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1 **COMMENT**

2
3 **Will Urbanization Cause Deforested Areas to be Abandoned in Brazilian**
4 **Amazonia?**

5
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23

1
2 Wright and Muller-Landau (2006) proposed that rural-urban migration could reduce
3 tropical forest loss worldwide and allow secondary forest to occupy abandoned clearings,
4 thereby reducing the expected magnitude of tropical species extinctions. However, the
5 usefulness of this global generalization is highly dependent on its being correct for Brazilian
6 Amazonia, which has the world's largest remaining area of tropical forest. Among the
7 features of the deforestation process that make urbanization an unlikely mechanism for land
8 abandonment in Brazil is the fact that most deforestation is done by ranchers rather than by
9 shifting cultivators. A family of shifting cultivators is only capable of farming a limited area
10 and cannot greatly expand the area it cultivates if additional land becomes available.
11 Ranchers, by contrast, can occupy huge areas and expand their holdings when the opportunity
12 arises. Were part of the population to leave for the cities their land would usually be bought
13 by neighbouring ranchers who would maintain and expand the deforested landscape.
14

15 As Wright and Muller-Landau (2006) predicted, their interpretations have generated
16 considerable controversy (Brook *et al.* 2006; Gardner *et al.* 2007; Laurance 2006; Sloan
17 2007). Only part of this controversy will be considered here, namely the expectation that rural
18 population in tropical areas will decline, allowing secondary forests to regrow in large areas
19 of abandoned farmland. Specifically, the present paper will consider the applicability of the
20 Wright/Muller-Landau hypothesis to Brazilian Amazonia.
21

22 **IMPORTANCE OF BRAZIL**

23

24 Brazil had 41% of the world's remaining tropical rainforest in 1990, the last year the
25 United Nations Food and Agriculture Organization tallied statistics for rain forests (FAO
26 1993). Of all "primary" forests in the world in 2005, Brazil had 31%; after Brazil, the major
27 tropical countries were Peru (5%), Colombia (4%), Indonesia (4%), Mexico (3%), Bolivia
28 (2%) and Papua New Guinea (2%) (FAO 2006). When cross-national studies compute the
29 effect of different variables on deforestation rates, each data point usually represents one
30 country, and all points have equal weight. Great variation exists among countries in terms of
31 the forces most important for deforestation. If the resulting generalization is to be true at a
32 global scale, Brazil must fall right on the regression line.
33

34 The dynamics of deforestation in Brazilian Amazonia suggest that the effect of rural-
35 urban migration would be minimal. Unlike some other parts of the world, most deforestation
36 in Brazil is not caused by shifting cultivation, but rather by large (> 1000 ha) or medium-
37 sized (100-1000 ha) ranchers (Fearnside 1993). The deforestation rate would not decline
38 proportionately were part of the small-farmer population to leave for the cities. A pattern
39 repeated many times has been initial clearing by small farmers, who may be either
40 "colonists" (legal small farmers in settlement areas) or squatters, followed by consolidation
41 into larger ranches, either by purchases or by violent expulsion by large ranchers and
42 *grileiros* (landgrabbers) (Fearnside 1986).
43

44 **DEFORESTATION DYNAMICS**

45

46 Will urbanization cause a depopulation of the Amazonian interior with consequent
47 expansion of secondary forests? The underlying assumption is essentially that the rural

1 population is like a jar full of marbles. If you take some of the marbles out of the jar, the
2 volume of remaining marbles decreases proportionately. But what if the marbles are of very
3 unequal size and it is primarily the small ones that are removed? What if the size of each
4 marble is not fixed and the remaining marbles simply expand to fill the space that has been
5 made available? Both of these characteristics apply to rural-urban migration in Brazil.

6
7 An example is provided by the colonization projects where land was distributed as
8 small settler lots by the National Institute for Colonization and Agrarian Reform (INCRA).
9 Many of the small lots were soon bought by wealthier colonists or newcomers and
10 consolidated into small ranches in settlements on the Transamazon Highway and Paraupébas
11 areas in Pará, the BR-364 Highway in Rondônia and in the Apuí area in southern Amazonas
12 (Fearnside 1986, 1989, 2001a, Razera 2005).

13
14 Cattle pasture is the dominant land use in areas where tropical rainforest has been
15 deforested in Brazilian Amazonia, even after the entry of soybeans as an additional actor
16 beginning in the 1990s (Fearnside 2001b). A minimal human population can maintain a large
17 area in pasture, greatly magnifying the population's impact (Fearnside 1983).

18
19 Rural-urban migration exists, but it is not as important for deforestation as might
20 appear to be the case. Ranchers, especially large ranchers, often live in urban areas. When
21 these people move from the rural zone to a city, their effect on deforestation continues. The
22 urban connection can even increase deforestation because money from urban sources
23 (including corruption and tax evasion) is invested in deforesting and expanding rural
24 holdings.

25
26 Most rural-urban migration does not involve ranchers. Those who move to the city are
27 often not from deforestation frontiers. In the state of Amazonas, much of the migration to
28 Manaus is from riverside farms and small riverside towns along the Amazon River and the
29 Rio Negro—not from the places where deforestation is accelerating in the southern part of the
30 state. The individuals who move to urban areas are often not the deforesters in the population.
31 Women often accompany children who move to the city for better school opportunities.
32 Elderly people make the move to accompany family members and for better health care. The
33 young males stay in the interior and continue to clear forest. The sex ratio in many of these
34 frontier areas is heavily skewed towards males (Sawyer 2001). This is even evident in
35 municipal-level census data, where lumping of the municipal seat with the rural area cancels
36 out some of the effect. For example, in the state of Amazonas, in the municipality that
37 includes the capital city (Manaus), men made up 48% of the population over 10 years of age
38 in 2000, while in interior municipalities the proportions were reversed: 55% men in Apuí,
39 53% in Lábrea and 53% in Manicoré (Brazil, IBGE 2008). In frontier areas the age
40 distribution is skewed towards those in the prime of life (Sawyer 2001). It is common to meet
41 older people in the city who have spent a lifetime moving between different frontier areas but
42 moved to the city after suffering an injury or becoming too old for the work they had been
43 doing.

44
45 Several trends are underway that increase clearing. One is the increasing sale of beef
46 for export (Smeraldi & May 2008). A growing number of Brazilian states have been certified
47 as free of foot-and-mouth disease, a disease in cattle which blocks export of frozen beef to

1 markets in Europe, North America and Japan. The certification process began in 1998 with
2 Rio Grande do Sul and now includes five of the nine Amazonian states. Likely future forces
3 speeding deforestation include biofuels from sugar cane and palm oil, more pasture for
4 supplying the international beef market, expansion of soybeans and timber harvesting. All of
5 this suggests expansion, rather than abandonment, of areas under human use.

6 7 **DYNAMICS OF LAND ABANDONMENT** 8

9 Why is land abandoned to secondary forest? The assumption of Wright and Muller-
10 Landau that this will occur because shifting cultivators have moved to the city and left their
11 land abandoned does not fit the norm in Brazilian Amazonia today.

12
13 The threat of agrarian reform can be a motivation for ranchers clearing secondary
14 forest, as this clearing prevents the property being classified as “unproductive” by the
15 National Institute for Colonization and Agrarian Reform (INCRA), which can lead to the land
16 being expropriated for distribution to landless farmers. The presence of secondary forest can
17 also attract invasion by landless peasants in the expectation that the land will be expropriated.
18 This, together with greater profitability of ranching for beef production, has resulted in a
19 noticeable reduction in the area of secondary forest. For example, this author traveled across
20 northern Mato Grosso in 1986 and again in 2006; the contrast was evident between large
21 areas of abandoned cattle pasture reverting to secondary forest in 1986 and the same areas in
22 productive pasture stocked with cattle in 2006 (personal observation). The general drawdown
23 of secondary-forest areas in the arc of deforestation is contrary to the trend predicted by the
24 Wright/Muller-Landau hypothesis.

25
26 The process of small farms being consolidated into large farms also took place in
27 south-central Brazil (Dean 1995). As in that case, this process does not mean that the land is
28 abandoned. This is often referred to as the “hollow frontier”, where the relatively densely
29 populated fringe of the deforestation frontier advances into the forest, leaving behind a
30 sparsely populated landscape of ranch land. It is combined with a frontier “retraction” process
31 linked to expansion of capitalist activity, but does not imply land abandonment (Sawyer
32 1984, pp. 197-202).

33 34 **URBAN EFFECTS ON DEFORESTATION** 35

36 Urbanization by population movement from the countryside to cities and towns is an
37 important demographic change in Amazonia as elsewhere. As of 2000, 69.8 % of the
38 population of the seven-state Northern Region (the Legal Amazon minus Mato Grosso and
39 Maranhão) was classed as urban (Brazil, IBGE 2000). However, it should be mentioned that
40 part of the urbanization indicated by these statistics is not the result of rural-urban population
41 movement. Urban-urban migration from other parts of Brazil makes a substantial
42 contribution. In addition, part of the “urbanization” of the Amazon is the result of small
43 towns growing past the threshold that defines them as urban, or results from towns becoming
44 municipal seats and thereby automatically being classed as urban. This results in the entire
45 populations of these towns being reclassified from rural to urban. The number of municipal
46 seats continually increases because there is constant pressure to create new municipalities,

1 which augments political representation, government subsidies and lucrative positions on the
2 government payroll (as well as stimulating deforestation).
3

4 Browder and Godfrey (1997) have compiled the most complete study of urbanization
5 processes in Amazonia to date. They conclude that “the urbanization of the Amazon’s
6 rainforest has ambiguous environmental impacts” because, although smaller areas are cleared
7 by urban-based farmers, the indirect effects that are pushing in the opposite direction
8 counterbalance this effect (Browder & Godfrey 1997, p. 342). Urban-based farmers have
9 “more casual and unproductive land use” (*i.e.*, pasture). They also have more money and
10 influence, such that “small farmers are often only the pawns in the deforestation spectacle
11 dominated by urban groups.” In addition, the demands of urban residents amplify impact on
12 the surrounding forest through demand for wood, charcoal, agricultural products, electricity
13 and weekend leisure establishments.
14

15 CONCLUSION

16
17 Deforestation is unlikely to lead to significant expansion of secondary forests in
18 Brazilian Amazonia, or to provide much relief from deforestation pressure in this the world’s
19 largest tropical forest. The notion that the danger of a tropical deforestation “crisis” has been
20 exaggerated by ignoring attenuating effects of urbanization is not supported by trends in
21 Brazil.
22

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