

HAITIAN PEASANT CONTOUR RIDGES:
THE EVOLUTION OF INDIGENOUS EROSION
CONTROL TECHNOLOGY

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**Haitian Peasant Contour Ridges:
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by

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In these pages I will describe and analyze the recent emergence, in a mountainous region of rural Haiti, of a locally unique but technically effective erosion control strategy which, though unknown some two decades ago, had by the late 1970's become an essential, universally adopted element in the agrarian repertoire of peasant cultivators in the research community. The significance of this pattern lies not only in its uniqueness within the context of the ongoing, virtually unimpeded erosion which continues to undermine the agrarian base of most regions of this mountainous Caribbean nation. In addition the appearance of this locally confined erosion control complex as an unplanned result of early 1950's developmental inputs illustrates for development planners at least one type of technically successful project outcome in a process involving selective retention by peasant cultivators of some developmental inputs, the rejection of other elements, and--above all--the evolution of locally created devices for the solution of agrarian technical problems for which planners had been unable to provide any convincing, cost-effective remedy.

But this paper is intended, not as an anthropological encomium of Haitian peasant wisdom, but as an attempt to identify those key factors which have led to the successful emergence of appropriate erosion control technology in one corner of a

denuded island Republic whose massive but tragic and economically most significant export is an unintended annual contribution of irretrievable topsoil washing out into the Caribbean Sea. The first Europeans to see this island in the late 15th century had described it as a lush tropical paradise. The erstwhile fertility of the island's soil is evidenced by 18th century colonial export figures, which earned for the colony of Saint-Domingue (as the island was then called) the title of most valued jewel in the French overseas empire.

But if the colonial economy was uniquely prosperous, the colony's slaves were uniquely successful in pulling off the first and only New World slave rebellion in which ex-slaves were to organize into an autonomous, centrally governed nation-state.

Yet the early Haitian governments which emerged in the wake of the uprising, though able to make their presence felt throughout the island, lacked the organizational strength and coercive capacity to carry out their original designs for reviving the prosperity of the devastated colonial economy, a scheme which would have entailed bringing the newly liberated and now dispersed population down from the hills back onto governmentally managed export crop plantations. The rural populace of those germinal early decades, by staking claim to and remaining entrenched on their own plots of ground, set at least two precedents, which have been faithfully reenacted by each successive generation of Haitian peasant: a basic economic strategy of diversified multiplot peasant gardening and a basic economic autonomy which with few exceptions has successfully

continued to ignore and resist the designs of virtually any and all would-be economic planner.

Some contemporary observers would undoubtedly question the appropriateness of the term "successfully." It would be anthropologically rewarding to be able to unveil a portrait of success for this first and only New World experiment in radical, nation-state autonomy for masses of ex-slaves. But such a portrait would be a flattering distortion of a contemporary reality which must be deemed tragic by any reasonable economic or social yardstick, per capita income, mortality, morbidity, malnutrition, illiteracy included. Even the most fervent anthropological admirer of the rich body of music, folklore, folk-religious beliefs, and other autochthonous manifestations of collective creativity that make rural Haiti unique in New World perspective must concede, however, that economically all is not well there, that very few things in fact are well.

The dynamic which has increased local poverty, and in the process thwarted the effectiveness of so much assistance planning, is multidimensional in character. In these pages I will focus in on one of these problems: the ruthless application by the rural population of ecologically inappropriate and catastrophic lumber extraction and gardening techniques which have transformed the once lush landscape of entire regions into grim, denuded savannas.

The ecologically destructive behaviors which have led to this environmental degradation have arisen in the context of particular technological antecedents, a particular type of

colonial history, and a particular type of subsequent national isolation from many mainstream international currents. In addition their incidence has been made more serious, and their impact more strongly felt, by recent patterns of sharp demographic increment. That is, technology unfolds and operates in the context of a multidimensional field of force.

My analysis here, however, will not attempt to cover all aspects of this field. I will focus in rather on specific issues of concern to two types of analysts: anthropologists interested in stress-generated patterns of spontaneous technological evolution, and planners interested in cases of the successful introduction of erosion control practices among groups whose technology formerly lacked such practices.

With respect to the anthropologist, the relatively recent burst of theoretically and methodologically more sophisticated studies carried out in a "cultural ecological" framework has produced documentation of the manner in which many horticultural and agricultural groups have come to improve the efficiency of their productive technology, not only by diversification of their tool inventory, but also through improvements in their techniques of ground preparation, irrigation, cultivation, and even of harvesting. And the disagreements between those who argue for spontaneous reinvention as opposed to those who believe technological diffusion to have played the prime role, have come to lose importance, as both groups recognize that acceptance of new technology introduced from elsewhere is as much a function of empirically identifiable determinants as is the indigenous

creation of such technology.

It would seem in either of these two regards that the Haitian case illustrates the dynamic of technological failure. In neither biological nor cultural evolution is "success" the only, or even the most frequent, outcome. The destruction of the Haitian environment--and visitors to Western Hispaniola will recognize the non-exaggerated quality of this assessment--appears to illustrate the negative case, that of a group which has not to all appearances adapted its technology to its environment. And whether one is more inclined to join those who explore "culture-internal" causes, or those who feel the blame should be placed on colonialists, imperialists, or some other group of international scoundrels, there seems little question but that in either case the analyst must explain why, when so many groups have devised effective technological measures for protecting the environment, the Haitian peasantry has clearly remained in the camp of those whose behavior has continued to contribute toward its destruction.

But analysts of developmental planning will find themselves equally challenged and perplexed by the Haitian case. The early UNESCO team of the 1940's, which entered the Marbial Valley of Southern Haiti to initiate what was one of the first attempts of the newly created organization to carry out its developmental mandate in any part of the world, began its task with the excitement and optimism of the bearers of good news to an island which, at least developmentally, was an untouched virgin. By now, however, more than thirty years later, the virgin has received the persistent attention of probably more suitors

than any other country in the Western Hemisphere.

The advances have been generally welcomed. This is particularly true of those more highly educated sectors of Haitians who have rushed in as intermediaries between the profferers of assistance and the intended beneficiaries, and who have thus been able to forge careers and livelihoods in the solicitation, reception, and administration of enormous quantities of cash, food, and other relief resources. Though the standards of living provided by these activities is far below that of the local expatriate counterparts from the donor agencies, it is far above that of the ordinary Haitian and helps to explain, at least in part, the generally enthusiastic (but by no means necessarily deferential) welcome which offerers of assistance have received.

But there is overwhelming evidence attesting to a generally positive reception among the peasants themselves--if not to the content of the plans, at least to the presence of resource-bearing planners. Because the donors have generally made "community self-help" a prerequisite for their attention, the past three decades have witnessed a mind-boggling proliferation of "Community Councils" from one end of the island to another. The initially puzzling spectacle of crudely painted roadside signs announcing the presence in this or that hamlet of a Community Council falls into place when one becomes acquainted with the hordes of overseas relief organizations, missionary groups, and other donor agencies who have frantically searched for village structures through which to disburse deadline-bound cash or relief food. More than one observer has suspected that the entire Community Council

movement can be viewed as a resource-collecting strategy. And though virtually every evaluation has pointed in dismay to the fact that most Councils are administered and run by wealthy, better educated villagers who rarely work the land themselves--i.e. by non-peasant--the peasants themselves collect at least part of the resources and the presence of these Councils does give accurate testimony to the enthusiasm with which outside assistance is welcomed.

Few planners or resource-bearers have viewed themselves as charitable agents. Most have rather devised plans in which the resources would be channeled in such a way as to make possible and trigger off significant changes in the behavior of the recipient communities, changes which would take hold and continue once the outside assistance is withdrawn. Several agencies, including the Food and Agricultural Organization of the United Nations and the United States Agency for International Development, have specifically earmarked large amounts of support for the proliferation of techniques of soil conservation.

The results have been generally discouraging, in some instances catastrophic. In the course of an evaluation which I was commissioned to carry out on the status of past and present soil conservation projects in Haiti, it became clear that projects had on the whole and with few exceptions been unable to interest peasants either in trees or in terraces. The vast majority of projects had been able to marshal support only by resorting to strategies of paying peasants, either in cash or --more often--in relief food which was subsequently sold by most recipients in local markets.

Haitian peasant technology has emphasized the cutting of trees, but has given very little attention to their planting. Small quantities of fruit trees are planted in the vicinity of new houses. But the concept of planting orchards of fruit trees was absent. And the concept of planting a lumber tree is virtually absent from the traditional economy. A pine tree or a mahogany tree is something that "lévé pou ko-li," grows by itself. And systematic contour terracing is equally alien to traditional practices. Some recent studies on aboriginal terracing in the New World indicate that, even in pre-colonial times, terracing was not present, on the islands. It has certainly been absent from the technological repertoire of the island's current inhabitants.

To give at least some compliance with project expectations, communities have built rock walls and planted trees--but on the agriculturally marginal lands where cultivation is less frequent, where the danger of erosion is subsequently less, and where the need for soil-conservation measures is consequently least. But the placing of soil-conservation measures in these places permits communities to receive wages and other rewards for their "self-help" activities without actually endangering their already stressful horticultural economy by taking up cropping ground with questionable structures whose payoffs are at best longterm and remote. In other projects, town-based foreign project administrators have simply issued mandates to their nursery specialists to plant nurseries. And when the seedlings were getting dangerously mature, but the anticipated masses of eager,

grateful peasant takers never materialized, further orders were issued to village personnel hired by projects to "get those trees planted." The consequence was predictable. The village personnel (many of them outsiders) simply ordered the work-gangs in their hire to invade gardens and plant trees. Peasants who protested were informed that this was a "proje léta" (a government project), and in at least one instance a farmer was brought before the authorities for resisting efforts to plant trees on his land.

The trees planted, or the rock walls built, under these circumstances, rarely survive, even when placed on marginal land. This latter type of land is used for the grazing of animals. When the trees have been planted, the walls built, and the wages collected, animals are let back into the field. And then, in the words of the peasants, "bouch bet manjé plan-bwa, pyé-bét krazé mi-sek", the cow's mouth eats the seedling, its feet destroy the dry-wall. The result has been the destruction, in most project regions, of probably more than 75% of the trees that were planted and perhaps 90% of the walls that were built.

This account is disturbing on at least two levels. The very sequence of events itself--and one or another variant of this sequence has occurred in a depressingly large number of projects--is a charade of the development process as envisioned by planners. But at another level the description of the failure entails a replay of a somewhat irritating role that anthropologists have come to assume: that of debunker. Justifiably irked by "official" models which even today occasionally depict planners as bearers of light to benighted, technologically ignorant peasants, and

armed with the basically on-target insights that even a brief period of linguistically and behaviorally sensitive fieldwork can bring, anthropologists respond with their own competing caricature: that of the hard-pressed but rational and clever peasant making a fool out of stupid (or at least out-of-touch) foreign planners.

Let each professional be aware of the crumbling clay feet that constitute the shaky support of all those who make a career out of analyzing or intervening in the dynamics of poverty and let us return to the common ground that can unite both fields: searching for the conditions under which technological improvement, which has occurred in so many world settings, can be anticipated or encouraged in other regions where it has not yet made its appearance.

I believe that the anthropological contribution to this task is achieved less through post-mortem debunking of the instances of program shortsightedness and failure, than by examining the dynamics of success. For if the vast majority of soil conservation projects which I observed in Haiti must be classed as failures, I had the good fortune of stumbling on one region where the peasants were protecting their soil through the use of back-breaking labor-intensive techniques that were absent from the repertoire of any other community which I or other observers had visited. It is this case which yields richest insights into the dynamics of failure in most other projects, and which identifies for us the most promising path which future efforts should take,

The Valley of Furcy

The capital city of Port-au-Prince is located at sea level on a bay which juts into the western end of the island of Hispaniola, the second largest island in the entire Caribbean. But though Port-au-Prince itself is characterized by a hot lowland climate, it is flanked by steep mountains which rise precipitously to nearly 2,000 meters above sea level within the space of a few kilometers. A substantial percentage of the middle and upper class population of this region of Haiti (and virtually the entire foreign colony of diplomats and the private enterprise sector) make their permanent residence in Pétionville, the first major population center on the road up into the mountains. But a well constructed and reasonably well maintained all weather road continues further up into the hills. At some 1,000 meters of altitude (only some 45 minutes by vehicle from Port-au-Prince) the road passes through the mountain town of Kenscoff, the site of a famous market and the furthest point of penetration for most of the tourist trade and the wealthy Haitians and foreigners who have built summer retreats.

But the mountains continue to rise, and the road as well, although the pavement stops shortly after Kenscoff and with it all regular vehicle traffic except jeeps and vans with four-wheel drive. Summer homes continue to be found, but as the road rises and approaches the small town of Furcy, the landscape becomes dominated by the increasing prevalence of peasant cottages and the increasing signs of peasant cultivation. The visitor who has come this far will have already observed on the

hills flanking the road between Pétionville and Kenscoff, some of the most barren, eroded land visible in Haiti. The lush vegetation to which earlier chroniclers attested has long since been totally removed, and the signs of all varieties and stages of soil erosion--from rilling to gullying to sheet erosion--present dramatic evidence of the long-term result of cultivation on steep slopes by peasant communities whose agrarian repertoire is devoid of the terracing techniques that had characterized the agriculture of other groups in other world regions.

In the context of this landscape, the Valley of Furcy strikes the visitor as a misplaced page from some other country. As the vehicle road reaches its highest point, the visitor is suddenly confronted with the vista of a heavily cultivated valley. The peaks of many of the mountains are still covered with stands of pine and eucalyptus but, most importantly, the cultivated slopes --from which, of course, virtually all trees and shade plants have been removed--are nonetheless carefully protected with closely spaced rows of terrace-like structures.

The unusual status of these structures was vividly underlined by their apparent restriction, or at least concentration, in only one of the valleys. The most complete vista of the system was to be had by travelling south along the crest of a ridge. The majority of the erosion control structures were to be seen in the valley to the west of this ridge. The hills of the adjacent valley, to the east, in contrast, were characterized by the same style of unprotected denuding and cropping that is the more common landscape seen throughout Haiti. If one can

expect technology to transfer, at least within a local region, one was justifiably puzzled as to why the farmers of one valley appeared to concur in protecting their hillsides whereas their neighbors in the adjacent valley were equally consistent in their adherence to the traditional un-terraced horticultural model which had long since impoverished and/or removed the soil of so much of Haiti.

The most promising research entry point appeared to be a line of questioning which first explored, not why the non-users rejected the terraces, but why their users, in defiance of general Haitian practice, had adopted them. But the very nature and taxonomic status of these structures was not at first clear. Though constructed approximately along the contour in regularly spaced descending steps in the mode of terraces, these structures nonetheless lacked the flat "bench" surface, which is a central feature of classic terracing systems, even those in which the bench is constructed with a forward or backward sloping incline. The terraces of Furcy, in contrast, were more in the nature of elongated mounds. That is, a schematic cross-sectional diagram would take the form, not of a series of descending steps, but of a constantly-descending "S"-like structure in which the crops were placed at the higher outside loop, whence the structure descended vertically to the inner canal of the next terrace, and so on.

But if the functional classification of these structures was problematic, the developmentally critical issue of their origins was even more so. Preliminary questioning of the peasants

resulted in contradictory assertions. Some claimed that the system came as a result of the presence in the community, during the 1940's and 1950's, of developmental inputs and personnel. Others insisted, in contrast, that the tram were a recent invention of the peasants of the region. "Se youn bagay ki sòti nan lidé abitan, nan lidé pa-nou mèm." "It's a thing that came from the ideas of the peasants, from our own ideas." The first point of view would excite developmental planners, who so rarely are granted the sight of planned interventions which actually work and catch on. The second point of view would excite anthropologists, interested in the rarely granted view of spontaneous invention by a community of indigenous soil-conservation techniques. But though at first it was not clear which of these substantially different frameworks was the one more appropriate to analysis of the system, it was clear that the system was a) the product of fairly recent change b) an ecologically sounder cultivation practice than the unprotected clearing and cropping done in virtually all other regions of Haiti and thus c) of interest to both planners and analysts interested in exploring the conditions under which agrarian systems create, select, and/or adopt improved technology. It was this concern which led to the establishment of temporary residence in the community to permit careful exploration of the origins and functions of these locally unusual contour ridges.

BACKGROUND ON THE LOCAL AGRICULTURAL CYCLE

As a methodological point, the decision to research erosion control strategies or any other specific topic automatically entails other research decisions as well. For applied research the investigator must steer a course between myopic, literal focus on the specific assigned topic--in this case, erosion control structures--and the broad general "holistic" research of traditional ethnography which tries to learn a little about everything. An exclusive focus on the terraces might reveal how the terraces are built. But if the analyst wants insights on the origin and overall role of the structures in the local economy, research must go beyond the narrow confines of the terraces themselves. An attempt was made thus to utilizing research time in putting together at least a general descriptive picture of the overall horticultural economy of the research community.

The Physical Setting

As is true of more than 75% of Haiti, the topography of the region was mountainous, many cropped plots sloping at a 45 degree angle. From the point of view of the selection of soil conservation strategies, this region was characterized by a virtual absence of the boulders and rocks that are a prominent feature of the landscape in other nearby communities. Precipitation averaged a modest 1,500 centimeters per year, the rain falling in two periods, permitting in effect two annual cropping cycles. The population density of the region and the intensity of cultivation was somewhat higher than is usual in Haiti for

regions of this altitude (nearly 2,000 meters). This was due to the unusual proximity of this zone to the capital city of Port-au-Prince and the presence of a good all weather road that began within a few kilometers of the community and took produce to Port-au-Prince. This road at the same time had encouraged the purchase of land in the area by middle and upper class city people, who built summer residences. The presence of these dwellings, and the presence of still untouched stands of pines and recently planted stands of eucalyptus, made this region clearly atypical of most of rural Haiti. The survival of so many trees was directly due to the purchase of land by the city people. Because the land was purchased, not for agricultural purposes, but for vacation purposes, the urban landowners insisted on protecting the trees on their property, and turning over to peasant cultivators only those parts of their holding which had no trees on them. The presence or absence of trees on the land was in general an excellent indicator of whether the plot of ground was "peasant land" (te abitan) or "city people's land" (te moun lavil).

Land Tenure

Some 30% of the land in the region was owned by city people; most of the remainder was the property of peasants who cropped the land themselves. Urban landowners in general did not attempt to put their land to productive use. As will be seen below, a great deal of money was being made from cropping the land, but urban landowners who tried to crop it by wage labor and occasional visits generally failed. That is, this community

presented the cross-culturally unusual sight of absentee, well-capitalized owners making less money off the land than local peasant cultivators.

There were a small number of better off local residents who had managed to secure other local non-agrarian sources of employment --e.g. working as government officials or tailors. Such individuals would crop land by the use of wage labor without wielding the hoe themselves. They were able to do this profitably as their continued residence in the community and their contacts with (and regular supervisory access to) local sources of labor permitted them to make a profit from the land without working it themselves.

But the majority of males in the community were peasant cultivators. Though the research period was too brief to gather quantitative data on this delicate matter, most appeared to be cropping multiplot holdings and most appeared to have proprietary control of at least part of the holding which they were cropping. The average household holding probably had between 1.5 and 2 hectares of land under cultivation in a given year.

Access to this owned land came through two principal routes: inheritance and purchase. The inheritance system operative in the community was similar to the partible, bilateral inheritance system, modeled on French legal codes, that has prevailed elsewhere in Haiti from the earliest days of the independent Republic. But in addition to inheriting land from parents, a large percentage of adults of both sexes (but particularly males) augment their holdings by the purchase of land. This initially enigmatic pattern of intensive land transaction now constitutes a central

element in the economic career of the average Haitian peasant and maintains a circulation of land even in the face of population growth. I have called this pattern enigmatic simply because, in standard Western economic perspective, it is difficult to account for the constant supply of land available for sale. Though space does not permit the presentation of the tabular data which I had gathered in other regions of Haiti, it turns out that the peasant themselves, at different crises in their lives, sell land. The most frequent occasion on which land is sold is on the occasion of a healing ritual. Such ritual expenditures account for some two thirds of all land transactions, as peoples' participation in the folk religion called "Voodoo" nudges them into these heavy ritual expenditures. In other publications I have presented the data showing the manner in which the ritual system thus functions as a latent resource circulator, illustrating the manner in which the distinction between "economy" and "culture" begins to disappear under the impact of carefully collected quantitative data.

Summing up the land tenure system in this community, we see that it is a creative, evolutionary blend of European-derived and locally evolved arrangements. But the principal actor in this system is the freeholding peasant cultivator who generally owns at least part of the land on which he is growing his crops.

Cropping Patterns

As is true throughout Haiti, the crops grown in the research community are a mixture of domestically consumed and marketed crops. The traditional subsistence crops are corn, sweet potatoes, and yams. Beans were also traditionally grown but have always served

as an important source of cash. Probably most households that grow beans sell the bulk of the harvest.

But in addition to these traditional, "ancient" crops, the past 25 years has seen the arrival of cash-cropping vegetable gardening. The major sources of cash in the Furcy region are cabbage and potatoes, but other vegetables, including lettuce, carrots, and tomatoes are also grown. Though much of these are consumed in the home, there is no question but that their planting is done first and foremost with an eye to the lucrative urban market that has existed for these crops for over three decades. It is in the context of this recent vegetable garden that practices of systematic soil conservation arose for the first time in the region. As we analyze this terracing process, our attention will remain fixed on the demands of vegetable gardening.

An important conceptual key to understanding this entire process is the cash cropping orientation which has been found to characterize peasants in all parts of Haiti. I have worked among New World peasants (in El Salvador) who adhere to the classic peasant model of growing first and foremost for home consumption, selling their surplus to the market. This characterization cannot be applied to the peasantries of Haiti and the Dominican Republic. These Caribbean peasants have been found to manifest a cash-cropping orientation that is substantially more radical than would be expected from the traditional model of subsistence peasant.

- Though they grow some of their food, on both sides of the island households rely on purchases during large parts of the year. Concomitantly their very cropping decisions may be made more with

an eye to the market than to the home table. Their "cash-cropping" orientation should not be identified with their planting of export crops such as coffee or sugar-cane. They are "cash-croppers" in the additional sense that they will grow nationally consumed foodstuffs principally with a view to the local agricultural marketplace. The emergence of erosion control behavior would not have happened, as we will see, without this orientation. It is the marketplace which has led to much of the deforestation that has occurred in Haiti; by the same token the forces of the market have, in this community, provided the most powerful spur to undertake the heretofore unheard of practice of systematic erosion control.

Agrarian Technology

The principal tool in the community is the long-handled iron hoe. In addition most peasant households also possess an axe, a broad machete, and a short scythe-like knife called a kouto digo. In view of the mountainous topography, all ground breaking activities are done with these tools. Neither machines nor animals supply energy for this most strenuous phase of the horticultural cycle.

Though there are numerous streams and springs in the area, there are no locally utilized techniques of gravity-mediated irrigation. Some cultivators will carry buckets or gourdes of water to vegetable seedbeds during the first weeks. But in general the horticulture of the region is totally dependent on the two periods of heavier annual rainfall. For some twenty years, all households have now been using chemical fertilizer in the planting of vegetables.

Marketing and the Female Role

The vegetables that are grown for the market are sold along those channels that are common throughout Haiti: traveling female intermediaries. Women in wealthier households will assume the role of purchaser of the produce of other households, in addition to marketing the crops from their own plots and those of their husbands. Even those women who lack the wherewithal to engage in trade will nonetheless undertake the harvesting and original marketing of their husband's crops. Developmental planners who have come into the region have occasionally attempted to institute cooperative marketing of produce. But this is one domain where traditional patterns have reasserted themselves with vigor.

The bulking of the produce generally takes place, not in the local town market, but on the roadsides. Vegetables and other crops are generally transported in large sacks. The females who accumulate a load, combining the sacks from their own garden with produce which they have purchased from their neighbors, will accompany the produce on trucks or vans directly to the urban Port-au-Prince marketplace where they will sell it.

Labor Arrangements and Social Stratification

It is rare for a cultivator to carry a plot through the entire cropping cycle with only his labor or the labor of his family. People use each others' labor. The most incisive socioeconomic indicator to gauge the status of a person in this community, as elsewhere in rural Haiti, is to ascertain whether the person is a purchaser or seller of labor. Most persons are engaged in one or another side of such transactions. Some people

actually do both. Though there are relatively stable socioeconomic divisions, to a large degree a person's behavior in this regard is at least partially governed by age. The labor sellers tend to be young, the purchasers tend to be old. Local norms of age-specific propriety result in some not-so-poor young men joining gangs that sell their labor, and not-so-wealthy older persons withdrawing, out of dignity, from the sale of labor to others in their community.

Labor is generally purchased and sold, not in the form of one-on-one relationships between buyer and seller, but in the form of voluntarily assembled (but ephemeral) work squads which assign one of the individuals to be the leader who makes the arrangements and collects the money from the purchaser of labor. Subsequently the members of these work squads will help each other out on their own plots with no cash payment involved.

What is important to note about the labor-transacting arrangements here (as elsewhere in Haiti) is that most of the sellers of labor themselves have proprietary access to at least some land. That is, the Haitian peasant not only complicates the task of standard planners. He also complicates the task of social analysts of inequality, who are at much more conceptual ease when they can juxtapose the absentee landlords with the landless proletarians who work their land. The prevailing arrangements in rural Haiti call for other conceptual tools.

THE CO. TOUR RIDGES: CONSTRUCTION AND USE

With a general overview of the local agricultural cycle, it was possible to begin asking more focused questions about the

nature and origin of the earth structures. Not surprisingly, investigation revealed that the erosion control behavior of the community was more varied and differentiated than original impression had led to believe. But somewhat more unexpectedly it also turned out that all variants of this soil conservation system were restricted entirely to one sector of their horticultural economy.

The soil conservation practices of agrarian groups utilizing such practices are generally divided into vegetative measures and structural measures. The former entail the planting of trees or other vegetal barriers; the latter consist of the construction of terraces or one or another type of rock barrier.

Much of the vegetation seen on the hills around Furcy turns out to have been planted with this erosion control view in mind. This was especially true of the heavy stands of luxuriant foliage planted in the ravines and in the folds of hills. In the absence of these plants, water quickly denudes the ravines. But such vegetal measures possess a substantially lower erosion control efficiency than earth structures. It is the construction of the latter which constituted the most important innovation.

On closer inspection, two fundamentally different types of structures were found to exist. There was one structure, referred to by the peasants as plat bann (literally "flat bed") which they did construct with some of the characteristics of a genuine mini terrace, most particularly in terms of a flat surface. But the peasants built these less frequently than the earlier described contour ridges, characterized by an oval/convex shape rather than

a truly flat terrace-like surface.

The functional specificity of each of these structures will be discussed below. In terms of their actual creation, the construction of the ridges was found to be a tedious back-breaking task entailing as many as four or five major operations depending on the state of the plot when the ground preparation begins. On those occasional plots that had been left to rest and protected from grazing animals, secondary vegetation could reach heavy brush proportions (but generally not more). The first operation in this case is the cutting of the vegetation. In times past any trees on the hillside would also be felled. But in recent years somewhat loosely enforced forestry laws forbade this. The cultivator will solve the problem by chopping off the lower branches of the tree, thus dealing at least partially with the shade/sunlight problem. The vegetation will be pulled together into small piles, allowed to dry, and eventually burned. That is, though the fertilizing value of ash is recognized, throughout most of rural Haiti the vegetation is so sparse that burning is localized and the spots covered with the resulting ash are planted in special crops.

Once the vegetation has been removed, the task of ground-breaking begins. The ridges are constructed, of course, in descending order, the work team beginning at the top of the hill. The first groundbreaking operation is a deep turning over of the soil, perhaps six or eight inches deep, referred to in Creole as rabouré te. If the ground is particularly hard, a pick will be used for this task rather than a hoe. The work-crew moves

horizontally along the hill. Though agronomists have been recommending for decades the use of strings and stakes to help ridges and terraces stay on the contour, virtually no peasant uses such mechanical device. The contour is estimated by eye. Each ridge will generally traverse the entire span of the field where the garden is to be planted.

When the entire field has been thus given a preliminary turnover, the work-group will return to the top and begin shaping the final ridges with the use of the long handled hoe. Much more care is taken here to insure that each ridge is suitably deep. Though ridges vary in size and technology is not standard, a common series of dimensions would be for there to be about a three foot drop from the top of the outside of one ridge down to the bottom of the inside depression (kanal) of the ridge immediately below it. From this depression the earth is then piled up and outward again as much as a foot higher than the bottom of the depression from where it will drop three feet again down to the next lowest ridge. In this manner the field is converted into a series of descending S-like structures.

The construction of these ridges increases geometrically the amount of time that must be spent in the preparation of the ground. The most common unit of measurement that is locally used in discussing land quantities is the quarter of a carreau, which is slightly larger than a quarter of a hectare. The preparation of a quarter of a carreau (assuming a field cleared of vegetation) for the unprotected, traditional planting would take a work group of six men less than a day. It would take this same group of men

some twelve to fourteen work-days to construct protective ridges on the same field. In terms of the going wages for day labor at the time of research ^{it was between 3 and 4 grades,} (seventy to eighty U.S. cents for a day) this is tantamount to contracting between \$50.00 and \$60.00 of labor just for the ground preparation itself--an incredibly large sum in the context of traditional Haitian agriculture.

But the matter became even more impressive and--at least initially--even somewhat bewildering when I realized that these laboriously constructed soil-conservation structures were temporary, one-cycle phenomena, which were demolished at the harvest of the crop and which had to be completely reconstructed from scratch at the beginning of the next cropping cycle. The expenditure by peasants of this much time, energy, and in many cases money for the construction of ephemeral soil-conserving earthworks is unique in the context of rural Haiti and can probably be seen as one of the most important technological innovations that has affected the agricultural practices of any Haitian peasant community.

In terms of the erosion control efficiency of the structures, two soil conservation technicians with whom I was collaborating rated these ridges as being almost twice as efficient in arresting runoff as the stone retaining walls which are the most commonly used soil conservation structure by developmental groups in Haiti. On very steep slopes, one occasionally sees rilling even on plots structured into ridges. But this is rare. The ridges for all practical purpose stop rilling, gullying, and sheet erosion.

The structures do not, of course, meet all standards of "correct" erosion control. Specialists will find at least two technical flaws. On the one hand, because the ridges are not built strictly on the contour, there is some lateral rub-off in heavy rains, the water escaping at the sides of the garden, bringing with it, of course, some of the topsoil. Furthermore the outlets are not protected by grass or any other measure. That is the water, once it reaches the side of the garden, where the ridges stop, immediately begins plummeting downhill, causing the traditional gulleys. But despite these technical drawbacks, the ridges probably arrest at least 75% of the runoff that would otherwise occur--and that does occur and has occurred in those regions of Haiti where no such protective measures are taken. Stated differently, the technical criticisms of specialists should not blind us to the analytic importance of this pattern in Furcy, by which perhaps for the first time in Haitian history a group of peasants has begun systematically protecting their land.

ORIGINS OF EROSION CONTROL BEHAVIOR

From a developmental perspective this immediately gives rise to two issues: what are the factors which have brought about this soil-conservation behavior among this group of peasants? And what, if any, are the replicable elements of the process?

Preliminary Hypotheses

• Exploration of the origin of the ridge-building behavior was at first guided by three overlapping hypotheses.

1. Developmental programs.

In view of the proximity of the community to the Kenscoff area, where some locally famous terracing efforts had been achieved by dint of enormous influxes of sustained foreign aid, it appeared likely that Furcy had also been the object of soil-conservation extension. Though no active soil-conservation project was going on in the community now, perhaps the present erosion-control precautions of the peasants were product of an earlier soil-conservation project.

2. Non-project imitation of foreigners.

Another hypothesis that also arose--and that tends to be the answer given by middle class Haitian observers--is the atypical presence of Haitian elite and foreigners in this region of Haiti. With respect to foreign influence, two local sources appear particularly important. In the first place there is a very well known and influential foreign resident who has lived in the region for some thirty years. Many years ago he constructed what are reported to be the first bench terraces ever to appear in Haiti, and he has been growing vegetables on these terraces for years. Because he has a seed store, and because he was a major supplier of chemical fertilizer for many years, he was in contact with peasant clients of the region and could possibly have acted as a model.

Another possible source of example is a locally influential foreign missionary compound whose directors have for decades lived in the region and engaged in various agricultural extension activities. Soil conservation has always been a major element

in their message. It appeared quite likely that some imitation effect had occurred with respect to the projects that these missionaries had fostered in other, nearby communities.

3. Spontaneous, profit-motivated valuation of soil.

In view of the failures of projects in other regions where foreigners and projects had attempted to intervene, I assumed from the outset that there were other community-internal dynamics which had nudged this group of peasants into such unusual erosion-control behavior. And these dynamics appeared quite likely to be associated with the unusually successful market position of the peasants in this community.

To discuss this point, it will be useful here to present the most significant piece of ethnographic information on the construction of the ridges: the observation that the impressive erosion control behavior that is being discussed here, though practiced now by all members of the community, is not in fact practiced, however, on all plots of ground. The soil conservation is practiced only on plots on which vegetables will be grown. It will be recalled that the community has a cropping regime with two major subdivisions: those root and grain crops which the elders have been planting since time immemorial, and those lucrative vegetables which people have been growing only during the past three decades. For corn and bean plots, traditional unprotected clearing and cultivation methods are used. The most common practice is that of simply broadcasting the corn or beans as step one, followed by scraping up the earth with the hooked knife to cover the grains with a thin layer of topsoil. This,

of course, loosens the topsoil and renders the generally steep plots highly vulnerable to erosion.

It is true that I observed a few bean and corn plots on which there appeared to be small parallel ridges, sign of possible erosion control behavior by peasants even for traditional crops. But questioning of informants would inevitably reveal that these were plots on which vegetables had first been grown. The small ridges were the remains of the ridges that had been built for the vegetables. The traditional crops were thrown in to give the owner one last harvest before turning the plot over to his animals. In no case would a cultivator invest the labor or money to build ridges on fields dedicated exclusively to traditional crops.

Here one immediately suspects the operation of rational cost-benefit calculus on the part of the peasants. The investment of \$60.00 of labor or cash on ecologically protective ground will be undertaken, one suspects, only if the cash from the harvest exceeds the total investment. This suspicion is born out in reality, at least in the case of the vegetable plots. The quarter of carreau of land which will consume this amount of labor will, if the harvest is good, produce some 50 large sacks of cabbage. If each sack can be sold in Port-au-Prince for \$5.00, it is clear that the yield will more than cover the investment in labor. Of course there are other extremely heavy production costs (which will be discussed below), and the cost of transporting a sack down to Port-au-Prince where it can draw the best price is another factor. But it is clear that the growing of vegetables is a profitable business which covers

the investment made in labor costs associated with the construction and renovation of soil conserving ridges.

It would be interesting to posit the existence of an implicit calculus which attributes tentatively to all peasants the desire to protect their soil, to keep it from washing down the hillsides, but which makes it unfeasible to undertake soil-conservation labor, either personal or unpaid, unless the net proceeds from the harvest sale exceed by a certain amount the cash that one would have had to lay out if one had purchased labor for the construction of the soil-conservation works. If this were true, then we are observing in Furcy the phenomenon of peasants becoming actively concerned about their land now that it is drawing for them a great deal of income. That is, by such reasoning, land which produces little or no cash will not inspire its owner to invest money or labor in protecting it. But once the owner has seen that the land can produce a sizeable annual flow of cash income, active concern is triggered off to take more direct measures to protect this source of annual income from washing down into the stream. That is, is it the market which is creating an active concern for protecting the soil? If the peasants of this region behave in ways which demonstrate exceptional concern for their soil, is it perhaps because they have an exceptionally secure niche in an exceptionally lucrative capital-city vegetable trade?

This latter hypothesis in effect attributes the erosion control to rational self interest on the part of the peasant. The earlier hypotheses concerning projects and foreigners

attributed it rather to education and imitation. All of the hypotheses could be integrated. The market situation may have created the impetus for becoming concerned about soil as a resource to be protected; whereas the projects and co-resident foreign terrace builders may have provided the technological models for actualizing this new interest. All hypotheses were compatible and plausible. And the fact that they all proved to be substantially wrong merely increased my own respect for the power of empirical micro-research to expose the fragility of common sense assumptions--even those with solid theoretical backing--in the face of local developmental history as it actually unfolds.

Reconstructing a Defunct Project

The events that led up to the emergence of erosion control behavior in the community had occurred during the lifetime of many of the adults in the community. As part of my research I not only familiarized myself with Haitian history of the relevant period. In addition, I interviewed as many older people as possible to learn about the differences between past cultivation practices and present practices, and to reconstruct in as factual a manner as possible the sequence of events that led to the appearance and spread of the contour ridges, and the possible linkages between the appearance of these ridges and other aspects of Haitian history. The exasperatingly contradictory information that came from different "knowledgeable informants" was able to be sorted out, cross-checked, and I believe, satisfactorily resolved. The precise dates are obscure,

but the main events stand out.

By the 1940's the U.S. Marines had left Haiti. In view of the proximity of the Furcy region to Port-au-Prince, the Marines had established an outpost in the area. They had undertaken the planting of some eucalyptus trees, which are still standing on the crests of various hills, and they introduced the planting of a small type of potato, which has since disappeared from the region. The principal crops grown in the region were the traditional crops of beans, corn, and sweet potato. The little bit of cash which the peasants earned from cropping came mostly from their bean harvest.

But by the late 1940's and early 1950's a different type of visitor and outsider began coming to Haiti. Development organizations began taking a closer look at Haiti--the vanguard project being the earlier mentioned UNESCO project. An all weather road had already been completed to Kenscoff, and regular vehicular traffic had become a daily event. The process of urbanization had begun, and the population of Port-au-Prince was beginning to grow. In addition the construction of numerous hotels in Port-au-Prince had been undertaken to accomodate a growing influx of tourists. Newly autonomous Haitian governments were once again self-consciously looking at the poverty of Haiti and taking measures to prove to the outside world the seriousness of their intentions to involve Haiti in the new "development" processes that were now being talked about internationally. In short the confluence of a number of demographic and institutional processes was making extremely likely the growing involvement of the

Furcy area in closer economic ties with Port-au-Prince.

One of the effects of the U.S. occupation had been the construction and organization of a Department of Agriculture at Damien, a town slightly to the north of Port-au-Prince. During the 40's and 50's this institution was producing a steady stream of apparently well-trained agronomist who left Damien, not only with technical skills, but also--according to older informants--with a willingness to dirty their hands and work side by side with the peasants in a manner which the contemporary graduates of Damien have long since ceased doing.

The first significant arrival of "outside assistance" came in the form of one of these agronomists. He arrived with an assistant, called several meetings, elicited the cooperation of the wealthier and more influential peasants of the region, formed a "cooperative" and rented a plot of ground.

In the context of this first "cooperative," the agronomist introduced two elements which were to eventually transform the economy of the region. The first of these elements was the practice of planting vegetables that had been unknown in the region: cabbage, lettuce, carrots, tomatoes, and others. In addition he introduced a variety of potato superior to that which had been sporadically grown in the region since the arrival of the Marines. The peasants had been oriented toward the market since time immemorial, the major cash crop in this region being beans. It was a natural transition to move to the growing of these vegetables, for which the peasants quickly learned there was a growing urban demand--including the hotels housing the

tourists who had begun traveling up the road and visiting the Kenscoff/Furcy area with greater frequency. The closeness of the region to Port-au-Prince, the presence of a road facilitating the rapid transportation on vehicles of perishable produce, and the relatively cool temperature of the region permitted Furcy and Kenscoff to become the major supplier of vegetables to the urban population.

But the agronomist introduced, not only the crop, but a strange new way of preparing the ground. Some of the peasants had tried planting the new vegetables using the same horticultural technology that had always been used for the growing of traditional root crops, particularly the sweet potato. These crops by their nature require a deeper turning of the soil than is true of corn or beans. For as long as anybody could remember the peasant had been planting sweet potatoes on small mounds (bit patat) created by the hoe. The function of this mound was dual from the point of view of the peasant: to provide a quantity of deeply overturned soil, and to provide at least a little elevation to prevent the immersion of the sweet potato in any puddles that could collect behind the mound. The mounds were small and separated one from another.

But the new vegetables had a requirement that the traditional crops did not have. They had a delicate seedbed stage, a period of closely spaced, carefully executed initial sowing on specially prepared ground. Only after the vegetables had passed through this stage could they be transplanted into the garden. The peasants of the region simply had no technology for preparing

their generally steep hillside plots for this seedbed phase. They were obliged to pay close attention to the agronomist for this technical step.

The agronomist presented to them the use of a flat hillside bed, the plat ban that was mentioned earlier. This structure, quite different from the tram, the ridge which now predominates, shares more of the characteristics of a genuine terrace. The surface of the bed is flat, and it is permitted to slope downwards. The downward slope is generally less than that of the hill itself. If the normal slope of the hill is 30 degrees the slope of the bed may be 15 degrees. A hillside prepared with these beds looks like a series of descending steps, except that each step, instead of being horizontal, slopes down and outward. The agronomist talked about the soil conservation function of these beds. The peasants were skeptical about this particular function. But they did know that some arrangement such as this finely prepared carefully structured bed was necessary for the preparation of vegetable seedbeds.

The agronomist intended that the peasants should plant, not only the seedlings, but also the transplanted vegetables in these hillside beds as well. Though some peasants initially accepted this, it soon became clear that the use of these hillside beds for the transplanting as well did not make optimum use of the space on the hillsides. Nor did it provide the slight elevation for each plant that the peasant's experience had taught them was necessary for the healthy development of a plant. The planting of vegetables caught on rapidly, and the technique of making the

hillside bed quickly spread from those better off farmers who had first learned it from the agronomist to the community at large. But within a few years of the introduction of the practice, people had taken to the custom of using the hillside bed only for seedbeds, and transplanting the maturing seedling onto the same type of small, discrete mound that had served as the structure for growing sweet potatoes.

But in 1952 Haiti was devastated by a violent hurricane, an event which threatened to sabotage the incipient foothold which the community had established in the urban vegetable market. The hurricane destroyed crops and other vegetation; but it threatened the new prosperity, not through the physical havoc it wreaked on the hillsides, but through the influx of massive foreign relief aid which it triggered off. This aid, through a number of circuitous paths not predictable by common sense, threatened to transfer the dominance of the Furcy region in the marketplace to their neighbors and competitors closer down the road toward Port-au-Prince.

To grasp the sequence, one need only remember that development assisters tend to prefer regions closer to their residences and to paved roads. Not only can they do their promoting more easily if they are only a half hour from their homes (foreign advisers in Haiti--with the exception of missionaries--have almost inevitably opted for residence in the capital or large towns). In addition, it is easier to use a nearby project as a showplace for incoming superiors and visitors. As a result of these and other considerations, a substantial

portion of the foreign aid that came in the wake of the hurricane was directed to communities substantially lower than Furcy and closer to Port-au-Prince. These communities were the target of massive technical and cash inputs.

These lower communities had not yet entered into the vegetable market. Climatically they were high enough to permit growing of vegetables. But they were exceedingly rocky. To counteract this problem, the foreign advisers instructed the peasants in techniques of rock wall and terrace building. These measures were explained in the idiom of soil conservation. But their actual function, from the point of view of the peasant, was to clear the landscape to make it more suitable for the new type of vegetable gardening.

The reports of the foreign advisers, which I was able to read in Port-au-Prince, indicated that these advisers incorrectly believed they were the first to introduce vegetables into the region. In actuality they were helping peasants at lower altitudes get a foothold in a market that had already come to be dominated by the Furcy peasants at high r altitudes, on land with fewer rocks and boulders.

The lower-altitude peasants received a series of subsidies not available to higher-altitude peasants. But in addition they received marketing support which in modern competitive terms would be listed as unfair. The foreign adviser himself, determined that his project should work, personally contacted the hotel owners in Port-au-Prince and secured from them a promise to purchase the vegetables from his project areas rather than elsewhere. He then rented a truck and personally sold the

vegetables directly to the hotel owners. From an outsiders' perspective, he was robbing Peter to pay Paul. From the perspective of a career development technician, he was merely ensuring that "his" project would work.

But this entry of the lower altitude peasants into the market did not eliminate the Furcy peasants. Their vegetables, grown at slightly higher altitudes, were of superior quality. But the foreigners, determined to make the lower altitude project area a showplace, took one final step which completely altered the rules of the game. They taught "their" peasants how to use chemical fertilizer.

The results were electrifying. Not only did yields double, triple, quadruple. In addition the individual vegetables grown with fertilizer made the unaided vegetables of the higher-altitude peasants appear like ugly gnomes. With small grains, fertilizer will increase yields without necessarily producing dramatic visible differences between individual fertilized vs. non-fertilized grains. But with vegetables, fertilizer, by producing more attractive individual vegetables, in effect drives unfertilized vegetables out of the market. The response of the Furcy peasants was predictable. They soon began purchasing fertilizer themselves and applying it to their own vegetables.

It was this critical move which finally nudged, or rather catapulted, the entire community into the creation and application of systematic erosion control strategies. For the first time in their history the peasants found themselves disbursing large sums of money to produce their crops and secure a foothold

in the market. They were no project community; they were receiving no subsidies. Their fertilizer was purchased in the open market. They had to purchase this fertilizer unless they wished to revert to the subsistence pursuits of years gone by. But for the first time in their own history or that of their grandparents, they were disbursing what for them were enormous sums of cash in the purchase of this powerful white powder. And from the point of view of this discussion, we are less interested in the maneuvers which they undertook to raise this cash, than in the maneuvers which they were forced to take to protect their investment once they had made it.

Recall: the vegetables were transplanted onto fields which had been prepared in the form of traditional, separate, sweet-potato mounds. The peasants began applying the fertilizer to these tiny mounds. But the reader can imagine the effect of heavy rainfall on this fertilizer. The Haitian peasant may have learned to look with resignation at the sight of soil washing down the hills. They were emphatically not resigned at the sight of their dearly purchased fertilizer following the same course. It was this infuriating sight which triggered off in this community of Haitian peasants the same sort of determined technological maneuver which has led to the evolution and intensification of agrarian systems in other regions, at other times in history.

Despite persistent questioning, nobody could remember who the inventor of the new system was. It was definitely not an agronomist. The original teachers of the plat ban had long since

left the community. But in the late 50's one peasant, or several peasants simultaneously and perhaps independently, took a look at their traditional sweet potato mound, took a look at the fertilizer escaping downhill in the interstices of these haphazardly deployed tiny structures, decided that some radical modifications were called for, and went ahead and experimented.

Two basic modifications were introduced into the traditional sweet-potato mound. In the first place the space between the individual mounds was eliminated. Perhaps analogizing with the elongated, continual structure of the plat ban the peasants began making continuous, unbroken ridges across the width of the garden. Secondly the mound was made higher. That is, whereas the difference between the top and the bottom of the sweet potato mound was no more than a few inches, the typical distance between the outside highest point of the new structure and the inside lowest point came to be as much as a foot. The result of this experimentation was the contemporary tram, the laboriously constructed contour ridge whose appearance in this community provides the anthropologist with a living replay of the spontaneous evolution of technology and the developmental planner with a case study in the project-mediated adoption of effective soil conservation techniques for perhaps the first time in Haitian history. That the critical response was triggered off by a project, not in their own community, but in a competing community closer to Port-au-Prince, merely indicates the manner in which history will stubbornly unfold in ways that force would-be analysts to check their assumptions and, above all,

to carry out their model-building under the inspiration, not only of received wisdom, but also of inductively generated micro-probes into the economic behavior of specific individuals and communities.

CONCLUSIONS

1. The unusual erosion-control behavior of the peasants of Furcy is directed toward preservation not of their soil, but of the fertilizer which they purchased on the open market.

2. The reluctance of peasants whose technology lacks soil-conservation techniques will disappear once economic options are made available which simultaneously presupposed the application of soil conservation techniques.

3. In such cases the erosion-control function will be a secondary spinoff of behaviors engaged in first and foremost for cash-generating reasons.

4. For reasons that deserve further analysis, the Haitian peasant in general sees little purpose in protecting soil for soil's sake.

5. The Furcy development of erosion control technology was intimately linked to development projects. There were elements that were a direct result of input from project agronomists in the late 40's and early 50's. The major contribution of these agronomists was in terms of new cash crops. The associated technologies were accepted simply because the peasants, in their traditional repertoire, had no techniques for growing seedbeds on the steep hillside.

6. At the same time, elements of spontaneous technological evolution were to be found. The Furcy peasants later had to develop independent responses to erosion control. The wall-building techniques which foreigners were teaching in lower altitude communities were technically inappropriate because of the absence of rocks in Furcy. The bench terracing techniques also available were counterproductive because of the loss of cropping space which the need for diagonal risers entailed. The result was a situation in which the peasants were forced to devise their own techniques. This illustrates a capacity of the Haitian peasant for technological creativity. But the precondition is protection and enhancement of domestic income.

7. The peasants have not generalized changed technology into changes in all aspects of their economy. Of most importance they have continued to practice traditional individualistic land tenure patterns, in which the principal actor is the proprietor-gardener. Furthermore they have preserved traditional marketing patterns, in which the principal actor is the traveling female intermediary. Change may be domain specific.

8. Appropriateness of technology is a relative concept, limited to specific context. The use of fertilizer was an "appropriate" technology in terms of short-run increases in production. It is not at all clear that this dependence on an increasingly costly and ecologically questionable input is in the long run a desirable development. We must accept this contextualized use of "appropriateness" and not restrict its use to behaviors or technologies with no possible backfiring consequences.

"Appropriate" should be read to mean "Appropriate to X Objective."

9. Planners have more global models of change and somewhat more ambitious criteria for defining success. Some planners might ipso facto dub the Furcy issue as an "unsuccessful" project because peasants, though practicing soil conservation, are "doing it for the wrong reasons" or doing it without changing their cooperation patterns. Just as "appropriate" is taken to mean "appropriate for X objective," so also successful will mean "successful for X objective."

10. Projects should not content themselves with giving priority to discovering the felt needs of the community, as classic community development theory would have it. A good working assumption for most peasant settings is that people have a pre-existing felt need for more cash. The contribution of planners would be that of suggesting cash-generating options that the community may never have thought of. Outsiders brought in the vegetables that transformed the economy of the Furcy-Kenscoff region.

11. The most difficult, but most valuable, contribution which a program can make is in terms, not of technologies per se, but in terms of substantially improved cash generating options.

12. Once the new options have been deemed feasible, the peasants themselves will modify and adapt techniques to their own ends. The peasants of Furcy did not reject the plat-bann. They simply relegated it to one function, that of seedbeds.

13. Important technological changes of this sort can probably not be introduced in isolation. Projects which try to teach the

peasants better techniques for producing, say, subsistence corn will probably be doomed to failure. The increase in cash income will be so negligible as not to warrant the investment in additional labor.

14. Projects may succeed even in the absence of certain educational inputs touted as essential to successful development programs. The Furcy peasants adopted technological change with little sustained educational input. The majority of peasants who today practice soil conservation learned it from other peasants. On most matters it may be the case that, where there are payoffs, the need for educational promotion will be minimal or nonexistent. In contrast, if elaborate mass-media education schemes are called for, chances are that the proposed scheme is so irrelevant to the perceived interests of peasants that the projects will founder anyway.

15. In Haiti, and probably elsewhere, planners and administrators have shown confusion in using the term appropriate. Ecologically appropriate strategies from the point of the hillside may not be economically appropriate from the point of view of the peasant. Various types of appropriateness will ideally be taken into consideration. But in projects predicated on voluntary participation, the criterion of economic appropriateness should be the first criterion.

16. Planner in Haiti, and elsewhere, have in general neither possessed, nor felt the need for, the type of region- or community-specific insights into local economic behaviors and options that would endow them with a sense of the genuine economic

appropriateness or inappropriateness of the schemes which they are proposing.

DISCUSSION

Some final points remain to be discussed. Why did peasants in the adjacent valley to the east not construct ridges? One of the most surprising elements of the Furcy panorama is, as was mentioned earlier, the localization of the structures to the Furcy valley and hillsides themselves. The adjacent hills are virtually absent of ridges. When the economic calculations underlying the construction of the ridges had become clear, it was easy to hypothesize that there were economic considerations underlying the puzzling decision not to build ridges in the adjacent valley. Since the valley was as close to the paved road as the Furcy valley, questions of accessibility to markets did not seem to be the key.

It turned out that the decision was based on solid ecological factors not easily visible to outsiders. The folk taxonomy of the Haitian peasant distinguishes between "hot land" and "cold land." Generally hot land tends to be at lower altitudes and cold land at higher. But even within a region plots of ground at the same altitude can fall into different hot/cold categories on the basis of 1) soil texture and 2) exposure to the sun. In general sandy soil or soil that faces east or south will be hot land. Other land will be cold at least at the altitude of the Furcy region.

Because of its general western, northern exposure, most of

the land of the Furcy valley was "cold land." The contiguous valley, on the other hand, was dominated by land recognized by the peasants to be "hot." Hot land is known to be unsuited to vegetable growing. I have seen cases of peasants who, lacking access to enough cold land, tried growing vegetables on this hot land, using fertilizer and the ridge system. The results were catastrophic and substantial investments were lost. The folk taxonomy embodies ecologically valid distinctions, and the contrasting erosion-control status of the contiguous was a product of important differences in ecological potential, differences which the peasants learn while still children.

Why have the peasants been unwilling to construct bench terraces? That is, the bench terrace is a permanent structure that entails enormous inputs of labor to construct it, but whose maintenance subsequently entails little case. The bench terrace permanently alters the topography of the hillside.

I initially suspected that the reluctance to use the bench terrace stemmed from this initial labor requirement. But questioning in different parts of Haiti where different agencies have attempted to teach the bench terrace indicate that much more profound objections exist. There are ample models of bench terracing in the Furcy area. Yet not one peasant has attempted to construct a bench terrace on his own land.

This reluctance has astounded and disappointed soil conservation technicians, who correctly recognize the superiority of the erosion control efficiency of the bench terrace. But it now appears that the resistance of the peasant to this apparently

superior structure is founded on solid considerations.

In the first place the assumption that the bench terrace would eliminate the back-breaking labor of erecting ridges for each cropping cycle is simply unfounded. The very character of vegetables, at least as they are planted by Haitian peasants, entails the construction of ridges and/or mounds. If a peasant had put his land into bench terraces, he would simply raise mounds on the surface of the bench for each vegetable cropping cycle. That is, this ground preparation labor is not eliminated.

But secondly, and perhaps more importantly, the placing of one's land in bench terraces, at least in Furcy, would entail a decrease in total surface available for cropping. Recall: the land of Furcy lacks rocks. On land where there are no rocks available for building the riser (the front wall) of the terrace, the cultivator cannot construct vertical risers. The earth would crumble. In the absence of rocks, the riser rather must be diagonal. Since no crops can be planted on the riser, the obligation to give it a diagonal slant automatically eliminates some cropping surface. In short, the bench terrace, attractive as it is to soil conservationists, is less attractive to the peasant.

The emphasis throughout this presentation--the need for short-term cash inducements--may seem like a rather dismal conclusion. It would appear to be saying that soil conservation measures will be voluntarily undertaken, at least in Haiti, only in those atypical regions that combine a paved road connection to Port-au-Prince with the proper altitude and rainfall patterns

that permit exceptionally lucrative market involvement.

Some might point out that it is precisely in view of this dilemma that there is such a need for community education, community motivation, and community organization. Stated one way: when there is a dramatic profit-motive being satisfied, as in Furcy, important technological change will happen almost in the absence of comprehensive project organization. But most development projects do not have the advantage of these immediate payoffs. Perhaps it is in such cases, one could argue, that the need for a different sort of developmental emphasis arises, an emphasis that calls on the motivational and educational expertise of donor agencies, that points to long-term benefits, to the obligation to work together as communities on projects which may have no immediate income implications, but which are for the general good of the community or for future generations.

I have heard different versions of this argument proffered. I must state that I disagree profoundly with the entire point of view. Development projects, at least rural economic development projects, should in my opinion channel the creative energy of their personnel in the direction of devising income-generating options for the peasants, not in exploring techniques for manipulating attitudinal and value systems in the direction of altruism, future orientation, or what not. This position on my part is not a statement of a philosophy of life, in which only economic improvements are to be sought. It stems simply from a conviction that the standard developmental agency and the standard developmental professional are eminently unsuited to

the task of fomenting and sustaining charismatic internal changes in the minds and hearts of Third World villagers. Charismatic political leaders, or dedicated missionaries whose long term presence in a region win for them the confidence and admiration of the people, are able to base part of their activities on moral force and idealism.

It is not being uncharitable to suggest however that the standard developmental career person is not in the same moral or charismatic league with those other figures. Programs must be consonant not only with the realities of the recipient communities. They must also be consonant with the character of the planning and implementing agencies as well. Members of the development establishment come from nations generally successful in the objective of making money. The careerists themselves, even those who appear to do little good for their host country, generally appear to do quite well. Their developmental objectives should likewise be oriented to raising the income of target groups, not their community spirit, their idealism, their concern for their children, or otherwise.

But we are still left with the dilemma, then. What do you do, short of coercion, in the case of ecologically critical projects for which there may be no immediate visible payoff? My answer would be that with creative thought in the right direction feasible strategies will emerge, at least as explorable possibilities. Two concrete examples may help.

There are soil-conservationists who simply cannot accept the fact of the rejection of bench terraces. They are convinced

that the only hope for Haiti is the covering of Haitian hillsides with the same intricate terrace systems as are found in the Philippines or other parts of Southeast Asia.

Let us assume, for the moment, that their concern is ecologically defensible. They have three basic strategies that they could try. The first would be one of education and motivation concerning the long-term advantages of bench terraces. The objective would be to morally and intellectually convince the peasants of the need for bench terraces. The second would be a strategy of simple remuneration. Buy or rent land, and purchase the labor to set up at least demonstration terraces. The third, and the one most consonant with the findings of this paper, would be to devise new cash-generating options, superior to traditional techniques, which however would absolutely require bench terraces for implementation by the peasants.

I can think of at least one such possibility. The mountains of Haiti subsist entirely on rainfall agriculture, irrigation being relegated to the plains. A technician or agency that could introduce the concept and practice of mountain irrigation by the use of gravity techniques on the thousands of mountain streams and springs in Haiti would open the door for transforming the agriculture of most of Haiti. But highland gravity irrigation systems would require structures much broader and flatter than the ridge--would require the same types of bench terraces that have supported highland irrigation in other world regions. The introduction of a technique such as this one would be one way for triggering off widespread bench terracing.

The point is that the Furcy experience points away from one course of action--education/motivation as principle strategy--toward another: cash generation as principle strategy.

We can take an even more challenging case. Given the poor road system throughout most of Haiti and the de-facto isolation of large sectors of the mountain population from easy access to markets, it would appear unlikely that any lucrative cash-cropping such as that practiced in Furby is feasible for the near future. In distant mountain regions we can assume that for decades conventional agriculture will remain commercially marginal. Yet the soil has to be protected, not only out of concern for the mountain farmers themselves, but also to prevent the silting of rivers from destroying already fragile downstream irrigation systems. How, short of coercion, motivate the farmers to conserve their soil.

The principle is: creative thought toward reasonably short term profits is impressively greater than those generated by current techniques and practices. For the distant mountain regions of Haiti, in light of this principle, I have elsewhere recommended a turning away from the virtually insane wall-building that has characterized perhaps hundreds of rural Haitian development projects. The peasants build the walls strictly to cash in on project food or wages. The walls are left destroyed afterwards.

For such distant regions, the Furcy lesson would push us in just the opposite direction--i.e. away from an erosion control strategy relying on structural measures toward one

relying on vegetative measures. At this point in history the tropical world is witnessing the spread of a small number of rapid growing "miracle trees," the best known one being *Lucaena leucocephala*, otherwise called Ipil-Ipil. The income potential of these trees consists in their unusually short rotation period--four years under reasonably good conditions--plus the fact that the peasant can continue cultivation of traditional crops on the treed plot during the first two years. That is, these trees may be planted without seriously disrupting traditional cultivation. By the time their shade is so thick as to make cultivation impossible, they are almost ready to be harvested.

In Haiti there is an incredibly strong internal market for wood, for both lumber and fuel purposes. The Haitian peasant has been an extractor of wood; he has not yet been a planter and harvester of wood. The most revolutionary breakthrough in most of rural Haiti would be the implementation of agroforestation projects in which, for the first time in Haitian history, trees are planted and harvested as a cash crop. I have worked out the logistical and organizational outlines of a possible approach elsewhere and will not discuss it here. The point is that these trees would geometrically increase the cash income which the peasant generates from the land. And quite significantly, the peasant would plant them, not with a view to protecting the soil, but with a view to reaping profits. The erosion control function would be a secondary spin-off of behaviors whose primary function from the point of view of the

cultivator is the generation of cash. And the programmatic value of keeping this principle in the center of attention should be obvious: it leads to the selection of one type of technology --earth structures--in a region such as Furcy, but fundamentally different measures--trees--in other regions. It is not a platitude; it is a pragmatically useful touchstone.

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