A Review of Literature on Charcoal in Haiti

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Introduction

Prosopis juliflora **plays a very important role in the charcoal industry in Haiti. This role could be expanded in ways that would contribute to ecological stabilization of the nation's rapidly degrading natural environment. However, it is possible that well-intentioned prejudice against charcoal production in any form is stifling the conservation or "wise-use" and development of the nation's** *Prosopis juliflora* **resources. One senses this attitude at its highest strength and influence among the community of international development specialists working to assist Haiti. One step in bringing about a more productive policy environment relating to this important species is to point out, especially at an international conference such as this, that charcoal production and use in Haiti is not an unadulterated evil that should be unequivocally condemned. This is the objective of this article. Hopefully, this article and the discussion it generates will lead to the development of a sound national and international policy on charcoal that includes a major role for** *Prosopis juliflora***.**

A literature review should take note of, and quickly summarize, past work in a given area to serve as the basis of current decisions and future work. Because literature reviews are not subject to quantitative filters, they are more susceptible to conscious or unconscious editorializing or position promoting than more quantitatively rigorous works that may share the same publishing platform. Thus warned, the reader of this review is invited to read on with an openness of mind that recognizes that this subject tends to be an emotionally charged one in which the biases of writers past and present and those of the reader can have a larger than scientifically justifiable influence on decisions based on the reading.

As a review of mostly consultant's reports, this review is probably more suspect than others since consultants are often paid, a fact admitted openly or not, to support a given point of view. It is common knowledge that experts tend to find problems and solutions within their realm of competence. Perhaps, most importantly, consultants tend to find the problems and solutions indicated, openly or tacitly by their employers. The literature on charcoal production and use in Haiti may be affected by this human tendency more so than other bodies of literature. In reading this literature, it is clear that those who paid the piper called the tune of problems, causes, and solutions. Those who viewed Haiti's problems as deforestation prescribed reforestation. Those who saw the problem as charcoal production prescribed alternative energy sources, centralized charcoal production enterprises, or constraints on charcoal production and marketing.

Having seen the tendency in others, I wish to alert readers to my own bias that the fundamental problem of ecological disaster in Haiti must be that set of causes which keeps most of the Haitian people in a state of poverty, dependent as farmers on a shrinking agricultural base. Thus, this review has an overlay of biases, those of the authors whose works are being reviewed, those of the author, and those of the reader. Hopefully, this review will encourage the advisors of decision makers to convince their bosses to look beyond the easily seen, barren hillsides and easily formulated responses that address only the symptoms and not the causes of the devastation. Hopefully, this will result in more effective programs and policies that begin to reverse what has been, at least, a hundred year old trend of ecological decline.

Deforestation and Charcoal Production

Charcoal production and use in Haiti is generally viewed with alarm as one of the principal factors in the deforestation (UNDP, p. ii) and general ecological degradation of the country. There is another view. In fact, the UNDP qualifies its characterization of the role of charcoal and fuelwood use in the ecological degradation of Haiti. They write, in 1991, that the charcoal industry is only one of the causes and probably not the principal cause of the deforestation of Haiti (UNDP, p. 23). Among the other causes of environmental degradation in Haiti they list:

- **Population growth and its attendant parcelization of agricultural holdings and the farming of land inappropriate for agriculture**
- **The insecurity of land tenure which encourages the over-exploitation of the land**
- **The risky and erosive agricultural practices of the peasant farmers, which has reduced their capital base and exposes them to broad fluctuations in income, has more and more frequently left them only charcoal production as a revenue source in times of need (UNDP, p. 23).**

All policy actions aimed at reversing the ecological degradation of Haiti should be based on an understanding of the role of charcoal production in that decline. The production of charcoal has played a relatively minor role in the destruction of Haiti. According to figures quoted by the UNDP, charcoal contributes a minor part of wood-based energy used in Haiti. The figures show that charcoal provides 90,000 energy units out of a total of 1,061,000 units derived from wood sources. Even taking into account that 60 percent of the energy contained in the wood used to produce the charcoal was lost during production (Foley, p. 79), the wood energy used or consumed associated with charcoal is only about 21 percent of the total. If one adds in other uses of wood for which trees are cut (such as for construction of rural homes), the proportion of national wood resources used in charcoal production drops further and charcoal production's role in the degradation of Haiti is put into perspective, indicating that Haiti's ecological problem will not be resolved by eliminating charcoal production.

An Overview of the Charcoal Economy in Haiti

There are positive aspects of the industry that should be kept in mind. First, the use of charcoal and fuel wood helps put Haiti in the relatively enviable position of being able to provide about 85 percent of energy needs from domestic resources (Smucker, p. 2; UNDP, p. 2). Fuelwood, used mostly in rural areas, contributes 70 percent of the nation's energy, while charcoal, used mostly in urban areas, contributes only about 6 percent (UNDP, p. 2).

Earl, writing in 1979, estimated the total annual value of charcoal at US$2,883,000, which he estimated provided foreign exchange saving equal to US$64,000,000. The industry provides a redistribution of wealth effect since it is a decentralized industry (Voltaire, p. 10; Smucker, p. 6) peopled by the poorest of the poor (Earl, p. 16-17) and practiced throughout Haiti. The flow of charcoal is from peasant producers to urban consumers (Smucker, p. 2). The industry is quite well adapted to the economic conditions of rural Haiti: the technology is low cost (The earthen kilns are made using simple earth-moving tools, such as spades and picks.), the inputs (trees and labor) are virtually free, the final product stores and ships well. Marketing is often only a matter of getting the bagged charcoal to a roadway where passing merchants will purchase the product. Earl estimated the number of persons employed full time in the production of charcoal at about 4,370 with an equal number involved in the marketing phase. He warned that "Any planned changes in the future energy supplies for Haiti must take closely into account the large number of people who depend entirely upon the charcoal industry for survival" (p. 15). The UNDP estimated, in 1991, the total value of the industry on the order of 50 million dollars (UNDP, p. 26). In 1991, some 150,000 persons were involved in the industry, with 65,000 of those being producers (UNDP, p. 26).

A significant change in the basic economy of charcoal is in the process of occurring, namely, the industry is increasingly based on wood that is purchased rather than obtained gratuitously. Voltaire, writing in 1979, felt that trees used in charcoal production were essentially free goods and felt that this hindered the expected economic rationing process that typically attends increasing scarcity. Writing in 1991, the UNDP noted that the era of free trees is over, citing that nearly 60 percent of charcoal producers purchase their raw material from tree owners.

Usage Rates and Other Data

Charcoal users are predominately urban (Smucker, p. 2 and 20). Given the fact that Port-au-Prince is the largest urban area in the country, it is no surprise that charcoal consumption in this capital city is estimated to account for two-thirds of national charcoal consumption (UNDP, p. 3). In a recent study, the UNDP found that 62 percent of the capital city's residents use charcoal as their "only" household energy (UNDP, p. 5). The same study estimated per capita consumption in Port-au-Prince between 0.36 and 0.42 kg per day. This implied the city consumed nearly 160,000 metric tons of charcoal in 1990 (UNDP, p. 5).

Evolution of Charcoal Price and Deforestation

According to the UNDP, the price of charcoal, in constant Gourdes (the Gourde is the monetary unit of Haiti) doubled between the late 1960s and 1990 (UNDP, p. 31). The rise in price is due primarily to cost increases in the marketing channel. The price at the producer's level remained essentially unchanged, in real terms, between 1979 and 1990. This would imply that, although the industry is increasingly based on purchased wood, the real price of wood does not appear to reflect the otherwise widely perceived scarcity of trees. Perhaps, the expected increase in the value of wood is hidden in the producer's price which includes the purchase price of the wood and the cost of transforming the wood into charcoal. This would be compatible with rising numbers of poorly employed rural residents, i.e., competition among themselves drives the price of wood up and the value of their labor down.

Recent History of Charcoal Production in Haiti

This information is based on separate reports by Smucker and Voltaire who made extensive visits within Haiti in the context of consultancies for USAID in 1979 and 1980. Citing individuals he met during his visits, Smucker places the beginning of large scale charcoal production in Haiti in late 1940's and early 1950's (Smucker, p. 15). For example, he writes that people he spoke with on Ile de la Gonave (the large island located in the bay of Port-au-Prince) "remember charcoal first being produced during the Estime administration (1946-1950)" (Smucker, p. 15). He reports that charcoal was first made in Baie de Henne (a charcoal shipping point on the northern peninsula) by outsiders from Port-au-Prince and Port-de-Paix following Hurricane Hazel in 1954 (Smucker, p. 12).

Market-Oriented Determinants of Charcoal Production

Certainly, without a relatively stable market for charcoal, there would be little charcoal production. Smucker (p. 2 and 20) states that rural farm families generally do not use charcoal themselves. Given the established market for charcoal in major cities and towns, a primary factor in making charcoal production profitable in regions outside of the consumption areas is transportation. Haiti's small (20 to 50 foot) sail-powered vessels have been and continue to be an important means of transportation, especially from the isolated northwest peninsula to the Port-au-Prince market. Smucker sites new roads and the attendant truck transportation as the basis for charcoal industries in several locations of Haiti where charcoal production did not exist as a major occupation prior to the construction of the roads (Smucker, p. 9).

Resource-Based Determinants of Charcoal Production

In reading the literature on charcoal production in Haiti a clear picture emerges of two distinct extreme ends of a continuum of resources (both human and physical) devoted to charcoal production, going from utilization of most resources for charcoal production to the utilization of most resources for agricultural production and almost none devoted to charcoal production. At one extreme, charcoal production occurs with resources that are probably not worth using in other activities. At the other extreme, it occurs as a by-product of agricultural production. It is significant to note that the erosion which so concerns most observers is more a result of activities at the agricultural production extreme of the charcoal production continuum, and, therefore, more the result of agricultural activities of which charcoal production is a by-product, than the result of activities whose chief purpose is the production of charcoal. "Available evidence would suggest that erosion is much more the consequence of heavy cultivation on land that is unsuitable for it." (Voltaire, p. 5).

The importance of charcoal production as a source of income across Haiti varies with the available agricultural resources. As available soil and water resources become more favorable to agricultural activity, charcoal production increasingly becomes a part-time activity. Part-time charcoal production tends to be associated with zones having agricultural resources (soil and water) that permit fuller utilization of available labor. Zones in which charcoal production is an important source of income for the inhabitants are generally characterized by a lack of adequate rainfall or irrigation schemes to support agricultural enterprises and the lack of other employment opportunities (Voltaire, p. 7). In general, the continuum from low agricultural productivity and high full-time charcoal production to high agricultural productivity and part-time charcoal production corresponds roughly with altitude, with the low-lying (often coastal) areas being characterized as arid forests and higher altitude areas being characterized as humid. "Where there is intensive agriculture and a short slack season, there is usually less wood available for cropping, less labor available for the heavy labor requirements of charcoal production, and generally less charcoal made" (Smucker, p. 20).

The relation between available agricultural resources and charcoal production across regions may be mirrored in the continuum of resource control across rural households, i.e., the more agricultural resources a household controls the less time it devotes to charcoal production. In the better-off agricultural zones, "only the poorest peasants are producers" (Voltaire, p. 10). Smucker notes that in the well watered highlands of Haiti, charcoal production is a seasonal complement to peasant agriculture (Smucker, p. 12-15). However, what is more common is for land-poor peasants to produce charcoal on a seasonal basis "...because they are cut off from an adequate living in peasant agriculture and have few other alternatives" (p. 20).

It seems logical to conclude from both Smucker and Voltaire that Haitians produce charcoal when more remunerative activities are unavailable. Thus, as agriculture becomes more profitable and less seasonal, across regions and across individual farms within regions, charcoal production becomes less important as a source of income to Haitians. Note, this implies that even in agriculturally productive regions, there may be a tendency for charcoal production to increase if access to productive agricultural resources is reduced as the rural population increases.

Primary Charcoal Production Areas in Haiti

Voltaire provides a map of the major charcoal production areas in Haiti (Figure 1). At the time (1979), the northwest peninsula produced an estimated 50 percent of Haitian charcoal production, followed in shares of total production (30 percent) by the Côtes de Fer region, located in the southern peninsula between Jacmel and Les Cayes. He estimated that Ile de la Gonave produced 10 percent of the total. The arid areas around Port-au-Prince and between Port-au-Prince and Saint Marc were estimated to produce an additional 10 percent. The UNDP study presented a figure showing the estimated areas of charcoal production in 1980 and in 1990 (UNDP, p. 157). This figure is reproduced here as Figure 1. There is growing evidence that the generally moist Grande Anse (the

western portion of the southern peninsula) is becoming more important as a charcoal-supply region for the Port-au-Prince area (Smucker, p. 16 and CARE). Perhaps, this is occurring in response to reduced availability of charcoal from the Northwest.

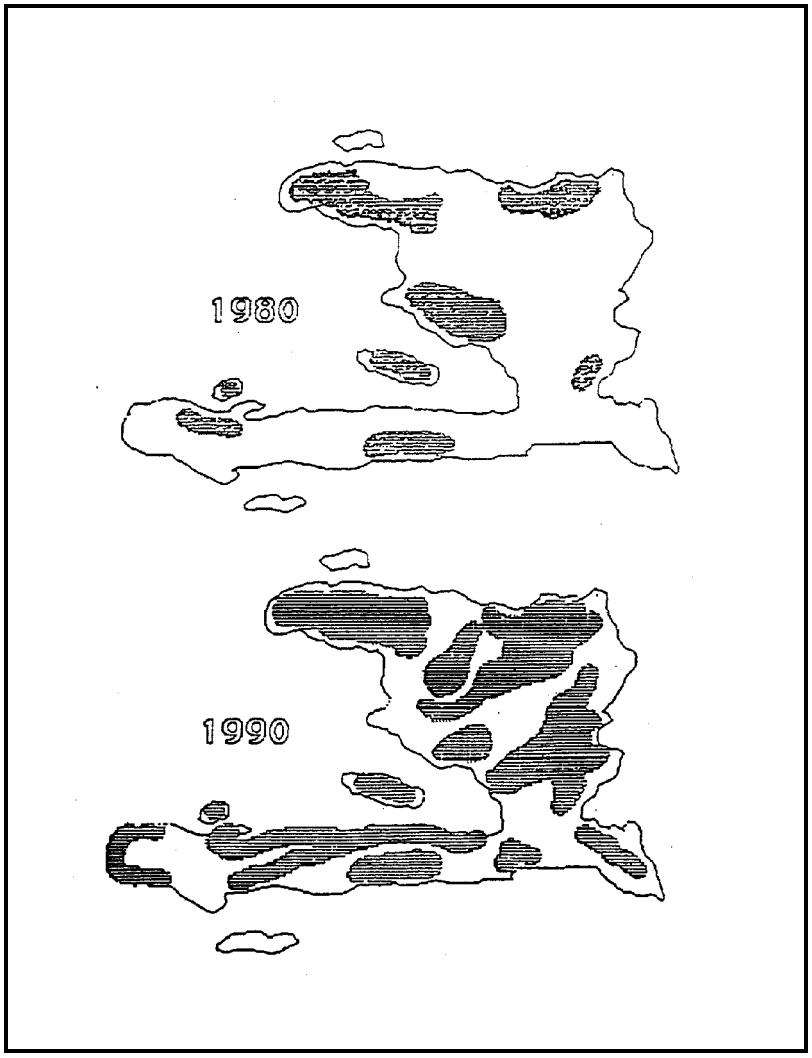

Figure 1. Charcoal Production Areas in Haiti, 1980 and 1990 (UNDP)

Charcoal Production From Arid Forests

As pointed out in the work of Voltaire and Smucker there are sound economic reasons why the arid regions of Haiti are used for charcoal production. These can be summarized in the assertion that such land is not appropriate for other uses. Charcoal production appears to be the most productive use of such land under the regulatory and economic conditions of Haiti. This evaluation is strengthened by the fact that such land is often populated by hardy, drought-resistant trees, such as *Prosopis juliflora*, which coppice readily and, therefore, can provide a succession of harvests with little management input, as long as the stumps and roots of the harvested trees are allowed to remain in place. Coincidentally, such a harvest practice has a minimal impact on soil erosion. Earl recommended that coppicing Prosopis forests, given adequate control, probably can be the best and cheapest source of fuel for Haiti (Earl, p. 25).

Charcoal Industry Cycle in Arid Zones. Smucker (p. 16-19) gives an interesting discussion of what he terms "the charcoal cycle." It is the cycle of events in the expansion and collapse of charcoal production in a given zone or locality. The cycle begins when some outside force triggers the commencement of charcoal production.

Smucker asserts that natural disasters, such as hurricanes or prolonged drought, have been the impetus to charcoal production in some important producing areas in the past (Smucker, p. 16). Economic disasters, specifically, the recent international embargo of Haiti, can also trigger charcoal production and harvesting of trees in moist, agriculturally productive zones where the trees have served as a store of wealth in anticipation of such economically difficult times (Smucker and Timyan, p. 59). Clearly, hurricanes can cause economic damage which can force farmers to turn to charcoal production; however, as the UNDP points out, hurricanes also throw down trees which can lead to higher rates of charcoal production. They use this reasoning to partially explain charcoal price decreases during 1950S1967 (UNDP, p. 30). There was a significant drop in charcoal prices during 1967, the year of Hurricane Cléo.

Commercialization, often aided by newly established penetration roads and driven by nonresident entrepreneurs has been another impetus (Smucker, p. 9 and 16). Charcoal production often begins as an occupation for the poorest local residents. However, if there is excess labor among the better-off residents (which often occurs in localities poorly endowed with productive agricultural resources), these better-off people also enter the business. If forest resources permit, nearly every one in the community becomes involved either as producers, buyers, and wholesalers. The highest quality wood (*Guaiacum officinale*) is used first, then lower quality woods (such as *Prosopis juliflora*), then softwoods and cactus, finally, the stumps of trees harvested earlier are dug up and fired. The local charcoal industry collapses. In some cases, especially when *Prosopis juliflora* is involved, privately controlled land is protected before stump removal occurs and the forest regenerates to be re-harvested at a later time. No doubt this regeneration occurs on some public lands that are protected via market forces, i.e., stump removal is not worth the effort.

Charcoal Production From Farmland

Farmlands are devoted to agricultural crops and not tree crops. Thus, there are a relatively small number of trees available for cutting; perforce, charcoal production from farmland is a sideline activity (Smucker, p. 14). There are occasional quantities of trees available for charcoal making when land that has been in long term fallow is re-cleared for agricultural purposes. Trees in these regions may be more closely guarded and cared for since they represent a form of savings or increasing wealth. Conway, who made a study of farmers' tree planting decisions associated with the USAID Agroforestry Outreach Project, indicated that most farmers viewed their trees as a cash reserve, although most farmers also had autoconsumption in mind for at least some of their trees (Conway, p. iii).

A consensus is building that trees grown in association with such small farms represent a viable (and perhaps the only viable) approach to wood production in Haiti (UNDP, p. 17). Grosenick studied the financial results of farmers participating in the USAID Agroforestry Outreach Project. Participating farmers planted trees on broad spacing in their crop fields. For example, the average participant planted about 235 trees. Grosenick found that about 85 percent of participating farmers obtained financial profits (net present values above zero) from the trees they planted. Street, Hunter, and Bellerive studied the financial returns of selected hillside farmers participating in the same project and found the farms made positive financial returns when the trees were processed either into charcoal or a combination of construction poles and charcoal. Their results also indicated a wide variation in wood production across sites and species and recommended that site-specific production recommendations, based on detailed site descriptions and tree growth studies, are needed for advising farmers on species and cultural practices.

Charcoal Production on Large-Scale Tree Farms

There have been several calls, over the years, for the re-establishment of forests and the establishment of large-scale tree farms for lumber, fuelwood, and charcoal (Burns, 1954; Benge, 1978; Voltaire, 1979). Barkley, Benge, Earl, and Voltaire have discussed the financial feasibility of large-scale charcoal farms using analyses taking place prior to the establishment of the farm. Earl felt that it was "... not financially viable to grow trees for making into charcoal..."(Earl, p. 23). Benge and Barkley felt such farms would be financially successful. History has proven them wrong. The UNDP (p. 17) indicates that a USAID project to develop large peri-urban charcoal plantations was terminated in 1987 due to lack of interest by landowners. Another attempt to develop energy plantations, the National Forestry Project, also failed due to the lack of counterpart funding, negative actions by the local rural population, and other factors, such as weather and animals (UNDP, p. 17).

Economics of Charcoal Production at Farm Level

Charcoal Production Labor Costs

D. E. Earl, a consultant with the FAO, observed the charcoal production process at three locations in Haiti and, using the then current official wage rate of US$1.30 per day, established the per-sack cost of producing charcoal using traditional technology. To convert these data to labor requirements, I have divided Earl's figures by the wage rate. These data are presented in Table 1.

Type of kiln used. Earl conducted a study of the traditional Haitian charcoal making process in 1976 and concluded that charcoal yields (charcoal per quantity of wood) from the traditional Haitian earth kilns was "very good indeed and is tribute to the high standard of skill in Haiti" (Earl, p. 10). Voltaire, p. 9, describes the Haitian charcoal making process: the cut wood is arranged in a grid and covered with straw and green leaves and then various layers of earth. Conspicuously missing is reference to the digging of a pit.

Table 1. Traditional Charcoal-Processing Labor Requirements per 30-kg Sack*

Place	Species	Woodcutting Labor per Stacked m^3 (man-days)	Kiln Operation (man-days)	Total Labor (man-days)
Ganthier	*Prosopis juliflora*	0.57	0.22	0.78
St. Marc	*Rhizophora* spp.	0.33	0.21	0.54
St. Marc	*Rhizophora* spp.	0.25	0.15	0.41
St. Marc	*Rhizophora* spp.	0.50	0.25	0.75
Forêt des Pins	*Pinus occidentalis*	0.57	0.18	0.75
Forêt des Pins	*Pinus occidentalis*	0.50	0.15	0.65

*Adapted from Earl, p. 12.

Labor Costs and Yields from Traditional Haitian Kilns

Earl compared the traditional earth kiln with a pit kiln and a portable steel kiln and provided tables of results, indicating labor requirements and charcoal yield for each type. I have presented some of the data relative to the traditional kilns in Table 2. Earl noted that the workers did not like having to dig a pit and concluded the pit kiln would only be suitable for use at fixed production sites such as sawmills (Earl, p. 10). He did not mention the capital cost of the steel kiln nor the cost of transporting it to new sites as a negative factors in it use. In comparing the traditional kiln and portable steel kilns, Earl, p. 12, found that the labor required to process charcoal in the steel kiln was about 40 percent less than the traditional kiln (19 versus 11 man-days). However, he concluded that the labor savings did not justify "...recommending a change in carbonization techniques in Haiti..." and there was no need to attempt to have Haitian charcoal producers alter their techniques.

Table 2. Labor Costs and Yields from Traditional Haitian Kilns*

Location	Species	Quantity of Wood (stacked m^3)	Labor (man-days)	Time (days)	Charcoal (kg)	Charcoal Yield per stacked m^3 (kg)
Ganthier	*Prosopis juliflora*	3.0	5	4	204	68
St. Marc	*Rhizophora* spp.	2.5	2	3	172	98
St. Marc	*Rhizophora* spp.	2.5	2	3	245	69
St. Marc	*Rhizophora* spp.	2.0	2	3	125	62
Forêt des Pins	*Pinus occidentalis*	2.5	4	4	220	88
Forêt des Pins	*Pinus occidentalis*	2.5	4	4	225	90

*Adapted from Earl, p. 9.

Charcoal Market Channels

Smucker provides an excellent description of the Haitian charcoal market, including the types of marketing agents involved, discussion of modes of conduct between agents, marketing units and example prices. The UNDP provides a diagram of various market channels connecting producers through intermediaries to consumers (UNDP, p. 11). Earl, Voltaire, and Street provide a breakdown of the cost of marketing charcoal. The UNDP provides similar discussion. Voltaire noted evidence of credit being used in the charcoal marketing process: small merchants advance money to producers and middlemen (Voltaire, p.11).

Policy Prescriptions

Consultants have been signaling the decline and eventual depletion of forestry resources in Haiti for more than a century. Most policy prescriptions have relied on the establishment and enforcement of laws and regulations governing the use of public resources, property rights, and the marketing of wood products. All require an effectively operating government ruled by law. Voltaire, writing in 1976, notes: "If one considers various proposals that have been made (since the 1949 U. N. Mission) to counter erosion, we are struck by the fact that almost nothing has been done. Yet the GOH repeatedly reassures everyone that erosion is indeed the main problem [of] Haiti and that it is ready to tackle it up front." (Voltaire, p. 23).

Solutions based on a desired but nonexistent regulatory environment will likely fail. A more realistic approach is to recognize the existing environment and attitudes and develop programs appropriate to the situation. The situation is one approaching a completely open and competitive market. Only programs based on raw market forces can be expected to succeed in such an environment. Reducing the area of the country impacted by charcoal production, then, is a matter of overwhelming the profitability of charcoal production in areas inappropriate for charcoal production through increases in supplies, ideally, from areas appropriate for charcoal production and through increases in supplies (and reduction of prices) of alternative energy types. Increasing the supply of alternative energy supplies is the approach taken by the UNDP.

A complementary approach that addresses the supply of charcoal from targeted production zones would be to encourage increased production of charcoal from existing *Prosopis* forests. Felker (personal communication) feels that many native stands of *Prosopis* in Haiti are too dense (have too many trees per square meter) for maximum wood production and sees a role for pruning and thinning of these stands as a means of increasing production. Additionally, there appears to be significant scope for increasing production through the introduction and use of faster growing species or varieties of *Prosopis* via transplanted seedlings or grafts (Felker and Patch, 1996). These suggestions will have to be tested through publicly-funded projects and demonstrated to be economically superior to other alternative uses of the resources before they will attract any attention from Haitian landowners.

Yet, as long as educated and influential Haitians and their international colleagues maintain their policy of obstructing charcoal production, the necessary projects will not be funded. This virtually condemns the nation to a scenario of further over exploitation of existing forest resources until reduced supplies have driven the price of charcoal out of reach of the Haitian poor. Until imported supplies of energy become affordable for the Haitian poor, the current approach of condemning charcoal production can exacerbate the environmental problem. When charcoal production is made illegal, local private sector, national, and international efforts to protect the environment through managed charcoal forests are also stopped. This reduces the supply, tends to drive the price of charcoal upward and encourages over exploitation. I submit it is time for those individuals with influence over forestry, agricultural, and environmental policy in Haiti to stop condemning charcoal production and begin encouraging ecologically sound charcoal production.

This will include the wise management of existing stands and may well include the planting of new stands of *Prosopis*. A visionary charcoal policy will foresee the day when increased supplies of charcoal and alternative fuels drive charcoal prices below the level at which forests devoted purely to charcoal are economically viable. Such a policy will have an alternative use in mind for the trees. As we have learned from this conference, there is an economically attractive alternative for *Prosopis* as a high-value wood for fine furniture and flooring. Additionally, as described by Henri Vallez of Haiti and Jose Inacio da Silva of Bazil in their presentations at this conference, there is a market for *Prosopis* seed pods for the production of human and animal foods. Thus, it may be possible, with wise

management, to convert today's and tomorrow's charcoal plantations into future suppliers of food for Haitians and their animals and fine wood for Haiti's artisans and craftsmen.

In the interim, charcoal production and use will remain an important component of the Haitian economy and the major use for *Prosopis***. My reading of the available literature indicates that:**

- **Charcoal is a significant foreign exchange earner (saver) for Haiti**
- **It is efficiently produced**
- **It has not been the major cause of ecological decline in Haiti**
- **Some areas of Haiti are well-suited to charcoal production (and perhaps, little else)**
- **It is one of the few available sources of revenue for the poorest Haitians (They turn to charcoal production when they have no other productive use for their labor)**
- **There is indication that trees are being purchased for charcoal production, indicating that under certain conditions charcoal plantations may be economically viable**
- **Better management of existing stands and future plantations of** *Prosopis* **can play a role in establishing an ecologically sound charcoal industry in Haiti.**

Hopefully, these observations will contribute to the development of an ecologically sound national and international policy toward charcoal production and use in Haiti.

Abbreviations

FAO Food and Agricultural Organization of the United Nations
UNDP United Nations Development Program
USAID United States Agency for International Development

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USAID/Haiti Library
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