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Disingenuous forests: A historical political ecology of fuelwood collection in South India

Gregory L. Simon*, Cody Peterson

University of Colorado Denver, Department of Geography and Environmental Sciences, P.O. Box 173364, Campus Box 172, Denver, CO 80217-3364, USA

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ABSTRACT

Much of India contains complex and ambiguous post-colonial environmental histories. Within the international clean cookstove development discourse, it is assumed that fuelwood collection for cooking is a significant factor in the overexploitation of forest biomass. This brand of storytelling is certainly applied in India where a series of programs have long targeted household fuelwood collection activities as a way of reversing rates of deforestation. This essay outlines the enigmatic and peculiar environmental histories of two distinct regions in South India. Based on oral histories, interviews and field surveys our findings indicate that many pressures other than fuel collection have helped alter vegetation and reduce fuel availability, particularly the expansion of commercially cultivated land in recent years. Moreover, a variety of historical contingencies, such as mass displacement from dam construction and the deliberate seeding of an invasive species complicate one-dimensional or reductive explanations of landscape change — a discursive environmental rendering referred to here as a 'disingenuous nature'. Through retrospective analysis, we describe how this land use narrative, like so many other sustainable development discourses premised on incomplete and misleading information, is the byproduct of a 'multi-scale narrative repurposing and sector coalescence' process. This characterization signals how environmental narratives are repurposed and recycled uncritically by actors in distinct yet discursively compatible development sectors.

Introduction

As early as the mid nineteenth century, colonial powers, national foresters and development agencies in India associated forest loss with fuel collection for cooking. This brand of environmental storytelling persisted long after independence and remains active still today. For example, in the contemporary carbon financed clean cookstove sector, development agencies still assume that fuelwood collection is a significant contributor to forest biomass overexploitation.[1] If local fuel collectors are responsible for forest loss, this line of thinking goes, then efficient stoves which require less fuel will help preserve the dwindling forests. Hence, in India a series of programs — including clean cookstove projects — have long targeted household fuelwood collection activities as a way of reversing rates of deforestation.

This essay explores two cookstove projects in South India in order to illustrate how land cover histories in these areas are more complex than the generalized cookstove framework allows (Figs. 1, 2 and 3).[2] We outline forest degradation narrative genealogies through different development regimes in an attempt to trace divergent accounts of human-forest interactions.[3] To conclude our analysis, we discuss how and why these simplistic narratives of environmental change might nonetheless endure across development regimes. We emphasize how archaic and limited clichés are sometimes recycled and reappropriated across spatiotemporal scales to generate and reinforce contemporary

* Corresponding author.
E-mail addresses: gregory.simon@ucdenver.edu (G.L. Simon), cody.peterson@ucdenver.edu (C. Peterson).

[1] Alliance. 2016a. Global Alliance for Clean Cookstoves, http://cleancookstoves.org/impact-areas/environment/last accessed 15 November 2016.

[2] This research was conducted between January 2016 and September 2017. The project included 1200 surveys on fuel collection practices, more than a dozen oral histories and ten open ended discussions with ten to twenty female villagers/group.

[3] Many of the women participating in interviews and focus groups described their memory of the landscape and its transformations. We also conducted oral history interviews with local NGO staff members who have managed development activities for many decades, providing the primary basis for the alternative forest histories. At various stages oral history interviews were conducted at the Ministry of Non-conventional Energy Sources central office in New Delhi and nodal offices in Maharashtra, Karnataka and Andhra Pradesh.

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Fig. 1. Case study areas in Karnataka (Left) and Andhra Pradesh (Right).

understandings of the environment. In the process, we illustrate how the 'fuelwood collection for cooking drives deforestation' trope emerging from (post)colonial contexts connects directly to contemporary sustainable development rhetoric and carbon finance markets.

Such one dimensional and misleading narratives are hardly uncommon, and political ecologists have frequently deployed historical analysis to expose problematic explanations of local

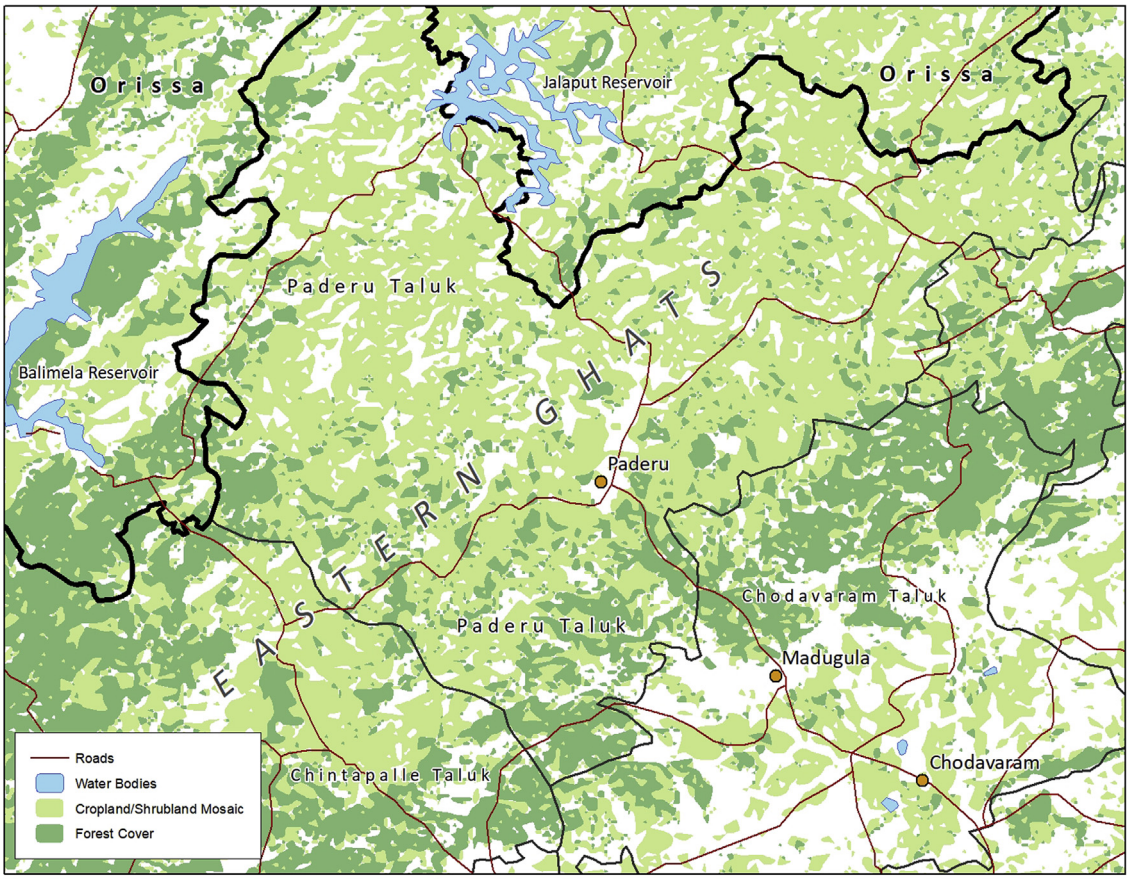

Fig. 2. Detailed map of Paderu Taluk, Andhra Pradesh.

environmental change.[4] These studies illustrate how certain historical accounts are perpetuated in contemporary development policy, and how the formation of these dominant narratives may conceal alternative landscape histories. The widespread assumption that deforestation is driven by local peoples' resource use practices (such as fuelwood foraging) has been discounted in a variety of historical and geographic contexts.[5] Perhaps most notable is Davis' work in North Africa, which shows how erroneous stories of local ecological decline and desertification generated a fictitious, yet broadly circulated and widely accepted understanding of environmental change in the region.[6] Importantly, this line of research has revealed the colonial origins of contemporary scientific thinking about forest degradation in developing countries.[7]

Political ecologists have also illustrated how these problematic knowledges may over time become uncontested conventional wisdoms, coalescing as 'consensus views'.[8] For example, Sluyter describes how certain explanations can solidify as the 'taken-for-granted be-all and end-all measure(s)' of environmental change — a process that normalizes incomplete conceptualizations of environmental change and reproduces public acceptance of them.[9] Scholars elsewhere have referred to these consensus understandings as 'environmental orthodoxies',[10] 'received wisdoms',[11] 'truth regimes',[12] 'storylines',[13] 'discursive formations',[14] or

[4] For example, M. Leach and R. Mearns, *The Lie of the Land: Challenging Received Wisdom on the African Environment*, London, 1996; T.J. Bassett and D. Crummey (Eds), *African Savannas: Global Narratives and Local Knowledge of Environmental Change*, Oxford, 2003; D.K. Davis, *The Arid Lands: History, Power, Knowledge*, Cambridge, 2016.

[5] E. Lambin, B. Turner, H.J. Geist, S. Agbola, A. Angelsen, J.W. Bruce, O. Coomes et al., The causes of land-use and land-cover change: moving beyond the myths, *Global Environmental Change* 11 (2001) 261–269; L. Jarosz, Defining and explaining tropical deforestation: shifting cultivation and population growth in colonial Madagascar (1896–1940), *Economic Geography* 69 (1993) 366–379; C.A. Kull, Deforestation, erosion, and fire: degradation myths in the environmental history of Madagascar, *Environment and History* 6 (2000) 423–450.

[6] D.K. Davis, Potential forests: degradation narratives, science, and environmental policy in protectorate Morocco, 1912–1956, *Environmental History* 10 (2005) 211–238; D.K. Davis, Indigenous knowledge and the desertification debate: problematising expert knowledge in North Africa, *Geoforum* 36 (2005) 509–524.

[7] C.A. Kull, *Isle of Fire: The Political Ecology of Landscape Burning in Madagascar*, Chicago, 2004; P. Robbins, Tracking invasive land covers in India, or why our landscapes have never been modern, *Annals of the Association of American Geographers* 91 (2001) 637–659; D.K. Davis, Potential forests.

[8] P.A. Stott, S. Sullivan, *Political Ecology: Science, Myth and Power*, Abingdon, 2000.

[9] A. Sluyter, The making of the myth in postcolonial development: material-conceptual landscape transformation in sixteenth-century Veracruz, *Annals of the Association of American Geographers* 89 (1999) 377–401, 391.

[10] T. Forsyth, *Critical Political Ecology: The Politics of Environmental Science*, New York, 2003.

[11] Leach and Mearns, *The Lie of the Land*.

[12] W. Adger, T.A. Benjaminsen, K. Brown, H. Svarstad, Advancing a political ecology of global environmental discourses, *Development and Change* 32 (2001) 681–715.

[13] M. Hajer and W. Versteeg, A decade of discourse analysis of environmental politics: Achievements, challenges, perspectives, *Journal of Environmental Policy and Planning* 7 (2005) 175–184.

[14] R. Peet and M. Watts, *Liberation Ecologies: Environment, Development, Social Movements*, New York, 1996.

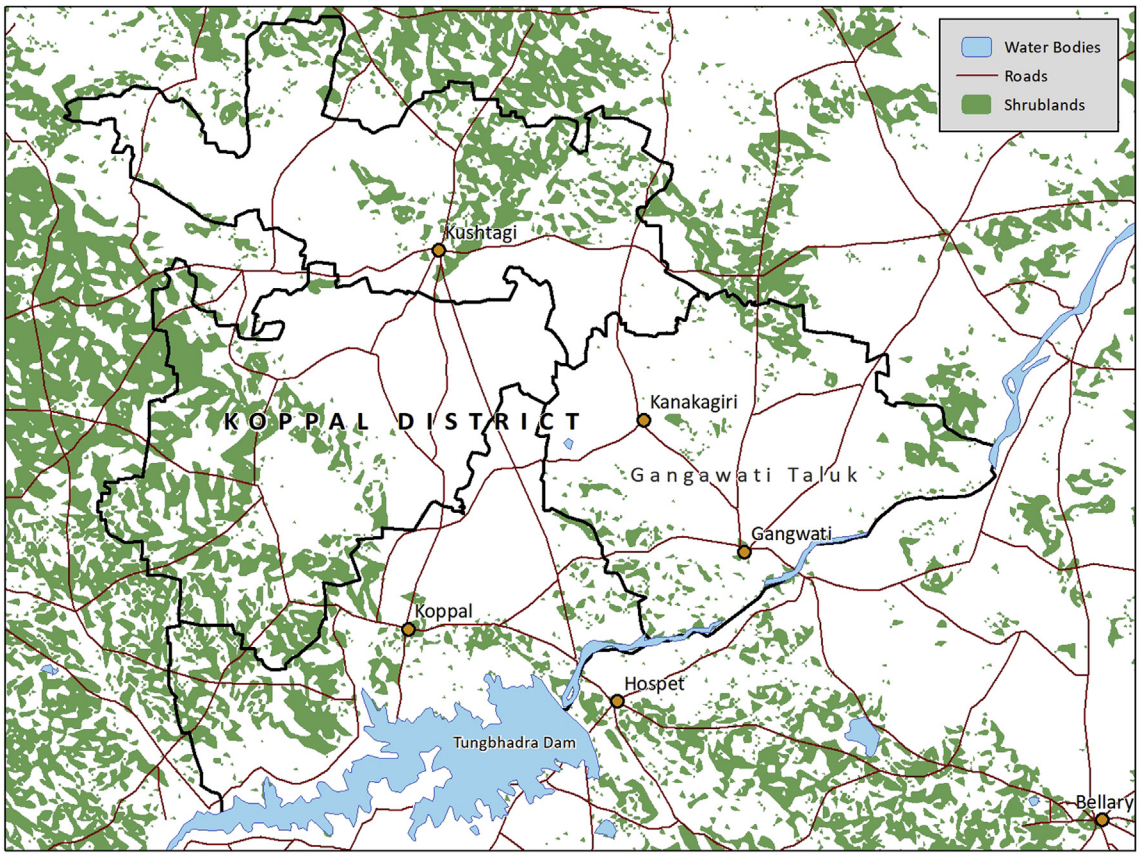

Fig. 3. Detailed map of Gangavathi (Gandawati) Taluk, Karnataka.

'myths'.[15]

We follow Walker in deploying the concept of the 'regional discursive formation' to explain the emergence of environmental change narratives in the clean cookstove sector. Peet and Watts first defined regional discursive formations as those 'modes of thought, logics, themes, styles of expression, and typical metaphors [that] run through the discursive history of a region, appearing in a variety of forms, disappearing occasionally, only to reappear with even greater intensity in new guises'.[16] These received wisdoms tend to influence the way national and regional development programs perceive landscapes and devise development policies, such as those involving forest conservation or cooking technologies. Walker, for example, effectively describes the fuelwood gap theory (and the broader 'myth' of locals overextracting forest resources) as an important regional discursive formation in the history of development and conservation in East Africa.[17]

However, in the contemporary clean cookstove sector similar discourses on forest cover change hold several qualities and contingencies that complicate the regional discursive formation concept, and suggest a more complex discursive-material construction process. Knorr-Cetina, for example, have edged closer to capturing the complexity and scope of 'discursive formations' within global environmental management contexts. Here, normative accounts of environmental change are presented as somewhat more diffuse, occurring where 'particular framings of the problem, research technologies, social configurations of scientists, funding contexts and laboratory settings combine to form distinct "epistemic cultures"'.[18] Fairhead and Leach similarly detail the internationalization of these epistemic cultures beyond regional applications. Here the authors describe 'the growing global coordination of science and policy as a sort of 'vortex', 'into which people and organizations are drawn, whether through obligations to internationally negotiated regimes, funding, interests, or the need for work to have contemporary relevance'.[19] As we suggest here, the clean cookstove sector has similarly become embedded within an 'epistemic culture' and 'vortex' of knowledge, policy and practices, which have in turn reinforced how we view and manage fuelwood collection in specific locations within the developing world.

Yet even these models have distinct limitations when describing the clean cookstove sector. The 'growing global coordination of science and policy' depicted by Fairhead and Leach, for example, does not fully account for the increasing diversity of actors and interests operating within development arenas. As this essay suggests, the carbon credit funded clean cookstoves sector ensnares a complex and variegated network of actors, including medical professionals, virtual carbon traders, tech companies, foresters, progressive churches, engineers, women's groups, non-profits focused

[15] H. Rangan and M.B. Lane, Indigenous peoples and forest management: Comparative analysis of institutional approaches in Australia and India, *Society and Natural Resources* 14 (2001) 145–160.

[16] Peet and Watts, *Liberation Ecologies,* 16.

[17] P.A. Walker, Roots of crisis: historical narratives of tree planting in Malawi, *Historical Geography* 32 (2004) 89–109, 90.

[18] K. Knorr-Cetina, *Epistemic Cultures: How the Sciences Make Knowledge*, Cambridge, 2009, 3.

[19] J. Fairhead and M. Leach, *Science, Society and Power: Environmental Knowledge and Policy in West Africa and the Caribbean*, Cambridge (UK), 2003, 26.

on isues ranging from climate change, public health, conservation, rural development, women's empowerment and so on. This suggests a diversity of interests that at first glance hold few obvious connections yet have, over time, found strategic opportunities to align and co-pursue development goals. Of particular significance here is how these complex institutional entanglements still coalesce around, and unwittingly carry forward, largely discredited colonial explanations of forest cover change.

We suggest that Peet and Watts' concept of 'regional discursive formations' may benefit from greater multiscale considerations, while Fairhead and Leach's sense of the multisectoral 'epistemic vortex' may be enhanced by a closer examination of strategic alignments across disparate science and development sectors. Accordingly, we explain the 'fuel collection causes deforestation' myth as a product of *multiscale narrative repurposing* and *sector coalescence* that produce a *disingenuous nature* in the forested landscapes of two case sites in South India. We offer these three concepts to provide a more nuanced articulation of how certain archaic narratives are reinvigorated and persist across temporal and spatial scales.

The notion of multiscale narrative repurposing suggests that knowledge residues of the colonial past are carried forward and reproduced in contemporary — yet geographically disparate, and politically convenient — global resource management contexts. As the two case study sites in India will demonstrate, simplistic tropes of forest cover change have undulated across scales, first carried outward from distinct regional origins, then reproduced within broader international development programs, and finally promulgated to other geographies within the clean cookstove sector. Meanwhile, the concept of sector coalescence is offered to highlight how diverse sectors and institutions converge around these forest histories as each interest group is able to leverage the same narrative of environmental change in distinct yet similarly advantageous ways. Collectively, these two concepts demonstrate the multiscaled *and* multisectoral nature of 'discursive formations'.

Finally, we offer the concept disingenuous natures[20] to describe how these broadly accepted land use histories concerning household fuelwood collection ultimately influence the management of landscapes and surrounding communities.[21] These socioecological conditions are referred to as disingenuous natures because they are the resulting material circumstances and coinciding management paradigms that emerge from knowledge distortions, partial information and/or erroneous environmental narratives that mischaracterize human interactions with the physical landscape. They are disingenuous environments because — despite being constructed by surreptitious knowledge, incomplete science and fictitious histories — they are understood and managed as if they were a legitimate, authentic and thus genuine depiction of past and contemporary socioecological interactions.[22]

Disingenuous environments are understood here as socioecological assemblages that emerge through what Harvey describes as a series of 'reifications' that 'create actual "permanances" in the social and material world around us'.[23] For historical political ecologists, Harvey's notion of 'permanances' is important as it refers to development practices and their material instantiations in particular locations that are durable and that reinforce and deepen our acceptance of the reifications over time; a process that normalizes simplistic and incomplete knowledge of environmental change[24] and reproduces public acceptance of them. This is a process usefully presented by Sluyter as a 'material-conceptual feedback'.[25] As the brief history of the clean cookstoves sector below and the two case studies that follow suggest, outdated scientific assumptions about the drivers of forest landscape change have become normalized, thus leading to the continued management of a disingenuous nature by development, conservation, climate and health agencies in both local and international offices.

By way of these three conceptual interventions, this article contributes in a more general sense to the growing field of historical political ecology which emphasizes retrospective analysis of interactions between environmental change, governance and knowledge.[26] Early in the field's maturation, Bryant and Wilson suggested that a key component of historical analysis should involve questioning the accuracy of mainstream narratives of environmental change.[27] Over the past two decades, historical political ecologists have largely accepted that landscapes are always 'situated, produced and representational spaces'.[28] For political ecologists this signifies that, at any given moment in time, environments — such as those described below in South India — are in a state of becoming; produced and understood in relation to a series of complex biophysical circumstances, social values and governance regimes. Thus, only by expanding a project's temporal scope can one sufficiently understand the social and ecological foundations, upon which normative environmental knowledges and narratives emerge and evolve.[29] These include conventional, taken for granted explanations of environmental change that are 'used universally and uncritically' and that may lead groups to 'undermine both environmental management and social development by adopting simplistic approaches to the causes of biophysical change'.[30]

Following these insights, this study demonstrates how historical analysis, not only of particular landscapes but also of narratives about those landscapes, can generate findings that call into question the sources of contemporary development rhetoric and the suitability of resulting management practice. As this essay will go on to describe in greater detail, contemporary carbon financing for clean cookstoves is premised upon (indeed, enabled by) a deeply problematic understanding of forest loss borrowed from previous contexts and recycled and repurposed within diverse contemporary geographies.

A discursive history of forest loss and fuelwood collection in global development narratives

Across the developing world, domestic fuelwood collection activities for cooking and heating needs have long been imputed for

[20] G.L. Simon, The rise of disingenuous nature and neoliberal stealth unknown-knowns, *Environment and Planning E: Nature and Space* (2018) 47–51.

[21] P.L. Crossley, Just beyond the eye: floating gardens in Aztec Mexico, *Historical Geography* 32 (2004) 111–135.

[22] P. Robbins, Fixed categories in a portable landscape: the causes and consequences of land-cover categorization, *Environment and Planning A* 33 (2001) 161–179; G. Simon, The 100th Meridian, ecological boundaries and the problem of reification, *Society and Natural Resources* 24 (2011) 95–101.

[23] D. Harvey, *Justice, Nature and the Geography of Difference*, Cambridge, 1996, 81.

[24] Circumstances that oftentimes arise when 'authorities … create fictions in which there is no local representation' to contest flawed yet prevailing explanation of environmental change; Peet and Watts, *Liberation Ecologies,* 26.

[25] A. Sluyter, The making of the myth.

[26] S. Naylor, Historical geography: natures, landscapes, environments, *Progress in Human Geography* 30 (2006) 792–802; K.H. Offen, Historical political ecology: an introduction, *Historical Geography* 32 (2004) 19–42.

[27] R.L. Bryant and G.A. Wilson, Rethinking environmental management, *Progress in Human Geography* 22 (1998) 321–343, 322.

[28] R. Mathevet, N.L. Peluso, A. Couespel, and P. Robbins, Using historical political ecology to understand the present: water, reeds, and biodiversity in the Camargue Biosphere Reserve, southern France, *Ecology and Society* 20:17 (2015), 2.

[29] Walker, Roots of crisis.

[30] Forsyth, *Critical Political Ecology,* 36.

elevated levels of localized deforestation.[31] These institutional anxieties about overexploitation of forests, particularly those associated with cooking fuel, have their origins in colonial forest management, most notably in the context of Africa and South Asia.[32] Throughout these and other regions, and especially within dryland forests, colonial foresters expressed concern that biomass was being harvested at unsustainable rates. Perhaps unsurprisingly, this forest exploitation was due in large part to industrial scale charcoal production which powered railroads used to procure resources for colonial interests.[33] Many of these foresters also falsely interpreted arid landscapes as already degraded by excessive forest use by locals, despite historical records pointing to a much different land cover history.[34] For many decades now, these alarmist narratives of potentially devastating fuelwood shortages around the world have inspired state funded mass tree planting campaigns, rigid conservation initiatives and fuelwood restrictions.[35]

Ribot suggests that colonial and postcolonial forest agencies frequently promulgated these scientific explanations of forest degradation in order to retain control over lucrative urban forestry markets and to maintain access to much needed biomass for resource intensive colonial activities.[36] Others have suggested this particular problem frame created a beneficial paternalistic relationship for forest managers by creating a series of local ecological exigencies that only well resourced and authoritative bodies, such as the Indian Forest Service, would be able to manage.[37] Some have even associated the origins of modern environmental science with these early and pervasive colonial fears of mass deforestation by local populations in various tropical contexts.[38]

Resurrecting fuelwood shortage concerns: environmentalism and imminent global crisis

Echoing anxieties from the colonial period, concerns about overextraction and fuelwood shortages throughout the developing world reemerged during the 1970s. The continuation of this durable forest change narrative, in some cases over a century after its introduction by colonial foresters, led to the development of a 'fuelwood gap theory' within many forest management agencies. This theory suggests that fuelwood consumption is outpacing the recovery of forest resources across large swaths of the developing world, creating a gap between household energy demand and long term supply. This theory rose to prominence during the first United Nations Conference on the Human Environment in Stockholm in 1972. During this period, Eckholm predicted catastrophe in the years following the summit, and similar interpretations thrived in development literature and policy through the eighties and early nineties.[39]

Still today, the narrative of household driven fuelwood shortages remains influential within sustainable development discourse. According to Hiemstra-van der Horst and Hovorka ' … woodfuels continue to be seen in a largely negative light due to persistent narratives left over from the "fuelwood crisis" era of the 1970s and 1980s'. The authors argue that the ongoing influence of these narratives 'is such that, despite much evidence to the contrary, urban fuelwood use remains widely associated with environmental degradation and energy insecurity among low-income households'.[40] Accordingly, by the mid eighties clean cookstove projects in diverse international settings began to use these same arguments to justify their interventions. In India, for example, the National Program on Clean Cookstoves (NPIC), which assisted the delivery of thirty-two million improved stoves from 1984 to 2002, originally contained four objectives: to (1) 'conserve and optimize the use of fuelwood', (2) 'help alleviate deforestation', (3) 'reduce the drudgery associated with cooking, especially on women, and the health hazards caused by smoke', and (4) 'bring about improvements in household sanitation and general living conditions'.[41] As these goals suggest, from their outset large scale stove operations in India were premised on the idea that 'efficient stove use would lead to fuel savings' and that 'this would in turn reduce deforestation'.[42]

Global alliances: carbon offsets, public health, and cooking in the era of sustainable development

Eventually, the distribution of fuel efficient and forest friendly stoves fell under the direction of the Global Alliance for Clean Cookstoves (GACC), which now oversees funding, standard setting and public outreach activities for the entire international clean cookstove sector.[43] A major pillar of the now massive sector is to mitigate forest loss worldwide by reducing 'reliance on wood fuel for cooking [that] has led to pressure on local forests and natural resources', in turn contributing to 'mudslides, loss of watershed,

[31] FAO, Indian Improved Cookstoves: A Compendium, *Regional Wood Energy Development Programme in Asia,* Field Document No. 41 (1993); National Council on Applied Economic Research (NCAER), Final Report: Evaluation Survey of the National Programme on Improved Chulha. Sponsored by the Ministry of Non-Conventional Energy Sources, Government of India (2003); World Bank, Access of the Poor to Clean Household Fuels—India. *Energy Sector Management Assistance Program* (ESMAP) 263 (2003).

[32] D. Chatti, M. Archer, M. Lennon, and M.R. Dove, Exploring the mundane: Towards an ethnographic approach to bioenergy, *Energy Research and Social Science* 30 (2017) 28–34; K. Sivaramakrishnan, Colonialism and forestry in india: Imagining the past in present politics, *Comparative Studies in Society and History* 37 (1995) 3; G. Hiemstra-van der Horst, and A.J. Hovorka, Fuelwood: The 'other' renewable energy source for Africa? *Biomass and Bioenergy* 33 (2009) 1605–1616.

[33] P.A Walker, Roots of crisis.

[34] J. Fairhead and M. Leach, *Misreading the African Landscape: Society and Ecology in a Forest-savanna Mosaic*, Cambridge (UK), 1996; D.K. Davis, *The Arid Lands*.

[35] N.L. Peluso, *Rich Forests, Poor People: Resource Control and Resistance in Java*, Berkeley, 1992.

[36] J.C. Ribot, A history of fear: imagining deforestation in the West African dryland forests, *Global Ecology and Biogeography* 8 (1999) 291–300.

[37] K. Sivaramakrishnan, *Modern Forests: Statemaking and Environmental Change in Colonial Eastern India,* Stanford, 1999.

[38] G.A. Barton, *Empire Forestry and the Origins of Environmentalism*, Cambridge (UK), 2002; R.H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860,* Cambridge (UK), 1996.

[39] E. Eckholm, The other energy crisis: firewood, *Worldwatch paper* (1975) 1; M.R. de Montalembert, J. Clement, Fuelwood supplies in the developing countries, *FAO Forestry Paper* 42 (1983); B. Agarwal, *Cold Hearths and Barren Slopes: The Woodfuel Crisis in the Third World*, Riverdale, 1986; J. Soussan, P. O'Keefe, and B. Munslow, Urban fuelwood challenges and dilemmas, *Energy Policy* 18 (1990) 572–582; J. Allen and D.F. Barnes, The causes of deforestation in developing countries, *Annals of the Association of American Geographers* 75 (1985) 163–84; J. Allen, Wood energy and preservation of woodlands in semiarid developing countries: the case of Dodoma region, Tanzania. *Journal of Development Economics*, 19 (1985) 59–84.

[40] G. Hiemstra-van der Horst, and A.J. Hovorka, Reassessing the 'energy ladder': Household energy use in Maun, Botswana, *Energy Policy* 36 (2008) 3333–3344.

[41] Food and Agriculture Organization (FAO). *Indian Improved Cookstoves: A Compendium.* Food and Agriculture Organization of the United Nations, Regional Wood Energy Development Programme in Asia GCP/RAS/154/NET. Field Document No. 41 New Delhi (1993); National Council on Applied Economic Research (NCAER). Final Report: Evaluation Survey of the National Programme on Improved Chulha. Sponsored by the Ministry of Non-Conventional Energy Sources. Government of India.(2003).

[42] R.D. Hanbar and P. Karve, National Programme on Improved Chulha (NPIC) of the Government of India: an overview. *Energy for Sustainable Development*, *6*(2) (2002) 49–55, 49.

[43] Alliance. 2016a; Alliance. 2016b. Global Alliance for Clean Cookstoves, http://cleancookstoves.org/about/news/11-02-2016-fighting-deforestation-with-cleaner-cookstoves-and-fuels.html last accessed 2 November 2016; Alliance 2016c. Global Alliance for Clean Cookstoves, Clean Cooking Critical to Protecting the Environment and Addressing Climate Change, http://cleancookstoves.org/binary-data/RESOURCE/file/000/000/416-1.pdf last accessed 18 April 2016.

and desertification, which places further pressures on regional food security and agricultural productivity'.[44]

More recently, this simplistic and misleading explanation which links forest loss to domestic fuel use has placed cookstoves under the speculative eye of an expanding carbon finance market. If households are driving deforestation due to woodfuel collection from unsustainable harvested forests, then providing efficient stoves that use less wood should, in theory, curb rates of forest loss. New cooking technologies will thus contribute to carbon savings by promoting greater forest cover and increased carbon sequestration. As a GACC report details, 'unsustainable wood harvesting also contributes to deforestation, reducing carbon uptake by forests'.[45] In carbon market parlance, thousands of new cookstoves amounts to considerable levels of supposed avoided deforestation. Today many projects, including the two described below, are funded by investors participating in the international carbon offset market.

The household induced deforestation trope and its detractors

This environmental change explanation is certainly not without its detractors. Over the past several decades a considerable body of literature has emerged questioning and discrediting the scientific validity of fuelwood collection as a significant cause of forest loss.[46] These critics argue that after over a century of concerns, the supposedly imminent fuelwood crisis has yet to occur. They suggest that fuel collectors rarely fell large trees, preferring drywood and branches, thus complicating a variety of assumptions about fuel collection practices.[47] As one study from India notes, 'In general, big trees in the forest are not cut down for the sole purpose of obtaining fuelwood. The main causes of deforestation are increasing demand for both land and timber. The forestry waste generated through such tree cutting operations … end up in the domestic fuel market'.[48]

Similarly, skeptical researchers have noted the high regeneration abilities of many fuel sources, arguing that much fuel collection is in fact largely sustainable.[49] Others question the empirical logic of supply-demand analysis which stimulated fuelwood gap anxieties to begin with,[50] noting that people often respond to scarcity in complex and creative ways beyond overexploitation.[51] Furthermore, Hansfort and Mertz argue that any such link depends on idiosyncratic socioecological context, and should not be applied so freely to all parts of the developing world.[52] Others suggest that instead of simply degrading natural resources and jeopardizing livelihoods, on the contrary, wood collection is often at the center of vibrant and sustainable informal economies in the absence of other opportunities.[53] Our inquiry into two land cover histories in South India illustrates historical factors other than wood fuel collection which have influenced forest cover in areas targeted for carbon financed cookstove interventions.[54]

Historical geographies of forest change in South India

Pedaru Taluk, Andhra Pradesh

In the hills of Paderu Taluk (a district subdivision) in the Eastern Ghats of Andhra Pradesh, India, state forestry and rural development agencies commonly identify fuelwood collection as a significant driver of forest loss (see Fig. 2). According to many local and international officials, this tribal belt — like many other rural areas around the state and country — has experienced significant ecological change over the past several decades as a result of unsustainable land use practices by a rapidly growing local population. This explanation of regional forest cover change has gained traction within the clean cookstove sector, which is using international carbon finance to replace stoves in over four thousand targeted households. These projects cite household scale fuelwood collection activities as a key driver of this regional forest loss. As such, they argue that new, efficient and clean varieties will save wood and, by extension, save the forests.

Colonial logging, swidden agriculture, and dam construction in forest history

Historical investigations reveal a decidedly different story of forest cover change in the region. During the late nineteenth and early twentieth centuries, the British Raj carried out extensive timber harvesting, significantly depleting forests along valleys surrounding Paderu and elsewhere in the Eastern Ghats. Much of the lumber was used to construct railroad ties (known as 'sleepers') for India's fast growing extraction based railroad system now crisscrossing the country. The original tree cover (a mixed deciduous/evergreen composition with considerable species richness and many endemic taxa) was felled and hauled down slope to mill sites to the east. Further, environmentally destructive commercial forest uses and land titling policies introduced by the British continued even after India gained independence in 1947.[55] This second wave of timber extraction under Indian rule left a replacement vegetation cover of greater patchiness, comprised of shrubs, grasses and small trees, vegetation which is now more sensitive to swidden agriculture.[56] Such historical contingencies and

[44] Alliance. 2016a.
[45] Alliance. 2016b.
[46] G. Leach and R. Mearns. *Beyond the Woodfuel Crisis: People, Land and Trees in Africa*. Abingdon, 2013; Ribot, A history of fear.
[47] Hiemstra-van der Horst and Hovorka, Reassessing the 'energy ladder', 3334.
[48] Hanbar and Karve, National Programme on Improved Chulha, 51.
[49] K.S. Neke, N. Owen-Smith, and E.T. Witkowski, Comparative resprouting response of Savanna woody plant species following harvesting: the value of persistence, *Forest Ecology and Management* 232 (2006) 114–123; E.J. Luoga, E.T.F. Witkowski, and K. Balkwill, Regeneration by coppicing (resprouting) of miombo (african savanna) trees in relation to land use, *Forest Ecology and Management* 189 (2004) 23–35.
[50] While we acknowledge that overexploitation of local forests certainly occurs in specific locations, the causes and extent of this vegetation change is far from universal or easily reduced to fuelwood collection.
[51] P.A. Dewees, The woodfuel crisis reconsidered: observations on the dynamics of abundance and scarcity, *World development* 17 (1989) 1159–1172; G. Foley, Sustainable woodfuel supplies from the dry tropical woodlands, *ESMAP technical paper* 13 (2001) 1–94; Hiemstra-van der Horst and Hovorka, Reassessing the 'energy ladder'.
[52] S.L. Hansfort and O. Mertz, Challenging the woodfuel crisis in West African woodlands. *Human Ecology* 39 (2011) 583.
[53] J. Baka, What wastelands? A critique of biofuel policy discourse in South India, *Geoforum* 54 (2014) 315–323.
[54] Land cover/land use histories were constructed primarily using an oral history method, specifically semi-structured interviews and focus groups conducted during February 2016 and January 2017 with government officials, NGO staff, and female villagers who collect fuel and use clean cookstoves. Interviews were conducted using preliminary overview sessions, the development of interview treatments and multiple interview sessions. Results were recorded, and important accounts were cross-referenced between subjects and checked during follow up interviews. Oral histories occurred in the dry season, between paddy plantings. For political reasons we have maintained the anonymity of all research subjects, including the identity of the NGOs.
[55] According to local officials familiar with historical land transactions, corrupt government titling practices effectively transferred indigenous lands into the hands of businesses seeking to extract natural resources. Jan. 11, 2017, NGO president, Visakhapatnam office, Andhra Pradesh.
[56] P.H. Krishna, K.R.L. Saranya, C.S. Reddy, C.S. Jha, and V.K. Dadhwal, Assessment and monitoring of deforestation from 1930 to 2011 in Andhra Pradesh, India using remote sensing and collateral data, *Current Science* 107 (2014).

fluctuating conditions are rarely acknowledged within contemporary management, which instead prefers more definitive accounts of environmental change.

In Andhra Pradesh, an alternative declensionist storyline has propagated through state institutions and embedded itself into the minds and imaginations of managers and activists alike. This storyline places much of the blame for regional deforestation on household woodfuel use carried out as part of shifting cultivation or *podu* (slash and burn) practices and informal biomass foraging activities.[57] Podu involves cutting vegetation on a small plot of land, burning the waste and planting a mix of crops for six or seven years of growth before moving to another location. This practice, which has slowed considerably over the past decade due to subsidized rice production programs, was a common activity performed by tribal communities. A large portion of the population that practices podu moved into the area after being displaced by the construction of several large dams in the 1980s and 1990s — itself a major driver of forest loss in the region.[58] Forced to move from their ancestral areas, these landless communities took up shifting cultivation as a low cost subsistence activity. Further, systematic land alienation in Pedaru forced 'tribal' groups to establish new agricultural land and swidden cultivation in nearby hilly areas.[59]

For many state forestry officials and key decision makers in the clean cookstove sector, the sight of denuded landscapes interspersed with barren patches from past podu activity provided sufficient evidence of the detrimental impacts of local forest use. This activity provided just the right kind of evidence to support to the 'fuelwood crisis' problem framing already in place — a narrative now embraced by key figures in the clean cookstove industry.

Alternative possibilities and narratives of forest change in Pedaru

There are several problems with this explanation. First, insights from more than ten village focus groups and staff interviews indicate that podu did not contribute to cutting down of large old growth trees because much had already been felled by the time the two large government dams were erected and the resettlement of tribal groups into the Pedaru area took place.[60] And for the impacts of podu that *were* detrimental on the local environment, allocating responsibility for this influx of slash and burn activity would require implicating, not the land dispossessed, but rather the land 'dispossess-ers' — namely the Andhra Pradesh and Orissa State governments and corrupt local officials — who forced relocation activities as a result of dam construction and illegal land titling.[61]

Second, most podu cultivation involved cutting and recutting small trees and bushes (with lower carbon sequestration values) and not the kind of large (high carbon sequestering) trees referenced by the clean cookstove sector.[62] Third, any biomass that was procured from podu activities for domestic energy use was merely a byproduct of the primary land use intent: agriculture and food production. Fuel procurement was nearly always a secondary benefit. This is not to say that podu never contributes to forest degradation, but fuelwood collection was rarely the central purpose of such activities in this region.

Fourth, and with respect to claims that informal (non podu) related woodfuel foraging is also leading to significant forest loss, a survey of 680 households in the area reveals that residents do not fell entire trees in order to collect large pieces of wood. Rather they gather crop residue from agricultural lands and already detached small branches from within government established community forests containing a mix of silver oak, coffee and peppers among other vegetation (Fig. 4). Some 82% report frequent use of agricultural residue, 79% report frequent foraging of dead wood, and 40% report cutting individual branches from live trees. Only 17%[63] report ever felling live trees for fuelwood.[64]

Despite these simplifications and shortcomings, the 'irresponsible' community driven forest loss narrative continues. Efforts to target this area with carbon financed replacement cookstoves evidences the persistence of this environmental change story — though now supported by a mindset that views household driven forest loss as a commodifiable and offset-able loss on the global carbon market. Since households are still believed to drive forest loss and reduce carbon sequestration potential, then introducing fuel efficient cookstoves into the area makes perfect sense. The distribution of modern stoves will stem deforestation and replenish the region's carbon absorptive capacity, thus fulfilling its carbon offset potential. In keeping with what has been described as 'accumulation by decarbonization', local forest loss *must necessarily* be driven by traditional stove user demands in order for improved cookstoves to offset the now (supposedly) decreased reduced carbon sink.[65]

This example from Andhra Pradesh is illustrative of the historically complex and geographically contingent socio-ecological relationships that shape forest cover change over many decades (see Fig. 5). Despite this complicated social and environmental history — that includes large-scale timber harvesting by British colonial interests and subsequent State-based commercial logging activities — communities such as the tribal settlements around Paderu routinely find their fuelwood collection activities scapegoated as influential drivers of local deforestation. It is a perspective that has emanated from centers of institutional authority that sees 'backwards' villagers (even to this day) as unsustainable land use practitioners and thus convenient culprits for large scale land clearing.

Gangavathi Taluk, Karnataka

Gangavathi (Gangawati) Taluk, a subdistrict located in the northern portion of the State of Karnataka is another region currently involved in clean cookstove projects (see Fig. 3). Here,

[57] M.D.S. Chandran, Shifting cultivation, sacred groves and conflicts in colonial forest policy in the Western Ghats, *Nature and the Orient: The Environmental History of South and Southeast Asia*, Oxford, 1998.

[58] The most proximate dam, Jalaput was completed in 2000. Other nearby dams include the Kodigam Dam 1991, Upper Kolab 1993, Balimela 1988.

[59] N.G. D'Souza, Dispossession of tribal lands in Andhra Pradesh: A study of East Godavari District, unpublished PhD thesis, Andhra University, 2001; Jan. 11, 2017, NGO president, Visakhapatnam office; Many indigenous families also lost their established paddy fields in the valley in a series of false title sales facilitated by corrupt local officials — when locals leased land to nontribal migrants, local officials forged documents and instead sold them outright, collecting the profit themselves. This process displaced indigenous agricultural activities and likely exacerbated podu cultivation. More than 50% of lands in tribal areas are now owned by nontribals.

[60] According to interviews with NGO staff, the primary drivers of forest reduction in the region were not slash and burn but rather state and commercial timber interests including paper mills and national railroad construction. Jan. 11, 2017, Visakhapatnam office, Andhra Pradesh.

[61] Jan. 9, 2017, Male NGO field staff, age 34, Paderu office; Jan. 11, 2017, NGO president, Visakhapatnam office, Andhra Pradesh.

[62] Jan 10, 2017, Female stove user, age 56, Focus group of 22 women, Andiba village, Andhra Pradesh.

[63] This 17% reporting comes with a significant caveat. Because felling live trees for fuelwood in the area is not allowed, there are legal ramifications for saying 'yes'. Although we altered the question to state 'did you ever (before it became illegal) fell live trees for fuelwood?', this reported percentage is still likely artificially low.

[64] According to village interviews, silver oak plantations provide shade for coffee, but it is controlled shade, so pruning the oaks produces firewood. Jan. 8, 2017, Paderu.

[65] A.G. Bumpus and D.M. Liverman, Accumulation by decarbonization and the governance of carbon offsets. *Economic Geography* 84 (2008) 127–155.

Fig. 4. A government plantation outside of Pedaru, Andhra Pradesh. The large silver oak stands provide shade for coffee, as well as timber and trellising for pepper vines.

Fig. 5. Fragmented secondary forest stands in the Pedaru region of the Eastern Ghats. Much of which is visible here is planted oak. This landscape reflects a complex forest use history including both deforestation and afforestation activities.

various organizations are facilitiating the distribution of roughly twenty thousand improved stoves in less than a decade.[66] Gangavathi is considerably more arid than Paderu (above) and contains extensive land dedicated to dryland farming. The landscape of Gangavathi contains sparse vegetation along roadways, within villages and interspersed between agricultural properties. Despite their many differences, Gangavathi and Paderu each hold an important feature in common: current tree cover in both areas is the byproduct of diverse, complicated and everchanging land pressures unfolding over the past several decades. As such, fuelwood scarcities in the Gangavathi area should not be explained away as simply a result of excessive household fuel collection activities, as if forest change was the product of any single factor. Instead, vegetation changes and patterns of fuelwood availability emerge from the interaction of manifold socioeconomic and ecological forces which prompt further land use policies, practices and changes.[67]

[66] This number is derived from carbon finance documentation from our NGO partner in Karnataka (the same holds true in Andhra Pradesh), which details how many stoves will be distributed.

[67] World Bank, Access of the Poor to Clean Household Fuels.

Small scale commercial endeavors requiring large quantities of biomass have led to depleted and scarce vegetation in select locations. For example, some locals have initiated tree felling in order to produce charcoal for sale within local energy markets.[68] Trees are also cut and sold to nearby mills providing building materials for expanding villages as the region's population steadily grows.[69] Moreover, common forest areas have been compromised by large state infrastructure projects for roads, irrigation canals, and electrical wires. While these areas account for only a fraction of common forests, they tend to be directly adjacent to villages and fields where people prefer to collect, thus reducing fuelwood availability and forcing women to find new collection areas.[70]

According to residents, another potentially significant factor contributing to vegetation loss in the area has been low rainfall and more recently chronic drought conditions, which have likely limited the growth of new biomass.[71] This region of Karnataka is already a semiarid environment which depends on monsoon rains for agricultural production and forest regeneration. Many locals cite lack of consistent rains as a primary reason for limited vegetation regrowth and fuelwood scarcities. For example, one villager noted how 'in the last ten years there has been a change in climate, we have not had good rains in many years, before we had many good rains but not today'.[72] Another nearby resident states, although 'wood source has definitely reduced, we used to get enough … ' she continues, ' … now, the rains also have been reduced and so the growth of trees has reduced'. Here we see residents explicitly cite the role of atmospheric changes — not foraging behavior — as a primary driver of localized fuel shortages.[73] Fuel efficient stoves thus appear to be a reasonable *adaptative* response to land cover change — but not a mitigative strategy as the international clean cookstove sector leads us to believe.

The rise of commodity crops, land privatization and fuelwood resource alienation

Perhaps most significantly, the loss of common forests has followed the expansion of cultivated land for commodity crops. This growth in commodity agriculture is in part driven by cost of living increases; inflation and increasing prices for household goods have affected the cost of living in rural India, as has the availability of education, health care, and desirable electronic goods. As the cost of living increases, many farmers seek larger revenues on more valuable commodities. Moreover in Gangavathi this agricultural land expansion is most directly stimulated by the introduction of growing contracts with transnational agribusiness firms.[74] Under these contracts, smallholders grow corn for chicken feedlots elsewhere in India, as well as millet, lentils, and watermelon for seed harvesting. Farmers receive loans, training, technology, and direct payments in exchange for their services. This opportunity for enhanced income has enticed many families to purchase and then convert forest and shrublands into productive farmland.[75]

New access to irrigation technology has similarly encouraged the production of commodity crops and the conversion of formerly high fuelwood content landscapes. Prior to irrigation advancements over the past decade, this area was overwhelmingly dryland agriculture with the exception of paddy fields near regional government canals. With the introduction of electricity to Gangavathi, farmers can now affordably run pumps to extract groundwater and irrigate their fields. With contract loans and increased income, they can also rent heavy machinery to dig deeper wells, enabling further expansion.[76]

These assorted pressures to expand and intensify agricultural production have reduced forest biomass by clearing vegetation. But they have also reduced fuelwood availability by converting common land into private land.[77] In this sense, scarcity emerged in part through large scale land privatization; that is, by restricting *access* to extant fuel sources including common pool forests, shrubs and agricultural waste. As one female resident remarked, 'ten years ago, there were many more uncultivated lands and common lands to collect wood from, now there is much more cultivated land and naturally this vegetation has disappeared'.[78]

While a certain level of resource scarcity is substantive in nature, stove users have witnessed an increase in the enclosure of common space, in turn producing *relative* scarcities for specific households and villages. Many women described the loss of common areas over the last several decades as one of the primary reasons why locating fuelwood has become more difficult. 'There are not many common lands available near this village so we must travel quite far'; another woman says that ' … it is difficult to find wood for us. We have very few common lands, it is all private lands, so sometimes we also collect from private lands but owners do not like this and become angry, we are facing this problem. Wood is not in one place, we have to travel many places to find wood'.[79] (Fig. 6).

These developments suggest that fuelwood scarcities in the region, which have prompted and justified new cookstoves projects, have been driven predominantly by the commercialization of regional agricultural production. Such land use changes have increased rates of farmland conversion and land privatization, thus restricting access to previously public forest resources for many villagers in the area. Cost of living and population increases, as well as recent drought conditions have only deepened fuelwood insecurities for village residents in the Gangavathi area. This is again a decidedly more complicated and historically nuanced account of fuelwood shortages than explanations provided within carbon financed cookstove project reports.

Forest fiction: the origin of 'government mesquite'

Further historical analysis reveals this landscape's still more complicated past, as the existing land cover is itself the product of earlier human interventions, thus calling into question what baseline condition should be used to ascertain contemporary forest loss. The primary fuel source in the Gangavathi area is the invasive shrub *Prosopis juliflora*, a type of South American mesquite tree (see Fig. 7). The shrub covers a substantial portion of all common land in South India, particularly in the arid and semiarid regions of Tamil

[68] Jan. 6, 2017, Male NGO Field Staff, age 47, Kanakagiri office, Karnataka.
[69] Jan. 6, 2017, Female NGO Field Staff, age 35, Kanakagiri office, Karnataka.
[70] Jan. 5, 2017, Female stove user, age 31, Focus group of 14 women, Gangavathi, Karnataka.
[71] Jan. 7, 2017, Male NGO Field Staff, age 28, Kanakagiri office, Karnataka.
[72] Jan. 6, 2017, Female stove user, age 58, Focus group of 9 women, Gangavathi, Karnataka.
[73] Jan. 5, 2017, Female stove user, age 49, Focus group of 17 women, Gangavathi, Karnataka.
[74] Jan. 6, 2017, Male NGO Field Staff, age 29, Kanakagiri office, Karnataka.
[75] Jan. 6, 2017, Female NGO Field Staff, age 35, Kanakagiri office, Karnataka.
[76] Jan. 7, 2017, Male NGO Field Staff, age 41, Kanakagiri office, Karnataka.
[77] Jan. 4, 2017, Female stove user, age 36, Focus group of 12 women, Gangavathi, Karnataka.
[78] Jan. 5, 2017, Female stove user, age 53, Focus group of 17 women, Gangavathi, Karnataka.
[79] Jan. 5, 2017, Female stove user, age 46, Focus group of 17 women, Gangavathi, Karnataka.

Fig. 6. A woman collects scarce fuelwood on fallow agricultural fields about 1 km from her village in Karnataka. This practice leads to frequent altercations between fuel collectors and private property owners.

Fig. 7. A patch of mesquite (*prosopis juliflora*) by the roadside near Gangavathi, Karnataka. Nearly 75% of fuelwood used in the region is sourced from this ubiquitous vegetation type.

Nadu and Karnataka.[80] Strictly speaking, there are no 'forests' in Gangavathi (much less the virgin, biodiverse tropical forests invoked by deforestation claims in sustainable development rhetoric), only abundant clusters of this hardy invasive. Today, Prosopis accounts for up to seventy five percent of rural fuelwood usage in certain areas of semiarid South India.[81]

Prosopis was originally introduced by British colonial administrators in 1877 as part of an afforestation strategy in arid Tamil, and was also planted en masse in other arid regions of the north such as Rajasthan in the early twentieth century.[82] The sprawling mesquite stands in Karnataka are of more recent origin. A government project during the 1970's — as the fuelwood gap fears rose to

[80] B. Kolappan, Seemai karuvelam, a saviour-turned-villain whose tentacles spread far and wide. *The Hindu* (2017, February 28). http://www.thehindu.com/news/national/tamil-nadu/a-saviourturnedvillain-whose-tentacles-spread-far-and-wide/article17379253.ece.

[81] K.J. Walter and K.V. Armstrong, Benefits, threats and potential of Prosopis in South India, *Forests, Trees and Livelihoods* 23 (2014) 232–247; Baka, What wastelands?, 318.

[82] Robbins, Tracking invasive land covers in India; C. Jaishankar, Tree species turning into environmental threat, *The Hindu* (2010, March 24) http://www.thehindu.com/todays-paper/tp-national/tp-tamilnadu/Tree-species-turning-into-environmental-threat/article16603887.ece.

prominence — aimed to provide fuelwood for the rural poor in anticipation of possible biomass shortages.[83] These projects, spearheaded under the Indira Gandhi administration, often entailed mass seeding of so-called barren land with mesquite by airplane and helicopter. For this reason, in Gangavathi, Prosopis is often referred to in Kannada (the regional language) as *sarkara juli*, or 'government mesquite'.[84]

Prosopis is an extremely resilient and aggressive colonizing species with the capacity to out-compete most native plants and transform entire landscapes even in nutrient poor/saline soils and drought conditions.[85] It is notorious for expanding into agricultural lands, thus becoming a nuisance for farmers.[86] However, the same qualities that make Prosopis a formidable invasive also make it a fairly sustainable fuel source, hence why it was chosen for afforestation and fuel plantation projects. It is leguminous and thus capable of nitrogen fixation, adding nutrients to depleted soils. And when it is cut but not uprooted, it tends to grow back even faster (high coppicing ability), meaning it provides a renewable and abundant fuel.[87] Prosopis has thus become an invaluable resource for rural people's livelihoods, and the basis of a vibrant local biomass economy in parts of India.[88]

Vegetation cover and fuelwood availability in the area around Gangavathi has been dominated by an invasive species which was deliberately propagated by the government for the specific purpose of providing cooking fuel. This complicates mainstream deforestation narratives within South India and raises questions about whether 'deforestation' is actually occurring in Gangavathi at all. Similar to the government tree plantations in the Paderu Taluk of Andhra Pradesh, these historical tree planting practices indicate that contemporary fuelwood harvesting is often renewable and not a detrimental or irresponsible practice leading to rapid ecological decline. They also highlight how substantial *afforestation* is a significant part of land cover history in India that is oftentimes excluded within alarmist narratives of landscape degradation seeking to blame local households for forest loss. Such histories indicate how other land use practices — from dam construction and colonial forestry (in Paderu) to land privatization and commodity crops (in Gangavathi) — have contributed to reduced fuelwood availability. Given these insights, history appears to be at odds with the popularized, noncontroversial and financially convenient accounts of forest loss found circulating freely within the cookstove sector.

Historical environmental storytelling in sustainable development

Claims about fuelwood collection activities by households as a primary cause of forest degradation have persisted for over a century. This research has illuminated the seemingly ahistorical and aspatial nature of this popularized environmental change explanation, which has been propagated by diverse institutions in different guises and now provides a central justification for the distribution of clean and efficient cookstoves throughout India and elsewhere. This overly simplistic narrative of a decidedly more complex set of socioecological relationships can be traced back to colonial foresters, then to postcolonial State forestry departments, followed by the FAO, World Bank and other international development organizations, and eventually to the Global Alliance for Clean Cookstoves. This most recent narrative mobilization has enabled stove projects to broaden investment streams, secure carbon finance and aggressively pursue win-win sustainable development outcomes.[89] In so doing, the clean cookstove sector has resurrected and reanimated this environmental narrative, presenting 'the small farmer … as the foremost enemy of the forest', an image which had already emerged and reemerged within diverse historical contexts.[90]

The considerable body of evidence contradicting this conventional explanation raises the following question: how has this interpretation not only survived, but proliferated across distinct development regimes?[91] The answer is surely too complex to detail definitively here. However this paper *has* shed light on a crucial aspect of this process: how normative explanations are maintained through the convenient intersection and strategic deployment of spatially and temporally disparate, but mutually compatible, explanations of environmental change.

From regional discursive formations to multiscale narrative repurposing: the spread of a 'disingenuous nature'

The fuelwood collection narratives found in Paderu and Gangavathi areas of India may be viewed as regional discursive formations due to their longstanding yet diverse rhetorical mobilization and acceptance in each region. However, these sites also hold several qualities and contingencies that complicate this concept, and suggest a more complex discursive construction process. To review, this environmental narrative is *multiscalar*, and is the byproduct of dynamic interactions across multiple spatial and temporal scales. (That is, enrolled within a 'vortex' or global 'epistemic culture'). While it emerged in particular regions holding unique colonial histories, it has been extended and reapplied to a large swath of the developing world through the work of global institutions like the United Nations Foundation and the GACC. Because the GACC's clean cookstove interventions occur on every continent, the environmental narratives which justify them also become global in scope, no longer directly referencing any particular regional history. In this way, archaic ideas are shown to be durable by continuously resurfacing and finding relevance in new policy contexts.

[83] Baka, What wastelands?, 320.

[84] This narrative was derived from the personal testimonies of local villagers and confirmed by NGO partners who have worked in the region since the mid 80's, and also corroborated by dozens of newspaper articles discussing mesquite removal.

[85] R.T. Shackleton et al., Prosopis: a global assessment of the biogeography, benefits, impacts and management of one of the world's worst woody invasive plant taxa, *AoB Plants* 6 (2014); H. Shiferaw, D. Teketay, S. Nemomissa, and F. Assefa, Some biological characteristics that foster the invasion of Prosopis juliflora (Sw.) DC. at Middle Awash Rift Valley Area, north-eastern Ethiopia, *Journal of Arid Environments* 58 (2004) 135–154.

[86] Walter, Benefits, threats and potential of Prosopis in South India, 318; Y. Ayanu, A. Jentsch, D. Müller-Mahn, S. Rettberg, C. Romankiewicz, and T. Koellner, Ecosystem engineer unleashed: Prosopis juliflora threatening ecosystem services? *Regional Environmental Change* 15 (2015) 155–167; R.V. Kumar, Forest department to weed out prosopis juliflora, *The Hindu* (2016, July 25) http://www.thehindu.com/news/national/tamil-nadu/Forest-department-to-weed-out-prosopis-juliflora/article14489517.ece#.

[87] M.A. Elfadl and O. Luukkanen, Effect of pruning on Prosopis juliflora: considerations for tropical dryland agroforestry, *Journal of Arid Environments* 53 (2003) 441–455.

[88] Baka, What wastelands?; 88% of surveyed villagers report frequently using mesquite for fuelwood.

[89] G.L. Simon, A.G. Bumpus, and P. Mann, Win-win scenarios at the climate–development interface: Challenges and opportunities for stove replacement programs through carbon finance, *Global Environmental Change* 22 (2012) 275–287.

[90] Chatti, Archer, Lennon, and Dove, Exploring the mundane.

[91] Hiemstra-van der Horst and Hovorka, Reassessing the 'energy ladder', 3337; Leach and Mearns, *Beyond the Woodfuel Crisis*; K.S. Neke, N. Owen-Smith, and E.T. Witkowski, Comparative resprouting response; Hansfort and Mertz, Challenging the woodfuel crisis; Ribot, A history of fear.

Despite its shortcomings and seemingly outdated empirical basis, narratives of cooking induced deforestation have been routinely recycled and popularized within the contemporary clean cookstove sector. Threatened forests — purportedly under siege from households — have thus become a 'disingenuous nature' used as an influential policy frame to justify contemporary stove replacement projects.[92] Unfortunately, this disingenuous explanation of household driven deforestation does not accurately reflect the local environmental histories of places where clean cookstoves are distributed, and is at variance with more localized accounts of forest loss. Moreover, in fixating on household scale fuelwood foraging activities, this management intervention tends to obfuscate other relevant sources of forest change, not least of which are practices of colonial and capitalist origins, such as logging and commodity crop production.

Sector coalescence and the diversification and aggregation of funding streams

For many decades now, diverse institutions including private corporations, international investment groups, local and international NGO's, and faith based organizations have referenced forest loss at the hands of stove users as a critical justification for development intervention — even if only tangentially related to their own core area of interest — because it broadens their ethical scope and funding appeal. Thus, fuelwood collection driven forest loss it is not only a multiscaled but a multisector discursive formation, as forest conservation and its underlying narratives have begun to interact, in a mutually supportive way, with institutions participating in health, climate, ecological and development fields.

A review of the clean cookstove sector demonstrates how the continued spread and acceptance of this narrative has been driven by its ability to contribute to a multisector development funding approach. According to the World Bank for example, 'an effective IAP [Indoor Air Pollution] mitigation strategy … should take into account the multidimensional nature of household energy use and promote synergy among the possible benefits of health, gender, and local and global environment',[93] adding that 'the multisectoral nature of IAP, means that there are different avenues for addressing the problem and providing external support … '.[94] Another report adds, 'several technical and economic barriers need to be overcome to promote improved stoves' which will require a 'cross-sectoral' approach promoting collaboration between 'agencies responsible for health, energy, environment, housing and rural development'.[95] Meanwhile, private companies that market their stoves to investors often proclaim these multiple 'wins'on their websites. These include statements such as, 'harvesting fuelwood also drives devastating deforestation of tropical forests', or 'each day, four million tons of fuel wood are burnt, contributing to the daily loss of two hundred square kilometers of forest'.[96] The implication is that including the environment and forest conservation efforts as a relevant and actionable component of improved cookstove projects can attract much needed financial support from diverse sectors.

Most recently, these narratives have been resuscitated as a critical component of another geographically untethered type of storytelling, this time one used to connect stove use to lost carbon sequestration in forests, which in turn has enabled cookstoves to fall under the speculative eye of global carbon markets. Implicating forest loss from fuel collection as part of the 'cookstove problem' has been a financially prudent marketing strategy for those seeking to combat indoor air pollution. Reducing rates of deforestation from the collection of firewood, along with acute respiratory illnesses for women and climate forcing greenhouse gas emissions, now form the triple benefits — forests, health and climate — of this rapidly expanding international stove replacement industry.[97] As the carbon financed projects from Andhra Pradesh and Karnataka illustrate, the pursuit of 'win-win scenarios at the climate-development interface' has indeed proven to be a tractable, if disingenuous, development strategy.[98]

As this brief discussion suggests, diverse interest groups have held distinct institutional motivations (such as women's health, forest protection, rural livelihoods or corporate revenue) emanating from international — and geographically dissimilar — sites. When viewed through a historical political ecology lens, we can see this forest degradation narrative not as a regional discursive *formation* but more accurately as the byproduct of a multiscale narrative repurposing and sector coalescence. This connotes how other already existing and politically compatible forest narratives (as part of a broader 'vortex') are borrowed and continuously reformulated; in this case by the GACC in order to achieve new benefits for more sectors. These various narrative applications — for example to commodify carbon emission reductions — may be understood as a type of narrative 'upcycling' as the repurposed story continually takes on new (and more relevant and useful) value, meaning, and scope for interested stakeholders. In these ways, not only do landscape narratives influence policy goals, but policy goals can also influence what landscape narratives take hold and propagate.

Conclusion

Within geography and cognate fields, historical political ecology analysis has proven useful for exploring the interaction between environmental change, governance and knowledge over time. In this essay, we employed retrospective analysis not only of particular landscapes but also of narratives about those landscapes. Doing so has allowed us to question the sources of contemporary development rhetoric and the suitability of resulting environmental management practice within the clean cookstove sector. More specifically, we explored two South Indian clean cookstove projects in order to demonstrate how forest cover histories in these areas are more complex than the generalized sustainable development framework allows.

Conventional explanations assume that fuelwood collection for cooking is a significant factor in the overexploitation of forest biomass. However, the above case histories suggest that other land use practices — from dam construction and colonial forestry to land privatization and commodity crops — have contributed greatly to reduced fuelwood availability. Given these insights, history appears to contradict the popularized, noncontroversial and financially

[92] Simon, The rise of disingenuous nature.

[93] World Bank, Recommendations of the Regional Workshop on 'Household Energy Indoor Air Pollution and Health' (2002) New Delhi, 2.

[94] World Bank, Recommendations of the Regional Workshop, 4.

[95] World Bank, Indoor Air Pollution: Energy and Health for the Poor. Energy Sector Management Assistance Program (ESMAP) 1 (2000), 5.

[96] Cited text, in order, drawn from the Tank stove by BURN (https://www.indiegogo.com/projects/a-cookstove-for-saving-forests-and-lives-in-east-africa#/) last accessed 28 October 2016; and the Philips Stove (http://www.philips.com/aw/about/news/archive/standard/news/press/2014/20141120-Philips-and-SNV-collaborate-to-increase-access-to-clean-efficient-cooking-solutions-for-communities-in-Africa.html) last accessed 28 October 2016.

[97] M.A. Jeuland, and S.K. Pattanayak, Benefits and costs of improved cookstoves: assessing the implications of variability in health, forest and climate impacts, *PloS one* 7 (2012).

[98] Simon, Bumpus, and Mann, Win-win scenarios at the climate–development interface.

convenient accounts of forest loss circulating within the cookstove sector.

This fictional forest disappearing at the hands of irresponsible households has, over time, produced a 'disingenuous nature' within the stove-based sustainable development sector. With its origins in disparate locations, including from the Indian NPIC, this simplistic narrative supporting notions of household cooking induced deforestation has been repurposed uncritically in diverse locations worldwide. More than a conventional 'regional discursive formation', this essay illuminates the tendency for diverse perspectives from governments, NGOs and private entities in geographically, temporally and institutionally disparate locations to converge as part of a 'narrative repurposing and sector coalescence' that drives both international and localized development policy. The spread, formalization and reapplication of these disingenuous, misapplied explanations within environmental management practices has resulted in development programs that are routinely misaligned with actual localized land use practices and environmental conditions.[99]

Furthermore, by allowing this knowledge to prevail as the accepted explanation of record and by managing a 'disingenuous nature', public and private sector decisionmakers will likely fail to substantively grapple with the messy materiality of local environmental problems. As this essay reveals, those actually culpable for forest loss appear free of responsibility and thus entrusted with the continued stewardship and expert management of forest resources. By conforming to explanations of environmental change first promulgated by colonial interests and later government forest managers, and by putting the onus of responsibility for forest loss on households, the actual problem of localized woodfuel shortages may go unaddressed.

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Appendix A. Supplementary data

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[99] Because fuelwood scarcity can be a real problem in certain areas, improved stoves which reduce fuel needs may nonetheless assist in helping households *adapt* to environmental change. While improved stoves may not address the fundamental causes of forest degradation, they remain and important technology to cope with fuelwood scarcity.