional semi-structured interview was conducted. A description of the villages visited for this study are listed below in Table 4.

### Table 4: Villages visited for case study

<table>
<thead>
<tr>
<th>Village Type</th>
<th>Rationale</th>
<th>Number Visited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villages in designated forest areas</td>
<td>Listed in Forest Department documents as village where Jatropha nurseries were established</td>
<td>5</td>
</tr>
<tr>
<td>Panchayat villages with contract farming</td>
<td>Jatropha farmer surveys conducted in this village</td>
<td>4</td>
</tr>
<tr>
<td>Panchayat villages with Jatropha plantations on poramboke lands</td>
<td>Government sponsored plantations on common lands</td>
<td>3*</td>
</tr>
</tbody>
</table>

* One of the villages visited had both contract farming and plantations on poramboke lands.

Semi-structured interviews were conducted with government officials at the Agriculture, Forestry, BDO, and District Collector’s Office in Virudunagar and the Rajapalayam, Srivilliputtur, Sivakasi, Sattur belt. Interviews were also conducted with current and former Jatropha company employees and with NGOs working on environmental policy issues. Supplemental interviews were also conducted with academics at TNAU and Anna University (Chennai), and government officials in Chennai. The purpose of these interviews was to gather information on the mechanics of Jatropha promotion and the current status of the industry. To the extent the interviewee was qualified, the topic of

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\(^{14}\) The names of the villages are withheld to protect the identity of key informants.
wasteland assessment was also discussed. The breakdown of these interviews is summarized below in Table 5.

Table 5: Summary of semi-structured interviews conducted

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Department/Description</th>
<th># Interviews Conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td>District government</td>
<td>Forestry</td>
<td>4</td>
</tr>
<tr>
<td>District government</td>
<td>Agriculture</td>
<td>5</td>
</tr>
<tr>
<td>District government</td>
<td>District Collector’s Office</td>
<td>3</td>
</tr>
<tr>
<td>State government</td>
<td>Planning Commission</td>
<td>2</td>
</tr>
<tr>
<td>Jatropha companies</td>
<td>Interviews with biofuel company officials and employees</td>
<td>4</td>
</tr>
<tr>
<td>Companies using Prosopis as a feedstock</td>
<td>Charcoal makers, brick makers, paper companies, power plants, wood cutters</td>
<td>11</td>
</tr>
<tr>
<td>NGOs</td>
<td>2 NGOs visited: DHAN Foundation and MS Swaminathan Research Foundation</td>
<td>5</td>
</tr>
<tr>
<td>Academia</td>
<td>Departments of Rural Economics, Environmental Studies, Remote Sensing</td>
<td>7</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>41</td>
</tr>
</tbody>
</table>

Field study findings

i. Jatropha market status

The general perception across stakeholders is that Jatropha is a failed experiment in Tamil Nadu and in India as a whole. At present, Jatropha production is stalled throughout Southern Tamil Nadu and only one seed market in Theni District was found in the course of the fieldwork. The sole Jatropha seed trader, who also happens to be a scrap metal dealer, has sold roughly five tonnes of Jatropha seeds per year over the past three years, a trivial amount. According to the trader, villagers collect the seeds from wild Jatropha trees growing in the foothills of the Western Ghats and sell the seeds whenever they visit the city. The trader was unwilling to list the areas where villagers have been collecting seeds. Regardless, such a market structure would be unable to support the government’s 20% blending target.

Based on a preliminary review of the farmer survey data, contract farming has also produced negligible yields. Of the 563 farmers surveyed, only 91 (16%) have harvested seeds. Further, 242 (43%) of the farmers surveyed have already stopped maintaining

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15 Interview with seed trader in Theni, August 27, 2010.
their Jatropha trees, often within a year of initial planting. Future analysis will examine the causes and impacts of this outcome.

When asked to explain the current status of Jatropha, a common refrain amongst stakeholders was that Jatropha is not suited for wasteland cultivation. The tree requires more water than promoters claimed and it is better suited for irrigated, arable lands. At present, raising plantations on wastelands is not profitable for companies and farmers alike because of its water needs. Companies, numerous government officials and academic researchers expressed the need for developing hybrid seed technologies better suited for marginal land cultivation. Village officials and farmers, on the other hand, expressed concern over whether Jatropha could ever be successful, largely because of land pressures. The average land holding is 0.95 ha in Virudunagar, making it challenging for farmers to wait out the multi-year gestation period for Jatropha, a figure that is still uncertain but ranges from 3-5 years in the literature (Paramathma 2007; Government of Tamil Nadu 2010; Jongsaap et al. 2007). These differing perceptions will be discussed more fully below.

**ii. Government promotion**

In Virudunagar, the Forest, Agriculture, Revenue and Rural Development Departments participated in Jatropha promotion. The Forest Department raised Jatropha nurseries on degraded forest lands, the Agriculture department promoted plantations on poramboke lands while the BDOs and DRDA offices, part of the Revenue and Rural Development Departments, respectively, implemented the programs.

According to an interview with the Srivilliputtur Wildlife Warden, the Forestry Department agency in charge of Jatropha nurseries in Western Virudunagar, the office distributed 11,000 free saplings to 33 forest villages in 2006.\(^{16}\) The office did not know the exact number of seedlings distributed to each village or the total area planted. As was typical in multiple interviews, the department claimed they did not monitor the progress of Jatropha plantings because no money was allocated for follow up visits.\(^{17}\) Thus, the department offered few specific details on the outcomes of Jatropha nurseries.

The Forest Department activities were part of a larger Jatropha promotion scheme coordinated through the BDO Supervisor’s Office at the Virudhunagar District Collector’s Office. In August 2006, The BDO distributed a total of 1,000,000 free saplings to the 11 panchayat unions in the District with instructions to plant the saplings on poramboke lands (Virudhunagar District Collector 2006). The Srivilliputtur Wildlife Warden, the DRDA and the Agriculture Department implemented the program. The Central Government sponsored the program and provided Rs. 3 million (approximately $67,000) to the District. In total, the BDO distributed saplings to 261 villages in Virudhunagar (Virudhunagar District Collector 2006). Similar to the forest villages, the

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\(^{16}\) Interview September 23, 2010.

\(^{17}\) Interview with Srivilliputtur Wildlife Warden, September 23, 2010.
BDO claimed it has not closely monitored the progress of Jatropha schemes due to lack of funds.\textsuperscript{18}

The blocks\textsuperscript{19} examined in this field study were the four largest recipients and received 321,000 saplings (Table 6).

**Table 6: Blockwise sapling distribution details, Virudhunagar district**

<table>
<thead>
<tr>
<th>Block</th>
<th>Saplings Received</th>
<th># Villages Receiving Saplings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vembakottai</td>
<td>95,000</td>
<td>47</td>
</tr>
<tr>
<td>Sattur</td>
<td>86,000</td>
<td>50</td>
</tr>
<tr>
<td>Rajapalayam</td>
<td>82,000</td>
<td>36</td>
</tr>
<tr>
<td>Srivilliputtur</td>
<td>58,000</td>
<td>33</td>
</tr>
<tr>
<td>Watrap</td>
<td>52,000</td>
<td>9</td>
</tr>
<tr>
<td>Virudhunagar</td>
<td>45,000</td>
<td>25</td>
</tr>
<tr>
<td>Sivakasi</td>
<td>42,000</td>
<td>26</td>
</tr>
<tr>
<td>Aruppukottai</td>
<td>35,000</td>
<td>12</td>
</tr>
<tr>
<td>Narikudi</td>
<td>20,000</td>
<td>7</td>
</tr>
<tr>
<td>Thiruchuli</td>
<td>15,000</td>
<td>6</td>
</tr>
<tr>
<td>Kariapatti</td>
<td>10,000</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>540,000</strong></td>
<td><strong>261</strong></td>
</tr>
</tbody>
</table>

Sources: (Virudhunagar District Collector 2006, 2006)

Finally, the program also received Rs. 3.1 million ($69,000) in support from the Central Government Sampoorna Grameen Rozgar Yojana (SGRY) scheme (Virudhunagar District Collector 2006). The SGRY was a food and wage guarantee scheme for rural communities in effect between 2001 and 2008 (Government of India 2002; Government of Tamil Nadu undated). The program provided employment opportunities for adult members of rural households living below the poverty line. SGRY program funds were used to recruit laborers for Jatropha cultivation and tree maintenance. The SGRY has since been incorporated into the Mahatma Gandhi National Rural Employment Guarantee Act (NREGA), a program that provides 100 days of labor for Rs. 100 ($2.20) per day for all adult members of below poverty line households (Ministry of Rural Development 2010).

**iii. Cultivation instructions**

Both the Forest Department and BDO instructed villages to plant Jatropha on wastelands. This was not a new policy intervention but rather the latest iteration of tree planting schemes that have taken place in India at least since the 1976 National Commission on Agriculture Report in 1976 (Eswaran 2001).

\textsuperscript{18} Interview with BDO Supervisor, September 30, 2010.

\textsuperscript{19} Block and taluk are two separate administrative divisions within Indian government. Blocks are used for program administration, largely through panchayat institutions while taluks are for revenue collection. Block and taluk divisions do not always overlap. For this field study, the taluks studied are Rajapalayam, Srivilliputtur, the southern portion of Sivakasi and Sattur. The corresponding blocks are Rajapalayam, Srivilliputtur, Vembakottai and Sattur.
Based on visits to forest villages, the department planted Jatropha in degraded areas along the boundary between forest and agriculture land. Based on an interview with a forest guard, forest officials did not plant it in the forest interior because Jatropha is a small tree and officials doubted its ability to grow under denser canopies. Jatropha was planted as part of the Forest Department's annual tree planting scheme. Each September and October, the department plants an array of new tree saplings and returns the following year to monitor progress. If the trees are underperforming, the department uproots the trees and plants something else.

One forest villager interviewed for this study referred to the areas where Jatropha was planted as pattal land, empty land. The particular area of forest where Jatropha was planted has always been pattal, according to the villager, because of a large rock formation nearby the area. In a second forest village visited where Jatropha was also planted along the forest-agricultural land boundary villagers were in the process of uprooting Jatropha trees because no yield had been obtained in the three years since planting. This was the only village the Srivilliputtur Wildlife Ranger’s Office believed was still cultivating Jatropha trees.20

Regarding panchayat villages, about one-fourth of the villages that received saplings planted Jatropha on the shores of irrigation tanks, according to BDO documents (Virudhunagar District Collector 2006). These lands are customarily poramboke lands in Tamil Nadu, which have historically been used for cattle grazing (Shah et al. 1998).

As evidenced during the field visits, the tank shores are living memorials to past tree planting schemes. Various fruit trees, including coconut and palm, dot the shores, as well as casurina and teak, two fast growing wood species planted as part of Social Forestry programs in the 1960s and 1970s (Arnold, Bergman, and Djurfeldt 1987). Prosopis, an exotic species native to Central and South America is also commonly found along the tank shores and other wasteland areas (Tewari et al. 1993). Based on interviews with several officials, Prosopis was promoted by the former Chief Minister of Tamil Nadu Kamaraj during the 1950s prior to the start of Social Forestry. Similar to the government and bilateral donor agency motivations of Social Forestry (Agarwal 1986), Kamaraj advocated Prosopis cultivation to bolster fuelwood supplies for rural communities in order to mitigate deforestation.

However, various authors have questioned the motivations of Social Forestry as the tree species selected were more often appropriate for the pulp and paper industry rather than village fuelwood needs (Pandian 1996; Shiva 1986). Prosopis may have been introduced under a similar guise because a native species, Prosopis cineraria, already existed in India (Tewari et al. 1993). Based on field visit interviews with industries using Prosopis juliflora, juliflora is preferred to its native counterpart because it is faster growing and has a thinner trunk, making it more suitable for industrial purposes.21

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20 Interview with Srivillipputtur Wildlife Warden, September 23, 2010.
iv. Wasteland perceptions

Stakeholders interviewed for this study also expressed differing perceptions on the concept of wastelands. Government officials frequently remarked, “there is no such thing as wasteland, only wasted land”. When asked to explain this comment, the officials stated areas classified as wastelands are not economically profitable to farm and should be put to more productive uses. While recognizing the ecological and livelihood significance of wasteland areas, one official went on to remark, “money and power dictates (in land assessments), not ecology”. When asked for clarification on wasteland assessment procedures, after detailing the mechanics of the Nine-Fold Classification, the same official stated, “wastelands are whatever the government says they are.” Thus, in theory, it is possible that any land the government chooses regardless of its economic, ecological or livelihood importance, could be deemed wasteland.

At the village level, numerous officials also claimed there is no such thing as wasteland but for different reasons than government officials. In their view, all lands are being used in some fashion, be it for farming, grazing or fuelwood collection, and are important for the welfare of the village. Many village lands classified as wastelands are cultivated with Prosopis, which is used for fuelwood and as a feedstock for a host of energy applications. Further, as various stakeholders remarked, Prosopis cutting is a main source of employment for the landless poor and marginal farmers.

Additionally, villagers did not necessarily perceive poramboke lands as wastelands, although government classifications often classify poramboke lands as such. The poramboke lands are frequently used for fuelwood and fodder gathering as well as for planting subsistence crops when feasible. Villagers used the term darisil, the Tamil word for waste as it pertains to lands, to refer to lands with poor soil quality. According to villagers, in some instances, darisil lands might be poramboke lands but villagers kept emphasizing the clear distinction between the land categories. Further, villagers remarked the extent of darisil lands vary annually because the soil quality is highly dependent on rainfall and climatic conditions from year to year. Darisil lands are not irrigated. Villagers considered the lands with Prosopis darisil because of the difficulties with removing Prosopis to farm the lands. However, village officials did not consider Prosopis lands darisil because the lands could support farming activities in theory if the Prosopis were removed.

As previously mentioned, Jatropha was planted on irrigation tank shores in many of the panchayat villages visited. In one such village, the panchayat president confided he was forced by the BDO to find land to plant Jatropha after he protested there was no space available for growing Jatropha. The village planted Jatropha along the tank shores, which villagers have historically used for cattle grazing. The president claimed Jatropha has not interfered with grazing but this may be because the shores are also densely

22 Interviews with Tamil Nadu Planning Commission officials, October 7, 2010.
23 Ibid.
cultivated with other tree species from past tree planting schemes. In other villages, Jatropha was planted as a boundary fence on main roadways in town or near the panchayat offices. In all but one village, the trees along the shores and in the boundary fences had not been maintained. There was no evidence of pruning, a technique used to encourage branching and increase seed yields, and many of the trees were dried up.

Biofuel companies operating in the region were aware of the tensions between wasteland classification and land use. In fact, the author first learned about the Prosopis energy economy in a 2009 interview with the General Manager of Emami Biotech.\textsuperscript{24} In 2008, Emami Biotech began leasing contiguous plots of wastelands from absentee farmers in Virudhunagar to raise Jatropha plantations; a process the General Manager called “contract farming under captivity”.\textsuperscript{25} However, by 2010 Emami had paused its Jatropha activities and was instead growing legumes on the leased wastelands.\textsuperscript{26} While the company acknowledged the linkage between wastelands and rural livelihoods, the General Manager claimed its significance has been steadily diminishing because of the introduction of LPG gas for cooking, rural-urban migration and the NREGA scheme.\textsuperscript{27}

According to the General Manager, Emami was providing a valuable service to rural communities by removing Prosopis and putting the wastelands to more productive use, a process that provided new employment opportunities to rural farmers. However, the validity of these claims is questionable because charcoal and brick kilns are commonly found throughout the Virudhunagar countryside and women carrying headloads of Prosopis fuelwood line roadsides at sunset each evening. Further, Prosopis cutting, charcoal and brick manufacturing provide steady annual employment for villagers while Jatropha offers one-time opportunities at the point of initial cultivation. Depending on if and how long a company maintains Jatropha, occasional seasonal employment for weeding, pruning and harvesting may also be available. However, both Emami Biotech and Saravana Bioventures, the two companies that have tried to establish Jatropha plantations in Virudhunagar, have stopped their Jatropha activities. Therefore, Jatropha currently offers no employment opportunities to rural farmers.

\textbf{v. Prosopis economy}

As discussed in the preceding sections, Prosopis is widely found across the wasteland areas of Virudhunagar. It is not unique to Tamil Nadu as it is widely found throughout the semi-arid zones of India (Tewari et al. 1993). In numerous interviews, villagers and government officials expressed ambivalence towards the tree because it is invasive and challenging to remove. Yet, it is a steady source of employment for the rural and landless poor, particularly in Sivaganga and Ramnad Districts in eastern Tamil Nadu. Similar sentiments have also been documented in North India (Gold 2003; Gupta 2009).

\textsuperscript{24} Interview with Emami Biotech General Manager, March 16, 2009.
\textsuperscript{25} \textit{Ibid}.
\textsuperscript{26} Interview with Emami Biotech General Manager, June 21, 2010.
\textsuperscript{27} Interview with Emami Biotech General Manager, March 16, 2009.
Regardless, Prosopis is currently used as a feedstock for a host of industries including charcoal, brick and power generation, both centralized and decentralized. There are two 10-megawatt biomass power plants near the study region using Prosopis as a feedstock: ETA Power Generation in Sattur taluk, Virudhunagar and Auromira Energy in Peraiyur taluk, Madurai. Additionally, villagers commonly use it for fuelwood. Further research is in progress to more closely examine the extent and magnitude of the Prosopis economy in the region and the environmental and livelihood impacts of replacing Prosopis with Jatropha.

However, based on this cursory overview, India’s rural and urban energy economies, as well as the country’s biomass and biofuel programs, are in direct conflict for the same lands. This can lead to potentially adverse outcomes if the policies limit biomass resources and land access for the rural poor. The Government of India, with its power to designate lands as wastelands, is the architect in this debate as the fate of countless rural poor hinges on government’s land use declarations.

CONCLUSION

This paper sought to highlight the ambiguities, contradictions and omissions embodied in the term wasteland in India. Multiple government-sponsored wasteland assessments exist each using different methodologies and yielding dissimilar results. Current assessments focus primarily on the economic and ecological capacity of lands and pay less attention to existing land use patterns on wasteland areas. These areas are often common property lands, which provide significant livelihood services to the rural poor. Without a more complete assessment of the economic, ecological and livelihood linkages of wastelands, the efficacy of policies aimed at developing wastelands, such as India’s National Biofuel Policy, is likely specious.

As a case study of Jatropha biofuel production on wasteland areas in Virudhungar Tamil Nadu revealed, a widely held perception across stakeholders is that there is no such thing as wastelands. Government and corporate stakeholders believed so called wastelands were wasted lands that could be put to better economic uses while villagers maintained all lands within the village purview were already serving useful purposes. Most strikingly, the lands targeted for Jatropha plantations are presently cultivated with Prosopis, which currently serves as an energy feedstock for a host of industries and whose coppicing provides employment opportunities to marginal farmers and the landless poor. This facet of wastelands is not present in India’s biofuel policy documents. Instead, the policy documents assert restricting biofuel cultivation to wastelands will distinguish India’s policy as one that avoids competition with food production. However, absent a more critical evaluation of wastelands that simultaneously considers their economic, ecological and livelihood significance, India’s biofuel policy may be distinct for increasing the instability of the rural poor. Other

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28 Madurai District borders Virudhunagar District to the north and Periyur taluk is along the Madurai-Virudhunagar border.
29 The two trees cannot be intercropped because as drought-tolerant species, the two would compete for water.
countries’ biofuel policies targeted at marginal or degraded lands would benefit from similar scrutiny.
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