



A history of fear: imagining deforestation in the West African dryland forests

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ABSTRACT

Urban demand for woodfuels in Sudanian and Sahelian West Africa has long been assumed to contribute to permanent deforestation in dryland forests and wooded savannas. Deforestation has also long been assumed to be progressing such that these woodlands will no longer be able to provide the region's cities with fuel. Available studies of regeneration do not support the first assumption. Further, woodfuel shortages projected in the 1980s to arrive in the 1990s or early 2000s are nowhere near, while more recent projections predict supply

shortages another 25 years hence. While there is deforestation from many causes, the data do not support crisis scenarios concerning woodfuels. Nonetheless, crisis scenarios and policies persist. While there may yet be deforestation due to urban woodfuel extraction, and shortages may be lurking on the horizon, the article explores some possible alternative origins of these woodfuel related deforestation and shortage fears.

Key words. Environment, deforestation, regeneration, drylands, forests, woodfuel, firewood, charcoal, Sahel, West Africa.

INTRODUCTION

The Sahel has been framed in recent years by stories about the misreading of the history of forest change. For the past century European colonizers and later European and African foresters believed that lands in the Kissidougou region of Guinea had been deforested by the abusive practises of local populations. Fairhead & Leach (1996), however, convincingly argue that these lands did not have natural forests on them, and that the existing forests in the Kissidougou forest-savanna mosaic were, on the contrary, created by local populations' fostering and managing. Across the Sahel, in Ethiopia, McCann (1997) also shows that both colonial and current outside observers read the landscape as highly degraded and in perpetual decline. He shows that in some areas that were deforested in the past, there are now thick forest stands, while other 'deforested' areas may not have been forested since before any records are available.

These powerful counter-narratives to constant ecological decline at the hands of indigenous populations bring into question images of deforestation across the Sahelian and Sudanian ecological zones.

Spatially specific observations, however, cannot be interpolated to fill in the vast landscape from Guinea to Ethiopia. There is a whole forest of perceptions and data to be examined in between. Some areas have undoubtedly experienced severe degradation. Others have probably flourished. The new challenges to images of unidirectional ecological degradation inform us that the data and motives behind narratives of decline need to be seriously questioned – without assuming that they are necessarily wrong (see Cronon, 1992). As Roe (1995, p. 1068) states, we need to insist that 'there is no story until the facts are in.' Yet caution is not enough. We also need to understand the social and political-economic circumstances that produce these narratives of decline and make them so persistent and compelling (Roe, 1995).

This article challenges two beliefs common across the countries of the West African Sahel (Burkina Faso, Niger, Mali and Senegal): (1) that urban woodfuel demand is a major cause of permanent deforestation; and (2) that urban woodfuel supply is threatened by deforestation in the near future (cf. Cline-Cole *et al.*, 1990, p. 514). By presenting evidence contrary to these beliefs and finding none to support them, the article

also brings into question forestry policies in the West African Sahelian and Sudanian dryland countries that focus on controlling urban-bound woodfuel production and marketing.

There are many other potential causes of deforestation, land degradation and land-use change in this zone, including agricultural clearing, fire, grazing, and climate change (see Tappan & Wood, 1995). This article is not concerned with the magnitude of these other causes (some of which have also been brought into question – see Nichol, 1989; Rhodes, 1991; Tiffen *et al.*, 1994; Fairhead & Leach, 1996; Sullivan, 1996; Swift, 1996; McCann, 1997), nor does it argue that there are not deforestation and forest degradation problems in the region. Rather, the argument developed here is that urban woodfuel demand has not been shown to be a cause of permanent deforestation and that regulating urban woodfuels production and distribution – one of the main activities of Forest Services across the region (World Bank, 1996) – may therefore not diminish deforestation, nor sustain supply.

Given the lack of ecological data and the tenacity of urban fears of deforestation and subsequent woodfuel shortages, the article explores some possible origins of the above-mentioned beliefs. While there are solid political-economic (i.e. nonecological) motives for national Forest Services to elaborate policies in order to control lucrative rural-urban forestry markets, this article focuses on the environmental justifications presented for these regulations. In this manner, the materials presented concern perception of an urban woodfuel crisis rather than the political-economy of forest-market control that these perceptions ultimately support.

The first part of this article examines fears that emerged over this century concerning the exhaustion of woodfuel resources to supply West Africa's cities and of estimates of supply shortages that keep moving further into the future without arriving. The second part examines data on the ecological consequences of woodfuel cutting, bringing into question the degree to which woodfuel cutting can be counted as a cause of permanent deforestation. The third part of the paper explores some possible origins of these imagined fears of urban shortages and related deforestation given the scarcity of supporting ecological data.

A HISTORY OF FEAR

In February 1916, the Director of the French West African Colonial Service of Agriculture and Forestry (GGAOF, 1916; p. 15–16) declared the following:

'The lack of surveillance of woodcutting has promoted a waste of the country's forest resources, which will prove to make sustaining her energy needs more and more difficult. A better organized exploitation would permit, on the contrary, to easily place at the disposition of her relatively sparse population all the wood and all the charcoal necessary.

... It is, however, of utmost urgency to protect from destruction the forests that still exist, of which the disappearance will not fail in a short time to have disastrous consequences for the future of the country.' (Quotes translated from original French by the author.)

In July of the same year, the Secretary General of the Colony (GGAOF, 1916; p. 13) followed suit, stating: 'It is to be foreseen that the rigorous application of these regulations will create difficulties for supplying the principal centres of the Colony with wood and charcoal.'¹

The colonial forester, M. Mangin (1924, p. 472) complained of urban woodfuel supply: 'instead of afforestation (in rows for example) or creating methodically exploited reserves, one has cut at random and progressively, it is in this manner that the Gonakié (*Acacia nilotica*) forests of the Senegal River are disappearing, it is in this manner that the production of charcoal threatens to destroy completely the forest stands of the region of Tivaouane along the Dakar-Saint-Louis [railroad], etc.'

During World War II, the chief of the colonial Forest Service, A. Aubréville (1939), initiated a campaign to increase charcoal production as an 'economic substitute for imported fuels', which were needed for the war effort. By 1954, however, Aubréville was arguing that: 'In the countries with dry climates, one lacks timber and firewood to supply the large centres of population and local industries, for whom wood is the only combustible' (Aubréville, 1954, p. 33).

Severe droughts across the Sahel in the late 1960s and 1970s, combined with fears of worldwide petroleum price hikes, rekindled concerns about woodfuel supply. E. Eckholm (1975, p. 9), an American environmentalist, stated: 'Firewood is a scarce and expensive item throughout the sub-Saharan fringe of Africa' and that 'Virtually all trees within 70 kilometers of Ouagadougou have been consumed as fuel by the city's inhabitants and the circle of land "strip-mined" for firewood – without reclamation – is continually

¹ All quotes from French articles are translated from French by the author.

expanding'. Based on my observations, however, most current peri-urban clearing, even around Ouagadougou, is agricultural (see discussion of agriculture below). He then went so far as to blame woodfuel use for 'The suicidal deforestation of Africa, Asia and Latin America.' Eckholm (1975, p. 20).

In the early 1980s, scenarios of woodfuel supply and demand were generated by concerned international organizations, projecting 20 years into the future they predicted that consumption would exceed and undermine the productive capacity of the forests (RdS, 1981, 1985, p. 48; UNDP/World Bank, 1983, p. 23; Gorse, 1985, p. 7). In 1985, a donor conference report from Senegal claimed that seven of Senegal's ten regions were already in deficit, stating that: 'the situation is cause of concern and the trend is unacceptable' (RdS, 1985, p. 18). J. Gorse (1985, p. 7), a World Bank forester, complained that large urban centres 'are responsible for much of the disappearance and deterioration of the forest cover because of their nearly exponential growth.' A. Bertrand (1985, p. 24), a forester working extensively in the region, proclaimed that the woodfuel crisis 'is terrible for natural woody formations because it is engendered by an urban crisis with rural impacts. It is the concentrated urban needs that cause the most severe and irreversible degradation.' Another report indicated that growing urban woodfuel demand 'would result in accelerated deforestation' (UNDP/World Bank, 1989, p. 11).

Predictions of a so-called woodfuel 'gap', in which demand would exceed the reproductive capacity of forests, became the fear of the 1980s. The idea of a woodfuel gap, however, and the assumptions behind it, have since been discredited. The estimate of national-level woodfuel supply and demand often employ unwarranted aggregation, poor quality data and, most importantly, they ignore links between supply and demand. Market responses, policies, changing forest access structures and conflicts reshape supply and demand through substitutions, new technologies, and consumption and production changes, well before such gaps might emerge (Leach & Mearns, 1988; Dewees, 1989; Ribot, 1993; World Bank, 1996). The deficit projections calculated in the 1980s, however, are still being quoted in the 1990s (e.g. RdS, 1993, p. 45). Indeed, new estimates of woodfuel gap horizons for Burkina Faso, Mali, Niger, The Gambia and Senegal were published in 1996, this time with projections of a 'gap' emerging by the year 2020 – except in Mali where supply will continue to exceed demand (World Bank, 1996, p. 43).

There have been real woodfuel shortages in Sahelian cities, shortages worthy of fear. But none of these could have been predicted by supply and demand projections, nor were they due to scarcities of wood. In 1985, the President of Burkina Faso launched the 'Three Fights' against desertification (BKF, 1985). One was against 'abusive woodcutting.' The policy applied new regulations to woodfuel production. Urban woodfuel merchants rebelled against the new policies, creating woodfuel shortages in the capital, Ouagadougou, by stopping production and transport. Officials feared that the resulting shortages would bring down the government. They reacted with a military takeover of woodfuel supply. To control the merchants, the government established permits for producers, transporters and merchants, preventing vertical integration and breaking up merchant oligopolies. Shortages ceased. The military is still a major supplier for Ouagadougou to this day. (From interviews of forestry and army officials, wood merchants and urban residents, Ouagadougou, August 1994.)

In 1981, Dakar merchants enacted a supply slow-down when the Forest Service attempted to tighten regulation of woodfuel trucks entering the city. The Forest Service gave in because they feared that they would be blamed by the people and by other branches of government if there were shortages. In 1994, Dakar's charcoal merchants again stopped supplying the city to protest against attempts by the Forest Service to make charcoal producers work in assigned rotation areas. As vendors began running out of woodfuel, the Minister for the Protection of Nature circumvented the Forest Service, allowing merchants to work where they chose. The flow of woodfuels resumed (Ribot, 1990; Interviews, Dakar, August and November 1994).

The fear of fuelwood shortages in Sahelian cities has persisted since early colonial times. The recent urban shortages experienced in the Sahel were shortages without scarcity. They do not indicate deforestation or supply problems, but rather they stem from struggles over control of the lucrative urban woodfuel markets (Ribot, 1990). While this type of crisis may be something to fear and regulate, it is not the result of a woodfuel 'gap'. These persistent fears – their ecological or social and political-economic basis – need to be explained. In short, despite widespread fears, even current projections indicate that deforestation does not to present an immediate threat to urban woodfuel supply. Further, these projections have been overly pessimistic in the past.

MEASURED CONSEQUENCES OF WOODFUEL PRODUCTION

It is difficult to believe that in 1916, when Dakar was consuming 2000 tonnes of charcoal per year, that this consumption could represent a threat to the forests, especially when today the level is well over 200,000 tonnes and the moving horizon of destruction remains far in the future (GGAOF, 1916; Ribot, 1993; World Bank, 1996, p. 77). There is still great uncertainty in our knowledge of the rural impacts of urban woodfuel demand. Nevertheless, a large portion of today's forestry policies are aimed at regulating the assumed impacts of urban woodfuel production. Implicit here is the idea that woodfuel production is a *cause* of deforestation. Permanent deforestation in the West African drylands caused by woodfuel production, however, has not been demonstrated. The critical question for understanding the long-term ecological effects of urban woodfuel production is whether (and to what degree) regeneration is occurring.

It is astonishing, however, how little is known about natural processes of dryland forest regeneration. Bailly *et al.* (1982, p. 28) noted that 'knowledge of this subject is very insufficient.' Bellefontaine (1997, p. 1) recently wrote: 'The deficiency of knowledge relative to natural plant reproduction by shoots, coppices and branch rooting is flagrant: there is absolutely no existing synthesis for the Sahelien and Sudanien zones.'

A quick survey of the literature on regeneration in the Sudanian and Sahelian forests and wooded savannas, however, provides a few insights. Natural regeneration occurs everywhere where observations have been made, whether in protected areas or not (Jolyet, 1905; Anglo-French Forestry Commission, 1937; Jones, 1938; Aubréville, 1939; Giffard, 1974; Clément, 1982; Parkan, 1986; Arbonnier & Faye, 1988; Renes & Coulibaly, 1988; Diatta & Matt, 1993; Nouvellet, 1993; Yossi *et al.*, 1993; Gjsbers *et al.*, 1994; Jensen, 1994; Ribot, 1995a; Doufourny, 1997). Regeneration *rates* are a function of rainfall (Anglo-French Forestry Commission, 1973), protection (Aubréville, 1939; Foury, 1951; Jensen, 1994), and grazing intensity (Doufourny, 1997). In some instances, certain species may not regrow, particularly those that reproduce solely by seed (Aubréville, 1939; Fourey, 1951; Arbonnier & Faye, 1988; Gjsbers *et al.*, 1994). Where regeneration is in protected areas, unexpected species may appear (Diatta & Matty, 1993).

That re-cutting of the same areas is practiced also indicates that regeneration is taking place. Foresters

estimated that 80% of the harvest taken during the war years was again available 20 years later along Senegal's railroads. Some areas in Eastern Senegal were cut for charcoal in 1940, 1969 and again in the mid 1980s (Giffard, 1974; Arbonnier & Faye, 1988). Bergeret & Ribot (1990) noted that charcoal makers in Eastern Senegal returned to re-cut areas cut in previous years. My interviews of woodcutters in Senegal, Mali, Niger and Burkina Faso in 1994 indicate that Charcoal makers return to harvest the same area after 9 to 12 years and firewood cutters return after 4 to 7 years. Jensen (1994, p. 31–2) calculated from Arbonnier & Faye's (1988) data on regeneration, that woodcutters could return to re-cut Eastern Senegal's forests at an optimal rate every 8 years.

Links between urban woodfuel production and agriculture may be hypothesized to contribute to permanent deforestation or forest conversion. Woodfuels can come from agricultural clearing at forest frontiers, in which case the fuel should be classed as a by-product, rather than a 'cause', of forest clearing. Woodcutting can also facilitate agricultural colonization, and therefore be viewed as a contributing cause of forest conversion. It is difficult, however, to find examples of agricultural clearing being used to produce woodfuels for cities. Most wood for agricultural clearing is burned *in situ* or used locally for firewood and construction materials. According to Forest Service officials and woodfuel merchants in Niamey, Ouagadougou, Bamako and Dakar, agricultural clearing is usually too diffuse to be economically worthwhile for the urban woodfuel industry (interviews 1994).

Agricultural fields can be a source of wood (Giffard, 1974; Nichol, 1989; Cline-Cole *et al.*, 1990; Jensen, 1994). Around Kano in Northern Nigeria, agricultural fields have a greater woody density than natural forests (Cline-Cole *et al.*, 1990). Wood from agricultural fields across the West African drylands, however, is usually for local use, rather than for urban commercial uses. In the region, rural woodfuel use typically consists of the gathering of deadwood and wood cleared from or grown in agricultural fields, and probably has little effect on deforestation. Woodfuel production in West Africa's drylands does not appear to be a significant motor of agricultural clearing and agriculture is not yet a major source of urban woodfuels.

Based on the little evidence we have, urban woodcutting cannot be counted as a major cause of permanent "deforestation." Other important potential consequences of woodfuel cutting are its effects on

biodiversity change and forest quality, forest density, and the impacts of a temporary period of clearing between cutting and regeneration. Since most woody species in the Sahel are widely distributed, species changes have only a local effect. Hence, plant species changes need to be evaluated vis-à-vis their social and economic values (see Tappan & Wood, 1995; K. Freudenberger 1998) – not biodiversity reduction or species loss writ large. Forest density – and productivity – changes may be positive or negative and remain an important area for further research. The temporal element of woodcutting concerns how local populations are affected by and cope with the absence of forests between cutting and regeneration (see Ribot, 1995a). Other under-examined aspects of woodfuel cutting and regeneration on forests and people include its effects on soils, long-term productivity and animal populations. Permanent deforestation, however, is not the consequence of urban woodfuel demand. What we need better to understand is how quickly and how completely forests return to cut areas.

FROM WHENCE COME THESE FEARS

Biological data indicate that urban woodfuel demand does not cause permanent deforestation and that urban shortages due to resource exhaustion are not near. This section outlines a range of possible origins of the fears of woodfuel shortages expressed throughout this century. This list is intended to be illustrative of possible origins. It is preliminary and does not attempt to demonstrate the relative importance of these different and intertwined explanations. The list below focuses on the fears of people involved in making and shaping forestry policy. It does not explore the fears and concerns of forest villagers who are deeply affected by the various changes in forest cover caused by woodcutting and other forest uses (but see Ribot, 1995a, 1998b). Further, this list does not attempt to explain the political-economic basis of current or past forestry policies, which I have done elsewhere (Ribot, 1990, 1993, 1998a). Rather it attempts to outline the beliefs and images that have justified those policies.

Exigencies of the colonial project

J-F. Bayart (1993) argues that the institution of 'development' in Africa required the erasure of African history and the creation of Africa as a great empty

space without culture or history (cf. Wolf, 1982). Bayart (1993, p. 3) points out that 'Montesquieu (1951) attributed African savagery and barbarism to the fact that "countries which are almost uninhabitable dress themselves up as little countries which could be habitable."' He argues that 'this myth persisted into the nineteenth and twentieth centuries, and culminated in the motifs of the Jungle and the Desert.' and continues:

"The Sahara was not the "ocean of sand and desolation" to which James Coleman attributed the so-called "isolation" of black Africa. Criss-crossed with caravan routes and a patchwork of tribal and brotherhood networks, a vehicle for Islam and link between the gold-producing Akan States and the Mediterranean markets, it was the geographical axis for political areas which were sufficiently vigorous to enjoy a resurgence after the colonial period.' Bayart, 1993, p. 18).

Bayart argues that emptiness and desolation were needed by European colonizers to justify their intervention as saviours and 'developers' of these 'backward' peoples in marginal lands. Such representations persist to this day (Ferguson, 1990; Fairhead & Leach, 1996). Roe (1995, p. 1066) sums it up: 'crisis narratives are the primary means whereby development experts and the institutions for which they work claim rights to stewardship over lands and resources they do not own. By generating and appealing to crisis narratives, technical experts and managers assert rights as "stakeholders" in the land and resources they say are under crisis.' These representations may lurk behind fears and cries of woodfuel shortages expressed throughout this century.

European imported fears

Another possible origin of fears is the projection across the African landscape of European deforestation and the U.S.A. dust-bowl scenario. Europeans brought these motifs with them to Africa (Anderson, 1984; Beinart, 1984). Shortly after the dust-bowl years Stebbing (1935) wrote on 'progressive drying' of the Sahel. Eckholm (1975, p. 8) later evoked the dust-bowl image in speaking of woodfuel problems in the Sahel. Evoking another important Western motif, he labelled African woodfuel shortages 'the other energy crisis', thereby drawing on first world fears of petrol queues and oil shortages of the early 1970s and projecting them across Africa.

The view from the road

Views of the African landscape 'from the road' were often extrapolated into the interior. Steamships along the Senegal River were hindered by siltation due to woodcutting along the river banks in the late 1800s. The cutting could probably be seen from the rivers. Woodcutting was also visible from railroads. The forester, M. Mangin, wrote:

'In French West Africa almost all of the railroads, riverboat companies and industries use firewood, of which the consumption has attained a fearful level. Here again one attacks the neighbouring forests immeasurably. The Kayes-Niger [railroad] consumes 15–20,000 tonnes of firewood for its normal traffic; along the whole length of the rail, for a width of one kilometer on each side of the tracks, the forests have disappeared or are destroyed, to the point at which the management of the railroad is moved, no longer finding it possible to provide fuel economically, to being obligated to provision by constructing kilometers of narrow-gauge tracks.' (Mangin, 1924, p. 472).

There was also deforestation due to agricultural settlement along roads, readily visible to travellers. Piles of charcoal used to be stocked along the roads for sale and transport. In 1973, Senegal's Forest Service banned charcoal storage within sight of roads because it disturbed international donors (Ribot, 1990). Clearing was visible around industries and cities as well. Earlier, the Colonial administrator, H. Hubert (1920), was alarmed by clearing around factories and electric utilities in the areas near Dakar. All of these views, from the rivers, trains, roads, cities and industries, are examples of the type of locally visible situation that could inspire fears and then be extrapolated across the larger unknown landscape.

Theoretical ecological extrapolations

Correlations of deforestation with progressive drying were prevalent throughout this century (cf. Grove, 1994). While Mangin's direct observations of deforestation in 1924 were along the railroads and rivers, he extrapolated into the interior by an association with diminishing rainfall. The only direct data he had on deforestation were from roadside observations. Nonetheless, he attributed reduced precipitation, altered river regimes and the advance of desert sands toward the south, entirely to deforestation, stating: 'The disappearance of wooded zones is certainly the principal, if not unique, cause of the

constant decline of rainfall, observed for some 20 years' (Mangin, 1924, p. 474).

Temporality and spatially

Stebbing visited West Africa during 1934, a dry year, seeing what appeared to be a degraded landscape. The French-Anglo commission visited during an unusually wet period in 1936–7, and did not support Stebbing's findings. Jones (1938, p. 411), a member of the commission, stated: 'During the dry season, after the crops have been reaped, the bare sandy plain looks like a typical piece of desert. What appears however, to be barren ground is actually fertile farm land and during the rains it yields an abundant harvest of useful crops.' Of Eastern Senegal in 1990, I wrote that 'Everywhere in the regions where charcoal production [for the cities] takes place, the impacts are evident and disastrous' (Bergeret & Ribot, 1990, p. 139). Upon returning to the zone seven years later, however, I was astonished by the widespread regeneration that had taken place. The consequences had been temporarily disastrous for villagers, but the forests were regenerating (Ribot, 1995a).

Further, visitors looking to study such phenomena as deforestation usually ask to be taken to see it. They see or are shown instances of forest degradation, but having travelled directly to the point of disaster, the images fill their whole imagination. In this way, isolated phenomena can be projected across vast unknown spaces. The timing and spatiality of visits shape the images that present themselves.

Economic signals

Economic forces can be misread as ecological change. From 1908 to 1920, colonial foresters regulated gum arabic tapping to stem rising prices that they believed were due to reduced supply from 'abusive' tapping practices. Freudenberger (1992) points out, however, that 'the colonial officials had little conclusive evidence to show that tapping was the key factor contributing to the demise of the gum arabic trees.' According to Freudenberger (1992), M. Louet, a Naval officer who had explored the region in 1876, believed that the decline in production was due to low prices and to labour constraints. Today, merchant oligopolies in the woodfuel sectors of Dakar, Ouagadougou, Niamey and Banjul collude to create high urban woodfuel prices (Ribot, 1995b). Over the century, agricultural expansion around cities, and the exhaustion of easily

available roadside supplies, has distanced woodfuel supplies, and this growing distance has increased transport costs (Ribot, 1990, 1995b). These price increases may all be misread as indicators of shortages that extend, by extrapolation, far beyond the local area where the shortages may actually be occurring.

Political forces

There are political groups, such as the merchant oligopolies mentioned above, who orchestrate shortages to leverage policy favours and political power (see Ribot, 1990). These could also be misread as supply shortages. In addition, much of the lobbying for forestry policy establishment at the beginning of the century was by commercial interest groups. The results of their lobbying allowed them to dominate woodfuel commerce through their control over licenses and permits (Ribot, 1993).

Institutional dynamics shaping perception and representation

Forestry institutions have a great stake in crises. After every declaration of disaster this century, policies, projects and increased staff and funding were proposed. Foresters have institutional incentives to expand the sector and their control over forests (Bergeret & Ribot, 1990; Ribot, 1995a; Swift, 1996). They may look for and focus on crisis scenarios by dint of their mission and institutional needs (cf. Roe, 1995). Crisis views are also present in most donor conference reports, funding requests by Forest Services and in donor project proposals.

Supplying urban woodfuel is a lucrative business. All of the fears discussed help justify policies of control of forests and of woodfuel markets. Such control can be a highly profitable activity for forestry institutions, officials, and agents, since these institutions are, I believe, built up around the perceived need for control, as well as via taxation, fines, allocation of privileges, and extortion. Regulation is also profitable for merchants who maintain control of forestry production and marketing through state quotas, licenses and permits (Ribot, 1993, 1998a).

Regulating the sector gives foresters and the Forest Service a *raison d'être*. The notion that forests regenerate implies that more control over woodfuel production could be devolved to rural populations – under appropriate regulations (see Ribot, 1999a, b) – without great risk to the forests. Such a claim can

threaten forestry institutions and merchants. These threats to foresters and woodfuel merchants may play an important role in producing and propagating this panoply of fears.

CONCLUDING REMARKS

After a century of fear that cities are running out of fuel and that urban woodfuel demand causes deforestation, it looks like fuel shortages are still some time away and that available data indicate that forests regenerate in the Sudan and Sahel, even in unprotected areas. Without further research, woodcutting for fuel cannot be established as a *cause* of permanent deforestation or of urban woodfuel shortages in the West African drylands. Linking this observation to policy, there appears to be little justification for the extensive controls that Sahelian states place on woodfuel production in the name of environmental protection. This by no means indicates that rural populations do not have woodfuel problems or that they do not have major problems and conflicts caused by urban woodfuel production, which leaves them without important commercial and subsistence forest products between cutting and regrowth (see Ribot, 1993, 1995a). It simply means that the current justification of the dominant policies, regulating the imagined impacts of urban demand, must be rethought. This conclusion extends to the new 'participatory' forestry and natural resource management approaches.

This article has listed some factors that shape how colonizers, administrators, development agents and environmentalists have viewed the impacts of urban woodfuels on Soudanian and Sahelian forests. Even with the advent of remote sensing, the view from the sky, there are still risks of distorted understandings of ecological change, its causes, and its importance. Problems of image resolution may draw attention to those ecological distinctions most easily discerned from a satellite. Some causes of forest change, such as fire, large-scale timber production, and agricultural expansion, may be visible, and consequently may be over-accounted for. Other causes of forest change, such as unequal relations of production and of access to markets, labour opportunities and forests, changes in commodity markets or international fuel prices, and inequitable national forestry policies, simply do not show up in remotely sensed images (cf. Blaikie, 1985; Hecht & Cockburn, 1990; Peluso, 1993; Ribot, 1993; Fairhead & Leach, 1996).

While remote sensing can provide a good overview, there are many interpretations left 'hidden in the understorey'. Environmental *problems* should also be about people's *experience* of environmental change (Blaikie, 1985). Some changes may be problems and some may be improvements. The meanings of these changes for those who live in and around the forests in question – whether the changes are good or bad, and for whom – can only be derived through 'grounded social sensing', i.e. the view from the villages (see Ribot, 1995b; Tappan & Wood, 1995; Freudenberger, 1998). Other meanings can be derived from the desks of those who study forest change (locally or remotely). If social sensing, through interviews and enfranchisement in environmental decision making, is not integrated into environmental interpretation, there is a risk that only the concerns and fears of those empowered to do and to publish environmental research and those sitting behind the computer screens reading satellite images will be projected into the remote landscape.

ACKNOWLEDGMENTS

I greatly appreciate Alan Grainger and two anonymous reviewers for their many constructive comments that have greatly improved this article.

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