

Cattle, Deforestation and Development in the Amazon: an Economic, Agronomic and Environmental Perspective

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This book reinterprets the role of cattle in Amazonian development, concluding that cattle are not as bad as they have been made out to be by many authors (including myself). The review marshals a considerable body of literature, much of it recent, and cannot be ignored by anyone dealing with deforestation issues in Brazil. However, the reader often must go beyond what is presented in the book to have all sides of the many controversial issues it touches.

The impacts of deforestation on climate and biodiversity are minimized in numerous ways, despite allusion to environmental costs in caveats to conclusions on the benefits of pasture (p. 230). Extinctions are presented as a normal event (p. 27). Faminow (an economist at the University of Manitoba in Winnipeg) believes firmly that the market will take care of everything: 'As deforestation increases, the value of remaining forest will increase, enhancing private and public incentives for preservation' (p. 30). Before placing faith in this mechanism, however, one might wonder about the ubiquitous 'market failures' that are evident around the world whenever 'prices aren't right' and human interests are not served by the course of *laissez-faire* development. Why not do what we can to steer away from dangers that we can use our intelligence to foresee, before the disastrous consequences of losing the Amazon forest force prices of forest to rise enough to affect rainforest 'supply'?

Faminow emphasizes that 'Much of what is written about the Amazon is based more on myth and anecdote than scientific fact' (p. 31), and that 'Data are fragmentary or imaginary' (p. 22). Characterization of scientific information as speculative or even imaginary is a leitmotif of the book. However, a substantial amount of sound scientific information exists, and much of it runs counter to the main thrust of the book, that cattle pasture is not really that bad.

One of the major impacts of converting rainforest to cattle pasture is the contribution of greenhouse gas emissions to global warming. Faminow examines in some detail the available infor-

mation on methane emissions from the cattle themselves (pp. 28–9, 167–9), but makes only passing reference to emissions of gases from the deforestation done by ranchers to prepare land for planting pasture (p. 168). Unfortunately, these emissions are huge (Fearnside 1997a).

Faminow questions the reliability of global circulation models (GCMs), and consequently the predictions they make about climatic changes such as global warming (p. 30). While GCM results still contain substantial uncertainty, they have improved dramatically since the 1987–92 literature on which Faminow bases his criticism. The massive efforts under the Intergovernmental Panel for Climate Change (IPCC) to improve the models and their parameters are not even mentioned (e.g. Houghton *et al.* 1996). Above all, uncertainty of GCM results, even if unjustly assumed to be higher than it now stands, does not justify failing to act on the basis of the best available data, and those data point to a tremendous environmental cost of not containing the expansion of Amazonian deforestation for cattle pastures. While Faminow is careful not to advocate continued deforestation, his underplaying the impacts of forest loss could be expected to discourage decision-makers from mustering the political courage needed to take effective steps to change the present pattern of rapid conversion of Amazonian forest to pasture.

Faminow devotes a chapter to reviewing deforestation estimates; while much important information is covered, the review is uneven in that it concentrates on criticizing high estimates while failing to point out errors on the low side. Brazil's official estimate for Amazonian deforestation by 1988 as 5.12% (p. 98) is presented without mention of the invalid procedure used to calculate this percentage, with the denominator chosen being the area of the Legal Amazon, an administrative region over 20% of which was not originally forest, thereby substantially understating the relative amount (see Fearnside 1990). These numerical acrobatics were politically convenient given public statements by the President of Brazil immediately before the study was done; a series of similar political influences have also affected handling of subsequent official estimates (see Fearnside 1997b).

The question of who is doing the clearing is central to assessing the role of cattle pasture in the deforestation process. Faminow labels my estimate for 1990 (Fearnside 1993) that 70% of the clearing was done by medium and large ranches as being 'at one extreme' (p. 119). However, he justifies his 'extreme' classification by comparing my estimate with others that confine themselves to estimating the percentage of clearing that is done with the benefit of government subsidies in the form of fiscal incentives, which is not the same thing as clearing by medium and large ranches (most clearing is done without fiscal incentives). I stand by my estimate.

Faminow stresses the capacity of forest to recover: 'rain forest can be remarkably resilient and re-establish itself quickly' (p. 89). 'Land that has been cleared and later abandoned will often return to forest cover, even if used for pasture, although there is some uncertainty about the length of the process of forest recovery from pasture abandonment to mature forest' (p. 114). 'Some uncertainty' here might be taken as a euphemism for an inconvenient fact: recovery from pasture takes a very, very long time. Secondary forests grow more slowly on abandoned pastures than they do in shifting cultivation fallows, and since pastures dominate land-use in Brazilian Amazonia, it is this kind of secondary forest that affects the impacts of deforestation. The role of secondary forest in reducing the impact of deforestation on climate change (pp. 18 & 113) is less than Faminow implies (see Fearnside 1996; Fearnside & Guimares 1996).

Faminow presents the 'Yurimaguas technology' for continuous cultivation as the 'best' evaluation of the potential for agriculture in the Amazon (p. 48). He seems to have completely missed the debate concerning this high-input system (Fearnside 1987, 1988; Walker *et al.* 1987). Suffice it to say, strong indications exist that the 'Yurimaguas technology' will not prove viable on a wide scale in Amazonia.

Faminow attacks the idea that land speculation contributes to deforestation, claiming that 'the land speculation hypothesis is based upon questionable data and faulty logic' (p. 123). Weaknesses in some of the studies that have identified land speculation as critical are rightly pointed out. Faminow shows that land values have not sustained increases over long periods at the regional or at the state level. This is true, and Faminow does a valuable service by making this point strongly and numerically. However, this does not necessarily lead to Faminow's conclusion that speculation is insignificant as a motivation for deforestation. Land values can increase dramatically in areas smaller than entire states, for example along highway routes whenever a new road is built or an existing one is improved. While the experience of researchers who have spent a good deal of time talking with farmers and ranchers in Amazonia is frequently dismissed by Faminow as 'anecdotal', there are too many cases of individual properties being bought and sold with speculative motives to allow this to be written off as a freak occurrence. Just as in speculation in the stock market, many of the practitioners wind up selling during crashes and losing money, but this does not mean that speculation has not motivated their investments (and, in the case of ranches, their deforestation behaviour). In order to have confidence in attributing motives to deforestation behaviour one must have both a theoretical explanation in terms of the financial interests of the actors and a consistent set of on-the-ground observations of real people. Although the book is almost exclusively based on literature review (often with emphasis given to census data and other general statistics), Faminow did travel in some parts of the region to speak with farmers. One wonders, however, how much of a reality check this provided; i.e. is there really a trend to using oxen as draft animals (pp. 123 & 217)?

Faminow points out the seeming contradiction between land becoming degraded under cattle pasture and the expectation of land prices rising that provides the engine for speculation (p. 146). He fails to mention that speculation takes place on the basis of whole properties rather than just the portion of each one that has been converted to pasture. The forested portions of the properties, including the timber stocks they contain, represent a significant value; profits from timber have been a key factor in keeping the ranching industry going, especially in eastern Amazonia (e.g. Mattos & Uhl 1994). The pasture provides an effective guarantee of continued possession of the entire property, therefore providing an important motivation in addition to beef production. If a property were offered for sale without a portion of it being under pasture, even if degraded, the remaining forest would have a lower sale value because of the need for a prospective buyer to either make heavy expenditures in clearing part of the forest or risk losing possession of the property.

Perhaps the clearest sign that land speculation has been a significant force in deforestation is the pattern of deforestation since Brazil's July 1994 Plano Real economic package was instituted, greatly reducing the rate of inflation. The results of LANDSAT imagery interpretation were released in January 1998 (after Faminow's book was written) (Brazil, INPE 1998). They indicated first a tremendous initial jump in the deforestation rate in 1995 to $29 \times 103 \text{ km}^2 \text{ yr}^{-1}$, versus $15 \times 103 \text{ km}^2 \text{ yr}^{-1}$ in 1994; the jump is best ex-

plained as the result of a much larger volume of money becoming available for investment following institution of the Plano Real. The 1995 peak was followed by a substantial decline, to $14 \times 103 \text{ km}^2 \text{ yr}^{-1}$ in 1996 and $13 \times 103 \text{ km}^2 \text{ yr}^{-1}$ (according to a preliminary estimate) in 1997.

The decline in deforestation rates accompanies a drop in land prices by over 50% from 1995 to 1997, a price decrease that is best explained as the result of the greatly reduced rate of inflation having eliminated the role of land as an inflation hedge. The association of falling land prices with reduced deforestation rates suggests that a significant part of the deforestation that was taking place in prior years was motivated by speculation.

Faminow emphasizes demand for beef and milk in Amazonian cities as the key factor motivating pasture conversion (pp. 125 & 131). This demand exists, and it is good that Faminow has drawn attention to its force. Dairy production is emphasized (p. 123), but it should be remembered that this is recent and is limited to certain areas (such as Ouro Preto d'Oeste in Rondônia, visited by Faminow). It does not apply to the vast ranching areas in southern Par and northern Mato Grosso where most Amazonian pastures are located (areas apparently not visited by Faminow).

The explanatory power of local urban demand must be tempered by the situation in the state of Amazonas. In Amazonas, which is dominated by the state capital at Manaus (1998 population approximately 1.6 million), only 25% of beef consumed is produced in the state (p. 132). The SUFRAMA agriculture and ranching district, located on the outskirts of Manaus and protected from competition by vast distances to competing producer areas, is notorious for having become a sea of secondary forest when government subsidies dried up beginning in 1984. If beef production were so profitable, why have these ranches not remained active over the period since 1984, during which time the population of Manaus has approximately doubled, along with its attendant beef demand? The case of Manaus fits a picture that includes deforestation motives other than the beef market emphasized by Faminow: motivation for maintaining the SUFRAMA ranches would have depended almost solely on beef profits because the timber value of these forests is relatively low, because pasture is not needed to maintain possession of the land since the ranches are part of a government-organized scheme with proper surveying and documentation (unlike the legal free-for-all of southern Par), and because the threat of invasion by landless migrants has (until very recently) been quite remote.

Faminow stresses pasture as a source of income for the population in Amazonia. The social progression emphasized is that of individual families being released from the 'gruelling physical work of slash-and-burn agriculture' and becoming progressively better off as the family cattle herd expands and the pasture management system employed modernizes (p. 217). Totally ignored is the dark side of pasture: the replacement of small farmer families with larger operators who either buy the small farmers out or expel them in various (often violent) ways (see Schminck & Wood 1992).

The role of pasture in exacerbating Brazil's notorious social inequalities is minimized with the observation that cattle production 'may be associated with but does not create inequality' (p. 228). True, just as chainsaws are associated with deforestation and hand-guns are associated with murders, but, while not capable of acting by themselves, these tools of the trade help enormously. The small labour and capital demands per hectare of pasture allow a tiny segment of the population to control a large fraction of the landscape: as of the last agricultural census (1986), 62% of all private land in the region was in the hands of ranchers with over 1000 ha each,

while in Mato Grosso the share held by ranchers in this class was 84%! If pasture had never been an option and landowners were obliged to plant, say, tree crops, then very few would be able to afford planting sufficient areas to stake out vast *latifundios* in Amazonia.

Faminow devotes only one page to sustainability, and admits that 'there seems to be little doubt that the sustainability of cattle production in the Amazon is open to question, from social, economic and physical perspectives' (p. 226). At the same time, however, he stresses the positive side of pasture monocultures: they allow landowners to capture the benefits of technological advances, as contrasted with traditional polyculture systems that 'prevent the capturing of gains from perturbations that create opportunities for upturns' (p. 226). This is certainly a novel view on the role of diversity in sustainability. One major unmentioned limit to the widespread expansion of the intensive pasture management Faminow advocates is phosphate deposits to supply the necessary fertilizers (see Fearnside 1997c).

The question of 'whether the best use of Amazonian rain forest is as pasture' is dismissed as 'now becoming passé' (p. 231). Really? Faminow seems blind to the fact that Brazil's Amazonian forests continue to fall at over two hectares per minute, and that virtually all of that area sooner or later becomes pasture. The low social value and high environmental cost of converting forest to pasture make the question of 'best use' anything but 'passé'!

Faminow has faith that increasing the productivity of pastures will 'limit future use of forest for new pasture' (p. 232). Presumably, the assumption is that, with higher productivity, either ranchers would be satisfied with their profits or the market for beef will be saturated such that further clearing is unprofitable. I have been one who has repeatedly called into question the 'full stomach' limitation on small farmer clearing, and I think the idea of ranchers limiting their expansion because they are satisfied with their level of material existence would be even more far-fetched. Markets, on the other hand, can eventually become saturated, but pasture is likely to be able to expand tremendously, and at great environmental cost, before market forces would restrain this process given the scale of beef demand in Amazonia, in the rest of Brazil, and beyond.

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The Amazon basin is also an important center of economic activity. Large cities like Manaus, Iquitos, and Leticia are vibrant centers for economic development. The region provides important products for the world, such as edible commodities, oil, and minerals. In addition, its variety of life forms may offer key elements for developing new pharmaceutical drugs that could cure illnesses. In spite of the Amazon's critical role, the forest is being depleted at an alarming pace. The main causes of deforestation vary between countries in the Amazon and in many cases a chain of events leads to deforestation rather than a single driver. For instance, roads are built or land is illegally seized, opening up areas to make pastures or grow crops. The agricultural sector is undoubtedly one of the main. The prevailing model for rural development in the Amazon over the last half century—replacing forests with agriculture, cattle ranching, and large-scale hydropower generation—has long been outdated for a number of environmental, economic, and social reasons (25–27). For instance, for Brazil, the gross agricultural product of the Amazon represents 14.5% of Brazil's agriculture sector gross domestic product (GDP), using a deforested area of about 750,000 km². In contrast, São Paulo state accounts for 11.3% of the agriculture sector GDP, using an area of approximately 193,000 km² (see Table 1). Most of Amazon deforestation is followed by the establishment of cattle ranches (Fearnside, 2005), which are also encouraged by the presence of market chains and the overall infrastructure context. Moreover, cattle ranching can often finance itself (Faminow, 1998), hence not having to depend on the acquisition of credit loans. With the notable exception of Brazil nut extraction, which has benefited from improvements in road access, these changes have led to a general shift away from forest-based land uses to other more lucrative and less labor intensive practices—especially cattle ranching—giving rural families an opportunity to purchase goods and services that might otherwise remain out of reach (Faminow, 1998; personal observation).