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## **Making Space for Energy: Wasteland Development, Enclosures, and Energy Dispossessions**

### **Abstract**

This paper analyzes why and how wasteland development narratives persist through an evaluation of wasteland development policies in India from 1970-present. Integrating critical scholarship on environmental narratives and enclosures, I find that narratives of wastelands as “empty” spaces available for “improvement” continue because they are metaphors for entrenched struggles between the government’s shifting visions of “improvement” and communities whose land use practices contradict these logics. Since the 1970s, “improvement” has meant establishing different types of tree plantations on wastelands to ostensibly provide energy security. These projects have dispossessed land users by enclosing common property lands and providing forms of energy incommensurate with local needs, a trend I term “energy dispossessions.” Factors enabling energy dispossessions include the government’s increased attempts to establish public-private partnerships to carry out “improvement” and a “field of observation” constructed to obscure local livelihoods. Unveiling these logics will help to problematize and contest future iterations of wasteland development.

### **Keywords**

Enclosure, energy dispossessions, wastelands, Prosopis, Jatropha

### **1. Introduction**

It’s March 2009 and I’m observing the preparation of a 300-acre Jatropha biofuel plantation in rural Tamil Nadu, India. As I interview the company manager, day laborers hurry around us digging pits and sorting Jatropha tree saplings. The manager informs me that this land used to be wasteland -- full of nothing but Prosopis trees, which he points to off in the distance. He acknowledges that Prosopis is still used as a fuelwood in the region but indicates that such practices are in steady decline. What’s more, he characterizes Prosopis use as a “backward” practice. Echoing the views expressed in the Government of India’s (GOI’s) National Mission on Biodiesel (GOI, 2003), a policy aimed at converting 17.4 million hectares (Mha) of wastelands to Jatropha plantations throughout the country, he states that biofuels will help India

modernize by providing a domestically produced, environmentally friendly form of energy. The juxtaposition of smoking earth kilns converting *Prosopis* wood into charcoal along the road leading to the *Jatropha* plantation serves as a stark symbol of what I term “energy dispossessions”: the energy economies erased and the livelihoods put at risk as India inscribes its *Jatropha* program in rural communities.

*Prosopis* and *Jatropha* were introduced into India’s rural landscape through different iterations of the GOI’s wasteland development policy, Social Forestry and the National Mission on Biodiesel (NMBD), respectively. An environmental narrative that frames wastelands as “empty” lands that could be “improved” in order to provide economic and environmental benefits has been used to motivate both policies. In concert with the rise of ecological modernization in the 1970s -- a mode of environmental governance predicated on interlinking ecological and economic planning (Mol and Sonnenfeld, 2000) -- the GOI’s notion of “improvement” since the introduction of Social Forestry has hinged on establishing tree plantations on wastelands in order to provide energy security.

An expansive body of critical scholarship has argued that land labels such as “wastelands” are political constructions (ie. Franco et al., 2010, Levidow, 2013, Borras et al., 2010) and that discourses of environmental degradation have frequently privileged elite stakeholder accounts of the causes and consequences of land use change over local land user claims (e.g. Fairhead and Leach, 1996, Dove, 1998, Scoones, 1996, Leach and Mearns, 1996). Specific to wasteland discourses, scholars have analyzed how such discourses have functioned at distinct time periods within particular countries (Goldstein, 2013, Gidwani, 1992, 2008, Yeh, 2009) while others have traced the evolution of wasteland discourses in a particular region over a certain time period (Saigal, 2011, Harms and Baird, 2014, Harms, 2014, Ferguson, 2014,

Baird, 2014). While these studies demonstrate the proliferation of wasteland narratives across geographies and policy contexts, they do not examine *why or how* this narrative persists.

In this paper, I analyze the persistence of wasteland narratives through a comparative analysis of India's Social Forestry and NMBD policies. Integrating critical scholarship on environmental narratives and enclosures, I argue that wasteland narratives are metaphors for an entrenched, ongoing struggle between the GOI's energy and industrialization visions and local land use practices. Further, I argue that wasteland narratives (re)-emerge at distinct times in order to avoid crises of accumulation. In the context of Social Forestry, the wasteland narrative helped the GOI to incubate a nascent high value timber sector while in the case of the NMBD, it has allowed the country to establish a domestic biofuel sector and reduce its growing dependence on fossil fuel imports.

I also attend to the socio-material impacts of wasteland narratives when they are implemented in rural communities. More specifically, wasteland narratives are enacted through practices of enclosure. While existing scholarship asserts that enclosure is both a discursive and material process (Blomley, 2007), little attention has been paid to the role of energy in mediating this practice. During the time period analyzed in this paper, the GOI established tree plantations on common property lands in order to increase fuelwood supplies in the case of Social Forestry or to provide new sources of domestic energy in the case of the NMBD. With limited exceptions, the forms of energy provided by these tree plantations have been incommensurate with the needs of rural communities. Although *Prosopis* has helped to address rural fuelwood shortages, it is now being uprooted to make space for *Jatropha*. This transformation stems in part from the invasiveness potential of *Prosopis* but also

because of the GOI's shifting views of what constitutes "modern" energy consumption. Presently, Prosopis is perceived as a barrier to India's industrialization and urbanization goals, which are embodied in the country's visions for a Jatropha biodiesel economy. Yet Prosopis fuelwood plantations were established in the 1970s to remove obstacles to the country's burgeoning "production forests". This tension between shifting government visions of "modern" energy and the non-substitutable types of energy provided by Prosopis and Jatropha tree plantations has served to dispossess rural land users, a process I term "energy dispossessions".

After a review of critical scholarship on wasteland narratives and enclosure, I analyze how the GOI makes space for energy through a comparative analysis of Social Forestry and the NMBD. I compare the policy goals of both projects and develop the concept of energy dispossessions through a comparison of Prosopis and Jatropha promotion in rural Tamil Nadu, India. I then examine how the GOI has constructed a "field of observation" (Hannah, 2000) to carry out wasteland development through an analysis of wasteland definition and classification procedures over this period. I conclude by reflecting on how this study helps to advance critical perspectives on environmental narratives, enclosures, and energy studies.

This paper draws on data gathered from 13 months of fieldwork conducted in India between 2008-2011. I conducted over 100 interviews with industry, civil society, and government stakeholders involved in biofuel and land use planning at the village, district, state, and central government levels. I also interviewed farmers and conducted participant observation at two Jatropha plantations in rural Tamil Nadu. Additionally, I conducted an Energy Flow Analysis to comparatively analyze the energy provided by Prosopis fuelwood and Jatropha biofuels in a sub-region of rural Tamil Nadu, which involved surveying 158 Prosopis users across 39 villages (author,

date). Lastly, I have reviewed numerous policy documents and government reports related to wasteland development, Social Forestry, and the NMBD.

## **2. Critical perspectives on environmental narratives and enclosure**

In this section, I integrate literature on environmental narratives and enclosure in order to evaluate why wasteland narratives persist. In isolation, neither stream of literature can sufficiently address this question as its explanation requires being attentive to the discursive construction and socio-material impacts of wasteland development, how these practices have changed over time, and how they are differentially mobilized across scales.

Since the 1980s, an expansive literature has emerged to critique the truth claims embodied in environmental narratives. One body of work has argued that environmental narratives result from a desire to simplify a more complex reality and can continue often in spite of strong contradictory empirical evidence (Roe, 1991, 1994). A related body of research contends that environmental narratives are not neutral statements but are instead social constructions consisting of different truth claims forged through the interaction of different stakeholder alliances (Hajer, 1995). Empirical studies of environmental narratives have attempted to map the landscape of stakeholder perspectives in order to reveal the more complex realities contained within a particular narrative.

Discourse analyses of the term “wasteland” have analyzed the relevance of the term in land use policies at distinct time periods in specific regions. Through an examination of the category in Indian colonial land settlement policies, Gidwani (1992) found that while there was little agreement as to what wastelands were or their extent, there was consensus that such lands were “bad” and needed to be eliminated. The moral qualities ascribed to the category assisted with this process. Indigenous

communities were considered wasteful while colonial settlers were considered productive. In this regard, the connotation of the term afforded the land category a degree of ambiguity and political power.

Similar logics continue to infuse India's postcolonial land use policies regarding energy development (Ariza-Montobbio et al., 2010), industrialization (author, date), and urbanization (Gidwani and Reddy, 2011), amongst others. The political salience of the category is not unique to India and has been well documented elsewhere in developing and developed country contexts, often at particular historic moments or over distinct time periods (e.g. Ferguson, 2014, Harms and Baird, 2014, Harms, 2014, Baird, 2014, Yeh, 2009, Goldstein, 2013).

In tracing the origins of the term "wastelands", scholars have linked the term back to John Locke (e.g. Whitehead, 2010, Gidwani, 1992, Goldstein, 2013, Harms and Baird, 2014), who invoked the term to refer to any lands not privately owned (Locke, 2011 (1680)). Locke advocated for privatizing wastelands, contending that the returns of privately owned lands would far exceed those of lands "lying waste in common" (Ch. 5, Sec. 37). While this logic is grounded in economic, not environmental logic, it marked the beginning of the wasteland narrative: underperforming common lands with the potential to be improved and provide a societal benefit if enclosed.

While these studies illustrate the social construction of wastelands and the origins of the wasteland narrative, they do not explore why wasteland narratives persist. Hajer (1995) argues that environmental narratives function as metaphors for larger, more entrenched political debates. Extending this logic, Forsyth (2003) contends that environmental narratives act as epiphenomena through which these

entrenched debates are played out in new policy arenas. The task then becomes to unveil the unresolved debates embedded in narratives.

As result of the rise in private governance initiatives in extractive industries, Bridge and McManus (2000) argue that environmental narratives can function as a form of social regulation in order to facilitate stability in accumulation processes. Extending this logic, environmental narratives may (re)-emerge as crises of overaccumulation loom. Regarding wastelands, Gidwani (2008) claims that the category acts as a literal and figurative frontier for civil society, serving as a repository for society's discards yet posing both an opportunity and a threat to surplus accumulation. As such, wasteland narratives may (re)-emerge to help negotiate frontier boundaries.

While this work helps to hypothesize why narratives persist, it does not systematically investigate how such narratives are implemented or their socio-material impacts. In this regard, Goldstein (2013) links shifts in the perception of "wastes" to the enclosure debates of 18<sup>th</sup> century England. Enclosure advocates came to understand this land category as "wasted commons" instead of "common wastes". This shift created a qualitatively new type of land, which he terms *terra economica*, lands capable of becoming but not yet capital. Hence, enclosure is a mechanism through which wasteland narratives are carried out.

Recent critical geography scholarship has argued that enclosure is both a discursive and material practice operating across a range of scales. Blomley (2007, 2014) notes that enclosure is depicted symbolically through maps, surveys, and laws but is also physically inscribed on the land using objects such as fences and hedges. Jeffrey et al (2012: 1248) assert that enclosure is spatially produced through a diverse assemblage of social and material activities characterized by "relations of stability and

flux, fixity, and movement”. As a result, Vasudevan et al (2008: 1642) argue that enclosure operates “contingently, provisionally, and violently across a range of scales, sites, and networks” and must be examined in a multi-sited fashion to reveal these dynamics.

Hannah’s (2000) concept of the “field of observation” helps to analyze how enclosure is discursively produced. Fields of observation are constructed through processes of *abstraction* and *assortment*, which refers to the calculative practices used to homogenize activities within a designated region so that they can be organized, compared, and contrasted. For example, Robbins (2001) reveals how remote sensing technologies can serve to enforce existing stakeholder perceptions of land use practices rather than to clarify debates over the causes and consequences of land use change. As such, classification techniques are not objective techniques but are instead political objects that help to determine what practices “count” (Demeritt, 2001), to render populations governable through acts of “state simplification” (Scott, 1998), and to sustain a need for expert knowledge and intervention (Li, 2007).

Despite calls to better spatialize the practice of enclosure and to study its political and material rationalities, to date, empirical studies have primarily focused on the political logics of enclosure (e.g. White et al., 2012, Peluso and Lund, 2011, Fairhead et al., 2012) and the extent to which enclosure produces “surplus populations” (e.g. Li, 2010, Li, 2011, Peters, 2013). With the exception of Blomley (2007), the material practices of enclosure are underexplored as are studies of how the socio-material impacts of enclosure vary according to the purpose for which lands are enclosed. Political geographers have emphasized the importance of studying the historic and spatial specificity of resource-related violence as different resources will be enmeshed within unique political struggles (Le Billon, 2001, Le Billon, 2008,



Peluso and Vandergeest, 2011). By extension, as resources are embedded within distinct commodity chains, their development will forge specific human-environmental relationships. In other words, enclosures for energy will be distinct from enclosures for food.

By examining the role of energy in enclosures, this paper not only helps to advance critical scholarship on enclosure but also responds to recent calls for a (re)-engagement between energy geography and social theory to better reveal how energy mediates human-environment relations (Calvert, 2015) and shapes the production of space through everyday practices of production and consumption (Huber, 2015). As I will demonstrate, analyzing energy development as a distinct improvement project not only helps to better explain why wasteland narratives persist but also helps to advance understandings of the specific socio-material impacts of enclosure projects.

### **3. Wasteland narratives and “improvement” logics**

Wastelands have existed as a revenue category in India since pre-colonial times (Gadgil and Guha, 1992). However, in line with global shifts towards ecological modernization in the 1970s, the GOI established a National Commission on Agriculture (NCA) to develop strategies for improving the productivity of the country’s resource base (GOI, 1976a). Social Forestry was introduced as part of these efforts. The NCA recommended transforming India’s forests into “production forests”, plantations of high value timber products. According to the GOI, this strategy would not only secure household energy supplies but would also create new jobs for rural communities through the establishment of tree plantations.

Social Forestry was not unique to India. At the same time, the international development community was promoting community forestry projects as an effort to

address the “other” energy crisis of the 1970s, the projected shortage in rural fuelwood supplies in developing countries (Eckholm, 1975). Concerned that fuelwood shortages could accelerate rural-urban migration, the GOI also implemented Social Forestry as a method for curbing urban influxes.

In practice, Social Forestry in India and community forestry projects throughout the world have been criticized for their regressive effects. Leach and Mearns (1989) argued that conceptualizing the fuelwood “crisis” as a supply shortage overlooked the broader economic and political processes facilitating deforestation. Further, many of the tree species promoted under these projects, such as eucalyptus and teak, were better suited as feedstocks for emerging pulp and paper industries rather than as household fuelwood (Agarwal, 1986). These disconnects motivated community protests including the famed *Chipko* movement in India whereby rural female villagers created human chains around trees in order to protest deforestation (*ibid*).

Demonstrating Roe’s (1991) assertion that environmental narratives often continue in spite of contradictory evidence, wasteland development in India rapidly expanded throughout the 1980s and 1990s. During this time, the project was formally institutionalized and the wasteland narrative motivating policies expanded to include environmental and ecological dimensions. In his inaugural address to the nation in 1985, Prime Minister Rajiv Gandhi expressed concern that India was facing a major ecological and socio-economic crisis due to continued deforestation and rural poverty in the country (GOI, 1989). To address these dual crises, Gandhi established the National Wasteland Development Board (NWDB) in 1985 to increase the establishment of fuelwood and fodder plantations on wastelands (Chowdhry, 1989).

According to various government reviews, wasteland development projects

failed to achieve their goals throughout the 1970s and 1980s. One review characterized the performance of previous wasteland development policies as “dismal” (GOI, 1994b: i) while another claimed that over Rs. 5,000 crore per year (\$92 million) was being spent on wasteland development with few results (GOI, 1995). In response, India began treating wastelands on a watershed basis in the 1990s (GOI, 1994b). Although watershed development did not have a specific focus on energy production, the program is significant because it represented a spatial reorganization of wasteland development. Instead of treating isolated patches of degraded lands alongside roads, fields, and canals, land degradation was now addressed throughout an entire watershed from “ridge to valley”.

The National Mission on Biodiesel (NMBD), begun in 2003, is the most recent iteration of wasteland development and continues many of the same themes established since Social Forestry. By developing a domestic biofuels industry to reduce fossil fuel imports, the project aims to address the combined challenges of land degradation, energy security, and rural poverty by establishing *Jatropha* plantations on wastelands (GOI, 2003). Extending the environmental rationale of wasteland development, the NMBD categorizes *Jatropha* biodiesel as an “environmentally superior” fuel that will help the country mitigate climate change and improve human health by displacing fossil fuel usage. According to the GOI’s estimates, employment generated by creating a *Jatropha* industry would allow 550,000 rural families to escape poverty over the lifetime of the projects (*ibid*).

Key themes emerge from this policy history. First, wasteland development is consistently presented as a “pro-poor” initiative with the ability to reduce rural poverty through job creation. Relatedly, projects are also characterized as “pro-environment” because of their potential to improve resource management and in the

instance of biofuels, mitigate climate change. Yet, wasteland development has failed to achieve its goals necessitating further rounds of wasteland development. With the exception of the NMBD, which makes no reference to previous wasteland development policies, new rounds of wasteland development have been justified on the basis that past projects have not adequately defined and classified wastelands, that government ministries have not sufficiently coordinated efforts or made use of best available technologies to arrest land degradation. This reasoning does not question the logic of the wasteland narrative underlying the projects. Further, it does not discern who benefits from wasteland “improvement”, a task I turn to in the next section through a comparison of the socio-material impacts of *Prosopis* and *Jatropha* promotion in rural Tamil Nadu.

#### **4. Inscribing wastelands: energy dispossessions**

Blomley (2007) draws attention to the overlooked role that material objects – specifically hedges -- have played in creating private property arguing that hedges are “powerful machine[s] of enclosure” (5) functioning as both physical barriers and symbolic representations of property. Yet, their materiality has made hedges sites of political struggles for those opposed to enclosure. As a result, hedges have often played contradictory roles in making private property.

This section will demonstrate that tree plantations serve to alter property relations in similarly contentious ways by acting as living fences and as symbols of “modern” energy and industrialization visions. However, unlike hedges, promises of jobs and usufruct rights have accompanied the introduction of tree plantations, which act to enroll rather than outright exclude rural land users from property transformations. Development scholars have long argued that tree plantations can deliver benefits to the rural poor by serving as a form of savings (Chambers and

Leach, 1989) but that beneficiaries of tree plantations will be determined by the complex interaction of gender, property rights, and power (Rocheleau and Edmunds, 1997). Further, tree plantations can be viewed as a variant of Peluso and Vandergeest's (2011) "political forests" by forging new property relations and erasing existing claims. As the proceeding comparison of *Prosopis* and *Jatropha* will reveal, the materiality of trees also plays a significant role in these processes because the specific energy services and jobs provided by tree energy plantations will influence the distribution of benefits, migration patterns, and efforts to resist enclosure through tree plantations.

*Prosopis* (*Prosopis juliflora*) was the archetypical tree of Social Forestry.<sup>1</sup> Quick growing, high in calorific content, and able to thrive in arid environments, the Forest Department tasked forest guards throughout the country with spreading *Prosopis* seeds on their daily transect walks. Various farmers and government officials I interviewed throughout Tamil Nadu told stories of forest guards also taking to the sky in helicopters to spread the seeds more quickly.

Forest officials did not anticipate just how well the tree would take to India's arid environments. It is now considered an invasive species because it colonizes and transforms landscapes. It spreads as goats graze on the pods of young trees. Once established, the tree is challenging to uproot without machinery because of its deep taproot and the sharp thorns on its trunk. *Prosopis* has been considered an inferior fuelwood by Rajasthani agriculturalists (Robbins, 2001) and a menace by Gujarati land owners because of the expense of keeping the tree at bay (Gidwani, 2008). Yet landless households have benefited from access to free fuelwood and employment opportunities provided by harvesting the tree. It has nearly erased the fuelwood crisis

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<sup>1</sup> *Prosopis* was initially introduced in India in the 1950s. However, it was rapidly spread through the country during Social Forestry.

in Gujarat by providing a steady supply to landless households who no longer have seek permission to gather wood from landowners (Gidwani, 2008).

Elsewhere I have documented a more robust yet similarly irksome Prosopis economy in rural Tamil Nadu (author, date). Coppicing the tree (cutting but not uprooting) provides about nine months of steady employment to cutting crews comprised largely of landless laborers who move across the landscape on three-year cycles, the time needed for Prosopis to regrow. Prosopis serves as a fuelwood for households and industry – mainly brick manufacturers and paper mills – and as a feedstock for energy production – for decades, charcoal but in recent years, electricity because of the construction of biomass power plants in the region.

Perceptions of Prosopis in Tamil Nadu echo those captured by Robbins and Gidwani in Rajasthan and Gujarat (author, date). Landowners deem it a menace because once it invades, it is hard to uproot motivating some farmers to abandon their lands. Shepherds avoid stands of Prosopis as the thorns on the tree's trunk threaten the gums of animals. Importantly, landowners and landless communities do not consider Prosopis lands to be wastelands (author, date). Instead, they claim the land could again be used for agriculture if the Prosopis were removed, a claim supported by studies of the soil restoration properties of Prosopis (Jambulingam and Fernandes, 1986).

Despite the energy services and employment provided by Prosopis, the GOI currently considers Prosopis lands to be wastelands. Numerous government officials and biofuel company representatives characterized Prosopis as a “backward” form of energy that was in steady decline (author, date).<sup>2</sup> In recent years, the Tamil Nadu

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<sup>2</sup> Out of nearly 100 interviews, only one government official acknowledged the significance of Prosopis to rural livelihoods in Tamil Nadu.

government has provided subsidies to help clear *Prosopis* from the land but only industries seeking to establish *Jatropha* plantations have qualified for such assistance.<sup>3</sup>

Although also able to grow in arid environments, *Jatropha* (*Jatropha curcas*) is a stark contrast to *Prosopis*. *Jatropha* wood has a lower energy content and a higher moisture content than *Prosopis* making it less suitable as a fuelwood (Bailis and McCarthy, 2011). The trees mature in about 4 years without fertilizers or irrigation and around 2-3 years if fertilized and irrigated (Almeida et al., 2011). Oil from the seeds is used to manufacture biodiesel, a liquid transportation fuel that is primarily demanded in urban areas. Biomass by-products from *Jatropha* biodiesel manufacturing can, in theory, be dried and used as substitutes for *Prosopis*. In a study comparing the energy provided by *Prosopis* and *Jatropha* in rural Tamil Nadu, we found that *Prosopis* currently provides a greater quantity of energy and a larger number of services to a broader range of consumers than would *Jatropha* (author date). Thus, the ability of *Jatropha* to substitute for *Prosopis* is doubtful as neither the quantity of energy or types of services provided by *Jatropha* meet those currently provided by *Prosopis*.

Agriculturalists in rural Tamil Nadu were skeptical of *Jatropha* for economic and material reasons. Labor is mainly needed to establish a *Jatropha* plantation and is only required periodically at harvest time once the trees mature (GOI, 2003). Day laborers I met throughout rural Tamil Nadu were concerned that they would no longer be able to obtain other agricultural work if they took a job on a *Jatropha* plantation. They would lose their place in the queue for general agricultural day labor, a position they were unwilling to relinquish. Regarding material concerns, *Jatropha* seeds are poisonous and as a result, children and animals are kept away from the trees. Thus,

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<sup>3</sup> Interview with Virudunagar District Business Development Office clerks, 23 September 2010.

similar to the thorns of *Prosopis*, the toxicity of *Jatropha* also helps to dispossess land users.

While *Jatropha* projects were largely stalled in Tamil Nadu (and throughout India) at the time of my extended fieldwork in 2010-11, the first harvest of the *Jatropha* plantation I visited in 2009 was underway when I revisited in January 2011. It would take about two weeks to harvest the 400-acre plantation using manual labor and workers were three days in during my visit. The harvesters were all women over 50 years old who were no longer fit for other agricultural day labor. *Jatropha* harvesting was easier for these women because the trees stood at eye level and seeds could be picked standing up, far better than a day's work bent over in a rice paddy. In this sense, *Jatropha* delivered new jobs for laborers expended by industrial agriculture. However, I found that *Jatropha* provided about 2 jobs per hectare compared to *Prosopis*' 14 (author, date). Thus, in addition to reducing the amount of energy circulating in rural Tamil Nadu, *Jatropha* also reduces the aggregate number of jobs available throughout the region. *Prosopis* laborers are therefore at risk of becoming both a "surplus population" (Li, 2011) because their skills are unsuitable for the information technology companies rapidly spreading into the region and an "invisible population" because the government does not acknowledge the *Prosopis* economy in its biofuel policy documents or wasteland assessments (author date).

Traveling 100 km west to the second *Jatropha* plantation I studied in Tamil Nadu, land brokers and village government officials played key roles in facilitating energy dispossessions by accumulating *Prosopis* "wastelands" into a contiguous 800-acre block (author date). Brokers working on behalf of a north Indian biofuel company initially purchased wastelands from farmers but soon bypassed farmers all together and bribed village land record officials to re-register contiguous parcels in



the broker's names. Farmers were still finding out whether their plots had been re-registered at the time I left the field in March 2011. Farmers in this region had not been actively farming the land in recent years due to increased seasonal migration related in part to a prolonged drought in the region. Many farmers simply were not there when the land transfers took place or to observe when the biofuel company planted *Jatropha* on about half of the acquired lands. Impacted farmers who were in the region had difficulties getting help as local police and government officials were unwilling to intervene.

These practices illustrate the “dirty” side of enclosing wastelands to produce *terra economica* by revealing how the materiality of energy has resulted in energy dispossessions. The incommensurate energy services provided by different tree energy plantations coupled with the thorns of *Prosopis* and the poisonous seeds of *Jatropha* have functioned to restrict access to common lands as well as to weaken rural energy security. Mediating these changes are the GOI's shifting notions of “improvement”. In this specific instance, the same (waste)-lands have been re-imagined and re-inscribed with “modern” *Jatropha* energy plantations, a transformation that dispossesses “backward” *Prosopis* users. The remaining sections of the paper analyze the discursive practices enabling energy dispossessions.

## **6. Shaping *Terra Economica*: Wasteland economies of scale**

Since the introduction of Social Forestry, the GOI has steadily increased targets for wasteland development so that land degradation could be addressed in contiguous blocks rather than in isolated patches. Corresponding with these increases in the scale of wasteland development have been calls to attract private sector participation. In this regard, the GOI has facilitated the creation of wasteland economies of scale so that “improvement” would be profitable for private industry.

Under Social Forestry, industry was viewed as a key partner for establishing production forests. To encourage industry participation, the GOI called for creating an agricultural development bank to provide access to credit for rural industries (Government of India, 1976c). The National Bank for Agriculture and Development was founded in 1981 as result of these efforts. While Social Forestry did not set specific wasteland development targets, a key motive was to alleviate pressures on production forests by restricting community usage of forests. As such, the NCA recommended establishing social forests on “lands not put to any productive use” outside of forest bounds (GOI, 1976b: 122). This included village wastelands, lands alongside roads, canals, and railways and the perimeters of farms.

In response to remote sensing estimates that forest cover in India had decreased by 1.3 Mha per year throughout the 1970s and 1980s, in 1985, Prime Minister Gandhi established a target of bringing 5 Mha of wastelands per year under fuelwood and fodder plantations (NWDB, 1986). According to one estimate, achieving this target would require planting over 16,000 trees in each village per year (Saigal, 2011).

Arguing that past wasteland development efforts attempted to treat land degradation in “isolated patches” (GOI, 1994b), watershed development advocated treating land degradation in designated blocks. When initially introduced in 1994, planners targeted watersheds of 500-1,000 ha but this was increased to 1,000-5,000 ha blocks in 2008 (GOI, 1994a, 2008). Treating land degradation in contiguous blocks instead of isolated patches, the GOI alleged, would create a “farmer-industry nexus” that would allow industry to meet its raw material demands and reduce incidences of “poor resource management” and poverty in rural communities (GOI, 1995).

As has been previously discussed, the GOI further extended the scale of

wasteland development through the NMBD by setting a target of establishing Jatropha plantations on 17.4 Mha of wastelands. To help achieve these targets, the GOI has implemented various support mechanisms over this time period with the goal of attracting private industry participation in wasteland development. Granting long term leases of wastelands to private industries for up to 100 years has been one of the longest ongoing support schemes (GOI, 2009). As part of wider agrarian reform efforts initiated after Independence in 1948, the GOI also started granting 1-2 ha plots wastelands to landless communities (GOI, 2009).

The NMBD has also expanded the types of support provided to industry to establish Jatropha plantations. In addition to continuing land concession schemes, the NMBD has also provided subsidies to assist with the costs of land clearance (i.e. removing *Prosopis* from wastelands), planting materials, and labor (GOI, 2003). Additionally, the GOI provided access to government loans to help with technology development and biodiesel manufacturing costs. Lastly, the GOI called for establishing public-private partnerships to attract industry participation in all phases of Jatropha production from research and development through to end use consumption. All of these efforts were undertaken in order to establish a foundation for a “clean and green”, energy secure, and employment generating India (GOI, 2003). The next section examines how the GOI has made space for energy provision through an analysis of wasteland definition and classification procedures.

### **5. Constructing a “field of observation”: making space for energy**

This section analyses the processes of *abstraction* and *assortment* the GOI has used to construct a “field of observation” for wastelands (Hannah, 2000). *Abstraction* has involved defining and estimating wastelands, processes that have privileged economic and biophysical dimensions of land use over its social significance while

*assortment* has entailed collapsing wastelands into different categories in an attempt to identify lands most capable of being improved. Yet, the GOI's "field of observation" stops at the district level obscuring land use activities – most notably the Prosopis economy -- occurring at the village scale.

### Wasteland definitions

Calls to better define and classify wastelands have accompanied successive rounds of wasteland development policies. The objective of these efforts, according to one review of wasteland development policies, was to develop a consistent approach across government ministries regarding the causes and consequences of land degradation, which would in turn help build a uniform database of wasteland locations (Eswaran, 2001). The National Wastelands Development Board (NWDB) first undertook the process in the 1980s. Asserting that land degradation is simultaneously an ecological and economic process, the NWDB proposed the following definition:

Wastelands refer to degraded lands which can be brought under vegetative cover with reasonable effort and which are currently lying under-utilized, and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes. (NWDB, undated)

Further, the NWDB commissioned the National Remote Sensing Agency (NRSA) to produce a *Wastelands Atlas of India*, a remote sensing estimate of wastelands. While the NRSA did not propose its own definition of wastelands, the agency hypothesized about the causes of wasteland creation -- population growth and resource degradation -- in the introductions to the four versions of the *Atlas* that have been compiled between 1986-2010:

Due to increasing population pressure, there is an excessive demand of land for both agricultural and non-agricultural uses. This has resulted in creation of vast stretches of wastelands such as degraded land, soil salinity, waterlogging, desertification, soil erosion etc., and the decrease in per capita cultivable land

besides ecological imbalances. (GOI, 2005: 1)

Throughout the 1990s and 2000s, policymakers have focused on refining wasteland definitions and classifications in order to characterize the severity of land degradation. The goal has been to distinguish between lands that had gone out of production because they are too badly degraded and lands that are still capable of productive use. In other words, efforts have focused on identifying lands most suitable for “improvement”.

The evolution of the category “scrublands” in the *Atlas* highlights this process. Scrublands, which has been a category in all four *Atlases* released to date, refer to lands prone to soil erosion that contain some vegetative cover but cannot presently support agriculture (GOI, 2005). The categories of “dense” and “open” scrubs were introduced in the 2010 *Atlas* to more precisely analyze the productive capacity of scrubs (GOI, 2010). Dense scrubs are defined as scrubs with a tendency to intermix with croplands and dominate the landscape. In contrast, open scrubs contain less vegetation than dense scrubs and have thinner soils.

The National Mission on Biodiesel does not define wastelands or document how wastelands would be identified for *Jatropha* plantations. However, the document identifies the following land types as suitable and available for *Jatropha* plantations: under stocked forests, protective hedges around agricultural fields, agro-forestry lands, fallow lands, lands related to other Ministry of Rural Development Programs,<sup>4</sup> and public lands along roads, canals, and railways (GOI, 2003). This expansion is notable because virtually all agricultural and forest lands not currently cultivated are potentially wastelands.

#### Wasteland estimates

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<sup>4</sup> This includes lands already enrolled in Integrated Wasteland Development programs, such as watershed development.

Since the start of Social Forestry, numerous wide-ranging estimates of wastelands have also been produced. To draw attention to the extent of degraded lands and to underscore the rationale for Social Forestry, the National Commission on Agriculture (NCA) estimated 175 Mha of wastelands, which represented 53% of the total geographic area (TGA) of the country (GOI, 1976b). Although the NCA did not specify how it arrived at this figure, mentioning only that various land use reports were used in the calculation, the figure took hold and has been widely used to justify future iterations of wasteland development (GOI, 1995).

The NCA estimate also sparked a wave of additional estimates conducted by different government agencies and civil society actors. Concerned that the NCA double counted certain wasteland estimates, a key civil society organization, the Society for the Promotion of Wasteland Development, conducted its own estimate in the early 1980s arriving at a figure of 93.69 Mha (GOI, 1995). According to one review of India's wasteland development program, seven additional studies were conducted in the 1980s and 1990s with estimates varying from 38.4 Mha to 187 Mha (Bhumbla and Khare, 1984).

Collectively, the GOI's efforts have focused on getting the definitions and classifications "right". Accompanying new iterations of wasteland development have been calls to better define and more precisely identify wastelands. These efforts have been both expansive and restrictive. On the one hand, the GOI's definitions of wastelands have extended beyond Locke's original conception, which solely focused on the economic dimensions of land use. The GOI's current definitions currently consider both biophysical and economic dimensions of land use. Additionally, over time, the GOI has significantly extended the types of land considered to be wasteland. However, these definitions obscure the livelihood significance of common property

lands, which has been well documented in India (Jodha, 1986) and elsewhere throughout the world (Ostrom, 1990, Dove, 1998, Yeh, 2009).

Wasteland Atlas

The *Wasteland Atlas* is the main technology used to “statistically picture” (Demeritt, 2001) wastelands and to enable *assortment*.<sup>5</sup> The objectives of the *Atlas* are to identify the extent of degraded lands throughout the country, to classify these lands into different categories, and to present these data at different scales through a range of tables and maps. Each of the four *Atlases* produced to date has contained different categories of wastelands – 8, 13, 28, 23, respectively (Table 1)-- and has relied on different numbers of satellite images generated from different satellites of varying spatial resolutions (Table 2). Because of the numerous changes in assessment procedures across the years, the GOI itself admits that it is challenging to compare estimates across *Atlases* (GOI, 2010).

**Table 1: Main Categories of Wastelands, *Wastelands Atlas of India, 2010*<sup>6</sup>**

1. Gullied and/or Ravine land	6. Under Utilized/Degraded Notified Forest Land	11. Barren Rocky Area
2. Land with or without Scrub	7. Degraded Pastures/ Grazing Land	12. Steep Sloping Area
3. Waterlogged and Marshy land	8. Degraded Land Under Plantation Crop	13. Snow Covered and/or Glacial Area
4. Land affected by Salinity/Alkalinity	9. Sands (Riverine/Coastal/Desert)	
5. Shifting Cultivation	10. Mining/Industrial Wasteland	

Source: GOI, 2010

In the 2010 *Atlas*, data are presented in statistical tables and maps at national, state, and district scales. In tabular form, the total wastelands for each scale and

<sup>5</sup> Although the GOI’s agricultural census also contains two categories for wastelands (author, date), the *Atlas* was the most widely discussed source of wasteland estimates in the course of my biofuels fieldwork.

<sup>6</sup> Table 1 lists the main categories used in the *Atlas*. Additional categories are sub-categories used to specify the degree of degradation for select categories, such as slight, moderate and severe salinity.

category are presented (labeled Total WL) and compared to the total geographic area for each scale (% to TGA). At the national scale, “Total WL” has fluctuated across the different *Atlases* from 53.3 Mha in 1986, equivalent to 16.4% of India’s TGA, to 63.85 Mha in 2000 (20.2% of TGA), 55.64 Mha in 2005 (17.6% of TGA), and 47.22 Mha in 2010 (14.9% of TGA) (Table 2).

At a categorical level, scrublands have been the largest individual category across the *Atlases*. Evidence suggests that wasteland development projects have focused on rehabilitating scrublands. Although the NMBD does not detail how wastelands will be identified for *Jatropha* cultivation, various government officials, including officials responsible for compiling the *Atlas* for the state of Tamil Nadu, informed me that scrublands would be the wasteland category targeted for *Jatropha* production.<sup>7</sup> According to the 2010 *Atlas*, India has 18.5 Mha of scrublands available for *Jatropha*, enough to meet the 17.4 Mha goal of the NMBD, at least on paper.

**Table 2: Review Wasteland Atlas Procedures and Estimates**

	<i>Atlas</i> Year			
	1986*	2000	2005	2010
Image Years		1986-88, 1991-92, 1997-98	2003	2005-06
Images Used		3 from years above	1 dry seasonal	3 seasonal
# Categories	8	13	28	23
Image Resolution	1:1,000 km	1:50 km	1:50 km	1:50 km
TGA (Mha)	325.00	316.57	316.68	316.70
WL Area (Mha)	53.3	63.85	55.64	47.22
WL Area (% to TGA)	16.40%	20.17%	17.57%	14.91%

<sup>7</sup> Interview with Member Secretary, Tamil Nadu Planning Commission 7 October 2010; interview with remote sensing specialist, Indian Agricultural Research Institute 29 October 2010; Interview with Head of Anna University Remote Sensing Department, 18 November 2010. The official did not distinguish whether *Jatropha* projects would focus on dense or open scrublands.



Scrublands (Mha)	10.79	19.40	18.81	18.50
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Source: National Remote Sensing Centre.

\* Data from the 1986 report was gathered from later *Atlases*.

Sixteen different maps showing the location and severity of wastelands at the national, state, and district scales are also included in the 2010 *Atlas*. Severity is represented by a series of six light to dark color-coded bands indicating the “% to TGA” of wastelands. The scale of severity ranges from under 5% (light color) to over 50% (dark color). A seventh white band is included to indicate areas that have not been surveyed.

With the exception of the scrubland categorical map, the maps are awash in light colors, indicating low severity across categories at the state and district levels. However, a closer examination of the categorical maps reveals large swaths of white, particularly for categories related to human activities such as grazing, shifting cultivation and mining. This occurs because the resolution of the satellite images used in the *Atlas* cannot detect small-scale, shifting land use activities. In fact, the highest resolution image used in the *Atlas*, 1:50 km resolution, is only capable of detecting large man-made structures such as large agricultural plantations but not individual houses (US Geological Survey). This demonstrates how local land use practices, such as the *Prosopis* economy, are erased from the GOI’s wasteland field of observation.

The scrubland map is a vibrant palette of orange, pink, and blue -- districts comprised of 5-10%, 10-15%, and 15-20% of scrublands, respectively. Southern Tamil Nadu is a patchwork of orange, indicating 5-20% of scrublands. Scrublands do not overwhelm these districts but are present in just enough quantities to justify a development project. With a bit of effort, in this case, removing *Prosopis* from the lands, 5-20% of land could be made available for “improvement” in certain regions.

This is *terra economica* in map form. Lands capable of becoming productive through *Jatropha* plantations yet absent any trace of the “bloody” implications required to inscribe this enclosure.

## 6. Conclusion

This paper helps to advance critical scholarship on environmental narratives and enclosure and responds to recent calls in resource geography to analyze energy as a distinct resource (Calvert, 2015, Huber, 2015). Although existing literature acknowledges *that* wasteland narratives have existed across time in numerous locales, it does not interrogate *why or how* they persist nor does this literature explore the specific socio-material impacts engendered through enclosing lands for energy production.

I have analyzed these questions through a case study of India’s wasteland development policies since the 1970s. In concert with broader trends towards ecological modernization, the GOI has attempted to make its resource base more productive during this time in order to provide economic and environmental benefits. While government documents do not delineate where or how such benefits would accrue, my analysis demonstrates that benefits flow to societal groups most closely aligned with the GOI’s shifting visions of “modern” energy consumption while rural communities whose land use practices contradict these visions bear the costs. Specifically, I developed the term “energy dispossessions” to better highlight this uneven distribution of costs and benefits and to emphasize that because energy production is enmeshed in its own specific commodity chain, enclosing land for energy will result in a distinct set of socio-material impacts separate from enclosing land for food or timber. In other words, “matter matters” (Bakker and Bridge, 2006: 18) in enclosure.

Yet, enclosure is discursive as well as material. Wasteland development has been carried out by constructing “field of observation” (Hannah, 2000) that homogenizes “wastelands” into distinct yet simplistic categories. Although the number of wasteland categories has shifted over time and the technologies deployed to “see” wastelands have become increasingly advanced, the GOI’s field of observation stops at the district level and erases local practices operating beneath this view.

At the local level, wasteland development has enabled energy dispossessions as the type of energy introduced through these projects has largely been incommensurate with local needs. Many of the fuelwood species introduced under Social Forestry were better suited for India’s emerging “production forestry” industry while *Jatropha* biofuels are currently demanded in India’s urban and industrial centers. One exception has been *Prosopis juliflora*, a fuelwood tree introduced under Social Forestry that has helped to alleviate the “other” energy crisis of the 1970s. However, *Prosopis* has also dispossessed agriculturalists because of its invasiveness and thorny trunk. Although *Prosopis* currently provides more energy services to a more diverse consumer base than would *Jatropha*, the *Prosopis* economy is not mentioned in the GOI’s biofuel policy documents because it competes with the GOI’s visions of a “clean and green” economy.

The tensions between government visions and local land use practices also helps to explain the persistence of wasteland narratives. As hypothesized in studies of environmental discourses, narratives are metaphors for deeper, unresolved struggles. In this regard, India’s wasteland narrative is a metaphor for an entrenched struggle between the GOI’s shifting visions of a “modern” energy economy and rural communities whose land use practices contradict this vision. Because the GOI has

increasingly sought to partner with private industry to carry out wasteland development, the narratives have also (re)-emerged as crises of accumulation have appeared. In the 1970s, India, as well as many economies throughout South Asia, was attempting to establish “production forests” of high value timber. Community dependence on forests was viewed as a potential threat to these nascent economies. In recent decades, as oil prices and fossil fuel import dependency rose, countries have tried to establish biofuel industries. To avoid competition with food production, India, as well as many other developing countries, has attempted to restrict biofuel production to so-called wastelands. Perversely, India’s *Jatropha* biofuel projects are today competing with the *Prosopis* fuelwood projects of the 1970s, literally for the same space. In other words, lands can be re-enclosed in concert with shifting notions of “improvement”.

By problematizing wasteland development as a unique energy development logic and by unveiling the ever-changing socio-material practices used to inscribe these projects over time, I have attempted to make wasteland development “strange” for the purpose of analysis (Li, 2014). As a result, we can see that despite policy goals seeking to eliminate wastelands, the land category will not (easily) go away.

Wastelands are the spaces India, and the multitude of countries throughout the world similarly engaged in wasteland development, needs in order to carry out “improvement”. By making the practice strange, I hope the underlying rationales of future iterations of wasteland development will be called into question or better yet, contested.

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