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Summary Market Assessment of Promising Watershed Economic Opportunities

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DEED Targeted Agricultural Production: Market Assessment of Promising Economic Opportunities

Introduction

The DEED project is based on the idea, born out from the experience of previous USAID projects including the Productive Land Use Systems (PLUS) and Hillside Agriculture Program (HAP), that improved management of natural resources in vulnerable watersheds requires as a precondition that farmers in those watershed receive increased returns to agricultural production in order to justify investments in soil conservation or changes in harmful agricultural practices that contribute to soil erosion. Rather than starting from a premise that is based on an external actor's judgments about "what the land needs," DEED's approach starts from the standpoint of the farmers in the two targeted watersheds by asking what do they require to raise their own agricultural incomes in way that will improve the management of soil resources.

Practically, this requires the introduction of new crops, infrastructure investments, training in new technical packages and the establishment of market linkages—all of which must be planned and tested with the participation of farmers to demonstrate that they likely will lead to increased revenues as well as desirable environmental improvements. This report presents and evaluates several "targeted agricultural production packages" that DEED may introduce during its first year at different levels of the two watersheds with Producer Groups (PGs) along with the market linkages and constraints that will need to be addressed, either within the framework of DEED or by other USAID, GOH or donor initiatives.

It should be noted that, although this report details the agricultural activities that are at the core of the DEED approach, it is not meant to offer an exclusive inventory of all the first year activities that are planned under the project. In particular it addresses those aspects of DEED's mandate that deal with increasing returns from agricultural production (defined broadly to include animal based activities). There are other aspects of DEED, particularly SME-income generation activities and conservation-related activities to be undertaken by DEED that are addressed in the report for Deliverable 2.6.1 "Results of promising entrepreneurs and SMEs survey". Furthermore, in Part 2 of this report, there are a number of marketing related enterprises that would complement and make effective the agricultural enterprises outlined in Part 1.

Part 1: Selection of Targeted Agricultural Production Packages

DEED staff has undertaken a three-pronged approach to developing the project's initial agenda for intervention in the two targeted watersheds. The first source is a rapid appraisal conducted by DEED staff in interviews of value chain actors, local NGO and community leaders and field visits to small farmers in the watersheds. The second source is based on a quantitative baseline assessment of the two zones focusing on physical, agricultural and institutional capacities with recommended activities developed by the baseline study team. The last source is the two watershed-level stakeholder workshops held in early 2008. Tables 1 and 2 present a

recapitulation of the main agricultural production related initiatives suggested by each of these sources.[1]

Table 1: Synthesis of Agricultural Production Ideas: Montrouis Watershed

	ACTIVITIES
Rapid Appraisal	Intensification of irrigated perimeters with high value vegetables
	Intensification of hillside/valley bottom systems with high value vegetables and bananas
	Permaculture/Sylviculture intensification in remaining wet mountain eco-systems
	Promotion of fruit tree planting with short cycle crop associations
	Integrated livestock production with fodder crops production on vulnerable slopes
	Development of Apiculture with associated tree crops
	Development of aquaculture in appropriate spots
	Development of targeted parcels of flower production for hotel market.
Baseline	Intensification of hillside/valley bottom systems with high value vegetables and bananas
	Promotion of tree planting in association with bananas on deforested slopes with sufficient water resources
	Integrated livestock production with fodder crops on vulnerable slopes
	Reinforcement of banana production and marketing systems
Workshop	Tree planting on soil conservation structures
	Jatropha planting campaign
	Vegetable production for Cote des Arcadins hotel market
	Enclosed livestock raising
	Aquaculture training to spread knowledge of aquaculture

[1] It should be noted that the workshops in particular contained many other suggestions for DEED interventions which included addressing infrastructure constraints, local governance and non-agricultural activities which are not shown in Tables 1 and 2 since they are not part of "targeted agricultural production" initiatives. The local governance and MSME income generating activities that are not related to agricultural production that emanate from the workshops can be seen in the full DEED workshop report.

Table 2: Synthesis of Agricultural Production Ideas: Limbé Watershed

	ACTIVITIES
Rapid Appraisal	Development of Apiculture with associated Tree crops
	Development of Aquaculture in appropriate spots
	Intensification of irrigated perimeters with high value vegetables
	Improved management of mangroves and coastal resources
Baseline	Development of high value vegetables
	Development of spices and herbs
	Development o integrated livestock raising with fodder production
	Development of Aquaculture in appropriate spots
	Development of Apiculture with associated Tree crops
	Promotion of permaculture based systems of forested production—primarily coffee and yam based systems
	Reforestation of denuded zones
Workshop	Reforestation with the establishment of a central nursery for tree production
	Development of aquaculture

For both watersheds there is a large area of convergence in all three sources around the project of increasing production of high value vegetables and also bananas (both plantains in the lower altitude zones and bananas (*figue banane*) in the higher altitude zones. In addition, a high level of consensus exists around projects for the promotion of fish farming and apiculture—often in association with complementary tree planting programs. The workshop participants also placed great emphasis on the problem of a lack of water retention and distribution infrastructure.

Taking all these sources, DEED staff selected a menu of project activities (Pas) from all these suggestions for inclusion as "targeted agricultural production" for the initial period of DEED. This was done using the three following criteria:

- Project has a known market demand that can absorb the targeted production in volumes anticipated
- Projected activities will lead to both increased income and improved NRM practices
- The targeted farmers, PGs and DEED staff all have the capacity to implement required technical and commercial packages

This process of selection has yielded the following consensus Targeted Agricultural Production projects for each watershed. The descriptions of projects that follow are divided into two categories. The first are Priority Projects which are already in the planning phase. These projects are for products for which demand is basically well understood and for which established technical packages already exist. These projects require little or no testing or trial experiences to gauge their suitability for a larger roll-out. Projects in the second category, "Pilot

Projects," however are still at an experimental phase, either because demand has not yet been established (as is the case for Jatropha) or because there are still too many technical and agronomic unknowns in different types of agro-ecological systems to begin with actual large scale promotion of these projects. These will require an initial phase of testing during the first year to establish their suitability for further replication in subsequent years of DEED.

Priority Projects

PA-1*: Intensification of high-value production on vulnerable hillside and valley systems*. (Limbe and Montrouis)

This project activity is particularly relevant to higher altitude areas whose temperature characteristics allow farmers to grow high value fresh vegetables and bananas (*banane figue*). Production is limited to zones with sufficient water resources to produce on a nearly year round basis—either due to abundant rainfall in wet mountain climate (as is the case in the higher zones of the Limbe watershed) or to small scale gravity fed irrigation and spring catchment systems in drier environments. The principal crops to be grown in this system are: bananas, hot peppers, onions, broccoli lettuce, cabbage, carrots and tomatoes. Shallots will also be an important crop at lower altitudes. These crops yield significantly higher returns than do the beans/maize/millet associations, where unprotected cultivation contributes to soil erosion and renders the land unproductive in less than four seasons. The exact crop mix will depend on the micro-climactic and soil characteristics of each intervention zones. The PA proposed here will rely on some use of improved inputs (seeds, fertilizer and pesticides) than is practiced in the bean/millet/maize systems and the introduction of improved agronomic production technologies. In many cases it will also require some infrastructural investments in improved water retention and channeling structures. The model for this system is based on that which is currently practiced in Kenscoff, in which high value vegetable production in altitude is practiced on a sustainable basis with use of improved inputs and unsubsidized farmer investment in soil conservation structures. DEED staff will also seek to integrate improved soil conservation practices such as living barriers (usually bananas) of crop bands and investments in soil conservation structures where justified by higher returns.

PA-2*: Intensification of high-value production on irrigated plains with transfer of labor from hillside zones.* (Limbe and Montrouis)

This activity set contains many of the same basic agronomic packages as in the previous case, with the principal difference being that it will be implemented on larger expanses of flat plains and at altitudes that are generally lower elevation and flatter terrain than in PA-1. As a consequence, the crop mix will be different (no carrots or lettuce, and the addition of shallots and more generalized cultivation of plantain type bananas). There will be little or no investments in soil conservation structures or practices, since erosion is less prevalent. It will be based on the presence of improved inputs and the transfer of improved agricultural production technologies. The main differences in this theme to the prior one are:

- In most cases, some larger investments will need to be made in rehabilitation of irrigation systems in order to increase the level and reliability of production;

- The strengthening of the management capacity of water user groups to maintain irrigated system will need to be part of the DEED package;
- DEED will also need to serve as a catalyst for specific arrangements for integrating small farmer households from upper valleys or adjoining hillsides as beneficiaries in the improvements that are introduced. These arrangements will take a variety of forms specific to each case, but are likely to include: agreements to use hillside farmer household members as laborers, allocating specific plots to hillside farmers (particularly when larger land-owners may have significant holdings), offering land lease, rental or crop-sharing packages to hillside farmers, In any case, the idea will be to increase the revenue of households occupying land on the hillsides that will allow them to reduce the immediate pressure for short-term returns that leads to erosive agricultural practices.

PA-3*: Intensification of permaculture systems in high altitude zones* (Montrouis)

Although the high altitude zones of the Montrouis watershed no longer contain any significant stretches of forest-based agriculture with tree and shrub crops requiring no or limited tilling, many households retain patches of tree-based crop systems in plots adjacent to their houses that contain crops that grow under shady conditions with a substantial amount of tree cover. Protecting these systems from further invasion by erosive bean/maize/millet based systems is an important component of DEED's strategy. The core of the system to be promoted is the association between yam and coffee plants under shaded tree canopies. This system already exists at a micro-level, but due to lack of funds for investments in costly seed yams and low profitability of coffee, farmers have a tendency to introduce beans into the mix which leads them to start cutting shade trees and engenders a gradual process that reduces yam yields and eventually leads to transformation to a bean/maize/millet crop system with no trees, yam or coffee plants. DEED's strategy for countering this trend will be to help farmers intensify the mix of permaculture crops on their house garden parcels to increase income and improve soil retention. DEED will develop yam seed nurseries and treatment centers along with technical assistance on parcel planning and developing other income enhancing associations that can coexist with coffee and yam plants—mainly bananas. Some help will also be given to farmers on coffee treatment and marketing to improve quality of natural coffees produced in the zone and develop new market outlets (such as direct sales to exporters) that will provide higher prices and therefore incentives to producers.

PA-4: *Intensification of permaculture systems on potentially vulnerable hillsides.* (Limbe)

The agro-ecological conditions for tree-based permaculture in Limbe are significantly different from Montrouis. The main difference is that a wetter climate has created a richer and more generalized forest environment in which large tracts of tree covered parcels still exist on hillsides or on flat non-irrigated lands. At lower elevations these are usually cacao-yam based systems while at higher elevations coffee-yam associations dominate. Whereas the areas under permaculture type systems are quite small in Montrouis, in Limbe they are much more extensive. Thus rather than focusing on redrawing individual plots, DEED will promote improvements using demonstration plots and developing nurseries, particularly focused on yam seed—whose expense and rarity make it a major limiting factor to the productivity of these systems at both high and low elevations. In addition, DEED will look to promote cacao and coffee plantings and

add revenue-producing shade trees such as fruit trees (avocado, mango, citrus) rather than Haitian oak, mahogany or *sucrin* trees that do not produce any revenue other than wood harvesting. In more exposed areas, where farmers have already removed much of the original tree cover but where isolated strands still exist, the package will include the cultivation of bananas to provide short term revenue and shade for the development of longer growing tree crops that will provide the needed shade for the yam-cacao or yam-coffee permaculture system.

PA-5: *Promotion of commercial fruit tree planting, either in orchard-like plots or on small farmer plots.* (Montrouis, Limbe)

The interest of farmers and end-of-value chain buyers such as commodity exporters for increasing fruit tree production in such crops as mango and cacao was one of the key lessons of the USAID HAP project. "Reforestation" based on market-led value chain principles organized around revenue producing tree crops has the potential to yield a much higher survival rate with a greater landscape level impact than does planting programs that are not based on clear market demand. DEED staff will work with PGs, large landholders and exporters to identify priority zones in the two watersheds for fruit tree planting programs and negotiate collaborative partnerships governing both planting and initial care of trees while they are still fragile. This will often include support for appropriate crop associations such as banana or vegetables that can help to incentivize farmers to maintain soil humidity and deny access to roving ruminants. DEED will promote both large-parcel orchard systems where such parcels exist in partnership with land owners and small farmer planting programs particularly where such programs can contribute to permaculture theme objectives of Themes 3 and 4. Initial efforts will be concentrated in the cacao and mango value chains, since these have a clear demonstrated demand and interest in such arrangements from exporters. Coffee will also be considered, although the willingness of exporters to contribute to plantation schemes is less than in the other two crops and the presence of subsidized coffee seedling distribution in the Marmelade zone of the upper Limbé watershed by FACN may diminish the need for such projects in that zone.

PA- 6: *Development of apiculture in association with flowering tree production.* (Montrouis, Limbe)

Apiculture provides an opportunity to increase the value of certain types of tree crops by creating short term revenue sources from tree crops that normally yield relatively little or no income. It has the added benefit of also creating MSME employment opportunities in functions associated with bee-keeping. The main constraints to apiculture are a lack of flowering nectar-bearing trees or shrubs and the narrow base of technical expertise and knowledge of bee keeping in the two watersheds. With relatively low investment costs and high demand for honey in both the local and export markets—at least at current production volumes bordering on zero—DEED will focus initially on expanding the nascent existing PG projects in the sector by developing MSME entrepreneurs and encouraging planting of nectar-bearing species of trees such as citrus, campeche, moringa (benzolive) and other trees—particularly where such trees can be integrated into permaculture or livestock production systems. DEED's initial focus will be on assessing technical constraints (mainly diseases and insect predation that are particularly prevalent in the Limbe watershed), integrating appropriate tree planting into existing agro-forestry production systems with local PGs and territorial authorities and in developing existing PG and MSME

apiculture producer and service provider capacities. Investments in new beekeeping equipment are unlikely to be required on a large scale in the first phase of development as there is significant room for increasing yields of existing producers through improved production practices and better management of beehives, including establishing a programmed calendar for hive migration between appropriate agro-climactic pockets within each watershed. Over the longer term, after the base for production has been strengthened, DEED will look at possibilities for developing appropriate new market channels, including export of certified organic and fair trade honey for which market demand is extremely strong but for which production volumes must be sure of hitting threshold market entry levels. DEED will work in close association with the exiting apiculture sector leaders in Haiti—namely the Benedictine Monastery of Saint Benoit (Montrouis) and the beekeeping SME Macouty, SA (Limbe).

PA-7: *Development of fish farming as an alternative source of revenue to farming vulnerable hillsides*. (Montrouis, Limbe)

The development of small-scale fish ponds (aquaculture) for tilapia production is an activity that has the potential to make a strong impact on both natural resource management and household incomes. DEED will promote family-based ponds managed by individual households whose production will largely be marketed in the local communities (as with milk) or through Madame Sara traders into the regional food market where transport is available. Experience with fishponds in Haiti shows that when harvest of fishponds in a given area is planned according to a fixed calendar that local traders are aware of, evacuating product and sale are relatively easy despite the highly perishable nature of the product. Producers in the Ti Bois zone of Montrouis regularly sell to the Caribbean Market through a local trader with a 4 X4 pick-up as well as the local market. There also seems to be high potential for establishing production-market linkages with the hotels on the Cote des Arcadin, perhaps via a PPA arrangement. The technology used will integrate green composting of plants rich in nitrogen such as *leuceana* and *moringa* (which is also highly appropriate for fodder use and apiculture). Major costs of the program will include initial investments in construction of ponds which can be arranged on a grouped basis with local PGs in DEED grants or through cooperation with external public works type programs (such as KATA). DEED staff and consultant will work directly with targeted farmer households to provide initial technical training.

"Pilot" Projects

As noted above, the following projects are more speculative in nature, and therefore will be tested on a relatively small scale in order to test whether the potential for success in the target watersheds is realizable in the short to medium term.

Pilot PA-1: *Demonstration trials of jatropha*. (Montrouis)

Jatropha is a potentially interesting biofuel crop that can be produced on arid dry land with minimal input at a low cost.[1] Two local NGOs with PG-based parcels in the Montrouis

[1] It needs to be noted however that the "low cost" production strategy on dry scrub land will necessarily result in lower oil yields compared to more actively managed jatropha productive systems and thus could have a negative impact on unit costs and market viability of the final product, depending on the level of yields actually obtained.

watershed with small scale jatropha cultivation projects have requested assistance in expanding production. While it would be premature to conduct a large scale planting program, since the market for jatropha seeds as use as fuel oil has yet to be established and no estimates of the market's absorptive capacity or willingness to pay are available, DEED can help speed this process by working with both partners to produce trial volumes, conduct some technical tests on the final product, and launch a test marketing campaign into the private unsubsidized market to inform the current debate on the viability of jatropha in Haiti. With no option at present for bio-diesel refining, the prospective market will mainly be limited to use of jatropha as a fuel for lamps, cooking and as an additive for diesel fuel used by certain classes of electric generators in Haiti (including possibly with côte des Arcadins hotels). DEED will work with the local NGOs, as well as PGs in the trial production zones to plan an initial production campaign, conduct technical product evaluations and develop a marketing strategy and implement a trial market test campaign. This will necessarily include a degree of subsidy through a grant mechanism to the producer group so that producers are guaranteed a purchase price for a product for which the market demand is totally unknown.

Pilot PA-2: *Develop a milk processing MSE to increase household livestock revenues and encourage improved fodder cultivation practices on hillsides that contribute to soil conservation.* (Montrouis)

Although revenue from livestock constitutes a minimal part of overall agricultural revenue (6% in Limbe and 3% in Montrouis according to the baseline study), this is largely a function of the lack of markets for animal products other than meat. To address this problem, DEED will initiate a pilot project to implant a small-scale milk pasteurization factory as a MSME service provider in at least one zone in the Montrouis watershed using an institutional model and technical expertise that have been widely tested by the Haitian NGO Veterimed. Under this model, which requires an initial capital investment in the dairy facility of around $80,000 that will have to be arranged with DEED brokering support or possibly grant co-financing, pasteurized milk that can be kept without refrigeration would be marketed to a combination of local households and public schools participating in the Ministry of Education's school feeding program for which Veterimed has a concession. The model is already being used in 40 other locations in Haiti. Once operational, the MSME dairy will provide a market outlet for milk that will encourage farmers possessing cattle to invest in improved production methods to enhance dairy productivity—notably by cultivating fodder crops such as elephant grass, Napier grass or Guatemala grass as well as sugar cane. Fodder production can be done on relatively arid deforested hillsides as well as integrated into soil protection structures for the production of high value vegetables under Theme 1. Increasing improved types of fodder production will also encourage farmers to reduce grazing areas as these fodder crops are not suited for open grazing but require manual harvesting—an extra investment of labor that is justified only by the higher incomes received from milk sales.

Pilot PA-3: *Trial production of dryland herbs and spices*. (Montrouis)

But, for DEED's purpose of exploring production possibilities that can be adopted by asset-poor small-scale farmers on highly degraded lands, this choice is the only one that is feasible.

Besides jatropha, another potentially viable set of crops for the degraded dry lands of the Montrouis watershed are herbs and spices, including vetiver. Spices such as thyme and oregano as well as vetiver for essential oil use are all potentially suited to conditions of dry land cultivation on degraded slopes. Herbs and spices have the advantage of being harvested by cutting rather than uprooting, which means they are appropriate crops for soil protection and erosion control. Vetiver is also highly appropriate, but for the purposes of intensive planting on degraded hillsides for eventual use in essential oils cultivation, experiments with cultivation and harvesting in successive bands for erosion control will have to be tested since essential oils production requires uprooting of plants. During the first phase of DEED, several pilot sites in degraded areas of Montrouis will be identified and planted and evaluated for agronomic and natural resource conservation results before any roll-out will be envisioned.

Pilot PA-4*: Trial production of flowers for hotel market and eventual export* (Montrouis, Limbé)

Possibilities exist to develop some commercial flower contract-farming arrangements with hotel purchasers of ornamentals in both the Région du Nord and the côte des Arcadins. In addition the Cape Haitian exporter, Georges Vieux, SA is currently exporting small quantities of flowers to Grant Turk on two weekly flights and has approached DEED about the possibility of developing contract farmers in the Limbe watershed to increase the volume of his shipments. DEED will investigate these promising production projects and develop models of cooperation between farmers and buyers in watersheds, using grant and PPA mechanisms as appropriate. Although this market is attractive, DEED will need to keep close attention to volumes since the depth of the local hotel and Grand Turk export markets are not well known.

Pilot PA-5: *Development of sustainable forest management practices on large landholder private woodlots* (Limbe)

The Marmelade region of the upper Limbe watershed contains a number of large parcels of privately held forest lands. At present the owners of these parcels either do not exploit them or practice unplanned occasional wood harvesting that may or may not be done according to sustainable practices. DEED will explore the possibility of establishing forest management plans with these owners that would allow some controlled degree of harvesting along with planed regeneration, possibly also with the input of community labor or the allocation of harvesting rights to persons identified as charcoal producers in especially sensitive zones of the watershed. Exploring possibilities for setting up thee forest management plans will require the cooperation of both landowners and local government authorities. DEED can help to facilitate this process and provide the technical expertise necessary (including GIS mapping) to develop the forest management plans.

The geographic distribution of the DEED Targeted Agricultural Production Project Activities for the first year of the project is shown below in Table 3 and 4. As DEED has not yet begun to actually implement agreements with its main PG, local government, MSME and private sector partners the exact composition shown in these tables may change somewhat as the result of negotiations and more detailed discussions with these various partners. The tables below also

show the principal umbrella PGs with whom DEED interventions in the various themes will be planned.

Table 3: Geographic Distribution of Agricultural Production Activities, Montrouis

	Targeted Agricultural Production Initiatives in Limbe Watershed					
	LIMBÉ WATERSHED					
Locality	Marmelade	Camp Coq	Limbe	Lombard	Bas Limbe	Bas Limbe
Agro-Ecological Zone	Wet Mountain	Interior Zone	Piedmont	Humid Plain	Humid Plain	Coastal Plain
A. Priority Projects						
1. Intensification of high value production on vulnerable slopes	APWOLEM, APKBA					
2. Intensification of high value production on irrigated plains with transfer of labor from upper valley				OGFL	OPBL	OPMBL
3. Intensification of permaculture systems on potentially vulnerable hillsides	APWOLEM,OPKBA	JEPROK	OGFL			
4. Promotion of commercial tree planting and grafting	APWOLEM,OPKBA	JEPROK	OGFL			
5. Development of apiculture in assocaition with flowering tree planting	APWOLEM,OPKBA					
6. Development of aquaculture as alternate source of revenue to hillside farming	APWOLEM,OPKBA					
B. Pilot Projects						
1. Improve productivity of fisheries thrugh intrduction of Fish Aggregating Device (FAD)						OPMBL
2. Cultivation of fresh flowers for hotel & export market		JEPROK				
3. Development of sustainable forest management plans for wood harvesting on large forest plots	APWOLEM,OPKBA					

Table 4: Geographic Distribution of Agricultural Production Activities, Limbe

	Montrouis Sub-Watershed					Roseau Sub-Watershed			Matheux Sub-Watershed		Deluge Sub-Watershed		
	Fonds Baptiste	Ivoire	Freta	Carries	Montrouis	Roseau	Bois Neuf	Pierre-Payen	Ti Bois	Arcahaie	Piatre	Deluge	Lanzac
Agro-Ecological Zone	Wet Mountain	Dry Mountain	Semi-Arid Hillsides	Semi-arid Hillsides	Irrigated Plain	Wet Mountain	Irrigated Plain	Irrigated Plane	Dry Mountain	Semi-Arid Hillsides	Wet Mountain	Irrigated Plain	Irrigated Plain
A. Priority Projects													
1. Intensification of high value production on vulnerable slopes	KAK CUPEC	OPD-8				APDR					APJDP		
2. Intensification of high value production on irrigated plains with transfer of labor from upper valley					AITAB		AID	AIPM					
3. Intesification of permaculture systems around habitations in high altiudte zones	OPD-8	OPD-8											
4. Promotion of enclosed cattle raising systems to increase productivity and reduce open grazing		OPD-8											
5. Development of commercial fruit tree production on large "orchard parcels"													
6. Development of apiculture in assocaition with flowering tree planting						AJITAP	AJITAP	AJITAPP					
7. Development of aquaculture as alternate source of revenue to hillside farming							APLPB		CODEP				
B. Pilot Projects													
1. Production of Jatropha for commercial trials			OPD-8						CODEP	CODEP			
2. Cultivation of dryland herbs and spices for pilot commercial and agronomic tests													
3. Cultivation of fresh flowers for hotel market													

Part 2: Developing Sustainable Market Linkages

The objective for each of the priority DEED activities listed above will be to create sustainable geographic concentrations of improved agricultural practices at critical locations in the two watersheds. This will require not only infusions of investment (both from the DEED grant/PPA funds and from private sector partners) and technical assistance, but also the creation of new market linkages to ensure that innovations introduced by DEED will be profitable for farmers and PGs, and therefore, sustainable. At present, there are fairly weak "value chains" in the two watersheds for most of the targeted agricultural production crops—meaning mainly that that input delivery systems and product marketing linkages are not fully developed so that farmers in the zones are able to start production after receiving technical assistance and capital infusions.[1] In the section below, we detail our approach to developing the necessary sustainable market linkages for the various DEED themes, taking into full considerations the institutional constraints related to weak PG capacity and the widespread problem of availablity of improved inputs for the technical packages being promoted by the project.

A. Project Activities 1 - 4

The first four PAs are all centered on the cultivation of new high value short-cycle crops integrated into productive systems with improved NRM practices or in association with longer-cycle or perennial crops to enhance soil conservation. They key element in all of these technical packages will be the introduction of higher-cost, higher potential return production strategies, using improved inputs (fertilizer, pesticides and germplasm) that will be justified in terms of increased returns to small farmer households. The major obstacle to the sustainability of these packages is the generalized absence of market systems for supplying the necessary improved inputs to small farmers and, to a somewhat lesser degree, for ensuring access to local and international markets.

To develop the necessary market linkages, DEED will employ an implementation approach that has been largely tested by DAI under HJRP in the Trois Rivieres and Gonaives/Savane Désolée watersheds. DEED staff works first with a PG in each targeted area to set the objectives and content of the program and then identify specific farmer households to be targeted for participation in the program based on spatial criteria and willingness to apply new cultivation techniques. In most cases, DEED and the PG will sign a grant agreement in which DEED will provide cost-sharing support for local small-scale water infrastructure investments and initial supplies of improved inputs required by each thematic package. The PG will organize its cost sharing contribution and identify specific individuals to operate as input supply traders and nursery operators/seed treatment centers for the areas targeted by the project. DEED service providers will then provide technical support to initially targeted households on production methods as well as detailed "on-the-job" support to the input traders and nursery operators who, in effect become MSME service providers to the farmers participating in the program. Nursery operators will be taught how to manage technical operations for the relevant crops and how to

[1] The only exception to this somewhat broad generalization may be for export tree crops such as cacao, francique mango and coffee, where input supply problems are minimal (under traditional low input production strategies) and export value chain marketing linkages are able to rapidly adjust to localized changes in product supply.

cost their products and run an efficient business operation. Input traders, who will generally supply both farmers and the nurseries, will be shown where to find the necessary phyto-sanitary products and what sources of germplasm are required as well as how to negotiate delivery with the major input dealers (primarily Agro-Service, SA). At the start up, this will almost invariably require that DEED staff or consultants actually perform these functions side-by-side with the trainee input traders. Mark-ups for inputs ordered will be initially set as part of the agreement with the PG and wholly retained by the traders so that they are motivated to continue providing these services.

At the first cycle of project intervention, participating farmer households will receive the initial input supply package with a cost-share contribution that must be paid after the first short-cycle crop harvest, as will be set in the grant agreement with the PG. Reimbursements from first cycle farmer cost-share contributions will go to the PG and be combined with further DEED grant funding to finance input supply to new first-cycle farmers who would be targeted by DEED and the PG to enter the program during the next crop cycle. In the meantime, farmers who are in their second or subsequent cycles would be responsible for placing input orders with the input trader and nursery operator and for paying the full cost of their inputs.

With this implementation approach in place, farm households will be encouraged to contract directly with privately-run independent MSME input traders and nurseries who are set up in cooperation with the PGs, without having the PGs themselves assume a commercial role in input supply. The role of PGs will be to negotiate the terms of the program with DEED, identify priority geographical zones and households/parcels for inclusion in the program (often through sub-groups) and to manage input cost-share repayments. This array of responsibilities where commercial functions are devolved to actual MSMEs, while "program management" type functions are dealt with at the PG level, will benefit longer term sustainability of the innovations introduced by creating simple clear market mechanisms to serve farmers' input needs. It also has the added benefit of being consistent with the natural orientations and strengths of most PGs.

DEED's approach to creating market linkages in product markets will follow a similar approach of relying as much as possible on private commercial actors. Three broad options will be considered in each location, where the exact mix of marketing solutions will, by necessity, vary according to the accessibility and cost of transport, proximity to market hubs, nearby market absorptive capacity, and the perishability of the products being transported. The three options are:

Option one: rely on existing small-scale traders (Madame saras) to access the regional and national wholesale food marketing network. This approach, largely following that used under HJRP has the main advantage of being simple, quick to set up and efficient in terms of organizing collection of small farmer production from many households through established market mechanisms understood by all. In this option, DEED staff would work with farmer households and the PG to identify a number of local *madam saras* (usually members of program participant households who are already active in local or regional trading networks) and help them establish the necessary relationships with intermediaries located at higher levels of the national marketing chain either in the wholesale market in Port-au-Prince (Croix de Bossales) or in regional market hubs so that regular supply links with the necessary credit relationships can be

established. This approach works especially well when good transport links are available and products are able to survive the journey to Port-au-Prince without too much loss.

Option two: organize farmers to group for product assembly and transport to nearest market hub. This approach may be required in areas without transport options such that there are no *madam saras* linked to national markets serving the targeted zones. This will particularly be the case in the upper reaches of the Montrouis watersheds where, until access roads are improved, no motorized transport is likely to be available on a regular basis. In this option, DEED staff will need to work with PGs to explore options for contracting with transport providers who are willing to serve the targeted zones on a defined schedule to evacuate produce. Some element of subsidy may be required, although this will no longer be needed when the access roads are improved. As in the above option, DEED will work with the PGs to identify a local assembler who can coordinate the collection and assembly of product in the relevant zones.

Option three: develop linkages through new collection centers to service specifically targeted markets. Since the volumes being produced, at least initially, will not be so large as to depress prices in regional markets that offer potential pockets of demand for high-value crops, there is considerable incentive for DEED to develop new marketing linkages to capitalize on these regional pockets of opportunity. These particularly interesting markets include the hotel demand along the côte des Arcadins and a similar market for hotels in the North and also the supermarket sector in Cape Haitian. None of these markets yet has well developed supply mechanisms as they often procure high value vegetables from the Dominican Republic or from Kenscoff with significant losses and limited shelf lives. DEED will work with the major clients in these markets to plan production schedules and develop needed regional wholesalers to establish collection centers specializing in fresh vegetables capable of centralizing production from the regional watershed production nodes and storing product on a limited basis for regionally-based distribution to hotels and supermarkets. Unlike the other options, this option will require significant planning and business assistance input from DEED staff to locate and develop potential MSME collection center entrepreneurs (preferably with some cold storage capacity) since this is a market function which does not yet exist. Specific market linkage service providers to be supported are given below.

MSMEs performing market linkage functions PA 1 to 4

Vegetable Nursery/Seed Treatment Operators
Tree Nurseries
Input Supply Traders
Local Madame Sara Collectors
Vegetable and Fruit Collection Centers

B. Project Activities 6 and 7 and Pilot PA 2

Specific DEED targeted agricultural production activities involve models of non-farm MSME activity. For each of these models, scale economies regarding the cost of investment and volume levels necessary to attain break-even point will dictate the basic structure of production. For

Pilot PA-2, dairy production, the Veterimed model clearly requires an MSME-level dairy factory with a full-time manager, investment in the $60,000 to $80,000 range to centralize the raw milk supply input of around 300 farmer households. Creating such entities will necessitate the formation of alliances of private sector entrepreneurs (from the watersheds or outside) together with PGs and/or local cattle raising households. Marketing linkage problems for dairy output will be minimized by the presence of the school feeding program market in the Ivoire area where DEED plans to initiate this activity. This market will absorb all of the production during the school year. DEED staff will investigate options for marketing non-school year production to regional markets (primarily hotels) or for stocking production for later consumption (which is technically feasible, but will require increased infusions of working capital.)

For fish farming (PA-7), where the parameters of production are also largely known, it is clear that economies of scale dictate smaller household-level units of production with individually managed fish ponds, rather than the creation of larger units of production. In this model, the main market linkages that need to be created are simply ensuring access to fingerlings to start initial production and to restock ponds in the event of die-off. These are readily available in Pont Sondé and Marmelade from Taiwanese-supported project sources. Although DEED will ensure that producers are familiar with these sales outlets, as fish ponds develop, the fingerling trade may provide enough volume to offer a viable trading opportunity to a local entrepreneur. Marketing for fish production presents minimal problems, as existing fish ponds simply coordinate harvest dates and make these widely known which is sufficient to attract Madame Sara buyers to these sites in sufficient numbers to ensure an attractive market. In the longer run, after the first year, DEED staff will look into improved transport options to serve Port au Prince supermarkets.[1] Establishing linkages with the hotel owners in the Cote des Aracadin and tourist hotels in Cap Hatien represents perhaps the best market alternative for fish.

Due to the small scale of apiculture production at present (PA-6), it is not yet clear what form of production will prove to be most efficient in the foreseen locations. Although the capital requirements for entering into production (mainly hive and larvae purchase) are small and easily manageable on a PG scale, the low density of appropriate nectar-bearing trees in many locations means that systems of hive rotation with transport are likely to be required, at least until nectar-bearing tree planting programs begin to have an impact on yields. Thus, initially, apiculture systems are likely to require joint forms of ownership or rental agreements between apiculture MSMEs (belonging to individuals or managed under agreements with PGs) and farmers on whose land hives are placed. In this scheme, most of the technical elements of production (hive construction, placement, stocking, collection and extraction) would be done by apiculture MSMEs which already exist in both zones (Agouty, SA and AJITAPP). Currently, extraction and purification units exist in each zone where they operate at a small percentage of capacity (Monastère Saint Benoit and Agouty, SA). Because of this excess capacity, DEED will initially favor the creation of market linkages through these two underutilized nodes, and only consider new investments in processing MSMEs should this prove to be absolutely necessary. Other related needs for service providing MSMEs would be created at the input supplier level for hive builders (among woodworkers) and nursery operators for nectar nearing trees. Marketing at volumes anticipated during the first year can be easily absorbed through the two main marketing

[1] Fishponds in Montrouis have supplied Port-au-Prince supermarkets in the past, but these market linkages have withered, apparently due mainly to transport difficulties arising from deteriorating feeder roads links to RN 1.

channels operating in each zone (Morne Saint Benoit label honey in Montrouis, and Agouty, SA honey marketed through Dominican buyers under the name "Mega-Miel"). In subsequent years, DEED will explore developing new market linkages, including the possibility of developing export markets driven by fair trade and organic certifications.

MSMEs performing market linkage functions for PA 6 and 7 and Pilot PA-2

Dairy
Small scale milk pasteurization and bottling factory
Local distributor

Aquaculture
Fingerling suppliers/traders
Local Madame Sara Collectors

Apiculture
Beehive tenders
Tree nurseries
Apiculture production/management firms

C. Project Activity 6

Implementation of PA-6 (commercial fruit tree planting) will be carried out primarily in association with large land owners or exporters who have an interest in increasing the volume of specific fruit tree crops in a given zone. Initially these campaigns are likely to be limited to mango and cacao plantations for which there is a clear demonstrated demand from exporters and a well developed downstream marketing system resulting in a minimal need for DEED staff involvement to ensure adequate product marketing. Potential for coffee may exist as well, although this would require an explicit agreement with an exporter or local market roaster, since the existing atomized marketing system is not providing enough clear incentives to justify new plantings. In this context were there are clear efficient product marketing systems led by local *fournisseurs* working for exporters, combined with a low or even "no input" productive system, the main need for sustainable market linkage creation exists at the level of local nurseries capable of producing seedlings of good quality and known genetic content.

The main exception in which a need for new market services may arise will be in cases where local post-harvest processing of fruit tree products will occur as part of a larger marketing strategy that will largely depend on exporters who are beyond the two watersheds, but who desire to locate needed processing activities in their commodity supply chains inside the DEED zones of intervention. The two possible areas in which such interventions may be viable would be for the development of fermented cacao and improved-quality washed or pulped-natural coffee. In both these cases, economies of scale would tend to dictate that processing facilities be conducted below the household farm level, probably in association with a PG-related MSME. Due to the risks involved in promoting such enterprises, however, without a clear commitment

from a downstream market buyer, DEED involvement in such schemes would be conditional upon receiving some counterpart commitments from an exporter to co-invest in such a plan through a PPA agreement.

MSMEs performing market linkage functions for Theme 6

Fruit tree nurseries
Cacao or coffee processing stations
Mango, coffee or cacao *fournisseurs*

Conclusion

The approach to creating sustainable market linkages outlined above, combined with the detailed taregetting agricultural production plans for each intervention zone, provides a detailed picture of DEED's "possible" first year capacity building challenge with the planned creation of the following MSMEs either as Service Providers or as value chain actors:

Table 5: Planned MSME Service Providers in Year One, Targeted Agricultural Production

Type of MSME	**Estimated number at end of first year**	
	Montrouis	**Limbe**
Vegetable Nurseries/Seed multiplication centers	6	5
Tree Crop Nurseries:	7	6
Input Supply Traders:	3	2
Fruit & Vegetable Wholesalers/Distributors	3	6
Madame Sara Traders	30	64
Dairy Pasteurization factories	1	0
Beehive tenders	400	200
Apiculture Management Firms	1	1

Each of these service providers will require some degree of technical and institutional capacity building support from DEED. For certain categories such as 1st level Madame Saras, this will be relatively minimal—consisting mainly of some training in product handling and establishing the necessary linkages at both ends of the marketing chain. For others, such as local inputs supply traders, nursery operators and milk processing and trading entities, DEED will need to provide a much higher level of initial accompaniment by specialized technical experts who will also advice each MSME on the business operations they will need to master to be profitable. In all of these cases, the driving force behind these arrangements is the added revenue accumulating to farmer households from sales of production resulting from DEED project interventions under Themes 1 through 8. Sustainability of these systems will then essentially be measured by the degree to which participating farmer households are selling production and accessing services successfully from the Service Providers in Table 5 with no direct subsidies from DEED.

A virtue of this approach is that the exit strategy of DEED is incorporated into the project from the very beginning. By investing much upfront effort in providing detailed extension services at the farm level, thereby ensuring the DEED Thematic packages are mastered by a critical number of households in each location, and by ensuring that the necessary market linkages to keep these activities going are provided on profit making basis by the MSME business service providers listed in Table 5, DEED will ensure long term sustainability well after project resources have been removed from the equation.