August 2006 Briefing Report on Cuba:

The Completion Project and STM: BAYAMO

submitted to:

Sustainable Cities
Canadian Urban Institute
Eco Tek Ecological Technologies Inc.
Asociación Nacional de Agricultores Pequeños
Ministerio para la Inversión Extranjera y la Colaboración Económica
Agenda 21, Bayamo
José Antonio Leyva García, Delegado de Recursos Hidráulicos en Granma
Ministerio de Azucar
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by

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August 28, 2006

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INTRODUCTION

This Report summarizes the results of meetings that took place in Ciudad de Habana, Los Palos (Habana), Bayamo (Granma) and Los Arabos (Matanzas) during the seven-day period August 3rd to August 9th, 2006.

The purpose of the trip was twofold:

> to facilitate the project proposal process for Sewage to Milk: Bayamo, (STM: BAYAMO), which will be presented to CIDA this December for funding consideration under the bi-lateral Modernization of the State Fund (MOSF), and
>
> to coordinate with ANAP our understandings regarding The 2005 Pilot Completion Project (timelines, sourcing of materials, sequencing, budgets) and to visit the CPA 26/7 to observe the Pedestals and consult regarding the upcoming visit of the Canadian Team.

OVERVIEW

Build on the success of the pilot project at CPA 26 Julio (Los Palos, Habana), the project STM: Bayamo will create a peri-urban model of sustainable milk production that uses treated municipal effluent to irrigate pastures for dairy cattle at a nearby CCS.

In the process, it will remove a major source of pollution from the river Bayamo depends on for its water supply, rehabilitate the river bank, add major capacity to a farm cooperative, and construct a modest, scaled down model at ANAP's nearby Modelo Agropecuario to serve as a provincial centre for training and extension.

This report is organized as follows:

SECTION 1: MEETINGS IN HAVANA CITY,
Havana Province
Thursday and Friday, August 3 and 4, 2006

Canadian Urban Institute/ Instituto Urbano Canadiense

On August 3rd, I had the pleasure of introducing - over dinner - Rafael Betancourt (Canadian Urban Institute's representative in Cuba) to Juan Carlos Loyola, (ANAP's person responsible for STM: Bayamo).

We spent several hours discussing the scope and direction of the project, our upcoming meetings in Bayamo and the importance of local government integration and support.

Rafael has done much to facilitate our linkages with local government in Bayamo, notably providing a personal briefing to and facilitating meetings with both Guia Ramon Fernandez, provincial director of physical planning and Jose Antonio Leyva, head of water resources for Granma province.

According to Rafael, the following four priorities have been identified by citizens of Bayamo:

1. clean-up of the river,
2. solid waste management,
3. urban mobility, and
4. public spaces.

We discussed project partners/collaborators/networks. Rafael identified Mario Otero, a Professor at the University of Granma, as a good starting point for university engagement.

Apparently, there is also a regional consultation process underway between Holguin, Santa Clara and Bayamo to share information on issues of urban sustainability. This may prove to be a useful network through which to share project knowledge and experience.

We discussed the construction of a similar water treatment plant completed this year in Mariano under the direction of Canadian Urban Institute and Havana's Parque Metropolitano. Rafael identified supply chain problems – getting materials on time and on spec – as the greatest potential obstacle/risk to project success.

Rafael will continue to be available to provide advice and facilitate networking and linkages as required.

ANAP – Cuba's National Association of Small (Private) Farmers

Friday August 4th I spent the morning in meetings with ANAP (Asociación Nacional de Agricultores Pequeños). We discussed two matters: The Completion Project and STM: Bayamo. Present were myself and the following staff of ANAP National Office:

Juan Carlos Loyola:	Project Direction, Camaguey and Las Tunas provinces, Associate Project Direction, CPA 26/7
Mirla Isabel García Placencia,	Project Direction, Havana and Matanzas provinces
Ana Maria Del Risco Rodriguez	Project Development
Miriam G, Peña Puig.	Proposal Development

THE COMPLETION PROJECT:

Finances: I confirmed that we had raised $32,000 in Canada to fund our contribution to the Completion Project. Unfortunately, the Canadian Embassy small projects fund, which ANAP had hoped to source to support the electrification and irrigation costs of the Completion Project, has been depleted until next spring. We discussed options. It was agreed that ANAP would apply for $20,000 CUC from the Canadian Embassy's bi-lateral Cuban Community Development Fund (CCDF – deadline mid September). We also discussed ways to trim costs, and agreed to continue this discussion with Juanito at the CPA. Since returning to Canada, I have been further advised by Jim Millson that Gallagher Canada has graciously agreed to Jim's request to make a further donation to the Completion Project: they will provide all materials at half price.

Materials: In addition to the donated materials (Section 2), it was agreed that we would also source a used motor for the irrigation pump in Canada.

Timing and implementation: It was agreed that Morgan Millson, Darryl Donneral and I would come to Cuba for 2 weeks to assist in the construction of the electric fences this fall. Target completion is by year-end. It was agreed that the electrical supply to the new pump should be in place for our visit and that the irrigation materials should also be on site. ANAP will keep us advised of their progress. The Millsons and I will likely visit the CPA one more time to ensure the calf handling practices are working well, that the grazing management is being successfully implemented and that the ration formulation is running smoothly.

Success to date: Although the Pedestals are only now well established (the mesh did not arrive until May), the CPA reports they are already milking their 20 best cows twice a day, averaging 7 litres of milk per cow. This is more than double normal milk production at this time of year.

STM: BAYAMO

The meeting schedule for the following week was discussed, as was the project proposal process. All were in agreement that a January submission date gave everyone more breathing room to put together a winning proposal.

MINAZ - Ministry of Sugar

Following up on an exploratory meeting I had with Manuel Alonso Padilla, Especialista A en Colaboración, Dirección de Negocios y Relaciones Internacionales, MINAZ in May, Juan Carlos Loyola and I met with Aristides Manuel Aravyo Rojas, International Relations, Ministry of Sugar on Friday afternoon, August 4th.

The Ministry of Sugar is very interested in this project because they are responsible for coming up with diversification alternatives for lands removed from sugar production at both the state (Empressa, UBPC) and private (CPA and CCS) level.

Although the lands belonging to the CCS we are planning to work with in BAYAMO do not happen to fall under MINAZ's direction, they expressed interest in following this project closely and so were invited to send their representative in Granma province to the project meetings in Bayamo.

MINAZ is also interested in this Project from the standpoint of water sugar reclamation.

A very interesting suggestion was tabled at this meeting. We noted the only difficulty we could foresee with this project was materials supply. Not technical materials but simple things like wire mesh and greenhouse structures and holding tanks and the like. Aristides raised the possibility of MINAZ taking responsibility for the manufacture and supply of the components needed by the Project.

MINAZ certainly has the infrastructure to deliver on this commitment and it would be most helpful to the project. This avenue will be pursued with Kim Rink and MINAZ.

SECTION 2: THE COMPLETION PROJECT: CPA 26 JULIO
Havana Province
Sunday August 6, 2006

Juan Carlos Loyola and I visited CPA 26 Julio. Los Palos, Havana Province on Sunday August 6th to review timing and works associated with The Completion Project.

We confirmed that a 3 person Canadian Team (Morgan Millson, Darryl Donneral and Wendy Holm) will travel to the CPA for 2 weeks this fall to construct the new electric fencing and assist in other ways with the works to be undertaken as part of the Completion Project.

We confirmed that the timing of our visit will be determined by the completion of works required to provide electrical service to the new pump and the delivery of irrigation materials. We are anticipating November.

We confirmed with Juanito the amount of re-bar needed at the CPA.

We also confirmed that the following project materials will be shipped from Canada. The date of the shipment will be determined by when the used motor can be sourced (we are waiting confirmation of some final details). We anticipate shipment in early September.

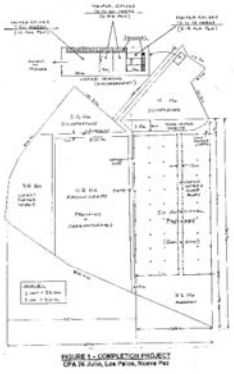
4	medium geared reel,
6	Gallagher Hats & 7 warning signs
1	spool of Turbo Wire (200 m.)
40	pigtail tread-in posts & 2 boxes of Fence Tighteners
2	boxes of pigtail tread-in posts (50 per box)
2	boxes of Offset Insulators (50 per box)
5	bags (25ea.) of Superstrain; 8 bags (25 ea.) of Screw-on
2	bags (25 ea.) Nail-On & 4 bundles (35) of Offset Insulators
2	boxes of Screw-On Insulators (20 pkgs per box, 25/pkg.)
2	bundles of 10 ea. --5 ft. lengths of half inch PVC conduit
15	rolls of 12.5 ga. Wire (1 bundle of 10; 1 bundle of 5)
2	rolls (100 m. ea.) of Heavy duty Leadout Wire
5	boxes of Offset Insulators (50 per box)
1	one 200-foot measuring Tape, 13 flashlights and 2 wire twisting tools, 1 fencing tool, and 10 pairs of work gloves

We visited the Pedestals and were pleased to see the legume Glycenia trellising well and looking very growthy. (The mesh was not installed until May end - a one year delay in project results due to supply difficulties. In the end, the mesh was imported from Mexico)

These pictures show 8 weeks of growth. At the time of our visit, the cows had not yet grazed the Pedestals, but were going to be introduced to them in 7 to 10 days.

Again, it is cows in their highest phase of production (e.g. from calving to 120 days) that graze the pedestals; 5-6 cows grazing one section per day. Cows in a later stage of lactation graze the rotational pastures. As a result of the Completion Project, the CPA will also be able to formulate feed rations to supplement the diets of all their animals including cattle raised for beef and buffalo raised for milk and meat.

We confirmed the crop and pasture configuration laid out in May:



Completion Project

Completion Project showing Pilot Project (upper right).

In our next visit, we will also review shade and water, calf handling practices, ration crop selection and the integration of on-farm formulated rations with the help of a rustic ration mixer (diagram to the right).

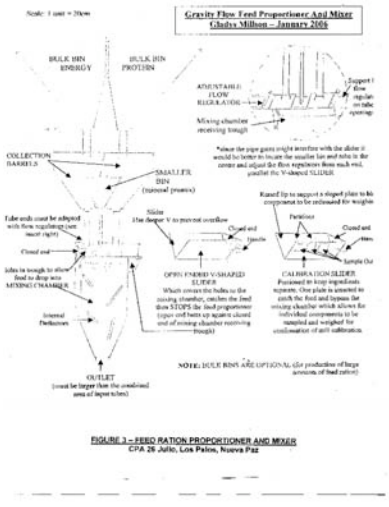


FIGURE 3 – FEED RATION PROPORTIONER AND MIXER
CPA 26 Julio, Los Palos, Nueva Paz

We discussed with the CPA the project we envisioned for Bayamo (STM: Bayamo), and asked if they would be prepared to lend some support to the farmers of the CCS as they try to follow the good example set by the CPA.

What was discussed was an opportunity for an ANAP-facilitated exchange – for the farmers of the CCS in Bayamo to visit the CPA 26/7 to see the Pilot Project in operation and to discuss the results with the farmers of CPA 26/7. Similarly, at some point, having a delegation of farmers from CPA 26/7 spend some time at the Bayamo CCS to assist in project implementation.

The CPA has sent a very eloquent letter of appreciation to the two principal Canadian funders, graciously inviting them to visit the CPA this winter to see the fruits of their support.

Justo Gonzales Gonzales, Vice President and Founding Member of the CPA 26 Julio, with his grandson.

SECTION 3: MEETINGS IN BAYAMO,
Granma Province
Monday and Tuesday, August 7 and 8, 2006

MINVEC - Ministry for External Investment and Economic Collaboration

Our first meeting on Monday morning was at the Bayamo offices of MINVEC (Ministerio para la Inversión Extranjera y la Colaboración Económica), where the Project was presented and discussed and the meeting plan and information needs of the next two days reviewed. Present were:

Wendy Holm, Sustainable Cities
Pedro Vargas Verdecia, MINVEC Delegado en Granma
Baldomero Suros Ramirez, MINVEC Granma Province
Juan Carlos Loyola, ANAP National Office, Project Direction
Miriam G, Peña Puig, ANAP National Office, Project Development
Carlos La Rosa Guevara, ANAP Granma Office, Project Direction
Norberto Millan, ANAP Granma Office, Project Development
Luis Canut Cedeño, Local Agenda 21, Bayamo
Silvia Ruiz Reyes, MINAZ, Granma

Meeting with Farmer Members of CCS

Following the meeting at MINVEC, we met with the leadership of the farm cooperative ANAP has chosen for us to work with: CCS Roberto Roblejo, a Credit and Service Cooperative.

(A CCS differs from a CPA - Agricultural Production Cooperative - in that individual members retain title to their lands and contribute a portion of their profits to the running of the collective.)

To enhance collective capacity, members share farm and community infrastructure and receive credit and extension serices from government. As do CPA's, CCS's operate under the jurisdiction of ANAP.

The President of this CCS is Feliz B. Diaz, and its Vice President is Enrique Maranjo Arias, It was founded on September 20, 1994 with 87 members, Today, there are 56 farmer members, 11 of whom are female. Thirty-six of the CCS members are landowners; 20 are family members.

Together, they farm 9.5 caballerias (127.5 hectares) of land. One and a half caballerias (20 hectares) of this is owned collectively; the rest is owned individually. If this project goes ahead, the government will give the CCS additional cooperatively-owned land (3-5 caballerias) for the dairy operation.

Situated on land formerly in tobacco production, the soils are considered very rich and productive. Major crops include yucca, watermelon, maize, pumpkin, papaya, okra and beans. There are 23 cows owned by 10 members.

They have two tractors and one truck, all in need of repair. Maribu (an aggressive and persistent shrub) is a problem.

The CCS supports a community of 125-130 people, 9 of whom are under 20 years of age. The average age of the members is approximately 45 years.

Forty-four of the 56 members live on the CCS in 25 houses, the rest live in nearby Bayamo. The CCS houses are very humble Bojios (peasant houses) with dirt floors and no electricity. Seven are considered to be in very poor condition. There are 20 small, shallow, household wells averaging 10-12 metres in depth.

Forty percent of the profits earned by members are donated back to the CCS for reinvestment in common facilities. The problem is, lacking irrigation, prolonged drought has meant that profitability is very low and consequently the CCS infrastructure has suffered. There is no mechanization, for example, no office, no workshop, no social centre. Access to the city is also difficult as there is no bridge across the Salado tributary.

Since the CCS was founded in the beginning of the Special Period, it has been a dream of these farmers to make this land productive. According to ANAP, the CCS has good leadership and good capacity.

Afternoon Tour of Municipal Sewage Outflow Sites

The afternoon of Monday August 7th was spent touring the municipal sewage outflow sites.

The below map shows the city of Bayamo surrounded by the Bayamo River to the west and the Salado tributary to the east.

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Map showing Bayamo River (heavy line on left) and Salado tributary (thin line on far right). There are five municipal sewage outfalls on the Salado before it empties north into the Bayamo River.

There are six major sewage/storm water outflows on the river, one from the nearby airport and the other five from the city of Bayamo.

The Salado tributary is the principal source of pollution to the Bayamo River.

Since the city of Bayamo relies on the Bayamo River for its water supply, reducing the amount of pollution contributed by the Salado tributary is a high priority.

Beginning south of the city as a small stream of perhaps 3 to 5 litres per second, the Salado increases in volume with the addition of sewage and storm drain water to an estimated 50 – 60 litres per second as it enters the Bayamo River to the north.

Two out of the five municipal outflows into the Salado are from sewage and industrial wastes that have been processed through settling ponds,

But the majority of the contamination of the Salado is from raw residential sewage.

These pictures are of raw sewage about to enter the Salado from the Road's End area municipal outfall.
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The left picture is of a man washing his truck in the Salado. Just before the picture on the right was taken, the woman in the background had walked barefoot through the Salado to continue along the road.

Recall that clean-up of the river, solid waste management, urban mobility and public spaces are the city of Bayamo's top priorities.

Fortunately for both the river and the community, lying directly east of the Salado tributary are wonderfully fertile, cooperatively owned farmlands!

Eco-Tek's Bio-Processing Plant

Irrigating farmland with nutrient rich effluent is nothing new. Many countries, including Canada, have been doing this for decades.

Traditionally, constraints to broader use of this technology are the costs of sewage treatment plants and the cost of transporting the water from where the sewage is produced to where the nutrient-rich effluent is needed by farmers.

Eco Tek Ecological Technologies Inc, Langley British Columbia has developed a low cost sewage treatment alternative that uses the natural action of green plants to purify municipal sewage water and produce a nutrient rich effluent ideally suited for the irrigation of pastures.

In essence, the unit is a hi-density constructed wetlands. The below photographs are of an Eco-Tek unit constructed in Mariano under a project supported by the Parco Metropolitano, Cuidad de Habana.

The Canadian partner to this project was the Canadian urban Institute.

These units consist of a series of large vats containing aquatic plants sheltered by a simple structure that provides shade and protection from rain.

In the Mariano unit pictured here, built to process 5 litres a second of urban sewage wastes, the sewage is collected in the concrete tank visible in the centre photo.

Inside the unit, the water moves through the sequence of vats, each one removing more organic material until, in the final stage, the cleaned water is stored in a small reservoir, in this case to irrigate a small organoponico.

Visit to Proposed Project Site

On Tuesday morning August 8th we crossed the Salado tributary and visited the proposed site of the bio-purification unit.

This location is marked with an X on the below map.

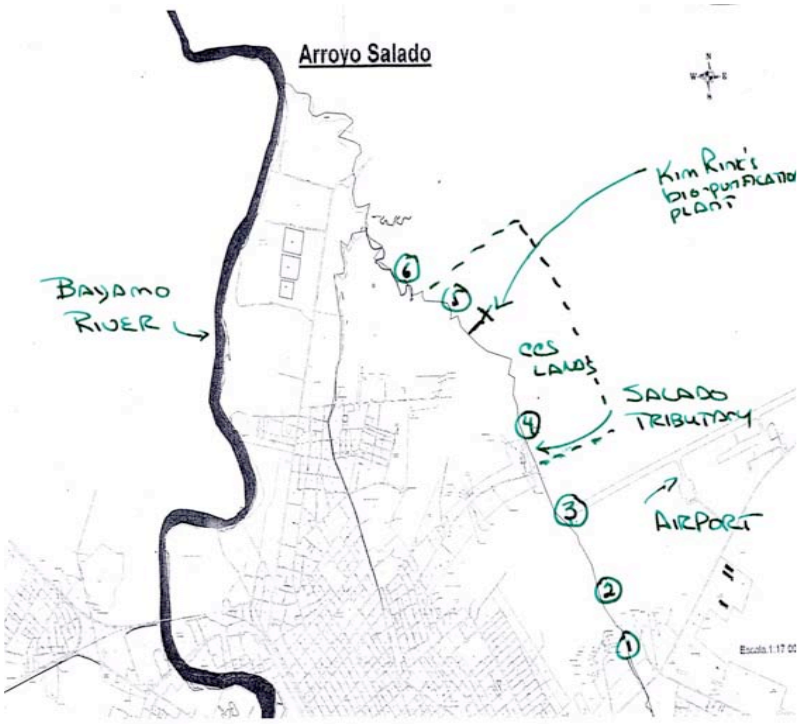
Points 1 through 6 are approximations of the locations of the sewage outfalls (1 from airport and 5 from city).

X marks the proposed location of the bio-purification plant.

The CCS lands fall roughly within the dashed lines.

Water for treatment will be withdrawn from the Salado tributary upstream of the industrial outfall (#5).

The anticipated withdrawal rate is 10 litres per second



The proposed plant location is situated on the east bank of the Salado tributary in the northerly aspect of the CCS lands.

An abandoned quarry adjacent to the building site will provide two natural reservoirs to hold the treated water.

The houses of the CCS can be seen in the centre background in the picture to the right.

Meeting with nearby UBPC Camilo Cienfuegos

After visiting the Project Site, we met with the leadership of UBPC Camilo Cienfuegos, which abuts the CCS to the northeast

(A UBPC is a cooperative that until the Special Period was part of a larger State Farm.)

The purpose of the meeting was to introduce the idea of sharing water produced by the CCS's bio-purification plant with the UBPC.

This UBPC has 123 members (20 of whom are women), 187.5 caballerias (2516 hectares) of grasslands and 1,056 animals. They are primarily a dairy UBPC. Seventy percent of the area is covered with Maribu. They have 8 dairy units, 1 crop unit and a modelo agropecuario (small animal production unit) for self-consumption. They have 6 milking parlours (5 are in use) and are milking 217 cows. Average milk production is 4.7 litres per cow (ranging from 7.2 in rainy season to only enough for the calf in dry season). They are supplementing generally poor pastures with King Grass and Norgold (the latter imported from the US).

The UBPC farm unit nearest to the CCS is called Santa Marta. Is it comprised of 8 caballerias (107 ha), 2 caballerias (27 hectares) of which are in grass forage; the remainder is Maribu). This unit has no irrigation potential and so suffers from the area's prolonged periods of drought

We gave the UBPC members a brief description of the project. The UBPC was of course very interested in the potential of receiving some water from the adjacent CCS.

Providing surplus water to the UBPC serves several project objectives:

- It removes twice the pollution from the river (10 litres per second as opposed to 5 litres per second).
- It enhances peri-urban milk production capacity.
- It increases technology transfer by indirectly exposing the UBPC sector (under State not ANAP jurisdiction) to the nutrition and management ideas we are implementing at the CCS and CPA level. (We have already suggested a challenge between the CCS and the UBPC to see who can produce more milk in two years time!)
- Increasing dependency on the water beyond the CCS to the adjacent UBPC adds project stability (more hands to help if day-to-day problems arise).

Visit to ANAP Modelo Agropecuario

In every province, ANAP maintains a house for traveling ANAP staff and official ANAP visitors.

ANAP House in BAYAMO is situated on the west bank of the Salado tributary roughly across from the CCS.

To provide food for staff and guests, most ANAP houses have a small organoponico and an animal production unit (Modelo Agropecuario).

The picture to the right shows this small production unit in Bayamo's Casa de ANAP. It has a staff of 3 and houses pigs, chickens, rabbits and 6 dairy cattle.

It is proposed that a small training unit be created at Casa ANAP's Modelo Agropecuario to provide extension support to the CCS. A small pedestal and some rotational grazing (enough for 6 cows and their calves) would be constructed, along with calf hutches and a small feed mixer(the latter for demonstration purposes as such a small unit would normally hand mix their rations).

Basically, this training unit would replicate the sustainable dairy production system upon which the Pilot (CPA 26/7) and the peri-urban (STM: Bayamo) are based.

It would be a place where Cuban farmers in the eastern provinces could come to learn sustainable dairy production practices and receive technical assistance and networking support to facilitate knowledge transfer.

Tuesday Afternoon Proposal Development Workshop

Tuesday afternoon the project team met in a workshop setting to coalesce the ideas which had emerged during the two days of meeting and field visits and to develop a strategic plan to bring this project forward through the project proposal stage.

Present throughout the afternoon were:
Wendy Holm, Sustainable Cities
Juan Carlos Loyola, ANAP National Office, Project Direction
Miriam G, Pena Puig, ANAP National Office, Project Development
Carlos La Rosa Guevara, ANAP Granma Office, Project Direction
Norberto Millan, ANAP Granma Office, Project Development
Luis Canut Cadeno, Local Agenda 21, Bayamo

The purpose of this workshop was not to revisit the decisions made in the CPA 26/7 Pilot Project, but to examine what additional factors needed to be considered if we were to replicate its success in Bayamo.

Considerations relating to the CCS:

Consideration: How much land is needed for dairy production?
Approach: We took as a given the model developed at CPA 26/7, below. This will create more capacity than the CCS needs initially for a 50 cow milking herd, but it is an appropriate size to accommodate future growth. Only half the rotational pastures would require electric fencing in the first year of the project

- 3 hectares of pedestals
- 32 hectares of rotational pastures.
- 12 hectares of ration crops.
- 6 hectares of grasses.
- 10 hectares of bull silvo-pasture.

Consideration: Additional collectively owned land will be needed.
Approach: Move the collectively-owned area of the CCS to the area where the plant and the dairy unit will be located and supplement it with enough additional lands (from the State) to comprise six caballerias (80 ha).

Consideration: CCS infrastructure needs support.
Approach: Include funds to build a rustic milking parlour, workshop, office and social circle, to buy computers, to repair equipment (tractors and truck) and to bring electrification to the houses.

Consideration: <u>How can we draw on CPA 26/7 Pilot success</u>
Approach: Create a mentoring exchange between the farmers wherein farmers from Bayamo would visit CPA 26/7 to see the system in operation, and farmers from CPA 26/7 would visit Bayamo to help implement.

Consideration: <u>There is no bridge across the Salado (delivery issue)</u>
Approach: Leverage municipal support to construct a simple crossing to facilitate access.

Consideration: <u>How can we deliver Training/Extension Support?</u>
Approach: Develop a model sustainable dairy unit at ANAP's Modelo Agropecuario. Build a small Pedestal and rotational pasture unit for 6 cows (using on-site power for fences as area has a perimeter fence), build a few calf pens, plant some ration crops and a small demonstration feed mixer.

Consideration: <u>What partnerships are needed to support the CCS?</u>
Approach: Once proposal is developed, circulate and hold discussions with Agrarian University of Granma, Institute for Research into Pastures and Forages, Institute for Animal Science.

Consideration: <u>How can we amplify/energize capacity of the CCS?</u>
Approach: Potentially offer CCS memberships of employment to top 3 students in dairy production at the Agrarian University of Granma. These students could provide technical expertise and become facilitators of and participants in the process. In 2-3 years time, they might move on (in a farmer-to-farmer context) to assist other CCS's in implementation of sustainable dairy production systems. It would also add some excitement to the Project among young professionals.

<u>Considerations relating to the Salado tributary:</u>

Consideration: Salado <u>riverbank remediation</u> is required both for erosion control and to facilitate public access.
Approach: Reforest the riverbank with bamboo and fruit trees .

Consideration: <u>What about drinking water for the cattle?</u>
Approach: Treat a small portion of the water with ultraviolet light to make it potable for the animals.

Considerations relating to the bio-purification plant:

Consideration: Who will be responsible for plant construction?
Approach: ANAP in coordination with Municipality of Bayamo.

Consideration: Who will own the bio-purification plant?
Approach: To ensure operational stability and accountability, the Plant will belong jointly to the CCS and to ANAP.

Consideration: Who will operate the plant?
Approach: Plant operation will be the responsibility of the CCS. (Training required.)

Consideration: Who will build the plant?
Approach: Municipal workers under the direction of ANAP and Canut (LA 21) who will have the experience of having built a similar plant on the other side of Bayamo city.

Consideration: Where will the materials come from?
Approach: MINAZ has raised the possibility ot them taking on the responsibility for sourcing/fabricating the bio-processing plants and the mesh for the Pedestals (at least as much as can be sourced/fabricated in Cuba. If agreeable to Eco-Tek, this would greatly remove supply risk.

Consideration: Will anyone pay for the water?
Approach: The water produced in the plant will be provided free to the CCS. Some consideration should be given the CCS for the provision of surplus water to the UBPC. Perhaps the State could remove the CCS's farm tax in exchange for the water provided to the UBPC.

Considerations relating to the Community:

Consideration: What is the message of this project to the community?
Approach: Benefits of nutrient recycling and closed systems. There is no such place as "away" (as in flush it away). Similarly, contaminating agents should not be flushed down toilets or dumped down storm drains or sinks. And that if we do this, we create a nutrient rich resource that can be put to work to meet community priorities (e.g. milk).

Consideration: Who will bring this message out to the community?
Approach: The North American recycling experience (reduce, reuse, recycle) has been that school children are the most effective agents of change in the home. Cuba Cuba already has experience with Pioneers (school) children) leading community change (e.g. reducing standing water as part of Cuba's anti-Denge campaign). An opportunity for school children to tour the facility and become "water deputies" would be a good start in changing community thinking.

Considerations relating to the environment:

Consideration: Are there any other environmental achievables?
Approach: Possibility of methane collection for CCS cook-stoves. and a worm composting facility for soil amendment.

Consideration: Can this project be replicated along the riverbank?
Approach: With resources, yes.

Considerations relating to women and children:

Consideration: In addition to improved income and nutrition, can other benefits to women be incorporated?
Approach: A simple agro-processing facility can be included to increase the contribution of female CCS members.

Additional Information Requested from City of Bayamo (Canut wil source)

What proportion of water volume does each outflow contribute to the Salado tributary? How does this vary from month-to-month?

What proportion of nutrient volume (TDS or BOD) does each municipal outflow contribute to the Salado tributary How does this vary from month-to-month?

What is the rate of flow of the Salado prior to the first sewage outflow? How does this vary from month-to-month?

What is the rate of flow of the Salado at the point where it enters the Bayamo River? How does this vary from month-to-month?

What percentage of Bayamo's storm/sewage water empties into the Salado?

Number of residents and number of households in Bayamo.

Meeting with Jose Antonio Leyva

Our final meeting on Wednesday afternoon was with José Antonio Leyva García, Delegado de Recursos Hidráulicos en Granma.

The results of our two days of meetings and site visits were presented, and the Project was discussed at some length.

Sr Leyva expressed strong support for the project and then made phone calls to arrange (at 8:30 the next morning!) meetings between his people and members of the STM Bayamo team (Canut, LaRosa and Millan) to begin the monitoring and baseline development process required by the proposal.

We are extremely pleased at the support this Project has from Sr. Leyva and the Province of Granma.

Granma is known for its forward-thinking approach tto urban planning. STM: BAYAMO will put another feather in Granma's cap!

Our final evening at ANAP House, toasting the success of this Project…

SECTION 4: RURAL AGRI PROCESSING – CPA JOSE MARTI
Matanzas Province,
Wednesday August 9, 2006

On our way back to Havana, Mirla arranged for us visit CPA Jose Marti, situated in the municipality of Los Arabos in Matanzas province. Founded in 1981, this CPA produces dairy, cattle and multiple crops, has a well-equipped machinery pool and machine shop, and an on-site CREE (Centre for the Reproduction of Entomophages and Entomopathogens).

Several years ago, to add value to their production, to improve economic returns to perishable crops, and to increase the contribution of women members of the cooperative, the CPA was given the opportunity by ANAP to develop a small micro-enterprise. This was the purpose of our visit.

The facility, located on the CPA, was built three years ago with a grant of $9,000 pesos from the foreign NGO HIVOS. It employs principally women CPA members.

Perishable crops such as papaya, guava, mango and melon are turned into marmalades, purees, gels, pickles and juices.

These products sold to the local population (at street “ferias”) and to the government for sale to tourism hotels. They also have a small spice line.

Equipment includes rustic cookers, a food mill canning equipment and simple packaging lines.




Some of the packaging processes are highly innovative, as, for example, this use of recycled water bottles to package red pepper pickles! The bottles are sterilized and filled, then the top of the bottle is hand-crimped, and a heating iron used to melt the plastic and seal the top of the bottle. Samples of all products are taken sanitary evaluation and the entire plant is inspected weekly



This little operation has been very profitable for the members of the CPA, who all share in the benefits. According to the CPA's economist, net profits average 32% of sales!

	2003-2004	2004-2005	2005-2006	Total 3 years
Sales	$241,942	$180,011	$180,764	$602,717
Costs	$141,850	$130,995	$139,917	$412,762
Profits	$100,092	$49,016	$40,847	$189,955
Profit per peso of sales	$0.41	$0.27	$0.23	$0.32
tonnes produced	57.5	44.3	46.7	148.5
Revenue per tonne	$4,208	$4,058	$3,871	$4,057
Cost per tonne	$2,467	$2,953	$2,996	$2,778
Profit per tonne	$1,741	$1,105	$875	$1,279

OBSERVATIONS

This is exactly the sort of small micro-enterprise that can easily be added to the Bayamo project, perhaps with the inclusion of an air dryer to dry sliced fruits.

The CPA, with 136 members (27 of whom are female) and 1,422 hectares of land, has strong capacity, fertile lands, good water, good machinery and excellent infrastructure.

Their principal crops are sugar cane, fruits, vegetables, grains (corn, beans), yuca, malanga and boniato. They also have a large dairy herd. Their milk production presently averages 4 litres/milking cow.

This CPA is a good candidate for an interchange with our Pilot Project in Havana Province. The Board of CPA 26 Julio (Los Palos) would find a visit to the micro-enterprise at CPA Jose Marti most interesting I am sure. And the Board of CPA Jose Marti would be amazed to see the results of the work undertaken during the past 18 months to improve milk production at CPA 26 Julio.

SECTION 5: NEXT STEPS

Next Steps:

In liaison with Natalia Verand and Wendy Holm (Canada) preparation of a Project Proposal for submission to Project Team in early December and to CIDA Bi-Lateral Modernization of the State Fund in early January.

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