

## **PEASANT STRATEGIES FOR DEALING WITH POPULATION PRESSURE: THE CASE OF HAITI**

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Today, it is a commonplace to point out that there exists a strong connection between the rate of population growth and the standard of living in agricultural societies throughout the world. Nobody would question that observation. The correlation has been known at least since the time of Malthus. Where opinions may differ is to the direction of the cause-effect relationship. One school of thought contends that it is improvements in the standard of living which allow the population to grow. This is the more traditional, Malthusian-inspired view which for a long time has been the dominating one. During the post-war period, however, and especially during the last twenty-five years, another strand of thought has gradually emerged which holds that the chain of causation runs the other way. The growth of the population is in some sense autonomous, and the standard of living changes, *ceteris paribus*, as a result of the changing pressure of the population on the natural resources. A common point of departure for the second view has been to note that population growth, especially in the Third World, has often been caused by falling death rates e.g. as a result of progress in preventive medicine.<sup>1</sup>

In the present article, we will adhere to the latter view and hold population growth as the autonomous component. The matter which we will deal with is how one particular agrarian society, that of Haiti during the post-World War II period, has attempted to adapt to an increasing population. All agrarian societies in one way or another present such adaptive patterns, the contents of which vary from society to society. If no adaptation takes place, the standard of living will immediately fall in rural areas. Larger numbers of people work on a given land area subject to diminishing returns to labor, and the product of their work has to be shared by more mouths than

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<sup>1</sup> A discussion and an extensive bibliography is given in Grigg (1976), especially pp. 135-38.

hitherto. It may very well be that the responses attempted do not suffice to prevent the standard of living from suffering a decline, but no agricultural society will exhibit a completely laissez-faire attitude to population growth. A number of counteracting mechanisms will come into action.

Such mechanisms have frequently been identified, described and analyzed in the economic, geographical and anthropological literature.<sup>2</sup> Among the more spectacular and well-known analyses are those by Clifford Geertz and Ester Boserup dealing with increasing labor intensity.<sup>3</sup> Geertz investigated the intensification of wet-rice production in Indonesia and showed how, due to unique ecological properties, the Javanese sawah (wet-rice terraces) managed to absorb increasing quantities of labor without running into diminishing returns to this factor. The system grew "into" itself and displayed an increasingly complex pattern without actually changing -the process of involution- not only in the agricultural sphere, but in rural social life as well, according to Geertz as a result of the changes in the economy. Boserup, in turn, showed how increasing population pressure will lead to a gradual shortening of the period when the land is allowed to rest in fallow -from shifting agriculture (at least 20 or 25 years) all the way down to the multi-cropping stage where the same plot yields two, three or more crops every year without any fallow at all or with an extremely short period only. Presently, we will be concerned with the identification and evaluation of similar and other mechanisms for adjusting to population growth in the case of Haiti.

### The Case of Haiti

Haiti has undergone very few structural changes after the Second World War. In particular, the dominant sector of its economy has remained the same: peasant agriculture. Ever since the mid-nineteenth century, Haiti has been a peasant nation, and it has remained eminently so to this very day. The fate of the agricultural sector is the direct concern of some 80 percent of its population, and through the supply of food and the foreign exchange earned by agricultural exports it affects the remaining 20 percent as well. Agriculture's contribution to GDP has ranged between 40 and 50 percent during most of the post-war period, and its share of export earnings was some 45 percent in the mid-1970s.<sup>4</sup>

There are no indications that this situation will change significantly in the foreseeable future. For a few decades to come, agriculture is quite likely to remain the essential sector in the Haitian economy, not least in terms of employment. The majority of the population will continue to be peasants who supply the remainder with food and presumably also provide the country with an important share of its export incomes. In short, what happens to the peasant sector

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<sup>2</sup> See e.g. the surveys by Netting (1974) and Grigg (1976).

<sup>3</sup> Geertz (1963), Boserup (1965).

<sup>4</sup> Lundahl (1979), p. 11.

of the economy should be a very important concern for all Haitians, regardless of whether they are themselves tilling the soil or not, and especially for the politicians governing the country.

In practice, this has, however, not been the case. The agricultural sector has been subject to very little positive action by the post-war Haitian governments in spite of much lipservice being paid to the cause, and, what is worse, in spite of the fact that rural per capita income appear to be slowly on its way down.<sup>5</sup> There is no correspondence between the sector's absolute and relative importance in the national economy and the amount of government interest and funds spent on improving and modernizing it. In fact, Haiti has never had a government or a ruler (with the possible exception of Henry Christophe in the early nineteenth century) with a wholehearted dedication to the modernization of agriculture. The passivity shown during the post-war period should be regarded as nothing but the prolongation or continuation of a policy which has been well rooted in Haiti for more than a century.<sup>6</sup> In other words: the responsibility for designing viable strategies for coping with population growth has always fallen very heavily on the peasants themselves --and on nobody else.

#### Population Growth in Haiti

During most of the nineteenth century, Haiti was a relatively land-abundant country. The expulsion of the French during the wars of liberation between 1791 and 1804 and the loss of a part of the slave population during the same period caused the total population to decline with an estimated 150,000 between 1790 and 1805. The latter year, the population figure was around 400,000.<sup>7</sup> During the remainder of the nineteenth century, the estimated growth of the population was low --not exceeding 1.25 percent per annum.<sup>8</sup> Before the last quarter of the century, all the arable land of the country was presumably not claimed by any owner.<sup>9</sup> During the present century, the rate of population growth has increased, to an estimated annual average of 1.9 percent from the early twenties to 1950, thereafter to fall to 1.6 percent at the present time.<sup>10</sup>

A figure of 1.6 percent is not a high one seen in an international perspective. The average for Latin America was believed to be 2.8 percent at the beginning of the 1970s.<sup>11</sup> Still, it should be the cause of deep concern. In the first place, the figure hides some information which is important when it comes to discussing agricultural adaptation. It is a figure which is net of external migration. Hence, it contains one means of adjustment: emigration. To arrive at a correct idea of the size of the triggering factor in the process of

<sup>5</sup> Cf. *ibid.*, Chapter 3.

<sup>6</sup> For the reasons behind this lack of interest in agriculture, see *ibid.*, especially Chapters 6 and 7.

<sup>7</sup> *Ibid.*, pp. 272, 190.

<sup>8</sup> *Ibid.*, p. 191.

<sup>9</sup> Murray (1977), p. 410.

<sup>10</sup> Lundahl (1979), p. 193. Present population trends are discussed by Allman and May (1979).

<sup>11</sup> Lundahl (1979), p. 193.

agrarian change, the natural growth rate should be employed. This rate is presently estimated to be 2.0 percent, both for the country as a whole and for rural districts.<sup>12</sup> The second piece of information that needs to be added is that the Haitian landscape presents some special difficulties which makes even 2.0 percent an extremely high figure.

These difficulties are connected with the topography of the country and with the extent of eroded land. More than half of the country consists of mountains with a slope exceeding 40 percent,<sup>13</sup> but due to the lack of flat, arable land, even extremely steep mountainsides are cultivated, and this has in turn led to very severe erosion problems. Together, these two facts make the rural population in relation to the arable area one of the highest in the Caribbean and Central America.<sup>14</sup> As a rough, but eloquent, indication of the ever-mounting population pressure it may be mentioned that the maximum total population density in the 1820s is believed to have been some 25 persons per square kilometer, while the corresponding figure for 1978 was 174.<sup>15</sup>

#### Demographic Adjustment

When an agrarian population grows to the point where rural per capita incomes start to fall off visibly, one of the first areas in which to look for reaction or adjustment patterns is in changes in the size of the agrarian population itself. By removing the very cause of the disturbance, equilibrium is restored. If there are too many heads to share the incomes, the number of heads may be reduced. Such a reduction may take place in three different ways: via lowered birth rates, via increased mortality and via increased out-migration from rural districts. Only the first and the last of these methods may be considered voluntary responses. An increase in death rates is not deliberately attempted except under extremely special circumstances. We will therefore not discuss adjustments via higher mortality but concentrate on the other two measures.

Little is known with certainty regarding fertility trends in Haiti. Even the static figures are fairly uncertain. For quite some time, it was assumed that crude birth rates were high - in the 40-50 per thousand range- but this presumption has not received support from recent survey data which rather point towards a rate of 37 per thousand in 1976 for the country as a whole.<sup>16</sup> The same survey also indicates that age-specific fertility is consistently higher in rural districts than in either provincial cities or the capital for all age groups. During the late 1960s, the Department of Population Sciences at Harvard made a field survey of demographic trends in rural districts and came up with a birth rate of 35 per thousand.<sup>17</sup>

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<sup>12</sup> Ibid.

<sup>13</sup> Ibid., p. 58.

<sup>14</sup> For comparisons, see *ibid.*, p. 60.

<sup>15</sup> Franklin (1828), p. 404, Lundahl (1979), p. 55.

<sup>16</sup> Allman and May (1979).

<sup>17</sup> Lundahl (1979), p. 191.

Provided that neither set of observations is too heavily biased, a comparison of the two sets indicates that birth rates may be increasing in rural districts.<sup>18</sup> If this trend is real, it indicates that no adjustment via birth rates has taken place.

If, for a moment, we attempt to go beyond the mere statistical façade and look into possible causes of increased rural birth rates, what do we find? Allman and May have identified a number of plausible variables affecting fertility in Haiti,<sup>19</sup> but unfortunately, evidence as to trends in these underlying factors is largely missing as is evidence regarding their relative impact. Among the bio-medical factors identified, in only a single case -possible improvements in public health- can we find any trend which may have pushed birth rates upwards, and even this trend is uncertain. Between 1950 and 1975, one, possibly two, improvements were made with respect to disease eradication. Yaws -a syphilis-like, albeit non-venereal, disease- which had been a terrible plight in the countryside, was wiped out with penicillin injections, and as it seems, the malaria situation may have been improved to some extent.<sup>20</sup> On the other hand, this must be weighed against another observable trend -that of increasing malnutrition<sup>21</sup>- which very well may have kept birth rates down. What the net effects of these two changes may have been is virtually impossible to say.

As to the rest of the bio-medical factors, nothing is known with certainty. Almost all Haitian women breast-feed their children for the first five months and usually well beyond that.<sup>22</sup> It is not known, however, whether the period of breast-feeding and its concomitant post-partum amenorrhoea are being lengthened or shortened. Nor do we know much about medically induced abortions. Presumably, however, the latter is a phenomenon largely limited to the capital with only small and very indirect repercussions, if any, on fertility rates in rural districts.<sup>23</sup> Modern methods of contraception, finally, are not available to the majority of the rural population. In the late 1960s, only 10,000 women were wearing IUD:s in the entire country.<sup>24</sup> This number has increased since then, but the program of the Division d'Hygiène Familiale of the Ministry of Population and Public Health which runs or supervises all family planning activities in the country is heavily centered on urban areas.<sup>25</sup>

If the bio-medical factors show no certain trends, what of socio-economic and cultural factors related to fertility? Allman and May

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<sup>18</sup> The figures must be interpreted with caution, however. In their recent survey of demographic trends, James Allman and John May observe that "...until the results of the 1977 Haitian fertility survey are available... and all the data from the Demographic Survey (five rounds, 1979-75) are analyzed it is not possible to confirm estimates of Haitian fertility nor to say much about the factors determining trends in fertility patterns." (Allman and May (1979).)

<sup>19</sup> Ibid.

<sup>20</sup> For a full picture, see Lundahl (1979), Chapter 9.

<sup>21</sup> Cf. *ibid.*

<sup>22</sup> *Ibid.*, note, p. 414.

<sup>23</sup> Allman and May (1979).

<sup>24</sup> Lundahl (1979), p. 193.

<sup>25</sup> Allman and May (1979).

identified two such factors: the conjugal patterns existing in Haiti and the extent of migration.<sup>26</sup> Beginning with the former, two points can be made. The first is that conjugal unions usually appear relatively late in Haiti. A 1977 survey conducted in the Petit Goâve region showed that 86 percent of all women under 20 and 40 percent of those in the 20-24 age group had never been in any union at all. This is true especially for the stronger unions- those involving cohabitation with more frequent sexual activities: regular, formalized marriages and plaçages (common law marriages)<sup>27</sup> both because younger adults of say 20-21 years of age are still considered ti moun -children- and because the establishment of stronger relations entail fairly strong economic commitments to support a family. Often therefore, unions are rather unstable in Haiti and do not involve cohabitation. The mean number of partners in the Petit Goâve survey was 1.7, and at the time of the survey almost 20 percent of those women who had already been in a union were found to be without a sexual partner. Little is known with respect to the dynamics or comparative statics of conjugal unions in Haiti. The only thing we can do is to advance the hypothesis that if the standard of living is deteriorating in rural Haiti, as it seems to be doing,<sup>28</sup> there may be a tendency for at least the stronger type of unions to be delayed more today than one or two generations ago and hence also for birth rates to be kept down.<sup>29</sup>

Before we go on to discuss the influence of migration on fertility (which we will do in the overall context of migration) we may summarize the evidence gathered so far. It must then be concluded that statistics appear to be very uncertain. In so far as they can be interpreted they point towards increasing birth rates, but this does not receive conclusive support from the scanty evidence with respect to possible underlying causes. Neither have we, however, been able to establish the opposite case conclusively -that birth rates have fallen and hence acted as a regulator of demographic pressure in the countryside. Keeping this in mind, let us now go on to look at migration.

If the rural population pressure has not been regulated via birth rates, it certainly has via internal and international migration. Beginning with the former, we may note that before the 1950s most of the population movements took place within the départements (of which there are five in Haiti). The 1950 census revealed that no more than 2.5 percent of the population of a département came from outside its own borders. Also within the départements themselves, mobility was low, with 4 percent moving from one arrondissement to another and 2.6 percent moving from commune to commune within the arrondissement.<sup>30</sup> Today, the pattern is entirely different. Between 1950 and 1971, Port-au-Prince -the main recipient of the flow of migrants from rural districts- grew at an annual average rate of more than 6 percent per

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26 Ibid.

27 The latter is the rule in Haiti.

28 Cf. Lundahl (1979), Chapter 3. We will come back to this below.

29 This is a mere hypothesis, however, which remains to be confirmed.

30 Ibid., p. 629. In Haiti there are 5 départements, 27 arrondissements, and 116 communes.

year—one of the highest figures for all Latin American capitals—meaning that the size of the city more than tripled in twenty years.<sup>31</sup>

International migration flows were also believed to be negligible in the 1950s. Projections of the Haitian population undertaken at the beginning of the 1960s assumed that the population for purposes of computation could be regarded as closed.<sup>32</sup> This assumption turned, however, out to be totally unrealistic when confronted with data from the sixties and the seventies. Between 1960 and 1975, an estimated 350,000 Haitians left the country permanently, to seek a better life in the Dominican Republic, the Bahamas, the United States, Canada, France and other parts of the world.<sup>33</sup> Much of this exodus, quite probably most of it, emanates from rural districts.

The net result of the out-migration from the Haitian countryside has been to reduce the rate of population growth there from the 2.0 percent mentioned above to a mere 1.1 percent.<sup>34</sup> Hence, beyond doubt, migratory flows constitute a very important regulator of the mounting rural demographic pressure.<sup>35</sup> Some of this adjustment may have taken place via an impact on fertility rates. Sex ratios are highly imbalanced in the entire country, showing a net excess of females over males—more so in urban areas than in the countryside.<sup>36</sup> This indicates heavy male migration out of the country. Inspection of age-specific data shows that it is mainly men in the 20–39 age group who have emigrated,<sup>37</sup> i.e. mainly men in "reproductive" age, and this should have some impact on fertility rates, "when it entails separation of spouses, the dissolution of already fragile conjugal unions...and the creation of large cohorts of marriageable women who are unlikely to find mates..."<sup>38</sup>

### Increasing Output: More Land

The alternative to demographic adjustment is to adapt the structure of agricultural production so as to make increased output possible. Many different methods may then be employed. The easiest one—the one requiring the fewest changes of existing practices—is simply to extend the physical area under cultivation. This type of solution was presumably the most common one during the nineteenth century. When the population grew, some migrated to clear new ground. This could, however, not go on for more than a limited amount of time. Possibly by the "mid-nineteenth century, all but the most uninhabitable regions were occupied,"<sup>39</sup> and "by the last quarter of the 19th

<sup>31</sup> Ibid., pp. 630–31.

<sup>32</sup> Saint Surin (1962).

<sup>33</sup> Segal (1975), p. 198.

<sup>34</sup> Lundahl (1979), p. 630.

<sup>35</sup> Strictly speaking, it is not clear what causes out-migration from the rural areas (cf. *ibid.*, pp. 631–33) but so far, I have not seen any study of the Haitian economy which does not point toward rural living conditions, and hence also population pressure, as one of the presumably most important determinants.

<sup>36</sup> Allman and May (1979), Table 2.

<sup>37</sup> Ibid., Table 1.

<sup>38</sup> Allman and May (1979).

<sup>39</sup> Palmer (1976), p. 62.

century probably very few tracts of arable soil were not either under cultivation or at least under the claim of one or another owner."<sup>40</sup> Closing the agricultural "frontier" was a comparatively quick affair. Hence, only under very exceptional circumstances has migration to "new" agricultural lands been possible during the post-World War II period. It has, however, taken place. Thus, Palmer reports that from 1961 to 1966, during the political turmoil following the death of Trujillo and the concomitant relaxation of border controls in the Dominican Republic, large numbers of Haitians illegally entered the Elias Piña district in search of vacant farm lands.<sup>41</sup>

Extension of the physical area under cultivation has, however, been a mere exception. Instead other methods to increase the effective area have been attempted. These methods involve a gradual shortening or elimination of fallow periods and an increase in the incidence of interplanting of several crops in the same field. Both procedures allow the existing physical land resources to be put to a more intensive use.

At the beginning of the present century, fallow periods ranging from ten to twelve years with only two years of cultivation between fallows were not uncommon. When it was felt that yields had declined too much, another plot was cleared of trees and the hitherto cultivated one was left to regenerate its fertility.<sup>42</sup> In Ester Boserup's terminology, this type or fallow practice lies somewhere between pure forest-fallow (20-25 years) and bush-fallow (6-10 years), both of which imply shifting cultivation.<sup>43</sup> In the 1930s, the fallow period had already been cut in half, and the period of uninterrupted cultivation had been substituted for shifting cultivation.<sup>44</sup> During the average fallow period of four or five years, neither trees nor bush vegetation had the time to grow up, but grass vegetation -used for grazing purposes- was the dominant form. This shortening of fallow periods has continued during the post-war period. Towards the end of the 1940s, it was observed that the period of cultivation had been extended to the point where fallows were allowed only when crop yields fell "to an impossibly low level"<sup>45</sup> at least among the smaller peasants. By that time, the fallow period was down to two or three years.<sup>46</sup> The only rest allowed the soil was a curative one, when the soil had been brought close to absolute exhaustion, while no preventive methods of fallow were employed to impede the soil from reaching this stage.<sup>47</sup> Twenty-five years later, the situation was even worse. Palmer found that by 1974, 58 percent of the farmers in the Belladère area had no land in fallow and that "the great majority of the remaining farmers had left only very small areas uncultivated as places to tie their animals."<sup>48</sup> Similar

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<sup>40</sup> Murray (1977), p. 410.

<sup>41</sup> Palmer (1976), pp. 122-23.

<sup>42</sup> Ibid., p. 165.

<sup>43</sup> Boserup (1965), pp. 15-16.

<sup>44</sup> Ibid., p. 16.

<sup>45</sup> Métraux et al. (1951), p. 59.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid., p. 65.

<sup>48</sup> Palmer (1976), p. 166.



findings are reported by Murray for the Thomazeau area in the Cul-de-Sac plain. Only some 5 percent of all plots were left fallow around 1972 -on the most generous count.<sup>49</sup> The fields were being worked until they were exhausted and only then was fallow resorted to. Fallow as a recurrent, systematic measure to restore fertility periodically was excluded.

A second way of stretching the available land resources is by increasing the amount of interplanting or mixed cropping. This practice has been common in Haiti for a long time. Alfred Métraux and his team reported that in the late 1940s perhaps three different crops were often growing in the same field at the same time in the Marbial valley.<sup>50</sup> The same type of observations (five or six crops) has been made by virtually everybody dealing with Haitian agriculture after that. The reasons for the practice are mainly twofold. In the first place, since different crops present different requirements with respect to rainfall etc. mixing crops in suitable proportions minimizes the risk of a harvest failure on any given plot -an important consideration for peasants who are living close to the subsistence level. The second reason is yet more interesting in the present context, since it has to do directly with economizing on scarce land. Fast-growing crops are mixed with slower-growing varieties. Ground crops are mixed with tree crops etc. to make maximum use of the field. Hereby, the amount of "unemployment" of the land can be reduced. To use the terms coined by Nicholas Georgescu-Roegen, intercropping is a way of avoiding to have to arrange production entirely in parallel and instead represents a step towards production in line. (Under the former, for example a tool employed at a certain stage of production of one unit of the good will be idle for some time, once that stage has been completed. If more than one unit is to be made, another tool is used, because all units have to be started at the same time. This is typical e.g. for agriculture. Production in line, in turn, means that the tool can be immediately shifted to next unit, since the starting point for each unit is not given.)<sup>51</sup>

While the existence of intercropping has often been noted, the fact that the practice is becoming increasingly intense and complex is less obvious, but recent observations appear to indicate that this is the case. Thus, Palmer reports that in the Belladère area harvesting is not a process taking place at certain times of the year only. Instead, "it is a continuous process since no single crop dominates; rather numerous crops mature throughout the year."<sup>52</sup> Farm plots in the area contained an average of no less than nine crops: "A typical lowland plot contains the following mixture: sorghum, manioc, two or three types of peas, squash, sugar cane, plantains and bananas."<sup>53</sup> Plots containing from fourteen to sixteen crops were common.<sup>54</sup>

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<sup>49</sup> Murray (1977), p. 202.

<sup>50</sup> Métraux et al. (1951), p. 59.

<sup>51</sup> Georgescu-Roegen (1971), chapter IX, Sections 8-12.

<sup>52</sup> Palmer (1976), p. 160.

<sup>53</sup> Ibid., pp. 154-55.

<sup>54</sup> Ibid., p. 154.

### Increasing Labor Inputs: Changing the Output Mix

A frequent response to increasing land scarcity in agricultural societies is to increase the input of the most abundant resource—labor. When a farming system undergoes the gradual change from shifting cultivation to multiple cropping, the labor intensity of the system simultaneously rises for production to increase:

Output, if not necessarily productivity, can be raised by more frequent cultivations of the seed-bed, by planting in rows rather than broadcasting, by carrying more loads of manure to the fields, by more weeding during growth, and by more careful harvesting—using a reaping knife, for example, rather than the sickle, and cutting heads rather than a handful of straw. In almost any peasant farming yields can be increased in this manner...<sup>55</sup>

The most well-known example of this type of intensification is the one given by Geertz for Javanese wet-rice cultivation, cited at the beginning. In Haiti, the intensification process has been a different one—at least during the post-war period.<sup>56</sup> Instead of an intensification of the production of a given crop, we have witnessed a shift away from land-intensive crops towards a higher proportion of labor-intensive agricultural products.

Between 1950 and 1971, the rural population grew by more than 700,000 people, and although official statistics tell a different story, the agricultural labor force is likely to have grown at a corresponding rate, by more than 200,000 people.<sup>57</sup> This labor force growth led to a pronounced shift in the emphasis of agricultural production during the same period. Production statistics are very shaky, to say the least, for the agricultural sector, but in spite of this, there seems to be a fairly general agreement that the output of export crops, notably coffee, has decreased in absolute terms, while that of subsistence goods (goods marketed only domestically), like corn, manioc, plantains, peas and beans, has increased.<sup>58</sup>

The shift is also a shift from land-intensive to labor-intensive goods. The labor requirements of for example coffee are much lower than those of subsistence goods, especially if it is taken into account that coffee is a perennial crop, while most subsistence crops are in the ground for less than a full year.<sup>59</sup> Is it correct then, to assume that this shift represents a response to the increased man/land ratio? It certainly is, and this may be seen with the aid of some economic theory and some empirical price data.

Production in the agricultural sector is a function of labor and

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<sup>55</sup> Grigg (1976), p. 151.

<sup>56</sup> A discussion of the relevance of Geertz's analysis for Haiti is made in Lundahl (1979), pp. 250-54.

<sup>57</sup> Ibid., pp. 204-05.

<sup>58</sup> Ibid., pp. 205-07.

<sup>59</sup> Ibid., pp. 235-37.

land mainly, while capital plays a negligible role. Given that export crops are land-intensive and subsistence crops labor-intensive at all relative commodity and factor prices and that the agricultural sector exhibits constant returns to scale as is reasonable to assume, we can deduce what happens to the production of the two types of goods as the population and the labor force grow. Let us keep relative commodity prices constant. We may then apply the Rybczynski theorem,<sup>60</sup> which tells us that with the assumptions made, the output of subsistence goods (labor-intensive goods) will increase absolutely and relatively, while the output of export goods will decrease. At constant relative commodity prices, the agricultural sector responds to population growth by expanding its labor-intensive line of production at the expense of commodities requiring relatively more land. For the relative price of export and subsistence goods to remain constant, relative factor prices must be kept constant as well. Otherwise, the relative cost of producing the two types of goods will be changed. It will become more expensive to produce the good which uses the factor whose price increases intensively, i.e. the relative price of this good goes up as well. Given that the production functions for both types of goods are linearly homogeneous, i.e. that there are no economies of scale in their production, relative factor prices are determined solely by the relative factor intensities in the two lines of production. Hence, to prevent these prices from changing, factor intensities must not be altered. The only way to achieve this is by expanding the production of subsistence goods and contracting that of export goods. The entire increase in the labor force must be allocated to subsistence production, but in order not to upset the factor proportions, some land must be added as well, and this land can only come from export production. Land, which must be accompanied by some labor (otherwise factor proportions will change in export production), is transferred into subsistence production until the original factor proportions are re-established in both lines. The output of subsistence goods has then increased while that of export goods has fallen.

Thus, we have discovered that when the rural population grows, we should expect strong forces to be at work to alter the composition of peasant production. This result was, however, obtained with the aid of an assumption of given commodity prices. This, of course, is nothing but an expository device. In practice, we should expect relative commodity prices to change as well, and Haiti does not constitute any exception to this rule. The most important determinants of this price change, in addition to the output effects just analyzed, are what happens in the world market for export goods, what happens to the taxation of these goods and what happens to the domestic demand for subsistence goods. From the early 1950s to the early 1970s, the price of the most important export goods fell in the world market or at best remained constant. In addition, Haitian taxation of these goods increased. The net effect was a lower price to the producers. What has happened to domestic demand for subsistence goods is more difficult to establish. It is possible to specify a general equilibrium model

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<sup>60</sup> See Rybczynski (1955). The complete algebraic model is found in Lundahl (1979), Appendix 1 to Chapter 5.

to study the factors pulling in different directions,<sup>61</sup> but this does not yield any definite result. Available price data, however, show that the net effect of these changes, the changes in the world market and the Rybczynski effect has been to make the relative price of subsistence goods fall. Hence, at least during the two decades following 1950, the market has not produced any counteracting forces which could serve to reserve the trend towards increased subsistence production. Quite the contrary: the price effect has reinforced the Rybczynski effect.

#### The Inefficiency of Adjustment: Erosion

The three methods of production adjustment identified above - shortening of fallows, increased interplanting and changing the output mix towards a higher proportion of labor-intensive goods- have one important, and unfortunate, feature in common. They all represent inefficient adjustment patterns which can at best serve to mitigate or delay the detrimental effects of population growth but which can never prevent rural per capita incomes from falling in the longer run. The main problem with all three of them is that they may be highly conducive to soil exhaustion and erosion. In so far as they are helpful, they are so mainly by trading tomorrow for today.

Decreasing the length of the fallow period has two negative effects. It does contribute to increasing output in the short run, but sooner or later comes the time when the land has to be put to rest. If this takes place only when the soil is close to complete exhaustion, i.e. as a last-moment curative measure applied the very minute before the patient is beyond hope, regeneration will take much longer than if fallow had been practiced on a systematic, preventive basis. Shortening the length of the fallow also means that the land is put back into production before it has been adequately rested. In this way, a double damage is being done to the soil. Fallow is allowed only when land productivity has fallen to a minimum, and then only for an insufficient period of time.

Increased interplanting may also increase the pace of soil exhaustion. Extending the number of crops on a given plot makes correspondingly higher demands on soil nutrients, and unless the mixture of crops is such as to balance requirements and add new nutrients at the same pace as existing ones are used up, the fertility of the plot in question will inevitably decline. The soil may be exhausted more rapidly than before, and if this is combined with shortening of fallows, the effect will necessarily be a permanent reduction of the soil fertility. The general picture with respect to Haitian agriculture is that no systematic balancing of crops with a view to maintaining fertility takes place. Rather, crop composition is dictated by income considerations.<sup>62</sup> The recent study by Palmer, cited above, which identified up to sixteen different crops simultaneously on the same plot gives a different view, however:

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<sup>61</sup> See *ibid.*, for such a model.

<sup>62</sup> Cf. *ibid.*, p. 79.

Although their system of interplanting is not highly developed ...they understand the importance of a mixture of crops for maintaining permanent production without a fallow. Through experience they have found that interplanting their entire parcels, the total yields, although small in terms of unit area, are more secure and the long-term effects on the soil are less harmful than if they practiced a rotating fallow system and planted only a portion of their land at a time. An indication of the success of the system is the fact that many farmers in the region have maintained their terraced and inter-cropped fields in continuous production without fallow for thirty years or more.<sup>63</sup>

In the Belladère area the plots contained hardy varieties of plants which could resist poor soils. Nitrogen fixers, like pigeon peas, red beans, and peanuts were common, and the dependence on "non nutritive-demanding root crops" like manioc, malanga, yams, and sweet potatoes was high.<sup>64</sup>

The problem with Palmer's findings is that they are, so far at least, probably not pointing to a common or generalized pattern in Haiti, but still, they are extremely interesting, since they may indicate that there are ways, within the traditional peasant mode of production, to at least slow down the process of declining rural per capita incomes. We will come back to these below.

The most harmful effects on soil fertility are probably those stemming from the shift from land-intensive to labor-intensive products.<sup>65</sup> If this shift had been accompanied by a shift into (labor-intensive) techniques which help to conserve the soil, little if any harm would have been done, but this is generally not the case in Haiti. Instead, the shift is mainly one toward crops which are likely to lead to increased erosion. The most typical export crop is coffee which is a perennial tree crop. Coffee has traditionally been planted in hilly and mountainous terrain. There, it provides a permanent cover and hence some protection against winds and precipitation. When the coffee trees have been uprooted, as has frequently been the case during the post-war period, and subsistence crops have been substituted for them, this cover to a very large extent is lost, and crops which are not in the ground during the entire year come instead. Thus, at the end of the dry season, when the land has to be planted or sown anew, the ground is exposed to water (both as rain and as runoff) and to a lesser extent also to wind. Thereby, the likelihood that the soil is going to be washed away, into valleys and rivers, increases. More serious yet, this process creates its own momentum. When the arable land area is reduced, at constant relative commodity and factor prices, another adjustment of the crop mix will take place, and this adjustment will be in the same direction as that created by the growth of the

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<sup>63</sup> Palmer (1976), p. 171.

<sup>64</sup> Ibid., p. 168.

<sup>65</sup> Cf. Lundahl (1979), pp. 209-13.

population. The Rybczynski theorem may again be applied to demonstrate that more subsistence crops and less export crops are grown.<sup>66</sup> Again, the rate of erosion increases. Further shifts take place, etc., and if these are not counteracted by movements in relative prices, erosion will accelerate. The relative prices are, however, to a very large extent determined by what happens in the world market for peasant exportables, i.e. they are outside peasant control.

The extent and consequences of soil erosion must not be underrated. Erosion is the most important problem that the Haitian economy is facing, and all policy suggestions for developing the agricultural sector must first and foremost be evaluated with respect to their ability to put an end to erosion. The quantitative impact of erosion is not known with certainty, but estimates which put the eroded area close to 500,000 hectares are common.<sup>67</sup> This figure may be compared to estimates of the arable area, which generally range from 1,000,000 to 4,000,000 hectares,<sup>68</sup> meaning that from one-fourth to one-third of the originally arable area has been lost for cultivation. Haiti's erosion problem appears to be the worst in the Western Hemisphere,<sup>69</sup> and quite likely one of the worst in the entire world. In *Losing Ground*, Eckholm points to Haiti as one of the very few countries which have been more hurt by erosion than the notorious El Salvador.<sup>70</sup>

Erosion quite likely proceeds in two different steps. At the beginning of the process, the fertility of the soil is rapidly lowered. Deeply weathered tropical soils frequently contain ninety percent of all their essential nutrients in the top ten centimeters,<sup>71</sup> and as erosion begins, this layer is rapidly lost. Thereafter, the process is mainly one of shrinking an area which is arable but of low fertility, frequently reducing the land to a state where the very "knee-bones" of the rocks are showing. Inevitably, as the Haitian population grows, the man/land ratio in agriculture increases, not only as a result of population growth itself, but also of the erosion process triggered off by this growth. Much of the production adjustment taking place in peasant agriculture should be termed maladjustment instead, since the detrimental effects of population growth are reinforced rather than counteracted by the peasant responses to demographic change.

Naturally, one cannot blame the peasants for their responses. The latter are dictated by the logic of the agricultural system within which the peasants have to operate. The trouble with this logic is that it is shortsighted. To ensure that today's minimum requirements are met, the peasants are forced to employ methods which make them worse off tomorrow. In this sense, future generations are being sacrificed for the benefit of the present population. Is there then

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<sup>66</sup> Ibid., Appendix 1 to Chapter 5.

<sup>67</sup> See e.g. Zuvekas (1978), p. 190, Lundahl (1979), p. 211.

<sup>68</sup> Lundahl (1979), p. 59.

<sup>69</sup> Zuvekas (1978), p. 189.

<sup>70</sup> Eckholm (1976), p. 169.

<sup>71</sup> Ewel (1977), p. 2.

nothing which can be done to break this deadlock, i.e. is it not possible to find other types of responses which somehow avoid permanent destruction of the natural resource base? To this question we must now turn.

### Switching into New Techniques

The Haitian peasant sector is technologically stagnant.<sup>72</sup> Adoption and spread of new techniques take place only very slowly. From the technological point of view, the contemporary picture differs very little from that of a century or a century and a half ago. The main deficiency is the almost total lack of capital. Usually capital inputs are limited to the seeds and plants themselves plus one or two simple hand tools, notably the hoe and the machete. Manure or chemical fertilizers are generally not used at all. For water, the peasants rely almost exclusively on natural precipitation while irrigation rarely is part of their agricultural system. Pesticides and insecticides to combat plant diseases and insect attacks are absent. Storage methods are primitive and provide inadequate protection to harvested crops which easily spoil. Mechanization is out of question, and as a rule neither plows nor wheel-barrow are ever seen. Knowledge of suitable techniques is often lacking as well. Systematic crop rotation, for example, is hardly ever practiced.

I have elsewhere dealt in detail with the reasons for the general failure to adopt new products and technologies in Haiti.<sup>73</sup> The main conclusions may be summarized briefly. Technological change is inherently difficult in agriculture, since nature poses obvious limits to what may be achieved. The rugged topography of the country excludes some innovations, e.g. the use of the plow in mountainous terrain. It also creates transport problems which may limit the scope for specialization. The price of capital is high in relation to that of labor. New techniques, e.g. the high-yielding seed varieties of the Green Revolution, are often capital using and thus tend to be rejected for cost reasons. Often, innovations are indivisible. They cannot be introduced on a small scale. Animal traction is a good example. Indivisibilities also make credit hard to obtain. Larger sums are simply not available for longer periods on terms that make borrowing to introduce new (indivisible) superior techniques profitable. Plows may not be introduced when farms are too small. The plow is a labor-saving device which requires a minimum farm size to be more profitable than the use of the traditional hoe and machete technique. Co-operative solutions to get around the problem of indivisibilities are generally not attempted. Most of the existing co-operatives have been formed "from above" and have failed to inspire confidence among the peasants. The social organization of the countryside, on the other hand, is such as to make the spontaneous creation of co-operatives difficult. New crops and techniques are potentially risky before they have been tried out in the local

<sup>72</sup> Cf. Lundahl (1979), Chapters 2 and 12.

<sup>73</sup> Ibid., Chapter 12.

environment, and risk is avoided by peasants living close to the subsistence level. Technological change may also lead to additional work and such requirements may be difficult to meet where malnutrition and disease are widespread. Knowledge of suitable techniques and crops, finally, may be lacking.

Resistance to technological change is the general rule in Haitian agriculture. Attempts to introduce innovations from the outside have not met with success. At the beginning of the 1970s, Christopher K. Clague concluded that "in Haiti, no examples of the spread of consciously introduced technological progress can be cited."<sup>74</sup> Where it occurs at all, technological change is rather a spontaneous process. An examination of such processes should hence provide us with some clues as to the conditions which may be favorable for innovations.

Only two field studies of technological change have so far been undertaken in Haiti. The first one of these was made by anthropologist Charles John Erasmus in 1952.<sup>75</sup> Erasmus found that it was easier for the peasants to accept innovations which yielded immediate results than changes where benefits were mainly long-term. He also noted that once some peasant had successfully tried a new technique or crop, it was not difficult to make others follow. This immediately leads to the formulation of the question of how to find peasants who are willing to act as spearheads when it comes to trying out new technologies which work mainly in the long run -such as soil conservation methods.

Here, the second study -by geographer Ernest Charles Palmer in 1976<sup>76</sup>- provides some assistance. Palmer's main conclusion is that technological change develops mainly as a response to population growth.<sup>77</sup> His findings are in bright contrast to everything which has so far been reported from Haiti, since he found that the peasants of the Belladère area were making use of an elaborate battery of soil conservation methods. Once the population pressure had reached the stage where there was no longer any room for fallow, the peasants were simply compelled to develop a farming system which was able to conserve the land in such a way that it could be kept in continuous production. New techniques then evolved. We have already seen how interplanting with different crops balancing each other was the rule. Practices of terracing, contour cultivation, composting and mulching were also common. No less than ninety percent of the peasants interviewed by Palmer were terracing their land, either "with brush, banana stalks, or on a more elaborate scale, with limestone rocks."<sup>78</sup> Instead of burning their fields (a general practice a few decades ago) the sods were turned with a hoe or a spade. On the mountainside, the peasants followed the contour line when preparing the land for planting -even on very slightly inclined lands. Composting was

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<sup>74</sup> Rotberg and Clague (1971), p. 331.

<sup>75</sup> Erasmus (1952).

<sup>76</sup> Palmer (1976), esp. pp. 167-93.

<sup>77</sup> Cf. Lundahl (1979), pp. 574-76, where Haitian agricultural technology is interpreted in Boserup's terms.

<sup>78</sup> Palmer (1976), p. 168.



employed, and the decaying organic material was spaded into the cultivated fields. Mulching of sugar cane refuse took place, and in coffee gardens, decaying vegetation was heaped around the base of the coffee trees.

Now, why have the Belladère peasants been able to change their ways, when a majority of Haitians have not? To understand this, we may begin by making a distinction between a "change to a new set of crops and methods which are ... known ... but not widely practiced," and cases where there is a need to "go outside the closed peasant system and adopt quite new methods and techniques."<sup>79</sup> Obviously, the Belladère case is an example of the first type rather than of the second. The origin of the knowledge employed lay several years back. In 1946, the Estimé government had established an "agricultural colony" in Baptiste, near Belladère, as part of a frontier development program. The colony contained a demonstration farm under the supervision of government agronomists, and land was allotted for peasants to work with new techniques. The colony failed -much due to the lack of support from subsequent governments- but in one important, but unexpected, respect it was a successful. Some of the peasants interviewed by Palmer reported that they had learned to construct terraces in the late 1940s -during the frontier development program. Others had learned the practice from a US/AID-sponsored soil conservation project ("Watershed") between 1959 and 1962. Thus, the relevant knowledge already existed in the area when it was needed and was being implemented by a minority. The latter could then act as teachers for others. Palmer's field study was carried out in 1974-75, and most peasants then reported that they had begun terracing "only within the past ten years."<sup>80</sup> The Belladère case was one of improvement of current methods rather than one of replacement by techniques coming from outside the peasant world.<sup>81</sup> Far from being a real "transformation of traditional agriculture" in the Schultizian sense,<sup>82</sup> the Belladère experience represents a selection from pre-existing alternatives, where emphasis is on complementarity and continuity rather than on a radical break with the past. Obviously, such an approach is highly successful from the point of view of adoption and spread. Whether it will also be successful from the point of view of preventing rural per capita income from falling remains to be seen. Palmer reports that "In the opinion of most, the general standard of living was declining, and there appeared to be very little hope among the people for improvement."<sup>83</sup> On the other hand, he also states that "Examples of extreme malnutrition are rare. The level of nutrition appears to be about the same for the Haitians and for the rural Dominicans."<sup>84</sup> This is probably an exception to the

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<sup>79</sup> Grigg (1976), p. 152.

<sup>80</sup> Palmer (1976), p. 170.

<sup>81</sup> Palmer cites a number of suitable practices which belong to this category: "instruction in terracing and the better use of mulches, introduction of additional soil-building food crops, the provision of fertilizers, aid in designing and building small-scale gravity-run irrigation projects, and the use of the hedgerows as hillside terraces." (Ibid., note, p. 188.)

<sup>82</sup> Cf. Schultiz (1964).

<sup>83</sup> Palmer (1976), p. 177.

<sup>84</sup> Ibid.

general pattern.<sup>85</sup> It may also be that change is cumulative, and that, given the relative success of previous innovations, resources permitting, the road has been paved for more deep-going changes as well.

A second lesson to be learned from the Belladère experience is that extension activities have a potentially important role to play in the process of technological change. The difficulty is to select the proper (geographical) areas for the efforts to have a maximum impact. One hypothesis here is that unless the population pressure is high enough no changes will be undertaken even if proper advice is given. The reason for this is that erosion control projects are very labor-demanding. Estimates range from 100 to more than 200 work-days per hectare for construction of terraces.<sup>86</sup> This labor comes on top of whatever other duties the peasants have during the agricultural year. Thus, there presumably is a tendency to delay this type of activities as long as possible.<sup>87</sup> It may therefore be worth while to concentrate the attention on finding communities or areas where the population pressure is high enough to make itself felt as a perceived need for change instead of spreading efforts too thinly, especially since there is an extreme shortage of extension workers,<sup>88</sup> and since this shortage is expected to continue for the next few years.<sup>89</sup>

#### The Need for Guidance

Rural Haiti is a society which presents clear indications of being overpopulated. Most of the usual symptoms are present.<sup>90</sup> Farms are small -less than 1.5 hectares on average. Seldom does a peasant own a single, unified field, but his holdings are generally scattered over a fairly large area in up to five (or more) plots. Per capita incomes are falling. Malnutrition is widespread. There is little room for livestock products in farm output, since the land has to be used for food directly and not for fodder to animals. The majority of the rural population continue to struggle with unproductive methods on depleted soils. Technological change has taken place only marginally, and it is even doubtful whether such change has been efficient. The problem in rural Haiti is not limited to finding a way of preventing incomes from falling, but the standard of living must be made to rise.

Today, the main regulator of the rural population pressure is out-migration from the countryside, but migration represents a viable solution only in so far as it transfers the surplus population abroad. The domestic urban sector has not been able to provide enough gainful employment to solve the problem. Most of the domestic

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<sup>85</sup> The general pattern is discussed in Lundahl (1979), Chapter 9.

<sup>86</sup> Zuvekas (1978), p. 341. On this point, cf. also Fei and Ranis (1966) pp. 16-17 where the connection between technological progress and labor requirements is discussed.

<sup>87</sup> Cf. Boserup (1965), *passim*.

<sup>88</sup> Cf. Lundahl (1979), p. 615.

<sup>89</sup> See Zuvekas (1978), pp. 313-17.

<sup>90</sup> Cf. Grigg (1976), pp. 154-61.

migratory flows end in Port-au-Prince, but more than 60 percent of the total employment there was provided by "commerce" or "services" in 1976, i.e. mainly by the "informal" sector, where incomes are likely to be as low as, or lower than, in agriculture, while less than 20 percent came from industry (which is concentrated in the capital), construction and transportation.<sup>91</sup> In absolute numbers the latter amounted to only 62,000 people -to be compared to an active population of almost 2 million (in 1971).<sup>92</sup> Nor has its increase been sufficient to absorb the flow into urban areas.<sup>93</sup> Migration out of Haiti is difficult, however. It must be kept in mind that Haiti is an island country. All transports, except those to the Dominican Republic, must go either by boat or by air. Since most of the immigration to other countries is illegal, this may pose a future problem, especially if neighboring countries perceive an increased inflow of Haitians as a threat, as has regularly been the case for example in the Dominican Republic.

The only long-term solution to population pressure in rural Haiti is economic development -inside and outside the peasant sector. Without development increased mortality may become the main mechanism to maintain an equilibrium between people and natural resources, but this equilibrium will be one close to the subsistence level. Economic development is, however, nowhere in sight. Hitherto, the peasants have had to design their own strategies for adjustment to the increasing man/land ratio. The adaptation has been a very limited one. The peasants have been inefficient in their search for adjustment mechanisms and one of the main reasons for this has been the lack of government support. It is completely absurd to have a situation where the entire nation, directly or indirectly, is dependent on agriculture and where yet those in power let the agrarian community go towards an eventual destruction. If viable strategies for dealing with the increasing population pressure are to be designed, a minimum requirement is that effective guidance, and not only token interest, is provided by those who decide the fate of the nation.

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<sup>91</sup> IBRD (1976), Table 1.3.

<sup>92</sup> Lundahl (1979), p. 634.

<sup>93</sup> Ibid., pp. 633-34.

## BIBLIOGRAPHY

- Allman, James & May, John. «Fertility, Mortality, Migration and Family Planning in Haiti», *Population Studies*, vol. 33, 1979.
- Boserup, Ester. *The Conditions of Agricultural Growth. The Economies of Agrarian Change under Population Pressure*. London, 1965.
- Eckholm, Erik P. *Losing Ground. Environmental Stress and World Food Prospects*. New York, 1976.
- Erasmus, Charles John. «Agricultural Changes in Haiti: Patterns of Resistance and Acceptance», *Human Organization*, vol. 2, 1952.
- Ewell, Jack. «A Report on Soil Erosion and Prospects for Land Restoration», Port-au-Prince: US-AID, 1977.
- Fei, John C.M. & Ranis, Gustav. «Agrarianism, Dualism, and Economic Development», in Irma Adelman & Erik Thorbecke (eds.), *The Theory and Design of Economic Development*. Baltimore, 1966.
- Franklin, James. *The Present State of Haiti (Saint Domingo) with Remarks on its Agriculture, Commerce, Laws, Religion, Finances, and Population etc. etc.* London, 1928.
- Geertz, Clifford. *Agricultural Involution: The Processes of Ecological Change in Indonesia*. Berkeley, 1963.
- Georgescu-Roegen, Nicholas. *The Entropy Law and the Economic Process*. Cambridge, Mass., 1971.
- Grigg, D.B. «Population Pressure and Agricultural Change», in *Progress in Geography*, vol. 8, London, 1976.
- International Bank of Reconstruction and Development (IBRD). *Current Position and Prospects of Haiti*. Volume II: Statistical Appendix, Washington, D.C., 1976.
- Lundahl, Mats. *Peasants and Poverty: A Study of Haiti*. London and New York, 1979.
- Métraux, Alfred in collaboration with Berrouet, E. & Comhaire-Sylvain, Jean & Suzanne. *Making a Living in the Marbial Valley (Haiti)*. Paris, 1951.
- Murray, Gerald F. «The Evolution of Haitian Peasant Land Tenure: A Case Study in Agrarian Adaptation to Population Growth», PhD thesis, Columbia University, New York, 1977.
- Netting, Robert McM. «Agrarian Ecology», *Annual Review of Anthropology*, vol. 3, 1974.
- Palmer, Ernest Charles. «Land Use and Landscape Change along the Dominican-Haitian Border», PhD thesis, University of Florida, Gainesville, 1976.
- Rotberg, Robert I. with Clague, Christopher K. *Haiti: The Politics of Squalor*. Boston 1971.
- Rybczynski, T.M. «Factor Endowment and Relative Commodity Prices», *Economica*, vol. 22, 1955.
- Saint Surin, Jacques. *Indices démographiques et perspectives de la population d'Haiti de 1950 à 1980*. Port-au-Prince, 1962.
- Schultz, Theodore W. *Transforming Traditional Agriculture*. New Haven, 1964.
- Segal, Aaron. «Haiti», in Aaron Segal (ed.), *Population Policies in the Caribbean*, Lexington. Mass., 1975.
- Zuvekas, Clarence, Jr. *Agricultural Development in Haiti. An Assessment of Sector Problems, Policies, and Prospects Under Conditions of Severe Soil Erosion*. Washington, D.C.: US-AID, 1978.