IMPLEMENTATION OF SUSTAINABLE FARMING PRACTICES IN TRINIDAD’S NORTHERN RANGE COMMUNITIES (ATN/ME-11488-TT)

INTERVENTION MODEL

Draft Final Report

Shango Abayomi Alamu

January 13, 2011
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Report completed by:
Shango Abayomi Alamu

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Acknowledgements

I would like to indicate that the thoughts and ideas of many were involved and deeply appreciated in the production of this document. I would like to thank The Cropper Foundation for allowing me the opportunity to work on a very exciting and meaningful initiative - sustainable development in Northern Range ecosystems, which has so many positive implications for island-wide eco-stability.

To Ms. Sarika Maharaj and the technical implementation team, it was a pleasure working with you; the exchanges were always meaningful and it appeared that you all had a passion for the project and were all quite willing to work at the field level. Mr. Beaumont Celestain, your baseline survey data and follow up interactions contributed significantly to the development of the model. Mr. Allan Williams, considering your life work and philosophy, I have always wanted an opportunity to work with you and for a time thought it may have been lost. As fate were to have it and with the intervention of a friend of the Northern Range, the late Prof. Dennis Anthony Pantin, to whom I must express my gratitude, we eventually were both involved in the project and I think that the combination can only be for the positive. Most importantly to all the farmers and representatives of the various organizations, we have started a process which can have tremendous implications for transforming or enhancing livelihood activities in these watersheds, in a manner that does not disturb their integrity, and respecting the services which these ecosystems provide. Working with you has been a pleasure and I look forward to the continued development of our relationship towards the achievement of the project’s desired objective.
Executive Summary

The primary objective of this consultancy is the formulation of an intervention model for sustainable livelihood development in two Northern Range Agro-ecosystems (Caura/Tacarigua & Maracas/St. Joseph), as a prerequisite to the development of intervention strategies for the target areas. The model was developed based on data gathered through a baseline survey and several follow up interactive sessions with groups and individuals, both on farm and at a stakeholder’s workshop.

The recommended approach is a participatory one, involving: GOs and NGOs who can contribute financial and/or technological inputs; and most importantly CBOs operating within the watersheds which recognize the value of folk technologies developed experientially over time to deal with real, and at times, very complex ecological situations. Additionally it recognizes the need for the development of appropriate community governance structures and pathways for collaboration among community organizations. Furthermore it is based on an understanding that there is a much higher possibility of successful implementation when communities take ownership of projects and actually drive the processes involved.

The model speaks more to process rather than actual strategy, thus enhancing its application under different conditions despite differences in terrain, biodiversity, agricultural development and even culture in the target areas or elsewhere. However it is recommended that research initiatives should attempt to study all possible threats to ecological stability that practitioners in the field may encounter, thus developing or enhancing a suite of intervention tactics readily available for implementation as situations arise.

Additionally the intervention model is intended to inform the planning function and to make a contribution to the formulation of appropriate regulations for sustainable ecological development.
List of acronyms

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<tr>
<td>AESA</td>
<td>Agro Ecosystem Analysis</td>
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<td>CABI</td>
<td>Centre for Applied Biology International</td>
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<td>CBO</td>
<td>Community Based Organization</td>
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<td>CES</td>
<td>Central Experimental Station MFPLMA</td>
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<td>CVFA</td>
<td>Caura Valley Farmers Association</td>
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<td>Ministry of Food Production Land and Marine Affairs</td>
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**Introduction**

The stability of the ecology of Trinidad’s Northern range is continuously under threats which are related to poorly managed livelihood practices, and to a lesser extent, recreational activities. The main contributors to the degradation are housing, quarrying and the utilization of unsustainable agricultural production systems, all of which involve indiscriminate removal of the forest cover and the failure to implement appropriate soil management strategies in combination with the use of toxic products which impact negatively on biodiversity. Even bush fires, which are significant contributors to the removal of forest cover, are most times due to the senseless actions of Homo sapiens. The integrity of these watersheds, particularly in the west and advancing rapidly eastwards, has been compromised to such an extent that the damage may be irreversible. Sustainability has not been the philosophy guiding human activities and as such there is need for rapid transformation of our thinking if the degradation is to be arrested, and where possible reversed, and there is to be continuance of the provision of the valuable services these watersheds afford.¹

**The objective** of this exercise is “the design of an intervention model which is expected to address the challenge of compiling functional profiles of the farming system, the community capacity and the impact of human activities within the two target areas as a precedent to formulating a meaningful intervention strategy”. The design was guided by a baseline assessment; a number of return visits; a stakeholders’ meeting which gave an overview of the current status of land use in agricultural production; the community organizational capacity; landscape factors that support biodiversity; watershed management and demographic indicators.²

**The study area:** The two targeted areas are The Caura/Tacarigua and The St. Maracas/ Joseph watersheds which are the 4th and 7th largest by size in the Northern Range.³ The landscape of these two areas is quite similar consisting of a number of forested hills and valleys at elevations of between 250 to 500 feet above sea level.⁴ The watersheds are adjacent and separated by one the mountain ridges of the Range. Both watersheds are well endowed with a network of water courses that flow into the Caura River in the Caura watershed and into the Maracas River in the Maracas / St. Joseph River watershed.

**Land ownership:** The pattern of land ownership is somewhat similar. In the Caura watershed there is approximately 1,966 hectares of privately owned lands relative to 3,092 hectares of state land.⁵ The majority of the land south of the Caura recreational site is owned by Home Construction Limited. There is another block just north of Karamath Street that is also privately owned. There are smaller blocks in the La Plata/ Tocoragua area that are privately owned. The latter parcels are essentially residential allotments although there is a minor incidence of farming activity. There is a large block of state land just north of the recreational site of approximately 150 hectares, which has been sub divided into two hectare allotments and distributed for agricultural development. In this area there are also blocks of forest reserve owned by the state and managed by the Forestry Department. North of the farming area there are large blocks of privately owned land which were previously cultivated with tree crops, mainly cocoa and coffee, which are now abandoned. In the Maracas/St. Joseph watershed the majority of the lands in the southern part of the valley are privately owned residential allotments. This

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¹ Millennium Ecosystem Assessment: [www.millenniumassessment.org/en/index.aspx](http://www.millenniumassessment.org/en/index.aspx)
² Annex I, reference documents: Report on stakeholders meeting and baseline assessment final report
³ Baseline assessment final report
⁴ Baseline assessment final report
⁵ Baseline assessment final report
represents a shift from agriculture which is taking place even at relatively high elevations. Further north there are parcels which have been subdivided and allotted to farmers, but as in Caura, there are large blocks of privately owned abandoned estates.

Coffee and cocoa estates were dominant in both valleys. These were inter-planted with citrus, bananas, and a range of root crops. These were produced both in the valleys and on the hillsides, thus there was always continuous vegetative cover. Most of the larger estates particularly on the hill sides, as stated earlier, are now abandoned and although there is still some evidence of the tree crops, secondary forests now dominate. What is of significance in these areas is that the secondary forests growing on the abandoned plantations, prevent the degradation of the ecosystem, and thus offer real possibilities for future application of sustainable development approaches.

Short term cropping became popular especially in the Caura/ Tacarigua Valley in the 1950s on lands deep in the valley on holdings subtending the Caura River. The system of production was the typical “green revolution” approach with the heavy and at times indiscriminate use of mineral fertilizers and pesticides with the related negative consequences. This system of production is still very popular in spite of the introduction of Ecological Crop Management (ECM) concepts through a Farmer Field School experience. In the Maracas watershed some short term cropping takes place on the hillsides but this may not be to an extent where it significantly alters the landscape. What is of interest is that farmers seem to be aware of the need for conservation practices and have attempted some conventional and innovative approaches. However, there is still a need for greater awareness and broader application of hillside conservation measures. An interesting development in Maracas is the renewed interest in cocoa production. This again offers an opportunity for the adoption of a well organized, eco-friendly approach which is an indication that the project’s intervention may be indeed timely.

Residential Development: Maracas has become extremely popular for housing development as population figures indicate (13,288 as compared to 776 in the Caura Valley). The landscape along the Maracas Royal Road and even on high elevations, particularly lower down the valley has been significantly altered by housing development. This is a pattern which is well established in watersheds west of the study area, such as Diego Martin, Maraval and Santa Cruz where residences now dominate and farming has been reduced to insignificance. The saving grace for Maracas is, as stated earlier, that large tracts of arable land previously cultivated are now under secondary forest and are not yet threatened by alternative land uses. What is of concern here is that a number of these holdings are privately owned. Without further development or even proper implementation of existing land use policy there can be further alienation of agricultural lands. Residential development in the Caura Valley in no way compares with that of residential development in the Maracas watershed. The population density in the Caura Valley is still relatively low. Caura has indeed experienced negative growth compared to the period prior to 1940 after which the majority of the residents were relocated to facilitate the construction of “the dam that was never to be”. Besides some of the original Caura inhabitants, the majority of the dwellers are farmers on holdings of approximately five acres. Even among the farmers about 50% do not reside in the valley. There are a few minor plots of farm lands at different locations in the valley in areas such as Tocoragua and on the hillsides subtending the Caura

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6 Michael Anthony: Reference listing
7 EU sponsored TOT program in ECM using FFS approach in the Caura Valley June to December 2003
8 Baseline assessment final report
9 Michael Anthony: Reference listing
Royal Road. However, quite different to Maracas, in Caura farming is centralized in one area and the majority of the watershed is forested.

Program of Work

- Study of base line data and comparison with data from previous and on-going studies
- Preliminary assessment of baseline report with a view towards filling possible gaps
- Field visit of the Caura and Maracas watershed to acquire hands-on appreciation of current status
- Identification and rating of farming systems vis-à-vis
  - Land use patterns
  - Production systems
  - Product range
  - Costs and benefits
- Identification of treats to ecological stability based on
  - Farming systems
  - Alternative land uses
  - Other factors/human activities
- Interaction with community leaders to determine:
  - Validity of data on status of CBOs
  - Willingness to collaborate on interventions
- Compilation of community organizational profile and possible roles in intervention strategy
- Stakeholders meeting # 01 (farmers & community representatives) within:
  - Caura Valley
  - Maracas Valley
- Validation of base line data based on:
  - Interactions with community leaders
  - Stake holders meetings in both communities
  - Previous data
  - Personal experience
- Presentation of progress report
- Interviews with the Ministry of Food Production, Land and Marine Affairs (MFPLMA) extension service on current development plans for the area
- Interactions with Land Administration on status of tenure arrangements
- Interviews with other development organizations on development plans
- Development of intervention model
- Stakeholders meeting # 02 (all actors)
- Presentation of draft report
- Presentation of final report

Activity 1: Evaluation of baseline survey
A preliminary evaluation was presented in a document titled “Comments on baseline survey”, dated: 11th May, 2010. The first report on the baseline survey was presented during the dry season during
which the country was experiencing severe drought conditions. This clearly influenced the intensity of production in the Caura Valley, in that only farmers in close proximity to a water source and with the capacity for irrigated production were active. This represented about 20% of the farming community. During the heights of the dry season the Water and Sewage Authority (WASA) was also paying regular visits to the area, restricting the use of water pumps even for low volume application techniques. In Maracas where hillside farming predominates the survey picked up just one farmer producing short term vegetables in grow boxes.

On revisiting the study area during the rainy season a much higher level of production was observed in the Caura valley, in that most of the farms (>90%) were either actively producing crops or were being prepared. In Maracas the level of production was still low but the survey picked up five farmers.

The preliminary assessment elucidated a number of gaps which needed to be filled based on the consultant’s personal experience in the Caura Valley and the continued difficulty in meeting farmers in St. Joseph Maracas. These included:

**Occupation of sensitive areas:** During the first visit to the Caura watershed the survey failed to pick up farmers in upper Manachal who were encroaching on sensitive state lands. These areas were at all times hillsides, forest reserve and at times farming was occurring up to the river’s edge. On a scale of ecological sensitivity based on propensity for degradation, these areas would be ranked most sensitive. On the second visit which was done in accompaniment with the consultant who is very familiar with the area, these allotments were observed to be in active production. This situation poses a real challenge in that it is difficult to address without causing some unease as a result of the possible dislocation. Relocation within the watershed is not an option as all other available areas are just as sensitive. A possible solution could be correcting current unsustainable practices while preventing any further encroachment.

**Impact of bush fires:** Because of the intensity and duration of the dry season the 2010 fire season was extreme. No area of the Northern Range was spared. However, because of the Northern Range’s amazing capacity to re-green (re-vegetate) and the fact that the rainy season was not extreme early on, the negative ecological impact within the study area may not have been as intense as anticipated. However, the continued frequency and intensity of flooding and extensive crop loss in the lower areas, is a clear indication that poor hillside management practices including the management of forest fires, the changing land use pattern and the continued removal of the forest cover, are having dire consequences on the national landscape.

**Other causes of vulnerability:** On revisiting the areas and by the presentation of the final baseline report most of the other concerns were addressed. There was a better appreciation of the other causes of vulnerability; the major ones being the continued popularity of unsustainable farm management practices, recreational activities and illegal waste disposal in the Caura Valley, housing - particularly on steep slopes, and quarrying in Maracas, and bush fires in both watersheds.

**Peculiarities of the Maracas Valley:** Meeting farmers and their representatives in the Maracas valley particularly on farms, remains a challenge. This is related to the inaccessibility of the major farming areas, in most cases allotments, which are hardly ever more than one acre, can only be reached on foot through narrow tracks. At a meeting organized by the Maracas Valley Farmers Association (MVFA) there was the opportunity to meet a number of farmers albeit not on their allotments. However relationships were established and visits were planned. On later visits it became clear that the level of farming taking
place in the valley was much higher than previously envisaged. However farming appears to still be on the decline. Thus one can conclude, with a high degree of confidence, based on current trends, that current and future farming in the Maracas Valley may not be a major environmental concern, particularly if an appropriate intervention strategy is established for any future development.

Activity 2: Field visit to Caura and Maracas Watersheds

This visit was intended to obtain a “hands on” appreciation of the current farming status and along with information coming out of the baseline survey, to identify and rate the farming systems. The visits took place during the rainy season and as such the level of production was high in the major farming areas relative to the much drier period when the baseline survey was first done. In the Maracas Valley where previously no crop production was encountered except for one producer using grow-boxes, farming was observed in several areas.

Caura Valley: The crop distribution and cropping system varied with location. In Tumbasson and to an extent in Concordia, tree crops and longer term crops e.g. Musa sp. dominated. On the Caura Royal Road and in Cachipal there were some tree crops but shorter term crops were mainly produced. Papaya (Carica papaya) remained the most popular crop, despite the fact that production presents a number of management challenges mostly related to pest and disease situations. During the visit a high percentage of fields were damaged or infected. Diseases which were not experienced for some time such as bunchy top were returning. However farmers were still prepared to take the risk and were establishing new crops. What is of significance and may be a major contributor to this decline is that one variety of papaya, Tainung #2, predominates. This remains the variety of choice because of its popularity on the local market. This approach is at variance with traditional culture where several varieties of the same crop were produced, mimicking forest eco-systems, enhancing the diversity of the agro-eco-system, reducing the risk of crop loss and promoting natural hybridization and the production of new and more adaptable crop types.  

Maracas Valley: Farmers were in active production primarily on the hillsides. The two main areas where farming took place were La Baja and Accono on the hillsides subtending the El Tucuche Mountain. Again the crop distribution and cropping system varied with location. In La Baja cropping was small scale, usually less than one acre, and dominated by pure stands of crops. Tomatoes (Solanum lycopersicum), sweet peppers (Capsicum annuum var.) and string beans are the main crops cultivated, and tomatoes appeared to be the most popular crop. In Accono there were pure stands and also mixed cropping. However there appeared to be a shift to long term crops. There was a very interesting project where a farmer was pursuing a poly-culture approach involving a mix of long terms intercropped with a range of annuals. The diverse nature of the project was commendable. Also he sensed the need for conservation of the soil as the long terms eventually dominate, for ultimately he was developing a fruit orchard. However there was not a focus on short term soil conservation measures save for encouraging good soil cover. At another location with a similar project, the farmer had the allotment properly bench. This was done manually over an extended period of time. At a later visit to the Lleungo area an incidence of short term cropping was observed, and there was also renewed interest in plantain production and cocoa rehabilitation. Through the MVFA plantain plants were being introduced at several locations. Of interest also were the hundreds of acres of abandoned lands that were previously established in cocoa. This represents tremendous potential for eco-sensitive development if they can be brought back into production.

11 Reference document: Traditional Agriculture
Activity 3: Identification and rating of farming systems

Multiple cropping and crop rotation: In the Caura watershed the system of multiple cropping and crop rotation continues. Although there are blocks of pure stand crops one crop is never produced on the entire parcel of land. On average five different crop types are produced. The multiple cropping and rotation of crops does not always appear to be related to scientific reasoning but as a risk management strategy to ensure some income if there is crop failure. At times the same crop or crops within the same family are produced on the same parcel of land over several seasons. This occurs particularly where the more lucrative crops, such as papaya, are produced. Here the risk is taken because of the possibility of high returns. Parcels of land are also left fallow during the dry season. Here again this is not by choice but due to the inability to irrigate.

Pesticide and mineral fertilizer usage: The use of these products, even the more toxic ones, is still very popular in the valley. Farmers are a bit more selective following the FFS experience but they are yet convinced that significant reduction in pesticide and fertilizer use could result in increased crop productivity. There is still a dependency on conventional products. Farmers have indicated preparedness to use alternative products, but effectiveness or the lack of it, probably related to improper usage and availability of a broad enough range, remains a challenge.

Ecological Crop Management: A number of farmers are aware of the integrated range of tactics involved in this methodology but not many are practicing it. There is considerable evidence of the benefits of ECM internationally and the FFS demonstrated real possibilities in the Caura watershed but the rate of adoption has been slow. Soil amelioration using pen manure, and at times limestone, is practiced but other strategies such as the use of border crops, companion planting, insect repelling plants, natural enemies, organic mulches, among others are practiced on a very limited scale.

Organic Farming methods: Mineral fertilizers and pesticide free production has been observed on a very minor scale in the production of some crops but the number of instances is highly insignificant.

Hillside production: In Tumbasson, Manachal, and on a limited scale lower down the Caura Valley hillside production is currently ongoing. What is of concern here is that production is often times taking place on forest reserves and there is little adherence to sound conservation practices. Farmers establish rows across the slope, but do not establish terraces. The proximity to the main water course, the failure to implement buffer zones juxtaposed with pesticide and mineral fertilizer usage and the use of un-composted pen manure is a clear environmental anomaly.

Maracas valley: A more limited range of crops is currently being produced in this watershed. Farmers were aware of the possibility of soil loss utilizing current systems of production especially with the bush fire situation. There were attempts at adopting conservation practices such as shifting cultivation, multiple cropping and terracing. One farmer indicated that he would rest fields for as long as four years. In Accono, as stated earlier, there were pure stands and also mixed cropping with some farmers shifting to long term crops. Pigeon peas (Cajanus cajan) appeared to be the most popular short term crop. The movement to fruit tree production and the intercropping system is positive and should be encouraged.

12 See www.communityipm.org/index.htm also reference document: Control of Pesticides and IPM
13 See reference document: Alamu & Ramcharan
14 The ginda plant (marigold) a noted insect repellent, is popular in the valley, this may be related to its religious significance among Hindus.
as a conservation strategy. What is needed on a larger scale is the terracing of the hillsides; this was
discussed with the farmers. They were aware of the technique but thought that the opportunity cost as
regards its time consuming nature was too high. They need to be convinced of the long term benefits for
they were experiencing soil loss. In this light they share the vision of the need for more sustainable
systems of production and are quite willing to participate in the development of a strategy towards this
end.

**Activity 4: Interaction with community leaders and compilation of community organizational profile**

This was intended to develop a Community Based Organization (CBO) data base, to share the project’s
vision and to determine the willingness to collaborate on the development and implementation of an
intervention strategy.

The community organizations identified in the **Caura Valley** are:

- **The Caura Valley Farmers Association (CVFA):** This is an organization which has been in
  existence for over fifty years and is still reasonably active. It has a good asset base; possessing
  high quality audio visual equipment including cameras (still and video), a multimedia projector,
  desk top and laptop computers, a wood chipping machine, a hand tractor and a power mower.
  The organization has been instrumental in conducting participatory research in the
  development of alternative systems of crop production based on the ECM model using the
  Farmer Field School approach and in hosting a number of other training exercises. During the
  FFS the CVFA developed an extensive outreach program utilizing a range of approaches
  including the production of a video and music (calypso) CD “Ecovibe”. Based on these
  experiences, the CVFA has established linkages with a broad range of organizations and is now a
  constituent of an international network practicing and promoting ECM. The CVFA has hosted a
  number of highly successful workshops attended by participants from throughout the Caribbean
  and has entertained a constant stream of visitors from throughout Trinidad and Tobago, the
  Region and abroad. The CVFA is currently undergoing a reorganization exercise to enhance its
  efficiency and farmer participation, because despite its successes it still does not represent the
  critical mass of farmers in the valley. The CVFA is committed to the development and
  implementation of sustainable farming practices and is currently seeking funding to continue
  research in eco-sensitive farming systems. Thus its vision is in sync with the desired objective of
  the Project. In this regard the CVFA has expressed a willingness to participate.

- **The Caura Valley Community Council:** This is an organization which has been striving over
  the years to become established but has had numerous challenges in maintaining sustained
  activity. The council has initiated a number of successful projects including employment
  creation and infrastructural development. With regards to the latter the council has been
  instrumental in organizing an electrification program which has over the years, been extended
  to most parts of the valley and also in bringing pipe borne water to a number of areas in the
  valley. The council is again active, having recently held elections and is quite willing to
  participate in development projects. In recent times the council has organized a number of
  social and recreational events. Some members of the CVFA are also members of the Community
  Council even at the executive level. Of interest is that there are a number of youths involved in
  the council.

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• **The Caura Valley Hiking Clip:** This is an organization which has been established to fill a gap in the community; the urge for exploration of the country’s natural spaces. The clip has organized a number of hikes and excursions throughout the island but particularly in the Northern Range. The outings are normally well patronized even by nature lovers from outside of the valley. The clip has also being involved in organizing social events and in raising funds for needy persons in the valley.

• **The Jewels of Nature (JON):** JON is a small organization which has had tremendous impact in Trinidad and Tobago (T&T) and abroad. JON is involved in the manufacture of art, craft and musical instruments from natural materials such as various beads and seeds, tree trunks, the calabash and bamboo. What is of significance here is that this can be seen as a recycling exercise as most of this material may have been otherwise discarded. Because of the level of innovation the musical instrument range is becoming very extensive. In this regard JON is becoming increasingly popular as a performing ensemble utilizing these eco-instruments. They have performed at the Summit of the Americas and at the Commonwealth Conference and have already been on tour in the United States of America (USA) to participate in an International conference on “Natural Resource and Environmental Renewal”. They have explored the possibility of planting for craft as a strategy to ensure availability of raw material which is becoming increasingly difficult to access from natural sources. The eco-orientation of this organization is also in sync with the Project’s underpinning philosophy.

• **The Caura Valley Youth Organization:** There appears to be a plan afoot to resuscitate a Caura Valley Youth movement. There has been at least one meeting, and so the organization remains in the early stages. In a previous manifestation this group was involved in a number of social events and in agricultural production. It will be interesting to see how this pans out.

• **The informal movement:** Residents in the Caura Valley have united in an ad hoc manner to agitate for felt needs whether they are for infrastructural improvement, security, amenities, ecological concerns such as the dumping of garbage, construction of structures in sensitive areas, unsustainable usage of the recreational facilities, among others. This demonstrates a degree of awareness and willingness to take action against activities which threaten their livelihood, comfort and integrity of the ecology. Thus, there is recognition of the value of the resources, their responsibility as custodians and the part they must play in their preservation.

• **The Caura Valley Eco-Development Committee** Represented on this committee are several stakeholders including:
  - The Caura Valley Village Council
  - CVFA
  - The Forestry Division
  - The Environmental Management Authority (EMA) of Trinidad and Tobago
  - WASA
  - Mr. Greenleaf serving as consultant

The committee is currently gathering information, through a series of interviews and consultations, to develop a project. From discussions with committee members this project seems to be focused on preservation of the Caura River and tourism; both the traditional “river lime” and the establishment of an agro/eco tourism initiative. Among residents there is the concern that infrastructural development is not the present focus but the consultant reasons that once the project is started this could be a natural development. This program has the backing of the Minister of Parliament (MP) of the area and it has been stated that funding has been identified through the Green Fund.

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16 Reference document: Alamu, S. and Sampson, T.
What can easily facilitate the presentation of a united position by the two key NGO’s, involved in the planning of the eco-development project, is that key members of the CVFA are also executive members of the Council and have been involved almost from inception in sustainable farming projects and other conservation initiatives in the valley.

*The Maracas Valley:*

- **Maracas/St. Joseph Valley Farmers Association (MVFA).** Like the CVFA the MVFA is a long standing organization with a current registered membership of 30 farmers. In recent times the organization has been striving to heighten its activity in the watershed. In this regard MVFA has been working in close collaboration with the Agricultural Society of T&T towards restoring the valley as a significant producer of agricultural commodities. However it is questionable whether MVFA represents critical mass for there is the perception among farmers in the valley that the organization falls short on delivery and needs to be more service oriented if it is to enhance its reputation. Of major interest is the willingness of the MVFA to participate on the Project for the development of sustainable farming systems in the valley.

- **Village Councils:** There are six functioning village councils in the area. Their focus is not specifically agriculture but from discussions with their representatives they are clearly aware of the need for sustainable development in the area. Most importantly as in Caura, farmers are members of the councils and are thus well placed to highlight the importance of farming as a component of their development agenda. Of the six councils, the LLengo council seems to be setting the trend as a model community organization and is currently developing a number of projects both social and economic; again there is the recognition of the need for an environmentally friendly orientation. In this light the council has initiated a study on mapping the biodiversity of the area.

- **An extremely interesting organization is The Maracas Valley Action Committee (MVAC).** MVAC has among its membership a number of conservationists. Their focus is protecting the valley from perceived threats to the stability of the ecology. The major ones they have identified are
  - Quarrying
  - Extensive housing development particularly on fragile hilly terrain.

  They have been using the media to highlight their position and through their action they have been successful in halting a “development” on a vulnerable hillside in the La Baja area which was already resulting in erosion and soil loss.

  Because of their green orientation one can easily see this group identifying with The Cropper Foundation’s initiative, if only as consumers of the safe wholesome products coming out of the eco-friendly farming approach. Their commitment was clearly demonstrated by their participation at the first workshop session.

**Activity 5: Identification of major threats to the stability of the ecology**

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17 Personal communication with the secretary of the MVFA.
This is intended to give some guidance for the development of an effective suite of intervention strategies; some directly related to this project, others to inform a broader development plan for the watershed.

**The Caura Valley**

- **Unsustainable farming practices:**
  - Continued crop production in ecologically sensitive areas
  - Continued use of toxic pesticides including herbicides, mineral fertilizers and un-composted pen manure.
  - Failure to relate pesticide application to agro-eco-system-analysis (AESA).
  - Failure to implement buffer zones.
  - Failure to adopt a more comprehensive ECM approach where non-chemical production strategies take precedence. Such practices should include:
    - Intercropping and companion planting
    - Use of border crops and trap crops
    - Use of bio-pesticides and other biological control mechanisms
    - Appropriate soil testing and soil amelioration
    - Composting and the use of bio-fertilizers
    - Crop rotation based on sound scientific principles
  - The failure to implement appropriate soil conservation techniques when farming on hillsides

- **The increasing popularity of the Valley for recreation:** On holidays and week-ends particularly during the dry season the carrying capacity of the area is clearly exceeded. This creates all kinds of difficult situations for farmers and residents which include:
  - Irresponsible dumping of garbage
  - Pollution of the water course
  - Encroachment on private property resulting in crop loss and crop damage
  - Vehicular congestion and its impact on free access
  - Noise pollution
  - Driving under the influence

- **The failure to implement existing land use regulations and to develop new and more appropriate laws.** This has led to:
  - Alienation of agricultural lands particularly lower down the valley
  - The construction of houses in sensitive areas
  - Farming in sensitive areas

- **Forest fires and the lack of a proper management system:** This dry season has been particularly severe, the real effects of which are now being felt with the onset of the rainy season.

**The Maracas Valley**

- **Residential development** is perhaps the major threat to ecological stability in the Maracas Valley. As indicated in the baseline survey the majority of communities in the Maracas Valley are now classified as exclusively residential.
- **Quarrying** is also perceived by the residents to be an important contributor to environmental degradation.
- **Unsustainable farming practices:** From follow up activities it is clear that the level of production in the Valley is much higher than the first baseline survey indicated. Besides actual production there is also renewed interest in further development. Currently however the
majority of farming takes place on the hillsides and as in the Caura Valley there is not always adherence to proper hillside management techniques.
- **Pollution of the water courses** from raw sewage and quarry materials is also a concern of the residents.

**Activity 6: Interviews with extension officers of MFPLMA**

- Officers of both watersheds indicated their willingness to participate on the Project and shared with the consultant, the MFPLMA’s development plans for the Caura/ Tacarigua valley and Maracas/ St Joseph. Although the plans were developed independently prior to MFPLMA knowledge of the Foundation’s planned intervention and as such not a perfect fit, there is common ground and also real possibilities for collaboration. In the Caura Valley the focus of the MFPLMA was on nursery production and because of its popularity as a cash crop, juxtaposed against declining productivity, the MFPLMA had an ongoing program of papaya production. In the Maracas Valley the programmatic areas were; soil conservation, pesticide usage, pesticide safety and home gardening.

**Activity 7: Interactions with Land Administration**

- Officers of this Department revealed that there was an ongoing program to accelerate the delivery of standard agricultural leases in the Caura Valley. In this watershed in the Tumbasson area, except in the few instances where there were disputes (10%), all allotments were already surveyed and farmers were offered the opportunity to acquire leases. Seven farmers (25%) had already taken up the offer while the others would receive their leases on payment of the required charges. Officers were recently in the valley in an effort to further the distribution. In La Veronica, the other major farming area, the lands were already surveyed and farmers are awaiting the formal offer. In Maracas/St. Joseph the situation is quite different, the lands officer indicated that few farmers may be able to qualify based on the fact that there was no consistency of production and in many instances, holdings were abandoned. He was of the view that because of the ecological sensitivity of the watershed, farming in this watershed is a difficult prospect and should be discouraged.

**Activity 8: Stake holders meeting #01**

This activity was of major significance in deepening the relationship between TCF and the other stakeholders. The representation was broad and the workshop was truly participatory as farmers freely shared their views and indicated their priorities. The way things unfolded signals that our desired farmer-led approach is beginning to take root, as the farmers are beginning to take ownership of the project recognizing that their input is valued. The contribution of the other stakeholders was also instructive, as we are beginning to see the consolidation of a green oriented network in the targeted areas and beyond. The common thread running through the offerings was the need for conservation and sustainable development recognizing the negative impact on the national landscape if the ecological integrity of the Northern range is disrupted.

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18 Reference document: Report on stake holders meeting.
Activity 9: More comprehensive validation of baseline data

By the end of the first workshop, based on extensive interactions with a broad cross section of the players and participation at the workshop session, there was much greater clarity of the status of both watersheds - more so the Maracas valley where information gathering presented the greater challenge. Relative to the initial survey these follow up activities took place during the rainy season when the level of production was much higher. In Maracas it became clear that there was still a great interest in agricultural production and generally the number of active farmers in the watershed was much higher than originally perceived. Of significance here was the fact that even abandoned estates were being rehabilitated and there was renewed interest in cocoa rehabilitation. This offers an opportunity for the pursuit of a development approach in sync with the Project’s conservation philosophy. What was also exciting was the recognition among the farming communities of the need for the adoption of sustainable management strategies and farmers were already practicing some conventional and some innovative approaches. What is of relevance to our planned intervention is the reality that the Foundation’s presence and participatory developmental approach is welcomed, which augers well for relationship building and the success of the project. Experiences worldwide have clearly demonstrated that successful implementation of similar initiatives depends on the full participation and training of the practitioners. The challenge though is to foster collaboration among the broad cross section of stakeholders. There are a number of planned and ongoing interventions in both watersheds and although the objectives are similar, there is a degree of unwillingness among certain elements to work as a team.

Analysis and future projections

Coming out of the baseline survey, the follow up visits and other interactions, it is clear that farmers are aware of the negative consequences of current management practices but are hesitant to make transitions because of perceived risks juxtaposed against livelihood concerns. The feeling is that they are willing to work on the development of alternative eco-friendly strategies but the research must be organized and facilitated in a manner in which there is no intense competition for resources, both human and material, and as such does not interfere with their income generating capacity and comfort.

The situation in Caura is somewhat different to Maracas in that in Caura, there has been a long history of organizations studying and working with farmers on a host of projects, however not always in a coordinated manner. In reality, currently there are at least three projects planned for the valley and a number of agencies have developed varying types of relationships with farmers. Farmers may be a bit wary of intrusions by “outsiders” coming with solutions for their concerns. Additionally here you are dealing with a relatively mature farming population that has, over the years, developed systems of production which they perceive are working for them. Thus one can anticipate resistance to change unless farmers can be convinced that transitioning would bear positive results. What is positive however is that there is a group of farmers trained in ECM through the FFS experience and who are practicing some aspects of this approach. Other farmers also include some components in their systems but there is still a heavy dependence on chemical and mineral fertilizer approaches. The bottom line is there are still a number of negative practices which need to be addressed.

19 Reference document: Control of Pesticides and IPM
What is required at this time is coordination of the various initiatives for they all have a similar objective; the achievement of a higher standard of living for farmers based on the development of productive sustainable systems of culture.

In the Maracas Valley, farmers are operating on more sensitive areas, essentially on hillsides, and although there is some awareness of conservation practices, they are not properly employed. However farmers appear to be quite willing to collaborate on the development of corrective mechanisms and welcome the interventions planned by TCF.

There is still a need to continue the assessment, more so in Maracas, for there are still gaps in our knowledge on the status of farming in this watershed. The view that there are only a few farmers operating may be a misconception. Although farming may not be a major contributor to degradation in Maracas we were informed that there may still be as many as three hundred farmers operating in the Valley.\textsuperscript{20} The scattered distribution and inaccessibility of farms in the valley has created a somewhat difficult situation. However the recent links which were made can go a long way in addressing this concern.

**Intervention model: Challenges to the design and implementation of an intervention initiative**

**Entrenched attitudes:**
As a concept, green projects promoting sustainable development are becoming extremely popular internationally. However where livelihood concerns are involved, short term economic viability normally takes precedence at times in direct contradiction to the long term goals. Thus, to successfully implement this type of initiative one has to be aware of this dilemma and plan skillfully to buffer any negative impact during the transition from conventional approaches.

Although the evidence indicates that agricultural production using conventional systems of production is becoming less sustainable and even less productive even in the short term,\textsuperscript{21} farmers are not convinced that alternative systems can work and are thus wary to change. They prefer to remain in their comfort zone, at times making marginal or no profits, and not prepared to take undue risk. To enable change one needs to develop a transitioning strategy whereby farmers participate in the planning and organization of on farm research\textsuperscript{22} geared towards the development of these alternative production systems. It should be noted that the approaches should be location specific influenced by the existing ecological conditions and even by cultural realities.

**Projects focus vs. Farmers concerns**

To facilitate farmers taking ownership one has to ensure that felt needs are addressed which may be quite different to the project’s main objective. Agricultural development in T&T has not been popular among the politicians and as such it has been poorly funded. The result has been continual decline and

\textsuperscript{20} Interviews with MVFA representatives.
\textsuperscript{21} Reference document: Discovery and learning manual for pest management in the Caribbean
\textsuperscript{22} Reference document: Regional training workshop on farmer participatory methods for ECM. See also Control of Pesticides and IPM.
reduced contribution to GDP\textsuperscript{23}. There has been much talk about food security and the role agriculture can play in a diversified economy, but there has not really been delivery. In this regard factors such as

- Insecure tenure arrangements
- Poor infrastructural development
- The escalating cost and availability of agricultural inputs
- Inadequate marketing arrangements

continue to impact negatively on the viability of farm enterprises. This was indicated clearly during the deliberations and from the responses during the priority setting exercise at the first workshop. Therefore to ensure the success of the project, these realities must be considered and concerns addressed either directly or indirectly.

**Inappropriate Governance Structures**

A major driver of the process would be the level of organization and influence of governance structures in the watersheds. With the focus of the project being agricultural transformation, the farmers’ organizations would be the critical body. The concerns are:

- Are they considered important enough to attract broader membership?
- Do they have the respect to be considered representatives of the broad mass of producers?

Both organizations have a history of activity in the watersheds and have been through several incarnations. In the consultant’s view they are still struggling to be truly representative for they are still perceived among farmers as not being able to deliver. The Project should seek to enhance the farmer organizations’ reputation and this must be based on building their capacity to service their membership.

**Other organizations:**

In both watersheds there exists the possibility of involving other organizations, either directly to give the movement some additional legs, or as conduits through which public funds can be channeled as in the case of the village councils. What is needed in this instance is the development of a strategy for promotion of collaboration.

**Capacity gaps:**

It is clear that there is a need for building capacity or more accurately, bringing a greater level of understanding and the better application of some of the conservation practices that are already in effect. We may need to introduce new techniques but we need to chart the way forward through a participatory process; respecting what has been developed, tried and tested driven by farmers’ experiences. Hence we must recognize the value of folk practices and tailor our training agenda to be one of exchange and not top-down.\textsuperscript{24}

**The aging farming community**

\textsuperscript{23}A figure of .2\% was quoted at a recent meeting on On the Job Training for Graduates at FTC.

\textsuperscript{24}Reference document: Regional training workshop on farmer participatory methods for ECM
Succession is crucial to the survival of agriculture and thus food security. The reality is that young people are no longer attracted to this livelihood. This is related to the way agriculture is perceived among the youth as being low-tech and not a lucrative endeavor, particularly as practitioners in the field. Our approach relating agricultural development to ecological concerns is quite interesting and topical and may resonate among youth at all levels. A strategy should be developed which involves youth, possibly through the school system (primary, secondary and tertiary) and among other youth groups in the watersheds.

**Reliability of alternative approaches:**

Although precedence has been set in other localities, eco-friendly farming systems have not been truly tested under our circumstances. Some work has been done through MFPLMA but it has been disjointed work. Extension officers were trained and several Farmer Field Schools were set up, but the political will to drive the process was lacking and hence the research and development work was poorly funded. Even in the Caura Valley where the work done through the FFS brought international recognition to the CVFA, an application to the MFPLMA for funding of a follow up project jointly developed by Central Experimental Station (CES) of the MFPLMA and the CVFA was turned down. Here again we are attempting to break new ground and are still unsure of funds to ensure implementation.

**Lack of an enabling environment:**

Negative attitudes at all levels, some of which have been indicated above, have hindered the creation of an environment which can promote sustainable agricultural development. There is need for the development of a package of incentives and freeing up of investment capital to encourage the transition. Provision of relevant information and access to alternative agro-inputs also need to be addressed. Thus a network consisting of:

- Research personnel
- Policy framers
- Technical back stoppers
- Input suppliers
- Funding institutions
- Training providers (not only experts but including “inperts”)
- Farmers/Farmers’ organizations
- Community governance structures
- Consumers

must be developed and made to function easing the burden on the ones charged with the responsibility for production.\(^{25}\)

**Intervention model**

The base line survey and analysis was somewhat incomplete. This was clearly related to the scope of the exercise, the limited time frame and the time of the year in which it had to be completed. The follow up visits and interactions have contributed significantly to our understanding of the watersheds and even so there are still gaps in our knowledge that may be critical to the design of a truly appropriate

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\(^{25}\) See annex II: Diagrams showing collaboration and interaction among stakeholders
intervention strategy. Hence we must leave room for flexibility in applying the model, recognizing that the model speaks more to process (as different from strategy) which will definitely be location specific.

As stated earlier the key to the success of this intervention is participation, for it must be a people’s project driven by the communities within the watersheds.

The key elements of the model should be
- Building appropriate governance structures
- Training and empowerment
- On farm participatory research
- Review and analysis
- Testing and application of research findings among a broader mass of practitioners
- Promotion to enhance broader adoption

Community Governance:

In each of the watersheds there are several organizations and individuals who could play key roles in bringing about transformation. The fact that the members crisscross organizations could be critical to collaboration and development planning without overlap and wastage of resources. The concern however is; do these organizations represent critical mass and if not how do we fix this? One can identify three limiting factors:
- Finance
- Personalities/leadership
- Delivery of services

Perhaps the factor in relative minimum here is delivery of services. People usually relate to organizations if there are benefits. Participation in an organization is an investment in time, energy and finance, hence one expects returns. In our circumstance farmers are interested in:
- Assistance with infrastructural development
- Security of tenure
- Easily accessible and reasonably priced agro inputs
- Marketing of produce
- Information
  - General information on production
  - More specific and timely information on project saving interventions
- Investment capital

Because of the relationships we are developing with the two organizations there is an opportunity to work with them to enhance their capacity to deliver and as such to become more proactive in the watersheds. In this light we may need to:
- Conduct a needs assessment of the two farmers organizations
- Provide them with information on viable farming alternatives which they can share with their membership
- Provide some basic training that one of our stakeholders may be able to facilitate
- Try to forge linkages with input suppliers who now have available alternatives
- Try to encourage with a willing supplier some form of bulk purchasing and distribution towards building a corporative approach
• Develop a listing of clients among stakeholders who may be willing to purchase “safe food” at a premium price
• Further develop the marketing arrangement with the Trinidad and Tobago Agribusiness Association (TABA) in collaboration with the National Agricultural Marketing and Development Corporation (NAMDEVCO).
• Try to assess the status of the tenure arrangements and develop, along with the national Land Administration Department, an approach to facilitate regularization.

It is noteworthy that the CVFA is well equipped with a range of high tech audio/visual equipment and some farm machinery but without a home for conducting its business.

As regards to the on farm participatory research, it is being suggested that all activities should be driven and coordinated by the farmers’ organizations. Other stakeholders should serve as back stoppers. The process could flow as indicated below:
• TCF organize a meeting with the executive of both organizations essentially to
  o Update on status of the project
  o Share the results of the survey on the ranking of farmers conducted by the technical consultant (Mr. Beaumont Celestain)
• Farmers’ associations should organize and conduct a joint working group session with funding assistance and technical support by TCF. This could:
  o Enhance their profile
  o Serve as a relationship building strategy between the two organizations
  o Further promote active participation by the target community
Participants should include
• All farmers who indicated an interest in participation
• Representatives of TCF
• Representatives of other CBOs active in the watersheds
• Extension officers

A suggested workshop agenda is presented below; this should be further developed with the farmers’ representatives:
• Reiteration of the participatory approach concept and the value of on-farm research
• Workshop organizers (farmers representatives) share survey results with other participants
• Farmers share and discuss a suite of possible project activities based on
  o Earlier suggestions by the consultant
  o Any other ideas coming out of the session
• Farmers guide the selection of projects
• Selection of appropriate project sites
• Establish a project steering committee with representation by the
  o Farmers organization
  o TCF
  o Other CBO
  o Extension
This committee will be responsible for:
• Coordinating project activities
• Analyzing data collected as projects develop
• Guiding the implementation of interventions
Planning interactive session for review and analysis of the project

It is recommended that the committee could advise but should not over-ride the management responsibility of farmers for projects on their allotments.

**Training and empowerment/Participatory research**

These two activities are clearly related for the most appropriate way to ensure that learning takes place through a projectized approach to training. This methodology is a “hands on” learning by doing process, where a relationship is established between the acquisition or enhancement of knowledge, attitude and skill and its application to the real world. The process begins with the desired outcome (the project) then knowledge is acquired and skills and attitudes developed to achieve it. This was adopted during the Farmer Field School experience. Within the field school, a demonstration plot was identified and participants developed, established, managed and assessed the project, guided by facilitators from several agencies including

- MFPLMA
  - research division (CES)
  - extension division
- CABI
- UWI department of agricultural extension

Development of the training and research agenda could be guided by the selection of projects and project sites, coming out of deliberations at the workshop.

The projects would essentially be on farm research where selected farmers would be directly involved in the management. Coming out of the first workshop and as indicated earlier there can be three categories of projects:

- Upgrading conservation practices on the allotments of all participants, and funded as far as possible by the farmers involved.
- Projects with some demonstration value partially funded by TCF
- Demonstration farms on selected farmers’ allotments that are funded by TCF. This arrangement should also consider a benefit from income generated through sales, which would compensate for them having to give up a portion of their holding for the research effort.

The choice of projects is critical because they must offer the opportunity to study and develop strategies to manage as broad a range of situations that may be encountered by farmers within the watersheds. These should include:

- Hillside stabilization
- Soil conservation
- Contour planting
- Fire guardianship
- Protection of water courses
- Ecological Crop Management, studying techniques such as
  - Crop rotation
  - Intercropping
  - Companion planting
- Biological control
  - Identification of natural enemies
  - Rearing and release of natural enemies
- Soil amelioration
- The use of trap and border crops among others

This project idea is developed further in annex IV.²⁶

**Review and analysis**

There should be continuous monitoring of projects by all participants using the AESA approach as discussed earlier. This would enhance the understanding of the conservation strategies employed and give an indication of the need for interventions as projects develop. In a real sense this represents continuance of the training effort. To facilitate this there must be an agreement by participants allowing periodic visits to their farms. However a more comprehensive review of project activities should be organized at the end of each phase of experimentation which could span over a dry and wet season. This should take the form of field visits followed by an interactive house session where research findings are discussed, analyzed and projections for continuance established. Participants should include all stakeholders and even members of the network who are not directly involved. Again the farmers’ organization must play a key role in organizing and conducting the workshop.

**Testing and application of research findings among a boarder mass of practitioners**

Ideally this should occur after verification of research findings although one may be tempted to expand the project at an earlier stage depending on results, probably even after the first phase. By this time one would have the benefit of a year of experimentation under both wet and dry season conditions. Additionally as informed by AESA a number of interventions would have already been made and analyzed giving a good indication of their worth. Also a number of “new” farmers may have been convinced to become more directly involved in the project. The new locations can then be utilized for further verification.

**Promotion to enhance broader adoption**

Several strategies could be utilized for promotion. The interactive session at the end of each phase is an appropriate occasion, for then it is intended to invite mass participation which may be even broader than the network involved in the research. Invitations can even be extended to farmers and researchers in other parts of the Caribbean involved in the development and testing of conservation strategies. This was successfully achieved during the Caura Valley FFS experience. Encouraging field visits by a broad range of interest including schools and youth organizations, input suppliers and consumers, all of whom can assist in spreading the message. There is also the possibility of the use of news-letters, print and electronic media. All these tactics were employed by the CVFA. In reality the association developed good working relationships with a number of media personnel including health and wellness practitioners

²⁶Annex IV: Establishing model ECM initiatives in Maracas St. Joseph and Caura Valley watersheds.
who promoted the Caura Valley initiative during their presentations. Another useful approach is the production of a video. We can plan with this in mind gathering footage from the inception of interventions.

Plan for Project implementation

Identification of participants
Following up on the range of interactive sessions and the generalized indication among farmers in both watersheds to become involved, the next step is the selection of the actual participants guided by the IDB’s recommendations. To facilitate this, a questionnaire was administered to farmers in both watersheds including those who attended the first workshop. The results demonstrated keen interest among the farmers for participation; 83% in Maracas/St Joseph and 69% in Caura Valleys indicated interest in participating. Only one farmer in the Caura Valley stated that he had no interest in the Cropper initiative. Accordingly and as previously recommended, there is the need to organize a session where perspective participants could be updated on the project’s present status and deliberate on actual projects, project locations and can assist further in consolidating the approach.

Project sites
As earlier indicated, the selection of actual project sites should be based on them offering opportunities to study and address the range of eco-sensitive situations farmers may encounter within the study area and for comparison sites where there may already be sound conservation practices. In this regard we may need to seek out:

- Ongoing conservation strategies that may have demonstration value. These do not have to be restricted to the targeted watersheds.
- Situations where there may be need for enhancement
- Situations where degradation has already set in but may be reversible
- New projects that we may be able to develop in collaboration with the farmer
- Abandoned /underdeveloped allotments that may not be extremely difficult to set on a new and sustainable course of development
- Extremely difficult situations that may truly test our ability to resuscitate.

Activities, roles and responsibilities of participants
As indicated earlier there could be several approaches to the implementation of projects:

- On farms of all selected participants we should endeavor to initiate some project activity. These do not always have to be large projects; the scale could depend on farmers’ capacity to fund these activities without direct injection of project funds. Again the priority setting exercise during the first workshop gave an indication of farmers’ willingness to fund conservation projects.
- There could be partially supported projects depending on TCF funding capability
- There could be larger special projects where an entire suite of integrated conservation practices are applied to demonstrate in an ultimate sense our desired management approach. These may fit the demonstration farm model. However these projects can still be established on farmers’

27 See reference document: Report on supporting the selection of participating farmers in the watershed areas Maracas/St Joseph and the Caura Tacarigua Valley.
allotments with some special arrangement with the owner. Such projects could be totally funded by TCF.

In essence the approach is collaborative, involving a range of stakeholders all expected to perform key roles even at the implementation stage. The GOs and NGOs must serve essentially as back stoppers helping to provide the necessary information and affording easy procurement of goods and services that may not be readily accessible by CBOs and their members. The farmers’ organizations, considering the primary objective of the project, must be empowered to provide the guidance and coordinating function on the ground. Other CBOs can give moral and, where they have the capacity, technical assistance to the project. Most importantly they must be involved in promoting and implementing other development activities within the watersheds that may not be directly related to farming but which may be of major significance in enhancing the livelihood of all community members and creating a more enabling environment for agricultural production. However farmers should be encouraged at all stages to take ownership of projects with an understanding that they are the drivers with crucial management responsibilities.

**Concluding remarks**

There is now much greater clarity on the threats to ecological stability in both watersheds and the contribution of various human activities to the degradation which in reality impacts negatively on the very services these watersheds provide and ultimately on livelihoods and human wellbeing. Although our primary focus is the development of an intervention model for sustainable agricultural pursuits, the other treats identified are real and may be perceived by residents to be of greater concern and in some instances may be above the National average as prioritized by available data. What is of significance is that they can influence the attainment of the primary objective. Thus we must endeavor if not directly but through some mode of suasion to have them addressed. However we are now well informed on the status of agriculture in both watersheds and the capacity of existing organizations to play key roles in the transitioning exercise. TCF has gone a long way in the building of relationships among major players at the community level and there is willingness, even anxiety, by other stakeholders to actively participate in the project. The selection of farmers, specific projects and project sites is the next logical step but in so doing we must ensure that there are opportunities for studying a broad range of situations which will offer possibilities for training on a full suite of conservation practices.

At the organizational level there are capacity gaps and thus a need for building capacity. What is encouraging is that the CBOs that can play a part in driving the process are active and in most cases are involved in eco-oriented projects. The challenge is effecting collaboration among these various players, for there is not always a willingness to work together, which goes against the concept of “community of responsible actors” and this unwillingness can lead to wastage of time, energy and resources. The continuation of the establishment of pathways of communication is needed in creating an environment which will enable partnership among the major players involved. In the Caura Valley “The Eco-development Committee” has all the major stakeholders as its constituent members, thus offering them the opportunity to work together on one common goal of the transformation of the Caura Valley guided by environmental sensitivity. In Maracas/St Joseph there are many more CBOs, mainly village councils, spread over a wider area. Hence the task of engendering collaboration is more of a challenge. The approach TCF has been using is a sound one; the involvement of all the stakeholders from inception in

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28 Pantin and others Reference document
the planning, organization and most likely in the implementation of projects. To further promote collaboration among stakeholders in the watersheds, a symposium on community governance could be organized involving the CBOs from Maracas and Caura in an effort to bring responsible actors together to discuss the benefits of joint action and to foster relationship building. Stakeholders should also be encouraged to visit projects as they develop and to continue to participate in their evaluation during working group sessions and in charting the way forward. TCF should also seek information on projects within the watersheds that the CBOs are involved in and where possible make a contribution - technical, financial, or just by giving moral support. There must be mutual respect among all involved and the development process must be one of exchange, recognizing that all have valuable contributions to input in the transformation initiative.

Thus, being much better informed and recognizing the ladders to climb and bridges we have to cross TCF is now poised to proceed with this initiative with the understanding that our participatory approach has yielded positive results as regards stakeholder ownership which augers well for the success of the project.
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ANNEX I

Terms of Reference

Individual Consultant for Design of Project Intervention

Introduction
This project is designed to improve the sustainability of farming practices in communities situated within the target watershed areas of the Northern Range (Caura/Tacarigua and St. Joseph watersheds) while reducing the degradation of the slopes and the downstream consequences that may result from intense productive activities.

The Baseline assessment is designed to provide an overview of the current status of land use in agricultural production, the capacity of community organizations, landscape factors that support biological diversity and watershed management and demographic indicators. The Assessment comprises four separate activities, namely:

a) Initial Baseline Data Collection
b) Farming System Profile
c) Community Organization Profile
d) Impact Assessment Profile

The Consultancy on the Design of the Intervention Model is expected to address the challenge of compiling functional profiles of the farming system, the community organizational capacity and the impact of human activities within the two target areas as a precedent to formulating a meaningful intervention strategy.

Scope of Work
1. Compiling the Farming System Profile
   a) Validating Baseline Data
      ● Review of the data collected with respect of the number of farmers, type of farms, land use patterns in the area: Crops; livestock; forestry products;
      ● Review and validate the predominant farming system practices of concern to the project.
      ● Review the Farm system models of costs and revenues and potential productivity and income gains
   b) Compiling the Farming System Sustainability Profile
      ● Land Clearing Activities
      ● Crop Management Practices
      ● Farming System potential costs and benefits

2. Compiling the community organization profile
   a) Identify communities of interest to the project
   b) Assess the baseline report on community-based organizations and their capacity to partner with this project in changing farming practices
   c) Compile a community organizational profile outlining the potential role of these units in an intervention strategy

3. Compiling a Profile of the Environmental Impact challenges
a) Identify the potential impact arising from the specific land use, intensity of activities and location of activities within the landscape.
b) Identify the risks to communities and livelihood of the patterns of activities identified
c) Profile of the impact on landscape functions in terms of key ecological features of the area such as forest cover, ecological processes and interactions of communities in proximity to major resources and evaluate the need for intervention

4. Present a Profile of an Intervention Model
   a) Identify the level of intervention of NGOs, their focus and potential for collaboration with the project.
   b) Outline the basic challenges that the intervention model must address
   c) Present a Profile of an Intervention Model that can provide guidance to the project activities

5. Time Frame
   a) The assignment will be undertaken over a period of ten (10) weeks commencing on March 22nd 2010 and concluding around May 31th 2010. Actual mobilisation and termination dates will be dependent on the progress made on the collection of Base line data and other requirements of the project.
   b) The Consultant will submit one (1) Electronic and one (1) hard copy of each Report which The Cropper Foundation will review and provide feedback to the consultant within two weeks.
   c) The provision of these services by the Consultant is conditional upon the requisite final clearance and approval by the executing agency. The Executing Agency will not commit to any extra time spent in excess of that stated unless previously agreed.

6. Reporting
   The Consultant accepts the responsibility to submit the following reports:
   a) Inception Report within the first 2 weeks after commencement of the study;
   b) Progress Report within 5 weeks after commencement of the study;
   c) Draft Final Report within 8 weeks after commencement of the study inclusive of the Profile
   d) Final Report within 10 weeks after receiving feedback from The Cropper Foundation.
ANNEX II

Proposed collaborative structure
Interaction Among Collaborators

**LEGEND**

<table>
<thead>
<tr>
<th>CBO</th>
<th>Community based organisations</th>
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<tbody>
<tr>
<td>GO</td>
<td>Government organizations</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Government organizations</td>
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</tbody>
</table>
Farmers through their organizations would be the main drivers of the research effort with technical backstopping by the other organizations.

Training would be hands-on directly related to the project activities and essentially in the field.

The guiding philosophy is one of exchange recognizing that training and knowledge acquisition is bi-directional.
ANNEX III

Date: 11th May 2010

Comments on baseline survey

Validating baseline data: Essentially the information gathered is accurate but there are a few areas which may require some further investigation in order to develop a more comprehensive data base. These are indicated below under the headings presented by the consultant.

1.2 Baseline Data Collection

Unauthorized occupation of sensitive parcels of land: With the almost complete occupation of state lands authorized for use by the Ministry Of Agriculture juxtaposed against an increasing demand for holdings, perspective land users are occupying ecologically sensitive areas including forest reserve lands on hillsides. One can easily recognize the watershed management difficulty this presents especially considering the failure to implement proper land use management programs.

1.3 Current situation with bush fires

Some general information was presented but there were no details as to how they impacted the study area. Should have picked up:
- Impact if any on crop damage
- Possible causes
- Approximate area affected in study area
- Areas most affected especially as regards human activity
- Existing and proposed strategies for management

1.4 Activities to date

Should probably pick up some more information on the status of squatting
- On state lands
- Forest reserve
- Private lands
- Farmers awaiting regularization and possible reasons for delays
- Should meet with more farmers especially as farmers association does not represent critical mass.

3.2 Environmental vulnerability in the Caura Valley

- Probably the perception “not that bad” was based on the time/date of the discussion. However fires were extensive this year and continue to burn, doing major damage essentially to non farm lands but with possible severe consequences to farming activities when rain begins. Although as indicated there is the CEPEP and forestry presence the management of bush fires requires a more proactive approach. The current methodology is more a fire watch than a fire prevention strategy.
- Current farming systems also a major threat to eco-stability as these could influence:
o Pollution of water courses
o Reduction of bio-diversity
o Degradation of soils
  ▪ Physical
  ▪ Fertility
  o Erosion and soil loss on the hillsides
- Recreational activities influence on
  o Solid waste management
  o Pollution of the water courses
  o Bush fires
- Spiritual activities effect on water quality
- Increasing popularity of the valley for residences and new farmers
  o Occupation of sensitive areas (hillsides, forest reserve); influence on watershed management, eco-degradation
- Safe haven for bandits
  o Occupation of sensitive areas
- Expanding families
  o Occupation of sensitive areas
- Land ownership status particularly private ownership. The negative influences exacerbated by the failure to develop and implement proper land use policy

3.3 Environmental vulnerability Maracas/St Joseph watershed

Concerns in this area well represented

4.0 Agricultural activities

4.1 Predominant Crops

Bee keeping is of some importance in both watersheds could be an integral component of upgraded farming system. There are at least three bee keepers in the Caura Valley and one in Maracas

4.3 Farming Population

In the Caura Valley the area indicated in the report represents the main production centre. However there is some farming taking place on the hillsides lower down the Caura Valley and also as stated earlier higher up the Valley on Forest Reserve lands. There is also the Government agro-forestry project with a range of fruit trees. This may be of significance in a comprehensive development project in the Valley.

4.4 Farming Practices

4.4.1 Land Preparation

The use of fires for clearing land is still very popular. This is always done without following the proper protocol. Historically this has been the cause of many of the major bush fires in the area yet the practice
continues. This season even in the heights of the dry season with fires burning all around this approach has been used with dire consequences.

4.4.2 Organic Farming Methods

The advent of the Farmer Field School was instrumental in providing the Ecological Farm Management (ECM) approach in the Caura Valley. It should be stated however that only 20% of the farmers in the area attended and even fewer have continued to practice ECM strategies. In a survey conducted by Agronomics Inc. a company involved in agriculture and environmental management in the valley, the data indicated that following the Field School Experience the majority of the farmers were aware of the concept and liked to be associated with the movement. However they are yet to be convinced that organic farming methods can significantly manage crops and satisfy their livelihood requirement. Thus generally conventional crop management approaches are still very popular. However there is still a willingness to change which indicates a need for further research on alternative farming practices and easier availability of safe inputs.

4.4.3 Cultivation Methods on Slopes

As indicated by the consultant hillside production is of significance in Maracas and in certain communities in the Caura valley. In Maracas it is almost a contradiction that the longer term crops are produced in the lower areas and short term crops on the hillsides. In the Maracas hillsides one can see bare rock on farmlands, the result of continuous shot term crop production and soil loss. Thus not even the benefits of shifting cultivation obtain. In both areas although there may be some rudimentary knowledge on hillside management the details are lacking. Thus proper techniques are not always applied.

4.4.4/5 Pest and Disease Control/Soil conservation Practices

A clear distinction should always be made among the farmers in the area for it cannot be generally stated that farmers in the Caura Valley and as indicated by the consultant, in Maracas have bought in to the Ecological Crop Management production strategy. As stated earlier conventional management systems are still very popular. A major concern in the Caura Valley is the failure to implement buffer zones. Thus production utilizing pesticides, mineral fertilizers and un-composted pen manure takes place right up to the river’s edge.

6.0 Governance and Capacity Building.

The survey did not speak to the CBO operating in both areas except for the CVFA and The Maracas Valley Residents Association. It may be useful to identify other local groupings which could make contributions in a collaborative development program. In the Caura Valley there is “The Caura Valley Village Council” and “The Caura Valley Hiking Clip”. It may be interesting to note that there was at one time a Caura Valley Women’s group with a focus on processing. Such an organization if resuscitated can be of major significance in adding value to products in the Valley. There is also “The Jewels of Nature” an organization involved in the production of organic art, craft and musical instruments from natural materials which may otherwise be considered as waste. This group is also involved in training in the manufacture of the various products and playing of the instruments In Maracas there may be similar organizations.
ANNEX IV

PROJECT PROPOSAL

Program: Implementing sustainable farming practices in Trinidad’s Northern Range Communities:

Project # 01: Establishing model Ecological Crop Management Initiatives in the Maracas/St Joseph and Caura Valley watershed areas

Rationale

Coming out of an ongoing baseline study, the following is apparent:

- Farming systems involving the use of toxic pesticides and large quantities of mineral fertilizers remains very popular
- There is need for enhancing the adoption of eco-sensitive land management systems on flat lands and particularly on hillsides in both areas

Both these issues have serious implications for the stability of the ecology in the study area.

An integrated research and development study conducted during the period June 2004 and December 2008, in the Caura Valley utilizing a “Farmer Field School” approach. This initiative has clearly demonstrated the possibility of reducing the use of toxic pesticides and mineral fertilizers in crop culture even operating in an environment where chemical usage has become the tradition.

The farming system tested included the use of:

- Soil amelioration to provide a healthy growth medium
- Companion planting to provide a mutually beneficial crop design
- Strip cropping to separate crops by family, nutrient demand and pest and disease susceptibility while maintain ease of management
- Crop rotation
- Inclusion of pest repelling plants
- Trap and border crops
- Pollinator attractants
- Organic biodegradable mulches specifically for weed management
- Use of safe pesticides

Despite the successes achieved and the adoption of various components of the “new” system by about 30% of the participants in the field school, farmers are not yet fully convinced that alternative eco-friendly production systems can be managed effectively and deliver their livelihood expectations.

Although terracing is identified as a major soil conservation practice in hill side production it is still not a general practice in the study area. Farmers may avoid deep plowing or practice planting across the slope but actual terracing even utilizing simple technology like the A-frame is hardly ever employed.

Objectives:
The project aims to establish six model plots on farmers’ allotments, four in the Caura valley and two in Maracas/St Joseph. These are to be conducted on flat land and hillside situations in order to demonstrate the possibilities of ecological crop management approaches under both circumstances. This represents a continuance of the research effort on farmers’ holdings giving them the responsibility of managing the projects while at the same time facilitating them with the inputs and relevant information. This eliminates the risk of them making a financial investment and any negative livelihood fall out. Indeed an arrangement will be made for participating farmers to benefit from profits emanating from the initiative.

The plots are also to serve as demonstration plots where farmers involved in the program will have free access to visit study and suggest possible interventions based on an Agro Eco System Analysis (AESA) methodology.

Considering that this is taking place on farmers allotments it gives an ideal opportunity for comparing the traditional with this alternative strategy.

**The Project design**

The six projects will be similarly designed except for slight variances in the choice of crops and of course on the hillsides terracing will be a major activity.

As far as is possible research plots will be selected on higher grounds and up wind to avoid cross contamination due to wind or run off.

Projects will be conducted on approximately half hectare of land. As indicated earlier a range of ecologically friendly strategies will be employed. Considering the proximity to traditional production a buffer zone will be established and border crops will be planted. Other crops will be established in a strip cropping format as explained above. It is worthy to reiterate that the FFS initiative was successful despite operating in an area where traditional production was occurring. This clearly indicates that transitioning to an ECM approach can occur without radical departure from the practices of an entire farming community once an appropriate suite of integrated practices are employed.

Each parcel will be divided into four sub plots which will be essentially replicates.

**Crop range:**

**Border crops:** Taller crops such as
- bananas/plantains,
- cassava,
- vineing bodi,
- seim
- pigeon peas

**Main crops:**
- Solanacea: hot peppers, pimento, melongene, tomatoes, sweet peppers
- Legumes: bodi, seim, pigeon peas, string beans
- Cucubits: cucumber, squash, water melon,
• Cole crops: cabbage, pakchoi, broccoli, cauli flower
• Salad plants: green lettuce, bronze lettuce, romain lettuce
• Allium sp.: chive, leek
• Aromatics: mints, basil, rosemary

Insect repelling plants
• Marigold
• Chive
• Thyme

Pollinator attractants
• Corn

Land preparation:

On flat land
• An effort will be made to avoid over plowing; probably initially at the commencement of the project but no heavy machinery will be utilized following the early preparation
• Raised mounds and well established drains will be employed
• Based on soil testing limestone will be added to manage soil acidity

On hillsides
• Land will be prepared manually
• Hill sides will be terraced using A-frame technology.
• Contour drains will be established

Pests and disease management strategy:
• The integrated crop design will be a major component of the pest management approach. This is consistent with the enhancement of the biodiversity of the agro eco system and in encouraging natural balance among the biological entities.
• Where pesticides are necessary preference will be for the softer, less toxic botanicals and biologicals
• More toxic products will only be used as a last resort if crop saving interventions are to be made.
• There will be strict avoidance of restricted or banned products

Plant nutrition:
• Here preference will be for an organic approach utilizing incorporated pen manure as a soil ameliorant
• Well rotted pen manure or compost will be used for direct establishment of seedlings
• Bio-fertilizers will be used in preference to mineral products
• There will be minimal use of mineral products depending on need
• There will be strict avoidance of products which impact negatively on soil reaction

Composting:
• Composting will be done on each location to provide a rich source of organic nutrients. The strategy will be the compost heap method utilizing pen manure and other available biodegradable products.
Project schedule

- Proposed starting date:
- Proposed duration of project: the project is expected to run for approximately one year during which there will be three rotations of the shorter term crops. There may be a hiatus during the dry season in situations where irrigation is not possible. This period is difficult to anticipate considering current trends.
- Anticipated completion date

Project participants:
- Consenting farmers from the Caura Valley/St. Joseph watershed
- Caura Valley Farmers Association
- The Cropper Foundation

Anticipated project results:
- Impact on the environment
  - Enhanced biodiversity on selected plots and a return to more natural systems of crop management where biological management approaches take precedence.
  - Enhanced management of soil erosion and water conservation and reduced wastage especially of mineral nutrients in hillside production due to more efficient soil management practices
- Impact on the participants
  - Enhance knowledge of ecological crop management and hillside production systems
  - Safer methods of crop production which could eventually lead to enhanced farmer, farm family and consumer health
  - Further development of the ECM network
- Greater possibility of adoption and the development of a model for possible replication elsewhere

Project monitoring, evaluation and reporting
- Monitoring:
  - Participating farmers and their organizations
  - Stakeholder representatives
- Evaluation
  - Use of work plan and log frame to guide the assessment and evaluation
  - Participant assessment during field visits and group meetings
  - Stake holder assessment at workshops
  - Presentation and analysis of progress and final reports at project steering committee meetings
- Reporting
  - Communication of project results at workshop and other meetings
  - Production of material for newsletters and other publications
  - Networking

Assumptions and Risks
- Assumptions
  - Results from the FFS are achievable on farmers plots
Current hillside production techniques are applicable for the study area.
Farmers from both areas are willing to participate.
Selected farmers have the time and man power capacity to effectively manage projects and are willing to forego production on apportion or their allotment to facilitate the “higher risk” research project.
Farmers and other participants are satisfied with the selection process (transparent system developed).
Other stakeholders are committed to the initiative.

- Risks
  - Environmental factors particularly current patterns as related to climate change
  - Commitment of time particularly the selected farmers
  - Funding; additional funds may be necessary
  - Sustainability issues

Strategies to reduce or minimize risks
- Establish crops as early as possible during the current growing season
- Effective drainage implementation
- Possible use of irrigation during the dry season
- Profit sharing mechanism developed with chosen farmers