

Environmental Education in the São Francisco River Valley:

A review of assets, requirements, and recommendations for the development of environmental education programs that will support the enhancement of sustainable fisheries and communities on the Upper-Middle São Francisco River



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projeto

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Executive Summary

As part of the CIDA project “*Peixes, Pessoas, e Água*” a Canadian and Brazilian team is working with environmental educators and people whose livelihoods are supported by fishing to address mutual goals for a healthy riverine ecosystem. Outstanding examples of environmental education exist in Canada and Brazil and we were most struck by the similarities in the issues facing educators and communities in both countries. The most important of these lay in connecting programs to local culture and issues of concern.

In March of 2005, Cathy Carolsfeld and Barbara Johnsen visited the six municipalities in the Project area and met with community members including fishermen and their families; students; teachers; school administrators; representatives of municipal, state and federal governmental agencies; private businesses; and NGOs. We also participated in guided tours of the river and riverine communities; discussed assets and local issues of concern to the community; and collated the results from questionnaires that were filled in by 48 schools in the project area. The information from these activities provided the basis for identifying assets that are already in place, environmental and (related) social issues of most concern, and components that need to be developed in each community in order to address these issues.

Although local pressures on the environment vary tremendously, the over-riding concern was with the health of local waterways that feed into the São Francisco River and the need for local communities to be both personally aware of and involved in efforts to restore them to a healthy condition. Educating children and helping them develop an active and personal role in addressing these issues was considered to be the most effective starting point. It was also clear that EE programs that are in place lack continuity, networking, and support, and that all of these issues need to be addressed in order to accomplish long term goals. Finally, all of the communities expressed an overwhelming desire to participate in Project *Peixes, Pessoas e Água* so that they could build the foundation needed to address these issues in a more coordinated and sustainable manner.

Our observations and results were used as a basis to develop a series of recommendations for both the individual municipalities and the overall project area. Addressing watershed health issues; supporting the training and networking of environmental educators; and developing venues for increased public awareness were identified as the most critical areas to be supported. The most effective first steps to achieve these goals will be through: participative extension courses for key students, teachers and administrators who will act as mentors to others in the project communities; developing relevant focal tools for environmental education (e.g. participatory construction of local microbasin watershed models &-or native freshwater aquarium ecosystems); and developing school and public education programs that use these tools as a focus for increased awareness about local environmental issues and act a springboard for positive community action programs.

Glossary of Acronyms and Terms

AMMESF	Associação dos Municípios do Médio São Francisco (Association of Municipalities of the mid-São Francisco)
<i>Beija Flor</i>	Literally, “kisses flower”, an education program done through SAAE, in partnership with MESFA and geography students from Unimontes in the Municipality of Pirapora. (Pg.
BG	Barra do Guaicuí
<i>buriti</i>	Palm tree native to Brazil and distinctive in the <i>veredas</i> ecosystem
BZ	Buritizeiro
CEMIG	Companhia Energética de Minas Gerais (hydroelectric company)
<i>cerrado</i>	Tropical grassland savannah
CIDA	Canadian International Development Agency
CIEA	Comissão Interinstitucional de Educação Ambiental (Federal Inter-Institutional Commission of Environmental Education)
CODEVASF	Companhia de Desenvolvimento dos Vales do São Francisco e do Parnaíba (Company for Development of the São Francisco and Parnaíba Valleys)
<i>coleta seletiva</i>	Selective collection, referring to solid waste management
CONFEA de MG	Comissão Coordenadora do Fórum Permanente de Educação Ambiental de Minas Gerais (Commission Coordinating a Permanent Forum on Environmental Education in MG)
COPASA	Companhia de Saneamento de Minas Gerais (Sanitation Company of MG)
EE	Environmental Education
ESEC	Estação Ecológica de Pirapitinga (Ecological Station)
<i>Fazendas</i>	Farms
<i>Gente Joven</i>	Young People
GRAAL	International network of women founded in Holland, with an active chapter in Buritizeiro
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (Brazilian Institute for the Environment and Natural Resources)
IEF	Instituto Estadual de Floresta
IGAM	Instituto de Gestão de Águas Mineira (Water Management Institute of Minas Gerais)
Integrated environmental education	Activities that are either integrated across the curricula in the school, or linked to other programs out of school/in the community. Ideally, programs meet both criteria.
<i>Lixo e Cidadania</i>	Garbage and Citizenship
<i>mananciais</i>	Sources, referring to a river’s starting point
<i>mata</i>	forest
<i>Matricula Verde</i>	“Graduate Green” - environmental education program at the school Colégio Cenecista de Pirapora

MESFA	Pg. 42
Minha Caderneta de Pescaria	My fishing passport; distributed by PNDPA
nascente	Spring, referring to a place where water flows naturally from the ground
NGO	Non-governmental organisation
Out-of-school environmental education	Programs initiated independently from a school. Students either leave school to participate in field trips or community events, or programs are presented in the classroom that may or may not support curricular goals.
passeatas	walks
Petrobras	Petróleo Brasileiro
<i>piracema</i>	Period between October and March when fish migrate to headwaters of rivers rapids to spawn
PMMG	Polícia Militar de Minas Gerais
PNDPA	Programa Nacional de Desenvolvimento de Pesca Amadora (National Program for Development of Amateur Fishers)
PP	Pirapora
PPA	<i>Peixes, Pessoas e Água</i> (Fish, People, and Water)
<i>Programa Semeando</i>	Sowing Program, part of the National Service for Rural Learning Apprenticeships
<i>Projeto Chuva</i>	Project Rain, offered by COPASA
<i>Projecto Manuelzão</i>	Manuelzão Project, restoration of the Rio das Velhas watershed
<i>Projeto Renascer</i>	Pirapora
<i>Projeto Vereda: Mãe das Águas</i>	“Vereda Project: Mother of Waters”, pg. 20
Rio SF	Rio São Francisco
RMEA	Rede Mineira de Educação Ambiental (Network for Environmental Education of Minas Gerais)
SAAE	Serviço Autônomo de Água e Esgoto (Autonomous Service of Water and Sewer)
<i>Sala Verde</i>	“Green Room”, environmental education program to be implemented in Pirapora by the Municipal Secretary of Infrastructure and Urbanism
SGA	São Gonçalo do Abaeté
<i>sítio</i>	Small farm
<i>Sucato</i>	Superintendência do Trabalho Artesanal nas Comunidades (Supervision of Artistic Work in Communities, overseen by the State Secretary of Employment)
<i>suribim</i>	Type of catfish native to Brazil
TM	Três Marias
UFRJ	Universidade Federale de Rio de Janeiro / Federal University of Rio

	de Janeiro
UFSCar	Universidade Federale de São Carlos
Unimontes	Universidade Estadual de Montes Claros
<i>veredas</i>	Source of a stream, unique ecosystem
WFT	World Fisheries Trust

Introduction

World Fisheries Trust (WFT), together with their Brazilian and Canadian partners, is implementing a project on enhancing sustainable fisheries and conservation in the São Francisco River: CIDA project Peixes, Pessoas e Água (PPA). The key elements of this project are to: 1) make positive changes in fisheries management practices, 2) enhance social support programs for fishing families in riverine communities, and 3) improve the conservation status of fish stocks, including the improvement of environmental conditions.

Environmental education has been shown to be a valuable tool in creating changes to how people manage and care for natural resources and the environment. This, in turn, is an essential prerequisite to making fishing livelihoods and communities sustainable in the face of limited resources and environmental degradation.

This review was undertaken in response to the Brazilian need for Canadian input to help implement and integrate the environmental education component of the PPA Project with other components that are already in place in a manner that addresses relevant community issues.

Objectives

- 1) To work in consultation with WFT, Brazilian partners, and community members to review community assets and requirements for the development of environmental education programs in the six municipalities within the PPA Project's focal area (**Figure 1, Map of PPA Project area**).



- 2) To use these results to develop a strategy for implementing environmental education, within the Project area and duration, in a manner that will foster sustainability of the fishing livelihoods and communities in the future.
- 3) To identify and recommend application of Canadian expertise and to propose next steps, timelines, budgets, and partner responsibilities within the proposed activities.

Methods

This work was carried out in partnership with Barbara Johnsen, a resident of Três Marias. Barbara did much of the groundwork to set up consultative meetings in each municipality, and was responsible for administering the surveys during the meetings. This Brazilian support enabled the investigator to converse freely with individuals during meetings to obtain a better understanding of the particular local situation.

The background information was gathered by four methods:

- 1) Participating in reconnaissance tours of the Rio SF, in areas including the Marias Reservoir to the Rio das Velhas Tributary;
- 2) Participating in on-site consultative meetings with community members from schools, government agencies, the private sector, and NGOs directly involved in environmental education programs taking place in the six municipalities involved in the PPA Project:Três Marias, São Gonçales do Abaeté, Pirapora, Buritizeiro, Varzea das Palmas and Ibiai;
- 3) Distributing and collating questionnaires (prepared by a joint UFSCar-PPA Project team) to school directors in each of the municipalities; and
- 4) Summarizing the information gathered from these sources to identify the key assets and the individual environmental, and related social, issues in each of these municipalities.

These results were then reviewed and discussed by Cathy Carolsfeld and Barbara Johnsen on an ongoing basis in order to develop the outline of an environmental education program that will address the unique needs and utilize the existing assets of each of these communities.

The consultative meetings included:

- A brief overview of the overall PPA Project and how it might be able to provide support for environmental education initiatives in the schools and community (presented by Yogi Carolsfeld and/or Barbara Johnsen);
- A brief description of Cathy Carolsfeld's experience in Canada and the success of integrated environmental education programs that focus on issues that are relevant to the local community (Cathy Carolsfeld);

- Discussions about the spin-off benefits of the integrated approach based on the Canadian experience (e.g. increased academic skills, social inclusion and increased self-esteem of marginalized groups, increased community awareness) and the role this can play in achieving sustainable fisheries and healthy fishing communities (Cathy Carolsfeld);
- An open forum for teachers and other professionals involved in environmental education to fill in the questionnaires and to describe the programs already in place and the environmental issues of most concern to their community; and
- Consideration of possible strategies for incorporating these concepts into integrated environmental education programs that address local issues more effectively.

The focus of the discussions was to determine the main environmental and related social concerns in each municipality, the assets that are already in place to help address these concerns, and possible new approaches that will help achieve a more sustainable fisheries and community lifestyle.

Activities

The author traveled from Canada to Brazil and toured six municipalities along the Rio São Francisco. See Appendix 1 for a detailed trip itinerary.

Results

1. Reconnaissance of the Rio São Francisco (Rio SF) in the PPA Project area

It is essential for youth to have hands-on experience with both natural and altered ecosystems to understand how they work, and to appreciate the impacts that human activities have on our natural world. This experience, combined with the teaching of critical thinking, provides a foundation from which to contemplate personal actions to lessen negative impacts.

A tour of the river and reservoir near Três Marias was hosted by Seu Norberto. It happened to coincide with record rainfalls and reservoir levels. Viewing the release of water from the reservoir down the spillway at Três Marias was not only spectacular, but demonstrated the extreme turbulence and upwelling created by the active spillway (**Image 1**). The distinctive and persistent division between water originating from the reservoir and water from the surrounding creeks was remarkable (**Image 2**), as was the marked difference between reservoir and river ecosystems (**Image 3**).



□ Image 1. Reservoir overflow. Note the extreme turbulence as the reservoir water meets the river at the base of the spillway.



□ Image 2. View of the São Francisco River from the CEMIG dam. Note the obvious distinction between river water (brown - top of photo) and reservoir water (blue - bottom of photo).



□ **Image 3. View across the reservoir from the CEMIG dam**

A boat tour to Pontal do Abaeté enabled the team to observe some of the negative impacts human activities are having on the river: many stretches of shoreline completely denuded of riparian vegetation, the input of sewage from towns such as Três Marias, and the upwelling of partially treated waste water entering the Rio SF from CMM. In addition, ecological features such as rapids along the Rio SF, and the interface between water entering from large tributaries (e.g. Rio Abaeté) and smaller creeks facilitated an understanding of the ecology of this dynamic environment.

The President of the Fishermen's Colony Z-01, Seu Pedro Melo, provided a guided tour of the Rio SF from the Pirapora-Buritizeiro falls (**Image 4**) to Barra do Guaicuí, where the Rio das Velhas meets the Rio SF. This was done on the Colony's boat and provided a valuable overview of the riverine communities (**Images 5, 6, and 7**) and the environmental challenges faced by communities along this particular stretch of the river (**Images 8 and 9**).



□ Image 4. View of the "falls" or rapids at Buritizeiro (looking across to Pirapora). This is an important site for the local artisanal fishery in Buritizeiro.



□ Image 5. Flooded shoreline of the São Francisco in the municipality of Buritizeiro.



□ Image 6. Riverine dwellings and fishing boats along the São Francisco, in the municipality of Buritizeiro.



□ Image 7. Fishers at work along the margins of the São Francisco River, between Pirapora and Barra do Guaicui. Note the healthy riparian vegetation.



□ Image 8. View from Barra do Gaucui, near the mouth of the Rio das Velhas. Note the raft of vegetation and garbage that has been dislodged from the shore and become riverborne during recent flooding (beneath the sign). There was a steady stream of such garbage heading downriver.



□ Image 9. Examples of some of the industrial activities along the São Francisco River, near Pirapora. View of the metal refineries downstream of Pirapora (background) and sand dredger (foreground). The smoke from the stacks causes eye irritation and was intensely noticeable at dusk, as the team returned from Barra do Guaicui.

There was evidence of the high rainfall levels and flooding that was further exacerbated by the release of overflow from the Três Marias reservoir (**Images 10 and 11**). The team saw and felt the effects of metal refineries near Pirapora (**Image 9**). Other features of note during the boat tour include: the artisanal fishers at work in the river (**Image 13**), irrigation pumps serving the vineyards between Pirapora and Barra do Guaicui (**Image 14**), the continuous stream of garbage floating down Rio das Velhas from Betim and Belo Horizonte to the Rio SF after the recent heavy rains; and the open sewage in flood water surrounding many homes in lower Guaicuí.



□ Image 10. Park equipment at a beach in Pirapora takes on a life of its own as it is submerged by recent flooding.



□ Image 11. View of the river wall and submerged community soccer fields in Pirapora.



□ Image 12. For the first time in many years this marginal lagoon in the vicinity of Buritizeiro is flooded.



□ Image 13. The net has just been cast by fishers at work in the São Francisco River, between Pirapora and Barra do Gaicui.



□ Image 14. Pump station for irrigation along the São Francisco River, between Pirapora and Barra do Guaicui.

The team also visited some of the sources (*veredas*) of the creeks feeding into the Rio SF in the vicinity of Três Marias (**Images 15, 16 and 17**). The *vereda* of Barreiro Grande Creek is close to Três Marias in the hills near the airport. It is easily accessible by vehicle and foot, and a beautiful example of a relatively intact *vereda* ecosystem, with abundant *buriti*.



□ Image 15. View of the *vereda* feeding Barreiro Grande, above Três Marias. The sandy soil here is typical of this *vereda* ecosystem.



□ Image 16. *Buriti* palms characteristic of the *vereda* ecosystem.



□Image 17. Upper reaches of Barreiro Grande, just below the *vereda*.

There is another intact 10 ha. *vereda* and small lake ecosystem near Andrequicé, at the BRO40. This area has been set aside as a reserve that can be used to educate the local community about intact native ecosystems. This project, *Projeto Vereda: Mãe das Águas*, is a wonderful opportunity to develop public awareness through a community - driven initiative.

These intact ecosystems are important in the daily lives of Três Marias residents, and need to be understood and appreciated by the community in order to address environmental issues in a sustainable way. (See recommendations for Três Marias, below.) Guided experiences in these habitats will help the public more fully understand the fragile nature of these ecosystems, the important role they play in the health of local waterways, and the kinds of environmental issues that communities need to address in order to ensure their continued survival.



□ Image 18. Field above Corrego Barreiro Grande, in Três Marias. Roadside garbage dump sites are exceedingly common throughout the area.



□ Image 19. A hand-drawn recycling cart that is part of a recycling program established by the Ministry of the Environment of the Municipality of Três Marias.



□ Image 20. View of a section of Corrego Barreiro Grande in Três Marias. It is not unusual to see sewage being drained directly into the local creeks (centre right).



□ Image 21. View of CMM (Três Marias) from Beira Rio.



□ Image 22. View of the upper spillway of the CEMIG hydro development near Três Marias. The reservoir reached record levels during February 2005 and the spillway was opened. Many of the repercussions of this flooding have been noted in previous photos.

Each of the communities in the PPA Project area possesses natural and disturbed ecosystems of these kinds. Programs that foster awareness and education about the communities' local resources should be incorporated into each municipality's integrated environmental education plans.

2. Review of community assets and requirements for environmental education programs

This section presents:

- Summaries of the consultative meetings in each of the six municipalities;
- A list of the environmental issues of particular concern to each community as they emerged from the consultative meetings and the questionnaires; and
- A summary of consultative meetings with governmental and other agencies in Belo Horizonte that support and/or deliver public environmental education programs.

These assets and issues were carefully considered in order to develop a proposal for an integrated environmental education strategy that would address both the unique needs of each community and the overall objectives of the PPA Project.

Três Marias (TM)

Consultative meetings

It was not possible to meet with teachers and directors of Três Marias schools during this visit, so impressions and recommendations for environmental education in this community are based on data from the questionnaires and discussions with Barbara Johnsen, who has a long history of working with environmental education in the municipality of Três Marias.

Activities in Três Marias included discussions with a representative of the Municipal Secretariat of Education and Culture (Cléria Maria Melo) and attendance at a lecture and discussions against the Transposition of the Rio SF.

1) Secretary of Education and Culture

Cléria Maria Melo is extremely receptive to the idea of integrating environmental education into the school curriculum. She summarized some examples of projects with environmental themes that have been implemented in local schools (e.g. storybook competitions, vermiculture, raising and caring for chicks, and stand-alone government programs). All attract interest and attention, but lack long term sustainability. These programs' deficiencies may include:

- Lack of training for teachers implementing the programs,
- Lack of long-term planning (e.g. what to do with chicks that are being raised, how to deal with mortality),
- Commitment to carrying out programs in the long term (i.e. how to spread the effect of stand-alone programs into the community by better integrating them into the school curriculum).

Cléria Maria Melo's suggestions for how to achieve a successful and sustainable environmental education program are:

- Identify a project that is relevant to the community;
- Build a network of partners to implement it (rather than relying on individuals working in isolation);
- Survey all directors of local schools that the PPA Project encompasses;
- Based on results and interviews with staff, choose a few key schools with which to initiate the work. (Note: this would depend on the nature of the project they have in mind).

Other topics of discussion about tools for success included:

- A local person should coordinate the environmental education program. It was suggested that Barbara Johnsen is an ideal candidate since she is familiar with the local needs, has the contacts in place, and has a great deal of experience in the project's focal area.
- Teachers need to be both dedicated and enthusiastic; they must be ready to put extra time into being trained and sharing their learning with other teachers.
- Administrators of participating schools need to be supportive (e.g. accommodating the need for training both during and outside of school hours) and actively involved in implementing the programs in the community.
- The community must be ready to seize opportunities as they arise.
- Networking within and amongst schools and communities must be established and maintained on a regular basis (e.g. workshops and brainstorming sessions to review progress and share lessons learned as programming evolves).
- Work and displays need to be circulated in the communities to increase public awareness and encourage increased involvement by the larger community.

Note by Cléria Maria Melo: The Municipal Secretariat of Education and Culture for Três Marias would be prepared to support the work of a coordinator by providing access to desk space and office equipment such as a telephone.

Note by Yogi: In order for a mutually-developed environmental program to succeed in the long-term, it is essential to have a permanent local coordinator who will provide support to teachers participating in the program.

2) *Lecture and Discussions: Transposition of the Rio São Francisco*

- The MG State government has proposed to re-route the Rio SF to provide water to impoverished parts of NE Brazil. The project is called the Transposition, or Revitalisation.
- The Transposition is an emotional issue in this part of Minas Gerais. Residents of Minas Gerais are absolutely against Transposition of the River and it is difficult to find public venues at which an objective presentation of the pros and cons are brought forward.
- Fears people have expressed include:
 - Less water would be available for residents of MG;
 - Local ecosystems would be damaged by the construction of canals;
 - Changes in flow patterns and rates would lead to increased sedimentation, etc.;

- The electrical power produced in MG would be strained and inadequate for State needs, since so much power would be required to pump water up to the NE;
- The majority of the water will be used for urban and agricultural needs. Due to the high cost of creating a distribution network from main canals, little of the water will reach the poor people who need it most.

Other issues raised included:

- The health of the Rio SF is in question. The people of MG are in jeopardy of being without an adequate supply of clean water in the near future. There is an urgent need to address the concern of restoring the river to a healthy condition before thinking about sharing it with other parts of Brazil.
- A teacher who has just moved to this area and is teaching in a local school wants to have access to information and resources related to the Transposition so she can get the information out to her students. She believes that reaching students is the best way to get information out to the community.
- People need both sides of the story so they can make informed decisions about the issue.

3) CODEVASF and UFSCar

The outcome of the discussions on the Três Marias Water Quality Monitoring Program (in partnership with IDRC) are presented in the minutes of the meetings that took place on March 10 and 12, 2005.

4) UFRJ and IBAMA

Introduction and Background Information

Cathy Carolsfeld, Barbara Johnsen, and Alison Mcnaughton met with Marilia Sato Brasil to discuss a possible partnership for developing sustainable community environmental education in the TM region. Marilia Sato Brasil is a biologist and professor from the Federal University of Rio de Janeiro (UFRJ) who is interested in environmental education in communities at risk. She has just arrived in TM as a consultant for the IBAMA station (Estação Ecológica (ESEC)-Pirapitinga) in the TM reservoir. This position is based on a joint agreement between the UFRJ and IBAMA. It is already very clear to her that most people aren't aware of this reserve and its potential as a focus for environmental education.

Marilia Sato Brasil will be meeting with local IBAMA representatives on March 15-17, 2005 to plan their strategy for helping increase environmental awareness in the local community. She feels that the water quality monitoring project provides a practical application for the launch of the environmental education component of her position.

History of the Ecological Station of Minas Gerais (Estação Ecológica de Pirapitinga (ESEC)

The ESEC was set up on Ilha da Maria (in the TM reservoir) in 1984, with the goal of preserving a portion (1000 hectares) of the Brazilian *Cerrado*.

It is supposed to be one of the best-preserved areas in MG, and encompasses a 20KM radius of protected area around the island, including *veredas*, *cerrados*, and traditional fishing communities.

IBAMA's main interest is research and conservation, but they want to integrate environmental education into their community programming efforts and are already involved in social work with the local fishing community.

Public visits are not allowed on the reserve; only research and private visits are permitted.

Marilia Sato Brasil noted that the partnership between the station and IBAMA is already well established. Her role during her first year will be to assist IBAMA with ongoing projects. Her long-term vision, however, is to develop a more global and sustainable plan for community education.

She envisions doing this through:

- Providing training and material resources for key community members, including:
 - Teachers and other professionals in the community;
 - University students who show commitment to continuing in this line of work; and
 - Public school students interested in pursuing studies in environmental themes. (Note: this would include pursuing scholarship/bursary options for these students.)
- Gathering and compiling resource material that will support community education efforts,
- Building awareness among professional fishers, sport fishers, and the extended community (families, students, teachers) living in isolated communities in the vicinity of the reserve about issues such as:
 - *Piracema* (spawning),
 - Pollution (personal and industrial), and
 - Water use.
- Developing a long-term plan (e.g. a minimum of 5-10 years) that is sustainable and can produce measurable results.

Marilia Sato Brasil believes part of this training should include boat tours to the local community members that would illustrate the local ecosystem yet avoid beaching and

causing damage to the shoreline. There is a fishing community that includes a school near the reserve that could be a pilot area for a broader program.

Discussions and Timeline

- Marilia's first year here will be dedicated to getting set up and helping publish existing resource material.
- Someone may be hired (possibly through IBAMA) to start the environmental education initiative under Marilia's guidance.
- The focus will be to do the groundwork and put together a proposal for a long-term, sustainable plan for environmental education.
- Marilia feels that the program will need partners to get off the ground and that the environmental education component of the PPA Project could be an appropriate partner to work with on community environmental education
- Marluca from IBAMA in Belo Horizonte can probably help in some capacity, but needs a proposal from Marilia to allow her to provide the necessary resources.
- Cooperative work that would be interesting for this partnership includes:
 - Producing a folder or brochure to build community awareness,
 - Supporting venues for shows/fairs that promote science and integrated environmental education,
 - Holding workshops and forums to pass information on to the public.

Suggestion: The PPA Project work cooperatively with Marilia to prepare an appropriate proposal for IBAMA.

Questionnaires

The information from the questionnaires for TM schools is presented in Table 4. A summary of the highlights is presented below:

- Except for pre-schools, all schools are involved with integrated environmental education programs that include at least four academic subject areas.
- Many of the schools participate in environmental education programs supported by outside agencies.
- All respondents were interested in working together and with the PPA Project.
- As educators, respondents expressed a sense of personal responsibility to do their part to help improve their local environmental situation, especially in the context of the importance of the river to the community.

- Now that the infrastructure, interest, and community partners are in place and ready to develop integrated environmental education programs, they feel the need to develop a network and share experiences in order to ensure the continued growth and success of these programs.
- There is a feeling that environmental education needs to extend beyond the classroom to the larger community.
- Teachers are concerned about their heavy workloads, lack of material resources, and need for training.

Recommendations for Três Marias:

- 1) Find Brazilian counterpart funding for a local environmental education coordinator and support person, possibly through IBAMA or MMA. Barbara Johnsen has many of the qualities essential for such a position.
- 2) Submit a proposal to IBAMA for a community environmental education initiative in partnership with Marilia Sato Brasil (UFRJ professor and consultant to IBAMA) and the Director of ESEC.
- 3) Build a watershed model (and associated map) of the Corrego Barreiro Grande – Rio SF watershed.
- 4) Train a group of key teachers, university and high school students, and fishers to help present the model and related integrated environmental education programs to other students and the community.
- 5) Appoint an interested teacher and university and/or high school student representatives to attend workshops on watershed education presented by Haydee's group from UFSCar in partnership with the Canadian environmental education team. These students and their sponsor teachers will be ambassadors for initiating community environmental education programming.
- 6) Have schools adopt the nearest (accessible) portion of Barreira Grande Creek to act as a focus for integrated school programs related to restoration of this creek, including a community environmental education component. (For example, a simplified version of water quality monitoring to supplement data emerging from IDRC Rio SF project.)
- 7) Create stronger links between fishers and schools; for example, through student participation in IDRC training workshops and parallel student monitoring programs on the creeks and river, with additional guidance from fishers as needed.
- 8) Deliver outreach environmental education programs to local students, including guided tours of the Rio SF reservoir (including viewing the Ilha de Maria reserve) the Rio SF from the dam to the Três Marias waterfront, Barreira Grande Creek (including its source (*vereda*)), CEMIG hydroelectric development, and the CODEVASF research station.

- 9) Develop long-term links between schools and CODEVASF through outreach programs and scholarship or bursary programs. CODEVASF could provide support and assistance in delivery of community environmental education initiatives, including long term monitoring and restoration of creeks and marginal lagoons, as well as development of “*Projeto Vereda: Mãe das Águas*” as a teaching park with signage that will educate the local and tourist community.
- 10) Maintain contact with a local tourism group around the issue of a Tourist Centre. If this comes to fruition, it would be a perfect venue to set up an aquarium and promote public education regarding local environmental issues.
- 11) Hold high school debates regarding the issue of Transposition of the Rio SF. Note: both sides have to be presented, debated, and voted on based on the arguments made. This would be a wonderful chance to develop an integrated project since arguments would be related to geography, history, math, science, economics, marketing, language arts, research and public speaking skills, and could also involve mentoring by university students.



□ **Image 23.** The boat belonging to the municipality of Três Marias anchored in the reservoir. This boat was designated to carry groups of students participating in educational tours of the river or reservoir, but has not yet been used for this purpose.

São Gonçalo do Abaeté (SGA)

Consultative meetings

The meeting in SGA included school directors and teachers as well as representatives of the municipal government.

1) Consultative meeting in SGA

The initial discussions were related to the following questions:

- 1) How to apply environmental education to different subject areas when teachers tend to work in isolation, and
- 2) How to come up with a focal tool that will be relevant to all schools, when each one has very different concerns.

The main environmental issues of concern identified by this group are:

- 1) Deforestation
- 2) Garbage
- 3) Problems with the water supply:
 - Pollution of the Abaeté River
 - Direct disposal of sewage into the river
 - Agricultural toxins entering at the head of the drainage system
 - Effects of diamond mining on the river (environmental and social issues)

Possible Focal Tool discussed for Municipality of São Gonçalo do Abaeté

The Abaeté River is one of the largest tributaries of the Rio SF and holds a great deal of cultural symbolism for the municipality. The group suggested that restoration of small, local creeks could be a focus for environmental education. A good starting point would be:

- Getting to know the Abaeté River through photographs, drawings, and interviews with local residents.
- Teaching the rest of the community what they have learned through public displays that raise awareness about the importance of the river and its resources,
- Creating a positive approach to teaching the community how their day-to-day activities affect the river, and
- Sharing lessons learned through exchanges with other schools, communities, and municipalities.

The main discussions were about possible problem areas centered around mining:

- Mining activity has the most serious detrimental effect on the river.
- Few people are aware of the damage done by mining.
- Miners are very poor and lead a transient lifestyle, which in turn affects their children's access to education and creates other social problems related to marginalization.
- Unfortunately, there are not any alternative livelihoods in place for the miners and their families.
- It is important to find a way to avoid marginalizing this sector of the population even more than it already is.
- The best possible first step could be through raising awareness about the importance of the river and conserving its resources.
- Part of this objective could include increasing our understanding of the life of miners and helping create positive alternatives for them in the community, rather than blaming them.

2) Visits to other schools

Beira Rio and Pontal Abaeté Schools did not fill out questionnaires. Observations below are based on visits by the team to the two schools. Both schools serve students in grades one to four, after which students go to schools in Três Marias.

Observations and consultative discussions at Beira Rio School

- Obvious atmosphere of pride, enthusiasm, mutual respect, and sense of community: e.g. School gardens have many palm trees planted and nurtured by students (Image 24).
- Community and family life is very closely connected to the Rio SF and fishing; the community is geographically close to the river with easy public access (Images 24 – 30).
- A history exists of integrated, community oriented projects.
- A re-planting program was done along the riverbank, although many of these seedlings have since been destroyed by fire.
- Versions of community mapping done as class projects that involve photographs, interviews that include issues related to social structure, and support networks such as health, basic necessities, and gender issues.

- School entrance foyer is a public area that would be ideal for community project displays.
- Introduction of PPA Project team to students evolved into impromptu English and math lessons.
- Using a digital camera was a successful icebreaker.



□ Image 24. School garden at Beira Rio School. The students themselves planted and cared for the trees and other plants, and take great pride in their garden.



□ Image 25. Selling fish at the market on the highway near Beira Rio and Três Marias. Most fish sellers are male middlemen.



□ Image 26. Cleaning and preparing fish for the market in Beira Rio, near Três Marias.



□ Image 27. Everyone participates in the fishery. Women returning home with their catch from the river.



□ Image 28. The local passion and pass-time near Beira Rio: someone is fishing from almost any accessible site along the São Francisco River.



□ **Image 29.** Boat launch in Beira Rio provides fishers with access to the river and will also be an ideal location for students from Beira Rio School to monitor an adopted portion of the São Francisco River.



□ **Image 30.** Dock site near the bridge over the Rio São Francisco close to Beira Rio. This is another convenient access point from which students could monitor aspects of water quality of their River.

The director of Beira Rio School had the following suggestions about planning their program:

- Use the Rio SF (rather than R. Abaeté) as the focus for environmental education.
- Include input from students and teachers to develop the project:
 - What do they already know?
 - What do they want to know?
 - How might they find this out?
- Involve parents, including fishers, as much as possible.

Observations and consultative discussions at Pontal Abaeté School

- One teacher instructs 15 students in a one-room classroom.
- A strong sense of community and connection to river exists in the students' everyday life.
- Youngsters here possess a great wealth of first-hand knowledge and understanding of the river and its resources, which should be shared with the larger community.
- Through environmental education mentoring efforts, a stronger connection could be built with other schools in the larger community (e.g. older students in other schools could provide some of the teaching resources, such as locally relevant alphabet display cards, storybooks etc.).

Questionnaires

The information from the questionnaires for SGA schools is summarized in Table 5. A summary of some important points that emerged are presented below:

- There was overwhelming consensus that teachers and directors are extremely interested in working together, both as representatives of the municipality and participants in the PPA Project, to integrate environmental education into the school curriculum.
- Except for the Pre-schools, all schools are involved with integrated environmental education programs that include at least four academic subject areas.
- Participation in out-of-school environmental education programs is inconsistent, but in two cases included the National Youth and Children's Conference on the Environment.

- There is a great deal of concern about the degradation and pollution of the Rio Abaeté, and especially the effects of mining activities and contamination of headwaters by agro-toxins.
- There is a need for increased community awareness of these environmental and related social issues.
- Teachers need material resources and access to professional guidance and training.

Recommendations for Municipality of São Gonçalo do Abaeté:

- 1) Set up an NGO through a school in SGA and carry out integrated environmental and community education through the NGO.
- 2) Create a model and laminated map of the Abaeté watershed to be used as a teaching tool for other communities.
- 3) Train a group of key teachers, university and/or high school students, and fishers to help present the model and related environmental education programs to other students and communities. These students and their sponsor teachers would then become ambassadors for initiating community environmental education programming.
- 4) Have key teachers from São Gonçalo, Beira Rio and Pontal Abaeté Schools attend workshops on integrated environmental education presented by an established group from UFSCar in partnership with the PPA Project environmental education team.
- 5) Develop and implement community mapping festivals in SGA, Beira Rio and Pontal Abaeté as a first step to identify environmental and social issues and to create a basis for networking.
- 6) Integrate results with classroom curriculum and community displays.
- 7) Set up integrated project to increase awareness about the life of miners. Lusmaene Zacarias Barbosa's husband owns a mining boat on the Rio SF and might be able to help with this component.
- 8) Have schools adopt local creeks, get to know them well, and share their learning with the community (through e.g. student led displays of school projects).
- 9) Do some version of the Canadian example of marking storm drains with yellow fish in the local communities.
- 10) Set-up a trial freshwater aquarium stocked with native species in Beira Rio School and work with teachers and fishers to develop and share learning from integrated programs.
- 11) Develop a simple, student version of water quality monitoring in Rio SF and Abaeté, as well as in the freshwater aquarium, to complement the IDRC-UFSCar project.

Pirapora (PP)

Consultative meetings

1) Secretary of Education and Schools

The main meeting in Pirapora included school directors and teachers from every school in the city, as well as representatives of the municipal government including the Secretariats of Education, Infrastructure and Urbanism, and the Superintendent of the Regional Board of Education.

This municipality recently began a project to integrate environmental education into the curriculum of all (municipal, state and community) schools. Delvane Maria Fernandes, the Secretary of Education, spoke briefly about this project and expressed a desire to work in partnership with the PPA Project and to develop more effective networking to accomplish mutual goals (See Table 2).

The group was large and discussions took place on an individual basis while school representatives filled in their questionnaires. Some items discussed included:

- *Matriculo Verde* school program (supported by MESFA and IBAMA) is just getting off the ground at the Colégio Cenecista de Pirapora (a private school spanning pre-school to high school graduation levels) under the leadership of Ana Claudia A. Chomone. Every student is given one seed from a native plant of the *cerrado*, which they plant at the school and eventually replant in the community. The program is used as a cross-cutting theme for all age levels and subject areas in the school, such as:
 - 1) Math – graphing, growth and survival rates
 - 2) Geography – mapping
 - 3) Biology – life cycles, adaptations
- Nossa Senhora Paracedo Creek is a local creek that is in good condition, has a *vereda* area with Buriti and is accessible through a local *sítio*. (This was brought to our attention by Marina Barbosa of Escola Municipal D. Candida M. Alvares.)
- Marina, a student at Unimontes in Pedagology has some interesting ideas about combating illiteracy problems at a grassroots level. She is interested in participating in integrated projects involving gender issues and is closely connected with the fishing community, as her father was a fisherman. (See Table 2.)

2) Local EE Support Agencies

SAAE

The team met with Janeir Soares, who is the manager of Projects and Environment for SAAE in Pirapora. He provided us with information about *Projeto Beija Flor*, including a description of all the steps of project development and implementation.

The *Beija Flor* program is done through SAAE, in partnership with MESFA and geography students from Unimontes. It is only available in the Municipality of Pirapora. The University students present the program to teachers. (The Ministry of Education chooses the teachers that participate in the program; however it was not clear how this selection process was carried out.) The program is a kit geared towards students in grades 5-8 and includes four short environmental programs that are presented in sequence during the year.

The team also asked Janeir Soares if it would be possible to do water sample analysis at SAAE. He said that they are not in a position to offer facilities for analysis of water samples. They could, however, contribute lectures to the water quality courses being proposed, as part of the community monitoring strategy related to the recent *suribim* deaths.

Unimontes

University Students and possible mentoring connections:

Two students from UFMG (BH) live in Pirapora and coordinate activities of other students from Unimontes:

- Valdinei – works on mapping *veredas* and their access points; and water testing to determine if the *vereda* water originates from rainwater or the water table.
- Veiridiana – is mapping environmental impacts on a local stream, including historical data, as well as monitoring water quality and soil strata.

Note: School programs could be designed that would complement these research projects and university students could act as mentors in the EE programs in local schools.

Municipal Secretary of Infrastructure and Urbanism

This group is primarily involved in building public awareness about the importance of integrated waste management. They are actively involved in:

- Inaugurating the “*Sala Verde*” program in the municipality in the near future. This will be carried out through the Ministry of the Environment. Information will be made available through AMMESF (Associação dos Municípios do Médio São Francisco / Association of Municipalities of the mid-São Francisco)
- Participating in the National Program, “*Lixo e Cidadania*”, including mounting a municipal forum to monitor garbage collection.
- The municipal program “*Coleta Seletiva*”, which already reaches the entire city.

They believe the main challenges to being successful with environmental education are:

- Integrating environmental education into the school curriculum, and
- Involving the whole teaching sector in this integrated process.

Regional Board of Education (Superintendencia Regional de Ensino)

The board provides support through projects such as the Program “*Semeando*” (part of the National Service for Rural Learning Apprenticeships) and Project “*Manuelzão*”, which support rural education and restoration of the Rio das Velhas watershed, respectively. They believe that effective environmental education must be based on a holistic vision that includes connections between the component parts.

Others

A local farmer is planting Eucalyptus around the *cerrado* on his land. This kind of activity can quickly destroy the native ecosystem, since Eucalyptus trees use vast amounts of water and quickly deplete the local water table. Some farmers have been receptive to advice on planning strategies that will help preserve the fragile local native ecosystems, and this kind of planning needs to be implemented more widely.

There is a real need to increase awareness about stewardship of the local environment, and school and community education would be an appropriate place to start. (See discussions in Municipality of Três Marias.)

Questionnaires

Questionnaires were returned from 21 schools and two government agencies in Pirapora. The information from the questionnaires from PP schools is summarized in Table 6. Some important points that emerged include:

- Only about half the schools are providing integrated environmental education programs as part of the curriculum.
- There is great momentum to develop a network to increase integration of existing environmental education programs more fully into the curriculum of more schools.
- There is a wide range of out-of-school programs in place amongst schools in the district, from none at all to school-wide and fully integrated programs like “*Matricula Verde*”.
- Conservation and preservation of native species and habitats (including the Rio SF and micro-watersheds) and sustainable management of natural resources were identified as important environmental concerns.
- Challenges include the need for increased community awareness, training for teachers, material and human resources (teachers are overworked), and effective networking and partnerships to make these efforts sustainable.

- Many directors expressed the fact that schools, teachers, staff, students, and families in the community are ready to work together and are sensitive to local environmental issues that directly affect the health and livelihood of much of their community.
- These issues need to be addressed as soon as possible.
- The municipal government is ready to provide the needed support to accomplish these goals, both within the school system and through public education in the community.

Recommendations for the Municipality of Pirapora

- 1) Help support a brainstorming session and training workshop using key teachers actively involved in the *Metriculo Verde* program as workshop leaders.
- 2) Use *Metriculo Verde* Program at E.M D. Candida M. Alvares as a model for other schools in the municipality.
- 3) Build a model of the Rio das Velhas watershed with highlights of Corrego Entrerios (demonstrating effects of canalization) and Nossa Senhora Paracedo Creek (healthy creek) and use it as a teaching tool for other communities.
- 4) Train a group of key teachers, university and high school students, and fishers to help present the model and related integrated environmental education programs to other students and the community.
- 5) Promote community awareness programs that highlight sustainable management (e.g. improved planning strategies for farmers working in Eucalyptus production; decreased emissions from local refineries, etc.).
- 6) Expand integrated environmental education school projects to include comparisons of healthy and less healthy creeks (see recommendation 3, above).
- 7) Host student exchanges e.g. between Pirapora (*Beija Flor*) and Guaicui (Community Projects), in which each group presents successful and integrated environmental education programs in their area.
- 8) Ensure that Pirapora's *Sala Verde* is in place and available for the larger community as soon as possible.
- 9) Assist in efforts to implement a neighbourhood library as a model for other communities, with a focus on environmental resources and including. Projects created by local students such as storybooks.
- 10) Facilitate partnerships with the GRAAL program in Buritizeiro.

- 11) Connect with SAAE and UniMontes students to develop simple monitoring programs for students to use in local creeks.
- 12) Expand the scope of SAAE school programs by developing mentoring programs between target classes and other classes that have not been identified through the Ministry of Education.

Buritizeiro (BZ)

Consultative meetings:

1) Secretary of Education and Schools

Introductions and background information

This meeting took place at Escola Elementar Marieta Amorini.

Historical Note: Buritizeiro was originally a suburb of Pirapora called Piraporinha. Although it wasn't officially founded as a city until 1963, it is for all intents and purposes a mature municipality (Image 31).



□ Image 31. A view from Buritizeiro of the foot bridge connecting Buritizeiro and Pirapora. Brave motorists also frequent this bridge.

This sprawling city has approximately 4600 students and 25 rural schools. As many as 650 students travel more than 100km to get to school each day, and must leave home by 5:00 am in order to get to school on time. Transportation costs alone are more than the entire state budget for education, and in many cases it would be cheaper to send teachers to remote areas to serve a few students than it is to transport students into central schools.

The implications of this geography - a large municipality with a vast rural component - were an important part of the discussions with schools and government agencies. For example, there are difficulties in building infrastructure to provide education to youth that wouldn't ordinarily be able to stay in school, and preventing the fall out of these youth to Social Assistance programs.

General Discussions

- Environmental education projects at Buritizeiro schools are always popular but tend to be too short and isolated in scope. It is important to design a sustainable program so that students can count on its continuity and build on successes.
- Personal involvement in environmental issues is considered of high importance in this community. Since many of the children come from fishing families who know a lot about the river, their knowledge could help build a stronger link between fishing families and the rest of the community (**Image 32**).
- If possible, this should include networking amongst programs that address:
 - 1) Youth at risk
 - 2) Women
 - 3) Communication between communities
 - 4) Fishers and their colonies



□ Image 32. Young fisherman casting his net in the Corrego das Pedras, Buritizeiro. Many young people were fishing and swimming in this creek, which runs through a suburban neighbourhood.

Local issues of concern that came up during discussions included:

- Threats to
 - 1) The river and local creeks (like Corrego das Pedras)
 - 2) *Veredas* (note: there are some intact ones on *fazendas* near the town)
- The need for restoration efforts related to the effects of:
 - 1) Monoculture (e.g. eucalyptus plantations)
 - 2) Untreated organic effluents (e.g. pig farming)
 - 3) Agrotoxins
- The need for increased public awareness about environmental issues (*i.e.* better understanding of long term environmental and social price paid for short term economic gain).

2) Support networks in the community

Government Agencies

The Municipal Government provides most of the support for work with environmental education. The team met with representatives from The Secretariats for Social Assistance, and Sports, Environment and Tourism. Both of these agencies provide out-of-school programs.

Secretariat of Social Assistance: supports youth programs aimed at creating positive bridges between youth-at-risk and schools.

Gente Joven is a partnership program that is funded by the Federal Government's Ministry of Social Assistance. The Secretariat of Social Assistance for Buritizeiro provides access to youth who are considered most at risk in the community. However, the Federal Ministry makes the final decision about successful applicants. It is not known what criteria they use in choosing the successful applicants. The selection process is quite demanding as funding is only available for 25 applicants each year, and last year, 90 youth were identified within this category.

The goal of this program is to teach young people to be independent and able to take care of themselves. It provides an incentive for youth at risk to make a positive contribution to their community. This is achieved by providing them with a bursary, a positive educational experience, and valuable job experience that will ultimately help them find employment.

- Each participant receives a monthly stipend that covers school supplies, food, and spending money while training. Participants also gain free access to six months of courses followed by six months of on-site job training.
- Areas of training include: the urban environment (e.g. solid waste management), nutrition, culture, or sport.
- Part of their on-job training includes sharing their learning experience through presentations to public schools.
- In 2004, only four of the 25 program graduates were hired in their community.
- The needs are far greater than can be met by available funding.

Ideas discussed for environmental education focal tools that could address the needs of this community:

- 1) Preserve the culture and tradition of the fishery while preserving fisheries stocks. This requires:
 - Work on creating positive links between fishing families and both school and community education programs,

- Increased awareness about the cultural and historical value of this fishery and its impact on existing stocks,
 - Development of co-management strategies that give ownership to the community and shift responsibility back to those most affected by the need for a sustainable fishery. For example, self-directed community policing or training in conflict resolution strategies, and
 - Research into the health of local rivers and watersheds.
- 2) Additional government funding or industry sponsorships for bursaries for *Gente Joven* in this community,
 - 3) Build environmental education into existing groups such as GRAAL and the Fishermen's Colony. GRAAL are already well established and co-ordinate a number of community initiatives in Buritizeiro. They would be an excellent candidate for mutual aid.
 - 4) Create a vision for the community, perhaps by forming a co-op. This would provide a means of getting families together and working for a common cause. The co-op could provide a focal point to develop community ideas such as gardens, music schools, festivals, and environmental initiatives.

Federal Government

- Project "*Semeando*" (with support from IEF) has a project in place in Buritizeiro. Its focus is usually restoration of riparian vegetation. It can provide environmental education information and training to teachers, through the Ministry of Education.
- Note: GRAAL works with a number of local families to provide material and technical support for planting gardens in their yards.

NGOs

Fishermen's Colony of Buritizeiro, meeting with President:

Local fishers have never had a good spot to embark, but the Colony has just acquired two immense warehouse buildings that will be an ideal launch site. The buildings are across the river from Pirapora and are large enough to house the colony headquarters, a lab, and a community co-op headquarters. This could serve as a support centre for the local fishing community.

The fishers would like to begin restoration of the riparian zone and are currently working with MESFA (NGO) to initiate this work. (Note: it would be interesting to involve schools and the community in restoration efforts from the start.)

The president of the Fisherman's Colony stressed that WFT is seen as an objective voice in their colony's discussion sessions. He indicated appreciation for the support and positive input the PPA Project has contributed to the local fishing community, and hopes the

relationship will continue. An open invitation was made for PPA Project representatives to attend the Colony meetings, held on the last Saturday of every month.

Aside: the local marginal lagoons are full for the first time in 15 years and the fishers look forward to the positive results they hope to see in the fishery next year.



□Image 33. View from Pirapora across to the warehouse buildings recently acquired by the Buritizeiro Fishermen's Colony.

GRAAL:

This is an international network of women that was founded in Holland, and also has an active branch in Canada. Its mandate is to address relevant environmental, cultural, and gender issues through the development of local programs designed to improve literacy and the social, economic, and political power of women.

Some of their projects include:

“Manejo Cerrado” has been in place in three rural and four urban communities since the 1970's. It works to change the economic culture and dependency surrounding charcoal. The main problem is that people are conditioned to think they need eucalyptus and charcoal to survive. However, re-education helps alter this perception.

Community and Family Gardening. Local families are given six tools to help them plant and care for a garden and grow their own food. They become much more independent and

realize that they don't have to depend on earning more to buy food and home remedies that they grow themselves.

Re-enforcing folkloric traditions. This program increases both self-esteem and economic independence and includes natural remedies.

Artwork from Recycled Materials. This program promotes creativity and provides income. For example, beautiful quilts also tell stories and promote awareness of social and environmental issues.

Discussions:

GRAAL representatives want to be involved in helping organize fishers so that they will have more control over their livelihoods.

Net pen culture of Tilapia is considered dangerous in that food containing hormones and other unnatural additives gets into the river and affects the native fish. There needs to be more thought put into issues such as biosecurity.

GRAAL runs a small store that sells artisanal products such as quilts and preserves and other food products made from native plants of the *cerrado*.

Producing and selling homemade products from local sources helps promote the idea that people can survive well without depending on more expensive, imported products.

The Municipal Secretary of Education is said to be interested in working with schools to help develop and promote these kinds of ideas (Images 34 and 35).



□ Image 34. The GRAAL team and Barbara Johnsen with a poster highlighting one of their projects along the São Francisco River.



□ Image 35. The GRAAL team and Cathy Carolsfeld highlighting examples of community artwork that reflects social issues of concern in the area.

Questionnaires

Questionnaires were returned from seven schools in the city of Buritizeiro. They are summarized in Table 7. Highlights include:

- All except the pre-schools are presenting in-school environmental education programs that are integrated across at least four academic subject areas.
- All except the pre-schools have support from several out-of-school programs, including Project *Semeando*, *Agua Fonte da Vida* and a variety of guest lectures and field trips.
- The environmental issues of most concern are conservation and preservation of watersheds (including *veredas*, creeks, rivers) and water quality.
- There is a general need to increase public awareness of pressing environmental issues.
- There was a general consensus that children need to be brought up with an understanding about the importance of environmental education and the personal role they can play in preserving their environment.
- Many schools also alluded to the fact that, as a riverine community dependent on the river for their sustenance, this responsibility is an everyday concern.

Important note: There is a need for increased municipal support, material resources, and working partnerships for these programs to be sustainable.

Recommendations for Buritizeiro

- Support a brainstorming session and training workshop for key teachers who want to be actively involved in integrated environmental education programs.
- Build a model (and laminated map) of the Corrego das Pedras watershed, including the Rio SF falls at Buritizeiro, and use it as a teaching tool in Buritizeiro and other communities.
- Host a community mapping event that includes as much of the community as possible. Be sure that there is strong focus on traditional and historical fisheries activities.
- Increase community awareness of the historical use of the Rio SF and importance of the traditional fisheries at Buritizeiro Falls through research and public displays.
- Provide support for development of co-management strategies that include self-directed community policing and training in conflict resolution strategies.

- Promote community involvement in research and public education about the health of local watersheds and resources. This will provide the background and understanding needed to participate effectively in development of management strategies.
- Solicit bursaries for programs that connect youth at risk with environmental education (e.g. *Gente Joven* Program) and programs that bring fishers into schools to share their knowledge and skills, such as making and repairing nets.
- Solicit support from MESFA to build partnership between MEFSA and the Fishermen's Colony, local schools, and GRAAL to begin a riparian zone restoration project in front of the new Fishermen's Colony headquarters.
- Foster these partnerships with the long-term goal of providing community support for the development of the Fishermen's Colony Z headquarters and integrated community EE initiatives.
- Develop partnership with GRAAL to provide mutual support for the community gardening project; use their nurseries to raise native plants destined for restoration projects.
- Use the GRAAL community gardening initiative as a model for schools in the municipality to follow in developing their own gardens.
- Use the opportunity of the annual community festival hosted by GRAAL to highlighting ongoing PPA Project community environmental education (and other) initiatives.
- Begin nursery for native plants in the abandoned garden at *Escola Elementar Marieta Amorini*.
- Use the closest river, creek, and *vereda* (e.g. *Corrego das Pedras*, Lanca 1 *vereda*) as a focus for integrated environmental education activities. Establish transects within riparian zones at shorelines destined for restoration projects to collect baseline and ongoing data and to document progress.

Municipality of Varzea da Palma

Consultative meetings in Barra do Guaicuí (BG):

Schools

Introduction and background information

This meeting took place at the *Escola Estadual de Guaicuí de Ensino Fundamental e Médio* and included school directors, teachers, secondary students from this school, and the school project coordinator from the primary school. The secondary student representatives at the

meeting have been involved in environmental education projects in the community for several years.

This community is intensely active in integrated environmental education projects, both in the schools and in the community. Many of these projects include connections with larger groups such as the Project *Manualzão* (which is active on the Rio das Velhas and has a long history of providing support for environmental education projects in BG) and UFSCar Manaus group (which has visited the school and presented lectures, workshops and exchanges of experiences).

Almira is a teacher at this school and project coordinator at the primary school. She has been instrumental in implementing award-winning integrated and pertinent environmental education projects in the schools. Two examples that stand out are:

- 1) “*Praca Manualzão*”, a community square near the river, which was planned, designed, built, planted, and is cared for by a team that was initiated in the school and came to involve the larger community, including 20 families (Image 36), and
- 2) A report on the local landfill site, which was affecting the health of the local residents, *vereda* and creek (Corrego Pedreira Tamboríu). School staff and students collected data and information to demonstrate the toxins leaching into the drinking water supply, and request of the municipal government that appropriate measures be taken to improve solid waste management techniques. (See “*Projeto Ambiental S.O.S. Guaicuí*”, for details.)



□ Image 36. View of “*Praca Manualzão*” in Barra do Guaicui. This town garden was a community effort initiated in the local school and involving many families.

Much of the success of these projects appears to be due to their participatory nature. There is active involvement of a multi-disciplinary team including students, their families and teachers. The students are instrumental in bridging the schools and the larger community. Other teachers in the schools have contributed a great deal to the success of the environmental education programs by using art, theatre, and music as a medium to help students reach out to the community. This integrated, participatory approach, together with focusing on locally relevant issues, is key to effective environmental education programs.

General Discussions

- Poor and less-educated people are not necessarily the only group that needs to be made more aware of how their day-to-day activities affect the environment. For example, teachers here have noticed many professional people throwing their garbage out the window as they are driving.
- The possibility was discussed of creating problems in the community by having children correcting their parents. Teachers at the school felt that this wouldn't be a problem. Their experience so far is that parents are very proud of their children's growth and success, and they become involved as a result. They have never encountered negative reactions from parents.
- The landfill project described above is a good example of an integrated community effort being successful in demonstrating the need for change in the approach to environmental issues. However this in itself is not enough. It is also important that the necessary change can be implemented in a timely manner (see community issues section, below).
- Other creative projects such as staff and student murals around the school grounds and planting of school gardens help create a feeling of pride and ownership, as well as increasing public awareness about environmental issues of concern to the community (Image 37).
- The school would like to connect with other schools doing environmental education to give students a chance to exchange experiences. A small group organized a visit to an Ouro Preto School with funding support from the municipality and Project *Manualzão*, but Ouro Preto didn't return the visit. This was very disappointing for students here.



□ **Image 37. View of proud teacher and students in the school garden in Barra do Guaicuí. Note the murals on the walls of the school and fence. The gardening and painting projects are more examples of community efforts instigated in the school that help create a sense of pride and ownership.**

Local issues of concern that came up during discussions

- 1) Need to increase awareness and build it into our everyday life to succeed in making sustainable changes. Youth can play a big role by bringing awareness back to their families and the community.
- 2) Challenge of accomplishing change to environmental policies. For example, the activity of changing the location of the landfill site was interrupted by a municipal election and has had to be re-started with the new government. Changes in policy and protocol would allow needed changes to be accomplished in a timely and effective manner.
- 3) The need for exchanges of experiences between schools and communities.

Role of community initiatives

- Escola Estadual de Guaicuí is the headquarters for the Guaicuí Committee of Project *Manualzão*, which coordinates many of the health and environmental education activities in Guaicuí.
- Programs such as “*Rio das Velhas Pede Socorro*”, “*S.O.S. Guaicuí*”, and “*Agentes Mirins de Saude*” include guest lectures, home visits, and community education including signage and theatre.
- These projects address themes such as preservation of the *Rio das Velhas* and prevention of diseases related to solid and liquid waste.
- The municipal government of Varzea da Palma, schools, churches, community radio, and other agencies also provide support for these activities.
- There is a great deal of community initiative and interest, but a need for financial resources and partnerships with environmental agencies, businesses and others, including the PPA Project, in order for their programs to grow.

Questionnaires

Questionnaires were returned from both schools and the Project *Manualzão* coordinator in Barra do Guaicuí. This information is summarized in Table 8. Some highlights include:

- Schools in this community are proactive in environmental education.
- There is strong local support from Project *Manualzão* and the Municipal Government.
- Teachers, students, and the community are keen to progress with integrated environmental education.
- In-school environmental education programs are fully integrated into the curriculum and connected to out-of-school programs.
- Health, waste management, and protection and restoration of the Rio das Velhas watershed were identified as important environmental issues.
- More effective partnerships outside of the community and additional funding are needed in order for integrated environmental education programs to evolve.

Recommendations for Barra do Guaicui

- 1) Support a brainstorming session and training workshop for key teachers from both schools who want to be actively involved in integrated environmental education programs.
- 2) A local person should be chosen as a facilitator in training workshops and brainstorming sessions here and in other municipalities.
- 3) Build a model of the Rio das Velhas watershed including the local creek where the city dump is located (Corrego Pedreira Tamboriu e Porteiras) and use it as a teaching tool in other communities.
- 4) Host a community event that includes as many community members as possible and include demonstrations of the watershed model by students, community facilitators, and fishers.
- 5) Develop a plan for an integrated educational program that could be researched and presented by local student residents to visiting students (e.g. from other communities within the PPA Project area). This could take the form of a walking tour that highlights ongoing projects and environmental issues of concern to the community, as well as local sites of historical and ecological importance. Examples of features of such a tour include:
 - Watershed model

- *Praca Manualzão*
 - School gardens and murals
 - The landfill
 - *Vereda* and creek
 - History of Barra do Guaicuí
 - Importance of the river, flow patterns, and marginal lagoons
- 6) Use this program for visiting students as a model for other communities. This could eventually build into guided tours for visiting tourists with fund-raising efforts being channelled back into environmental education initiatives in the community.
 - 7) Help set up venues and means of financing exchanges between schools in Guaicuí and other communities to broaden their environmental education experiences and strengthen future programs. This might be achieved through science or environmental fairs, or forums.
 - 8) Provide support for efforts to bring about policy changes that would not only change the landfill site but also simplify the process for future efforts of this kind. This could be achieved by introducing participative management strategies as in other components of the PPA Project.
 - 9) Careful documentation of the relationship between human health and environmental degradation such as open sewage and the contamination of water supply by garbage, and steps needed to achieve improvement on both issues should be a primary focus. Expand on S.O.S. Guaicuí and continue to lobby for changes in legislation.



□Image 38. View of the inside of the Igreja das Pedras in Barra do Guaicui. This is an important historical and tourist site in the town.

Municipality of Ibiaí

Consultative meetings in Ibiaí

Integrated Community Meeting

Introduction and background information:

Approximately 150 people attended this community meeting, with representation from the government; staff and students from public schools, the local nucleus of UniMontes, Fishermen's Colony 18, and non-governmental organizations. The meeting began in the school courtyard with a quick review of the PPA Project and Ibiaí's involvement in it to date. Later, those interested in the fisheries stock assessment report remained in the courtyard while the environmental education group moved to one of the larger classrooms.

The environmental education group was so large that it was difficult to focus the discussion and summarize ideas. However, a strong theme of enthusiasm was evident among teachers, who presented many interesting ideas and demonstrated a readiness to work together to implement and improve local environmental education initiatives. In fact, the communication in this community is probably one of their most striking assets; one which will doubtless be important when developing sustainable community environmental education initiatives within the Project area.

Three community members stood out as key to the development of local initiatives:

- David Vieira Rodrigues is both a councillor for the municipality of Ibiaí and a high school teacher (EF: math and EM: physics). He is interested in the Transposition of the Rio SF and thinks it is important for the public to be aware of both sides of this issue. The idea of using public debates (in the school and/or community) was discussed as a way of helping the public make informed decisions about important issues like this.
- Bia is a local resident who is very interested in getting involved with projects focussed on increasing public awareness. She would like to see some kind of folder or brochure produced and distributed that summarises: what is known about the health of the Rio SF, what can be done to improve it, and how individuals can do their part and become involved on a personal basis.

- Marcos Ximenes is the President of an NGO - Amigos do Rio São Francisco – which has its headquarters on their *fazenda*, near Ibiaí. They note that they have patience, perseverance and an understanding of the local environmental issues, but feel that the biggest challenge is to go beyond words and meetings and actually implement programs that are needed. They are particularly interested in environmental themes that relate to the Rio SF watershed and would like to contribute to the environmental education proposal for the PPA Project. They can provide expertise in the areas of:
 - Public awareness and community involvement in clean-ups, environmental conservation activities, and special events;
 - Integration of environmental education activities;
 - Importance of the Riparian Zone;
 - Preservation of “*nascentes*” (sources or veredas) and “*mananciais*”;
 - Presenting lectures;
 - Cultivation and distribution of seedlings for re-planting initiatives;
 - Incentives to reduce pollution.

Questionnaires

Questionnaires were returned from seven schools and the UniMontes campus nucleus in Ibiaí. This information is summarized in Table 9. (Note: The information from the NGO, Amigo do Rio SF is presented above). Some highlights are:

- There are very few in-school and out-of-school environmental education programs in Ibiaí schools.
- Out-of-school programs most commonly involve guest lectures or field trips, but more integrated programs supported by outside agencies are virtually non-existent.
- There is a great deal of enthusiasm to develop integrated environmental education programs and networks to facilitate this process (e.g. through the PPA Project).
- Recurrent environmental issues included restoration and preservation of the Rio SF, water, deforestation, and garbage.
- The community has little experience and needs human and material resources, including training.
- There is great enthusiasm and willingness from the whole community, including teachers, students, and local residents, to implement school and community environmental education programs.
- Proximity to the river and rural areas will make local programming relevant to participants’ lives.

- There is a tremendous need for increased awareness amongst all community groups including students, parents, teachers, fishers, hunters, and charcoal producers.

Recommendations for Ibiaí

- 1) Build a model of the Corrego da Extrema watershed and use it as a teaching tool here and in other communities in the municipality.
- 2) Train a group of key teachers, university and high school students, and fishers to help present the model and related integrated environmental education programs to other students and the community.
- 3) Have “Amigos do Rio SF” lead interpretive tours and workshops for local teachers to learn more about local natural history and environmental issues. Integrate this training into classroom curricula and larger community initiatives such as restoration of riparian zones and marginal lagoons. This might also be done in partnership with MREA (BH) and follow the models for their short teacher training courses. (See Consultative meetings in BH, below.)
- 4) Develop and implement a community festival in Ibiaí to identify environmental and social issues of concern and to create a basis for networking. Invite representatives from all the groups identified in the questionnaires: students, parents, teachers, fishers, hunters, and charcoal producers.
- 5) Set-up a trial aquarium stocked with native species of biota in the community centre on the river. This venue would serve as a focal point for a partnership between public schools, UniMontes students, and fishers (as mentors) to share learning through public displays. Once it is fine-tuned, it could be used as a model to share with other interested communities.
- 6) Develop a simple monitoring program for students to apply to the Rio SF, local creeks and their aquarium. (Note: This could also be applied to land based fish culture tanks, if such plans are implemented.)
- 7) Ask SAAE to present a workshop/lecture on collecting and processing water samples for monitoring water quality. Include fishers, teachers and student representatives.
- 8) Encourage networking between teachers/community educators and the “Amigos do Rio SF” group for professional and technical support for environmental education initiatives.

Other Governmental and non-governmental resources outside of the target communities

1. COMFEA de MG (Comissão Coordenadora do Forum Permanente de Educacao Ambiental de Minas Gerais)

Introduction and Background

The Federal Ministry of Education conducts its work in environmental education through the Federal Inter-Institutional Commission of Environmental Education (Comissão Interinstitucional de Educação Ambiental or CIEA). Each state in the federation is represented through the Interinstitutional Coordinating Commission of the Permanent Forum on Environmental Education (e.g. COMFEA-MG).

COMFEA has a mandate to develop and implement environmental education programs that address local issues of concern. For COMFEA-MG, the first step in achieving this goal was to map existing programs in the state, based on input from questionnaires sent to schools, businesses, public governmental agencies, and NGOs. The responses were recorded and summarized for all municipalities.

Based on these results, six key lines of action (and their respective objectives) were identified for MG to deliver integrated environmental education programs. These are:

- 1) Environmental education through the formal school system.
- 2) Education in the environmental management process.
- 3) Community networking and integration to facilitate environmental education.
- 4) Networking within and between institutions.
- 5) Research, training of educators, and outreach activities in the area of environmental issues.
- 6) Publication and distribution of educational material.

Next, a forum involving representatives from all of COMFEA's designated regions was held in 2002. Its focus was to define objectives, actions, strategies, and participants for each of these six key lines of action in each of ten sub-regions. These results were published as a book in 2004 (see *Programa de Educacao Ambiental do Estado de Minas Gerais* for details). The book is being distributed throughout the state and is meant to provide guidelines for developing integrated environmental education programs based on the individual needs identified in each sub-region.

The scope of the PPA Project includes a small part of three of the sub-regions: 1) *Norte de Minas* (Municipalities of Buritizeiro, Pirapora, Varzea da Palma and Ibiaí); 2) *Noroeste* (São Gonçalo do Abaeté); and 3) *Metropolitana Interior* (Três Marias).

We met with Idarci Lasmar, of SEMAD/COMFEA in BH. The environmental education component of the PPA Project will be the first example of which she is aware of using the forum results to help develop an integrated environmental education programming strategy. As such, she is interested in sharing the results as a model for other communities.

Note: Requesting access through REBEA to the data collected by COMFEA in the municipalities involved in the PPA Project could elucidate valuable information to help design environmental education strategies for the Project area.

The aim SEMAD/COMFEA in BH is to:

- 1) Develop a larger support network between individual communities; and
- 2) Prepare teachers to work more effectively with their students by changing their perception of teaching environmental education, and supporting them in program planning by identifying appropriate themes around which communities can address environmental education.

Some concerns with implementing integrated environmental education into the curriculum that teachers have voiced:

- Basic networking and support structure is the main element that is lacking. Most programs are given to teachers without support from each other or an outside agency.
- A fear of the unknown and being unqualified interferes with teachers' ability to deliver the programs effectively.
- Packaged programs are isolated in scope and not integrated into the curriculum, thus losing much of their potential value. Project "*Chuva*", offered by COPASA, is an example. It succeeds in teaching about the water cycle, water treatment, and water distribution. However, there needs to be a way to offer it within the context of issues that are important to the region, and provide guidelines and support to deliver programs with a local focus.
- Other programs exist that are wonderful but rely too much on the person who developed them. These need to be more self-sustaining in the long term. Instead of relying on professional support, the programs must be made easier for teachers to build into their own curriculum.

Solutions discussed:

- 1) Establish a network between teachers, schools, and communities that includes a basic framework such as contact lists and information on training for existing programs. This would enable new teachers can become involved more easily. Improved communication through networking can develop into a self-sustaining support structure.

- 2) Provide training and resources for educators that include simple tools to help them work more effectively with their students. This involves changing the perception of what it means to teach environmental education and supporting teachers in their learning (e.g. through UFSCar group). Note, however:
 - COMFEA has been involved with informal education, but has never provided training for teachers;
 - COMFEA doesn't provide resource material, but recommends other agencies such as COPASA, CEMIG, Petrobras, and IBAMA (in Brasília), and other institutions that might be able to provide this kind of support.

2. IEF (State Forestry Institute or Instituto Estadual de Floresta)

The team met with Miguel Ribon, Marcello Coutinho, Lina Maria Mourao Toledo, and Celia Lúcia Querino Lima Afonso to find out what material and human resources IEF has available that could support environmental education programs in the PPA Project area.

Resources

- 1) IEF is just completing a UNESCO application for protection of a high altitude habitat, Campos Rupestres. Part of this process requires the submission of maps and photographs of the flora, fauna, geology, and palaeontology of Minas Gerais, as well as a map that identifies habitats and species at risk..
- 2) Later this year they will also be publishing an atlas that includes many details about the natural resources of Minas Gerais. Copies of the atlas for use by schools and municipalities may be obtained by filing an official request.
- 3) IEF also supports restoration initiatives such as replanting and restocking. If a community wants to do a restoration or community gardening project, for example, IEF could help establish the contacts and identify and provide appropriate species for specific projects, at no cost.
 - Note: IEF has contacts with greenhouses in Sete Lagoas and Pompeu, which grow both native and non-native species, as well as a *Fazenda* near Ibiai (Coração de Jesus) that is growing native plants.
 - They have also published a book with details about how to plant and care for native species, including the use of natural pesticides.

School Programs

- 1) Fishing Workshop for kids. Lina Maria and Célia Lúcia run this program. They set up a habitat aquarium in the classroom and students fish for representatives of various fish species cut out of colourful foam. There is information about the different species' ecology on the back of each fish. After the program they leave brochures that summarize the lessons learned during the workshop.

- Lina Maria and Célia Lúcia are interested in developing the program further and taking it outside of the BH area to the municipalities involved in the PPA Project, including offering workshops for teachers and older children so that they can present the program to others in the community.
- 2) *Minha Caderneta de Pescaria* is a book about salt and freshwater sport fish species in Brazil that would be a useful resource for the Fishing Workshop. Publication of the book was supported by the National Program for the Development of Recreational Fisheries (Programa Nacional de Desenvolvimento de Pesca Amadora (PNDPA)) and was illustrated by Lester Escalon of Arte Estudio Z. This book is available from Miriam Carvalho in Brasilia (see Table 3 for contact information).

3. Military Police of Minas Gerais, Brazil

The team met with Captain Arley Ferreira, who has extensive involvement with the PPA Project and came to Canada for training in 2003. The military police in MG are involved in environmental policing and are often asked to give guest lectures in schools and communities. Capt. Ferreira thinks that it would be useful to have representatives of their Environmental Police Force involved in the PPA Project Environmental Education program. However, he also feels strongly that those representatives need to be sensitized to life in artisanal fishing communities, so that they better understand the issues of concern to these communities.

Capt. Ferreira would like to present a workshop as part of a training session for Environmental Police. He feels that a short documentary film or computer-generated slide show that demonstrates the day-to-day life of artisanal fishers would go a long way toward improving the relationship between fishers and the police. He also thinks that if the police are better prepared before entering communities, both for school presentations and for policing activities, policing would be more effective and enforcement practices would improve greatly.

4. IGAM (Water Management Institute of Minas Gerais or Instituto Mineiro de Gestao das Águas)

The team met with Adriana Freitas, who has just assumed responsibility for environmental education at IGAM. She believes that effective environmental education has to be undertaken by a team that includes employees at all levels, starting with a common understanding of the issues at stake.

In order to initiate this, Adriana Freitas wants to provide training to increase awareness of environmental issues by all employees in all government agencies. Her belief is that by creating a structure in which everyone is sensitized to the issues and feels a personal sense of responsibility, change will be achieved and the results of environmental education will have a lasting impact.

Common goals:

- IGAM is planning a brochure about environmental education as it pertains to water use. Perhaps it can be distributed to schools and communities within the scope of the PPA Project.
- At the IGAM offices there were good examples of public displays that increase awareness about power and water use, such as signs encouraging people to take the stairs instead of the elevator, and graphs showing power consumption for the building over several months. These ideas could easily be incorporated into school programs, such as graphing data to show trends related to environmental issues, and competitions between schools or communities to achieve decreased levels of power and/or water consumption.
- IGAM's computer mapping department can provide maps of the microbasins in the Project area, including the creeks of local importance in these communities (see below). These will be very useful for building accurate watershed models and providing resources to supplement programs involving water use and the health of local microbasins.

Maps: Christian Rezende coordinates digital mapping for IGAM. He can easily produce maps of the Rio SF from the Três Marias Reservoir to Ibiaí, including important features such as major rivers, tributaries, local creeks, *veredas*, towns and cities. To obtain maps an official request must be submitted to Fabrízia Araujo Rezende, *Chefe da Divisão Sistema de Informação* (Head of the Division of Information Systems), explaining the project, the area that needs to be included in the maps, and why these maps and information are needed.

5. REMEA (Mineiran Network for Environmental Education or Rede Mineira de Educacao Ambiental)

Barbara Johnsen and Cathy Carolsfeld met with Aluisio Cardoso de Oliveira to talk about REMEA activities in the municipalities involved with the PPA Project. REMEA representatives are not equally dispersed throughout MG and Aluisio Cardoso de Oliveira thinks there are few, if any, representatives in the Project area. The only structure that might be in place is through the Unimontes Campus in Pirapora.

Aluisio Cardoso de Oliveira will contact the municipalities to investigate environmental education in the different areas. He would also like a copy of this report, so that he is aware of what the PPA Project Environmental Education team is planning and implementing, and so that the team can be part of the Network.

Networking with groups in the PPA Project area that developed guidelines for the Environmental Education Program of MG (see COMFEA discussions, above) would be valuable. In this regard, it would be useful to have access to the original data and contact information for those who responded to the questionnaires and participated in the forums. This data would complement the information compiled for the six municipalities in this report.

An official request submitted to the president of SEMAD for COMFEA, Dr. Jose Carlos Carvalho, could secure this information.

Summary Recommendations for Integrated Environmental Education programs across Project area

The initiatives listed below are intended as guidelines. They should be prioritized and implemented based on discussions with Brazilian and Canadian partners, and the timeline of the PPA Project, to maximize long-term sustainability. Activity plans that incorporate these recommendations will be developed as these discussions evolve and strategies are agreed upon.

Brazilian Initiatives

- 1) Together with Canadian input, develop and support programs in the different municipalities that include:
 - Regional public forums on environmental education to present and discuss experiences, initiatives, and resources, including experiences gained from participation in the activities outlined below;
 - Participative training workshops on environmental education teaching strategies;
 - Support for interpreting school curricula to foster integrated environmental education;
 - Support for public awareness materials arising from program activities;
 - A monitoring program for recording and assessing effectiveness of initiatives.
- 2) Work with Brazilian partners to solicit counterpart funding to hire Brazilian experts in Environmental Education to coordinate and help deliver these programs. Partnerships are required to provide ongoing and on-site professional, technical, and communications support. The following expertise should be represented:
 - A) Hire a Brazilian liaison full time for at least one year to support and help implement the integrated program and build it to the point of being sustainable within the larger project goals of sustainable fisheries and communities. This will include:
 - Assisting and supporting Canadian and Brazilian experts in the delivery of training sessions, workshops and forums;
 - Assisting Brazilian teachers and facilitators with the development and implementation of integrated curricular programs;

- Promoting and helping create opportunities for student involvement in public education initiatives and mentoring amongst students (within and between schools);
- Soliciting and collecting relevant material resources to support the integrated environmental education initiatives for all communities, including publications from IBAMA, IEF, CEMIG, and other agencies; and
- Ongoing networking with active partners, including key Brazilian and Canadian teachers, community facilitators, public school students, businesses, government agencies, and NGOs.

B) Hire a Brazilian instructor part-time to organize and/or assist in the research and development of integrated environmental education programs in the project area. This person would also oversee organisation of:

- Short (credit), practical and participative training courses/workshops for key teachers and community facilitators in the project area. The results of such workshops can ultimately be used as a basis for a handbook for Brazilian educators (see Recommendation 13, below).
- Environmental education forums in the project area.
- University student research projects aimed at further development of integrated environmental education programs that can be applied in the Project area.

C) Work with Marilia Sato Brasil to build an active partnership between IBAMA and the PPA Project environmental education initiatives in Três Marias. Begin by submitting a joint proposal to IBAMA for a long-term environmental education program for the community that can be used as a model for other communities in Brazil.

- 3) Together with Canadian input, construct one representative watershed model and three laminated digital maps for the Project area and one other microbasin. Below is a list of the microbasins that were identified as being of particular importance for each municipality.
 - Três Marias – Corrego Grande and Rio SF
 - São Gonçalo do Abaeté – Corrego Santo Inacio and Rio Abaeté
 - Pirapora - Corrego Entre Rios (canalized creek), Nossa Senhora Paracedo Creek (open creek) and Rio SF
 - Buritizeiro – Corrego das Pedras and the Rio SF, including the falls at Buritizeiro
 - Barra do Guaicui – Corrego Tamboriu and Porteiras, Rio das Velhas and Rio SF

- Ibiai – Corrego da Extrema, Rio das Velhas and Rio SF
- 4) Include an environmental education component in community youth forums in the Project area. These are currently being organized by Alison MacNaughton (WFT) and Susan Kurbis (Vancouver, B.C.-based Environmental Youth Alliance) in consultation with key Brazilian environmental education experts and educators.
 - 5) Identify and release key teachers and community facilitators, with pay and with temporary replacements for their positions, to participate in integrated environmental education training and workshops in Victoria and Vancouver, Canada.
 - 6) Release key teachers and community facilitators, with pay and with temporary replacement for their positions, to participate as group leaders in participative training and program development workshops in Brazil.
 - 7) Work with Brazilian partners to solicit funding or in-kind contributions, from both public agencies and private businesses, for material resources to set up a central resource library in each municipality. Additional material needs to be identified and collected on an ongoing basis by visiting IBAMA's library in Brasilia, and monitoring publications by CEMIG, COPASA, Petrobras, and IEF.
 - 8) Work with IEF and CODEVASF to provide human and material resources to support school programs including:
 - Delivery of a fishing workshop in PPA Project area schools, and development of modified programs that involve student mentoring;
 - Native and other seedlings for restoration and community gardening initiatives; and
 - Native fish for stocking aquaria in schools.
 - 9) Work with IGAM to adapt and transfer their staff training initiatives to school and community levels.
 - 10) Provide staff training to the Environmental Policing Division of the Military Police of Minas Gerais on the subject of social and environmental issues surrounding environmental policing policies. This should include:
 - Production of a short documentary film or computer-generated slide-show that demonstrates the day-to-day lives of artisanal fishers and relevant social and environmental issues of concern; and
 - Networking with Captain Arley Ferreira and local communities to develop a school presentation that promotes an integrated approach to community policing.

- 11) Design all activities to foster the production of outputs suitable for public awareness activities. Examples are posters, brochures, and art that can be displayed in public places, conferences, fairs, or other events.
- 12) Build monitoring tools into all activities to permit adequate reporting, monitoring, and publicity.
- 13) Foster the exchange of Canadian and Brazilian experiences through:
 - A Brazilian mission of key environmental educators to Canada;
 - Canadian missions of key Canadian environmental education mentors to Brazil;
 - Forums, workshops, and publicity coinciding with these exchanges to maximize their impact; and
 - Support for development of monitoring and evaluation of environmental education initiatives.

Canadian Support

Providing Canadian expertise in specific areas will maximize the development of integrated environmental education. Following are examples of Canadian experience that would be relevant to the PPA Project initiatives and provide excellent mentoring opportunities.

- 1) The Burnside Gorge Community Association, in Victoria, Canada, has a history of successful joint school-community environmental recovery and stewardship programs. Watershed models have proved to be a useful tool in these programs, especially when integrated with school and community environmental education. A representative from this organisation could:
 - Provide instruction on building 3D models from 2D maps;
 - Train local educators and community facilitators to present their model effectively;
 - Produce a simple handbook for facilitators that includes basic protocol for presenting the model, and sample programs that integrate its application to both the school curriculum and public outreach programs;
 - Help build community support for environmental stewardship. Design simple brochures and posters that increase awareness, promote personal involvement and provide guidelines for participative development of best environmental and social practices by local citizens, businesses and public agencies. The brochures, posters and website for the Burnside-Gorge Community Association can be used as models.

- 2) Seachange Marine Conservation Society, in Victoria, Canada, delivers outreach programs that support the whole ecosystem approach to environmental education, as well as integration of outreach programs with classroom learning. The society offers two programs: Opening Minds with Water, and EcoRowing. Opening Minds with Water comprises four components that include both classroom presentations and guided field trips: Stream Studies, Invertebrate Investigations, Beach (Intertidal) Programs, and Watershed Model Presentations. EcoRowing is a one-day field trip to an estuarine ecosystem that has three components: First Nations traditional culture, marine oceanography, and rowing in a boat or canoe. A representative from Seachange could provide expertise in adapting these programs for Brazilian use. This would include:
- Hosting key Brazilian educators and community facilitators in Victoria to experience these programs in action;
 - Hosting brainstorming sessions to develop ideas for adapting components of the program to the Brazilian situation, in both classroom and public education settings;
 - *Note:* For the OMWW program this would include adapted versions of: 1) the watershed model; 2) stream studies; 3) invertebrate studies; and 4) reservoir studies (possibly including a boat tour of the IBAMA reserve).
 - *Note:* For the EcoRowing program this would include adapted versions of: 1) Traditional First Nations Culture; 2) Collecting samples for scientific research; 3) Hands-on studies of local flora and fauna, including plankton; and 4) physical activity and teamwork through rowing, adapted to fishers' traditional row boats and a tour of a protected, local stretch of the Rio SF.
- 3) The Vancouver Aquarium excels at using aquaria to represent local aquatic ecosystems. A representative from the Aquarium could provide expertise in setting up, maintaining, and using aquaria as a focal tool for education in schools and communities. This should include:
- Setting up trial aquaria stocked with native fish and plant species at key schools and other public locations, such as the proposed Tourist Centre in Três Marias, the Fishermen's Colony headquarters, and municipal halls;
 - Hosting key Brazilian educators and community facilitators at the Vancouver Aquarium;
 - Supporting Brazilian educators and community facilitators to set up, care for, and trouble-shoot the aquaria, and to create interesting and relevant educational displays around them;
 - Producing a simple handbook for facilitators that includes basic protocol for setting up an aquarium; stocking it with appropriate species; and caring for the tank

ecosystem (water quality, feeding etc.); and developing interesting public displays to support awareness about relevant community issues.

- 4) There are many excellent Canadian examples of adaptation of school curricula to embrace environmental education. Integrating environmental themes between subject areas, and building links between classroom learning and outreach programs are keys to this success. The role of representative Canadian educators acting as mentors will include:
 - Hosting Brazilian educators and facilitators during a visit to Victoria and Vancouver as they experience the Seaquaria in Schools, EcoRowing, Opening Minds with Water and related school and outreach programs;
 - Hosting brainstorming sessions with Brazilian and Canadian educators (in Victoria and Vancouver) to discuss and develop applications of these techniques to integrated environmental education in Brazil;
 - Providing workshops and/or participating in community environmental education forums in Brazil to instruct Brazilian educators in simple and practical methods for integrating environmental education into the curriculum on an ongoing basis and creating more effective links between classroom and outreach programs;
 - Working with these educators to adapt methodology to the Brazilian curriculum at three representative levels: Primary, Middle and High School.
- 5) Westwind Sealab Supplies has a demonstrated history of coordination of networking, and facilitation of information exchange between school teachers, out-of-school program educators, and community project representatives through the Seaquaria in Schools program. A delegate from this company would coordinate efforts of Canadian and Brazilian Project participants, including:
 - Facilitating workshops and think tanks involving key Brazilian and Canadian educators and experts. These will focus on the recommendations presented in this report, including:
 - Addressing learning outcomes in the school curriculum (all subject areas and school levels (EF 1-4, EF 4-8, EM 1-3));
 - Building bridges between formal and public education;
 - Addressing relevant environmental and social issues in the local communities;
 - Facilitating a sustainable networking system in the project area, that can be used as a model for other communities;
 - Producing a simple handbook for Brazilian teachers and facilitators that includes networking contacts in all participating schools and outreach

programs; examples of integrated environmental education projects at the primary, middle and secondary school levels; and models for integrated environmental education projects that encompass community initiatives; and

- Providing translations for Canadian and Brazilian experts, as required, to implement these initiatives.
 - Design, assist in coordination, and participate in exchange trips to Brazil and to Canada
- 6) A Canadian who has traveled to Brazil for work or study and has practical experience in developing and maintaining community-based environmental education would be a great asset to situate in one of the communities in the PPA Project area. This person would provide on-site long-term support and expertise in the development and implementation of integrated environmental education programs in schools and communities by:
- Assisting with organization of presentations and workshops by Canadian experts (including on-site translations, as needed);
 - Developing a web-site (or links from the WFT website) that highlights the environmental education component of the PPA Project;
 - Providing improved communications and networking support for environmental education programs through ongoing updates to the web-site, including photos of environmental education programs in action and acknowledgements of sponsors;
 - Working with community reporters to ensure that local activities are documented and posted regularly.
 - Providing ongoing support for the development and delivery of school and community environmental education programming, as required; and
 - Network with Alison Macnaughton (WFT) to promote integration of environmental education with other community initiatives.
- 7) An individual with experience in designing and delivering environmental education programs would provide Canadian assistance by:
- Producing the basic handbooks for Brazilian facilitators (described above);
 - Helping organize, deliver and facilitate training programs and workshops for key Brazilian educators visiting Victoria and Vancouver.
- 8) Canadian assistance in developing monitoring and evaluation protocols. Options include Giuliano Reis and his thesis supervisor, Dr. Michael Roth (UVic). This could also be built into integrated school programs, with students helping design and

implement surveys on an ongoing basis. IDRC may also have monitoring tools that they could contribute, and WWF – Brasil appear to have some good experience. A workshop in Brasil on this issue may be appropriate.

- 9) Submit a proposal for CIDA's Global Classroom Project in partnership with SeaChange Marine Conservation Society and Seaquaria in Schools (January 2006) as a way to sustain the EE component of Project PPAgua in the longer term. This will allow the direct transfer of learning and experiences between Canadian and Brazilian students and teachers, help promote the growth and evolution of an integrated EE model which can be implemented between Canada and other countries, and help sustain the model in the Brazilian context beyond the duration of Project PPAgua. (*Note: some of the website work might be accomplished through this grant.*)
- 10) Hire a communications expert to highlight the between Canadian and Brazilian EE initiatives within the context of Project PPAgua.
- 11) Identify key Brazilian and Canadian high school students (from Project PPAgua area and Victoria, respectively), with an interest in pursuing careers in environmental education. Support them in applying for Rotary scholarships and developing relevant EE projects for their home communities, based on their experience abroad.

Appendix 1

Table 1. Detailed Trip Report.

Date	Location	Activity
02-03-05	Belo Horizonte	WFT planning meeting; IBAMA Environmental Education sector information meeting
03-03-05	Belo Horizonte	Bus BH to TM
	Três Marias	Taxi BH to SGA
	São Goncalo do Abaeté	Consultative meeting with school directors, teachers, and municipal administrators
	Três Marias	Attend community meeting against Transposition of Rio SF
04-03-05	Três Marias	WFT strategy meeting and reporting; tour of CEMIG hydroelectric facility; consultative meeting with Secretary of Education and Culture for TM
	Beira Rio	Consultative meeting at BR School; tour school; meet students
05-03-05	Três Marias	Meeting with communications liaison (Ceíça); research cost & availability of aquarium supplies; meet local fishermen at Syndicate meeting; meeting with Rotary exchange student (Anna Carolina) <i>re</i> : possible role in environmental education program
	Beira Rio	Consultative meeting with Fishermen's Colony Z5 President (Norberto) and fisher (Bigua); boat tour of Rio SF (Beira Rio to base of TM dam)
06-03-05	Três Marias Pirapora Barra do Guaicuí	Visit Beira Rio Fish Market; travel TM to PP (taxi); River Tour (PP-BG) & consultative meeting with President of Colonia Z1 Pirapora (Pedro); walking tour of BG
07-03-05	Buritizeiro Pirapora	Consultative meeting with Secretariats for Social Assistance and Tourism, and Sports and the Environment for Buritizeiro; consultative meeting with Director of Education for Buritizeiro and various school directors (at the Escola Estadual de Marieta Amorini); Consultative meeting with Buritizeiro Fishermen's Colony (Geraldo); consultative meeting with SAAE director; attend Women's Forum at UniMontes campus
08-03-05	Barra do Guaicuí Ibiaí	Travel PP-BG; Consultative meeting with school directors, teachers, students & fishermen at Escola Estadual de Guaicui; walking tour of town, including Pracinha Manuelzão and church; travel BG- Ibiaí. Review and strategy meeting with Barbara Johnsen; presentation and update of PPA Project activities to Fishermen's Colony and community; break out for environmental education consultative meetings with teachers, directors, and students from Ibiaí schools.
09-03-05	Buritizeiro Pirapora	Review and strategy meeting with Barbara Johnsen; short visit to Secretary of Education for Buritizeiro (questionnaires etc.); short visit to GRAAL office (Arlete); Consultative meeting with Secretary of Education for Pirapora (incl. teachers, directors, Secretary of Education, Secretary of the Environment etc.); short visit to Pirapora Colonia Z1 office and Projeto Renascer;

09-03-05, cont.	Buritizeiro Pirapora	travel PP-TM; supper & brief consultative meeting with UFSCar Chemistry and Environmental Education group (IDRC Water Quality Monitoring Program)
10-03-05	Três Marias	Consultative meeting at CODEVASF (re: IDRC partner Project); river and reconnaissance tour for site selection (TM dam to Pontal Abaeté; led by Seu. Norberto and fishers from Colony Z1); lunch and consultative discussions in Pontal Abaeté; short visit to Pontal Abaeté School (Cathy Carolsfeld, Barbara Johnsen and Haydee Torres); consultative meetings with UFSCar environmental educator (Haydée Torres).
11-03-05	Três Marias	Strategy meeting for IDRC project (incl. fishers, WFT, UFSCar, CODEVASF, and IBAMA); lunch and environmental education discussions with Haydee Torres and Barbara Johnsen; reconnaissance of upper and lower Corrego Barreiro Grande and <i>vereda</i> ; short visits to local schools and Coop Bakery; view and discuss BBC film.
12-03-05	Três Marias	Revise travel arrangements; short visit with Alison Mcnaughton; short visit with Seu. Raimundo; catalogue digital photos.
13-03-05	Três Marias	Site visits to TM reservoir; view CAP boat; review and strategy meeting with Barbara Johnsen (most of day and evening).
14-03-05	Três Marias Beira Rio	Short visit to IEF (Carlos); review and reporting; consultative meeting at CODEVASF with Marilia Sato Brasil <i>re</i> : community education; supper and consultative discussions with PPA Project environmental education team; short consultative meeting with CPT representatives; pack and reporting. Visit and photograph Beira Rio School and local shoreline access
15-03-05	Belo Horizonte	Travel TM-BH; reporting; consultative meeting with COMFEA (Idarci) re: Environmental Education Program for Minas Gerais; consultative meeting with IEF; review and strategy meeting with Barbara Johnsen.
16-03-05	Belo Horizonte	Attend morning sessions of seminar “Rio SF - <i>O Desafio da Verdade</i> (Challenging the Truth)”; consultative meetings with IGAM Environmental Education Sector (Adriana) and Computer Mapping (Christian); short visit to IBAMA (Marlucia not available);
17-03-05	Belo Horizonte	Attend morning sessions of Rio SF Seminar; consultative meeting with REMEA, manager of Environmental Education (Aloisio) and visit to their library; travel BH-Betim
18-03-05	Betim	Tour Vale Verde (ecological reserve licensed by IBAMA); site visit to Salão do Encontro
19-03-05	Belo Horizonte	R & R; reporting
20-03-05	Belo Horizonte	R & R; reporting
21-03-05		Air Travel BH-Sao Paulo, Sao Paulo-Toronto; reporting
22-03-05		Air Travel Sao Paulo-Toronto, Toronto-Vancouver, Vancouver –Victoria; reporting

Appendix 2

Table 2. Contact Information for Surveyed Schools.

Municipality and School	Director (or other Representative)	Teachers	Level (Subject)	Phone no.
Buritizero				
E.E. Benedita Conceicao Roquette	Maria Aparecida Medeiros	Anaide, Antonia, Magola, Ines, Regina, Joselma, Marlene, Vanderlice, Eralina, Conceicao, Angelica, Ana de Fatime, Eliane, Angela, Marta, Simelia, Miguelina, Karla, Junia and Carina		38-3742-1170 38-3742-1573
E.E. Prfa. Silva de Alencar Zsehaber	Valeria de Cassia R. Medeiros	Maria Alice Sonia Marques Mariles Alves Darleia Azevedo	EF:Portuguese EF:Geog, Hist EF: Math. EM: Biology	38-3742-1859 38-3742-2713
E.E. Marieta Amorini V.	Ever (Vice-Director)		EF: gr. 5-8 Sciences Geography History Portuguese	38-3742-1638
E.M. Inacio Alves Moreira	Eva Claudia Franco Neres	Ariana Jane Assuncao Janete and Ilma	<i>Phase 1</i> EF: gr. 2 EF: gr. 3 EF: gr. 4	38-3742-3027
E.M. Maria de Sales Souza	Valeria e Irene (Professoras Regente)	Valeria Menezes Balbino Irene Jose dos Anjos	EF: gr. 4 EF: gr. 3	38-3742-1346
Creche Casa da Crianca Pai Grande	Marina Alves da Silva (Coordinator)		Pre-school	38-3742-1216
Creche Santa Terezinha	Meres R. Moreira (Coordinator)		Pre-school	38-3742-1345
Ibiai				
E.E. Bom Jesus da Vereda	Maria de Fatima Gonçaves (Teacher)	Maria de Fatimo Goncalves Eva Iris Various others	EF: gr.1-8 Geography Introductory Phase	38-3746-2000
E.M. Boa Vista	Antonio George (Teacher Coordinator)	Anadir Maria Cleonice	EF: gr.4 inter-disciplinary EF: gr. 4 Introductory Phase	38-3741-2580

<i>Ibiai, continued</i>				
E.M. Joao Cardoso da Cruz	Hercilia Marta Rabelo, Coordinator	Eliane	all 5 classes	
Centro Educacional 1 Primeiros Passos (Pre-Escola)	Magda Cordeiro Souza (Teacher)	Renata Cordeiro Geralda Alcantra	2nd Period 3rd Period	38-3746-1271
E.E. São Fransisco	Ma. Iva Mendes Rabelo (Teacher)	Monica Aparecida Cordeiro Cleuza Oliveira Vanilde Ramos Igna Cordeiro	EF: gr. 1-4 (16 classes: morning and afternoon)	38-3746-1156
E.E. Cel Aristides Batista	Alessandra (Supervisor) Deurson (Teacher)	Ione Ivone No contact given for EM	EF: gr. 5-7 Sciences EF: gr. 5-8 Geography EM	38-3746-1170
Creche Mae Angela	Sandra Jardim (Coordinator)	Sandra Jardim	Pre-School	38-3746-1137
UNIMONTES Ibiai Nucleus	Eliana Marta Fonseca Mota (Coordinator of Ibiai Nucleus)	38-3746-1136	Curso Normal Superior	
<i>Pirapora</i>				
N. Sra. do SS Sacramento	Irma Ercy	Denise and Angela Mariluce and Ma. Jose Juliana and Adalci Milton Severiano Silene Diniz	EF: gr. 1-2 EF: gr. 3-4 EF: gr. 5-6 EF: gr. 8, EM EF: gr. 7, EM	38-3741-1988
E.E. Bairro Cidade Jardim	Luiza Alves (Supervisor)	Portuguese Geography Science History	EF	38-3741-2680
E.M. Ma Josefina Santos	Solanoe Soares D. Silva	Luzinete Alice Albertina, Lenaide, Joana and Rosimeire Zuleide and Gilcelia	EF: gr. 1 EF: gr. 2 EF: gr. 3 EF: gr. 4	38-3741-8785
E.M. Geny Hatem	Raquel Barbosa	Claudete Magnolia Eunice Nair, Dilma, Mariangela and Vera Inez and Hildet	Pre-School EF: gr. 1 EF: gr. 2 EF: gr. 3 EF: gr. 4	38-3741-1496
E.M. N. Sra. Aparecida	Juildeny de Aquino	TBA based on plans that emerge		38-3741-1712
E.E. Profa. Heloisa Passos	Ma. das Neves Neres Bezerra	Ma. de Fatima Guerra Batista Jussara Ma. Rego Neto Edvaldina de Castro Goncalves Georgina and Elizabeth	Geography History	38-3741-1915 38-3741-3660

<i>Pirapora, continued</i>				
E.E. Deputado Quintino Vargas	Rita Avelar (Profa.)	Maria Isabel Daniela Iara	EF: gr. 5-6 Geography EF: gr. 5-8 Sciences EM: Chemistry	38-3741-4023
E.E. Santo Antonio	Rita Avelar (Supervisor)	Elaine and Regina Rivana Lopes Elisa Maria Luciene Luz Ester Rodrigues Doris Cordeiro	Pre-School EF: gr. 1 EF: gr. 2 EF: gr. 3 EF: gr. 4 EF: gr. 4	38-3741-1898
E.E. Coronel Ramos	Ma. das Gracias (Supervisor)	Adalcy Maia Diniz Mourao Wanubia de Souza		38-3741-1902
E.M. Rui Barbosa	MGR Pereira (Supervisor)	Amalia Angela		38-3741-2554
E.M. Maura Dias da Costa	Arlete (Director) Wilma Celia (Teacher)	Adriane Maria Campolina Cunha Eliane da Silva Pereira	EF: gr. 1-4	38-3741-4500 38-3741-1204
CESEC Umbelina Diniz	Maria de Jasma (Supervisor)	Neide Rubia Elizabeth Regina	Geography History Sciences	38-3741-1329
E.E. Fernao Dias	Vandersonia C. Barbosa (Supervisor)	Prof. Iara Prof. Amaral Profª. Carla Profª. Luciene Profes. Raul and Milton	EF: gr. 5 (Geography) EF: gr. 6-8 (Geography) EF: gr. 6-8 (Sciences) EF: gr. 5 EM: yr. 1 Science EM: Geography	38-3741-1911
E.M. Dona Candida Mendes Alvares	Mariza	Ana Rodrigues Cremilda	EF: gr. 4 EF: gr. 4	38-3743-2302
Colegio Cenecista de Pirapora (Private School)	Ana Claudia A. Chamone	Adriane Luciene Edlamar, Elieuzza, Miriam Karla, Graça Raul, Lucia, Junior	EF: gr. 1 EF: gr. 2 EF: gr. 3-4 EF: gr. 5-8 EM: yr. 1-3	38-3741-2233
E.E. Anesia Goncalves Longuinhos	Anesia Longuinhos	Marlene Angela		
E.M. D. Rita Santos Braga	Anesia Longuinhos	Andrea Peixoto		
E.M. Mathilda Cordeiro de Aquino	Anesia Longuinhos	Vanderleia de Freitas		38-3743-3062
E.M. Coeli Ribas Andrade e Silva	Anesia Longuinhos	Ana da Abadia Isabel P. Lopes		
E.M. Dr. Otávio Vieira Machado	Anesia Longuinhos			38-3741-1617
<i>Pirapora, continued</i>				

Municipal Secretariat of Infrastructure and Urbanism	Ma. do Socorro M. Souza (Coordinator of Municipal “Selective Collection” Program - <i>Programa Municipal de Coleta Seletiva</i>)			38-9982-2710 38-3749-6142 ssu@interpira.com.br
Superintendent for Regional Board of Education	Elda Alvarenga (Education Analyst)			38-3741-4018
Secretariat of Education	Delvane Maria Fernandes (delvane@interpira.com.br)			38-3741-8239 38-8805-2808
<i>São Gonçalo do Abaeté</i>				
Pre-E.M. Crianca Feliz	Lusmaene Zacarias Barbosa (Director)	Claudina Cardoso Soares Silvia Cristina de Castro Lucas Lilian Cristina da Silva	Pre-school (4-5 yrs.)	38-3563-2005
E.M. Prof. Martinho Matos	Ma. Geralda Porto Lucas	Silvia Cristina Silesia Candida Vaz Aparecida Braga	EF: gr.1-4	38-3563-1197
E.M. Prof. Maria Jose Dutra	Christiane Kellen M. Braga	Azevedo Sueli Gontijo Vanda Albino Darci Teixeira Maria Barba	EF: gr.5-8	38-3563-1246
E.E. Zico Mendonca	Elizeu N. Carvalho (D.) Maria Angela Porto (Vice D.) Maria Alcione Popalardo (Supervisor)	Fatima Dutra Lucas Fatima de Almeida Silva Geraldo Cesar de Azevedo	EF: gr.1-3 EF: gr.5-8	38-3563-1244
E.M. Olinto Gonçalves (in Beira Rio)	Ivany Fonseca Melo (Director)	Ana Claudia F. Leal	EF: gr.1-4	38-3563-3029
E.M. Quatro Irmãos (in Pontal do Abaeté)	Mônica Claudia Elzatátima Barbosa		EF: gr.1-4	38-9114-4624 38-9115-0296

<i>Tres Marias</i>				
E.M. Irene Castelo Branco	Thereza Wildeanea (Dir.) Silvia Cristiane (Pedagoga)	Cristiane Kassia Cassia Adriana Lucilene	Fase III Fase III Fase IV Fase II	38-3754-5468
E.E. Manoel Pereira de Freitas	Neiva V. De Souza (Director) Joana Eloisa de Almeida (Director)	Luciene Valadares Vera Lucia Pereira Balsamao (coordination of all teachers) Angelita Maria de Oliveira Luciene Hida Cotta Cirivo Rosane Gobira Santos Xavier Anna Gabrielly da Conceição Silva Telma C. da Silva Amaral	Fase II EF: gr.5-8 EF: gr.5-8 EF: gr.5-8 EF: gr.5-8	38-3754-2284
E.M. Memorial Zumbi	Mateus	Marina Ma. Josino Ana Maria Jucelino Rubens		38-3754-577 0
E.M. Policena A. Amorim	Deolinda (Director)			38-3754-5996
E.M. Prof. Joaquim Candido Goncalves	Adenize Maria Reis (Director)	Gilceia Ribeiro da Costa Ednalma Ribeiro Pereira	Fase II Fase I	38-3754-7222
E.M. Rosa Pedrosa de Almeida	Fabio Nascimento Jesuino			38-3754-5669
E.M. V. Carlindo N. Gaia		Rosangela Rosa dos Santos	Fase I and II	
<i>Varzea da Palma (Barra do Guaicuí)</i>				
E.M. Profa. Dulce Lopes de Oliveira Mota	Almira R. De Jesus Lima (Project Coordinator and Teacher)	Almira (She will check, but thinks they will all be interested)		38-3731-5000
E.E. de Guacui	Ma. Aparecida Mendes de Freitas (Supervisor of Education) Mariluzam (Coordinator of the Guaicuí Committee)	Ma. Aparecida da Silva Almira R. De Jesus Lima Ma. Aparecida M. De Freitas Antonio da Silva Lopes Leila Aparecida dos Santos Sandra Celia Celestino	Geography	38-3731-5073 38-3731-5030

Appendix 3

Table 3. Out-of-School Program Contacts

Institute	Contact Name	Phone Number	e-mail	Comments
Amigos do Rio São Francisco (Ibiai)	Marcos Ximenes Helio Guimaraes: biochemist and partner, BH Carlos: head of IEF office, PP	38-3746-1137 31-9981-7515 BH		A local NGO
CEMIG	Vasco Torquato	31-3221-9459		Involved with producing Detailed Guide to fish of the Rio SF
COMFEA	Idarci Esteves Lasmar	31-3298-6562		Secretaria Estadual do Meio Ambiente
GRAAL	Arlete	38-3742-2224	graalpir@interpira.com.br	
IEF	Miguel Ribon Lina Maria Mourao Toledo Celia Lucia Querino Lima Afonso	31-3295-5079 31-3295-5079	linamouraorigi@aol.com cgpa@ref.mg.gov.br	School Programs School Programs
IGAM	Adriana Freitas Christian Rezende	31-3337-3355 Ext. 110	ascom@igam.mg.gov.br comunicacao@igam.mg.gov.br inscricao@igam.mg.gov.br geo@igam.mg.gov.br	Environmental Education Digital Mapping
MESFA	Sidney Moreno	31-3741-4093		
REMEA	Aluisio Cardoso de Oliveira Fabrízia Araujo Rezende	31-3277-5199	Geeda@pbh.gov.br	Networking and teacher training for field trips; Head of Information Systems
SAAE and Beija Flor Program	Janeir Soares	38-3741-1530		Manager of Projects and Environment
REBEA			www.rebea.org.br	Brazilian Environmental Education Network
UFRJ	Marilia Brasil Sato		mcbs@redelago.com.br mcbsato@ufrj.br	Supervisor of IBAMA reserve

Appendix 4 – Summary of Survey Results

Table 4. Summary of Questionnaire Results for Três Marias Schools

School	In School Programs	Other Programs and Support	Important EE themes	Challenges	Other Comments
E.M. Irene Castelo Branco	Integrated: Portuguese Math Geography Science etc.	1) Projeto Cultivar 2) Projeto Maos que Cuidam 3) Projeto Semeando 4) Municipal Government 5) Visits to local creeks and <i>cerrados</i> 6) (Guest) Lectures	Preservation of the Environment: 1) Importance of the <i>Cerrado</i> 2) Water 3) Selective Collection 4) Pollution 5) Garbage 6) Consumerism	1) Lack of specialists to provide necessary support 2) Lack of resources such as books, labs etc.	Our school is very close to the <i>cerrado</i> , creeks etc.
E.M. Manoel Pereira de Freitas E.E. Manoel Pereira de Freitas	Integrated: All subject areas including: Physics Science Math Portuguese Religion Art History Geography English	1) Projeto Revitalizacao do Corrego Barreiro Grande 2) Field trips to increase awareness of environmental and conservation issues 3) Special activities during Environment Week 4) Project Escola Viva 5) Project Coleta Seletiva 6) revitalization projects (fields, (flower) gardens and school gardens) 7) UniMontes Biology students in training	1) Preserving the Environment 2) Water 3) Selective Collection 4) Preservation and Conservation 5) garbage and citizenship 6) Reusing and Recycling 7) Use of water and electricity	1) Need for interesting material resources to work with (folders, brochures etc.) 2) Methodology (training)	1) We need to work together and share ideas. This will help strengthen our individual programs. 2) We have a lot of experience in integrated EE programs that we want to share 3) Our whole community is ready and raring to work together with the larger community
E.M. Memorial Zumbi		1) Public Parade (Environmental) 2) Lectures 3) Field trips (<i>Passeos</i>)	1) Conserving <i>veredas</i> 2) Garbage 3) Restoration of the Rio SF	Heavy (double) teaching loads	We hope that Project PPA can continue providing because it is important for us and our municipality

Results for Três Marias, continued

School	In School Programs	Other Programs and Support	Important EE themes	Challenges	Other Comments
E.M. Policena A. Amorim	Integrated: all subject areas	1) Projetos Veredas 2) Projeto Maria Bonita 3) Garbage and citizenship 4) Public Parade (Environmental) 5) Secretary of Education for TM	1) Garbage 2) Conservation and preservation of existing <i>veredas</i> 3) Restoration of the Rio SF	1) Transportation 2) Heavy teaching loads 3) Economic situation	
E.M. Prof. Joaquim Candido Goncalves	Integrated: Portuguese Math Geography History Science	1) SEMEC 2) SEMEIA 3) SEMADS 4) Lectures for parents and students 5) Public Parade (Environmental) 6) Field trips 7) Artesanal work (with <i>Sucato</i>)	1) Sustainable management and conservation of natural resources 2) Developing an ethic of respect and value for all life forms 3) Garbage and citizenship	1) Engaging and involving the larger community in environmental issues 1) Fear and timidity about taking EE to the next level (integration)	1) The biggest hurdle will be to reach the general public so everyone understands their personal roles and responsibilities in preserving the environment
E.M. Rosa Pedroso de Almeida			1) Health of the environment 2) Water consumption and waste 3) Pollution of creeks and rivers	1) The most difficult part will be to help everyone change their concept of the environment and understand that they (and their actions) are an important part of the environment we live in, that each of us needs to take personal responsibility.	2) Community awareness can be done through theatre, dance written work etc.
E.M. V. Carlindo N. Gaia	Integrated: Portuguese Math Sciences Geography History	1) Plantando para o futuro 2) Maria Bonita 3) Lixo e Cidadania 4) Public (Environmental) Parades 5) Field trips to CODEVASF, CAP	1) Pollution 2) Consumerism and Garbage 3) Values 4) History of our Neighbourhood	1) Lack of Material Resources 2) Lack of Human Resources	

Table 5. Summary of Questionnaire Results for São Gonçalo do Abaeté Schools

School	In School Programs	Other Programs	Important EE themes	Challenges	Other Comments
Pre-Escolar M Crianca Feliz	None	1) Guest lectures 2) Field trips	Awareness and preservation of Rio Abaeté	1) Training and professional support for teachers; 2) Lack of public awareness	Access to a mining barge
E.E. Zico Mendonca	Integrated: Portuguese Science Art Geography	1) Projeto Chuva (COPASA) 2) Guest Lectures: Enviro. Police; EMATER; Mun. Secretary of Health 3) Environmental Conference	1) Preservation of <i>nascente</i> 2) Degradation of Rio Abaeté 3) Garbage 4) Agrottoxins 5) Deforestation	1) Lack of trained professional support 2) Lack of public awareness 3) Fear 4) Lack of interest by those taking profit from public resources	Importance of field trips
E.M. Prof. Martinho Matos	Integrated: Portuguese Science Art Geography		1) Environmental protection 2) Preservation of <i>nascente</i> 3) Garbage 4) Deforestation	The need to review our work proposals in relation to EE (in the classroom)	
E.M. Prof. Maria Jose Dutra	Integrated: all disciplines	1) Projeto Chuva (COPASA) 2) Projeto Semeando 3) National Childrens and Youth Conference on the Environment 4) Mun. Secretary of Health 5) Mun. Secretary of Education 6) Guest lectures 7) Field trips	1) Public Awareness 1) Preservation of our municipal creeks 2) Preservation of the Abaeté River 3) Conservation of <i>nascentes</i> 4) Degradation of the environment	1) Lack of teaching resources 2) Lack of public awareness 3) Lack of training for teachers 4) Lack of commitment to active involvement in addressing environmental issues	

Table 6. Summary of Questionnaire Results for Pirapora Schools

School	In School Programs	Other Programs	Important EE themes	Challenges	Other Comments
N. Sra. do SS Sacramento	Integrated: All subject areas, incl. drama	1) Projeto Terra 2) Vida que Pulsa 3) Field Trips 4) Public parades (environmental) 5) Lectures supported by: MMA Municipal Secretariat of Infrastructure and Urbanism	1) Increased understanding of relationship between people and nature 2) Integrated ecology 3) Recycling	Increasing public awareness	1) In-school programs coordinated by geography and sciences (note: Gr. 3-4 produce and present a book describing the project) 2) Integrated programs began in 2001
E.E. Bairro Cidade Jardim	Integrated: All subject areas	1) Projecto Terra 2) Planeta em que Vivemos 3) Field trips 4) Lectures etc.	All are important	1) Lack of financial resources 2) Lack of material resources 3) Lack of human resources	Our local environment (vegetation, Rio SF, agriculture, industry) is all around us!
E.M. Ma Josefina Santos	Integrated: Sciences Portuguese History Geography	1) Projects 2) Lectures 3) Field trips	1) Garbage (e.g. landfill sites) 2) The river 3) Pollution	1) Partners (networking) 2) A project that can involve the whole school (incl. Pre-schoolers) 3) Training (for the whole team)	Have trained educators and the support of SEMED
E.M. Geny Halem		1) Programa Semeando 2) Lectures 3) Field trips 4) Public Parades (Environmental)	1) Recycling 2) Preservation	1) Assistance (support) for educators involved in environmental education	Desire to help create global citizens through integrated environmental education
E.M. N. Sra. Aparecida		1) Lectures 2) Public parades (environmental) 3) Field trips	1) Awareness 2) Preservation 3) Restoration (revitalization) 4) Recycling	1) Finding time 2) Finding financial resources 3) Creating working partnerships 4) Support from NGOs 5) Support from the community	1) We are a riverine community and most of our families depend on fishing 2) Want to better understand the whole project 3) Possibility of exchanges between Brazilian and Canadian students

Table 6: Results for Pirapora, continued

E.E. Profa.Heloisa Passos	Integrated: Geography History Biology Physics Sciences Portuguese	Aqua e Vida	1) Personal health 2) Cleaning the environment (esp. the Rio SF) 3) Brazilian Steppe (<i>cerrado</i>) 4) Water (and water use) 5) Caring for our school property	1) Achieving increased awareness of environmental issues by all citizens (incl. big industry, other polluters and citizens) 2) Desire to create direct links between EE and school curriculum	1) Many of our students are fishers or children of fishers 2) My personal dream is to once again see the Rio SF with the diversity of species it once supported
E.E. Deputado Quintino Vargas	Integrated: Portuguese Geography Sciences	1) Sempre Verde 2) Revivario 3) Field trips 4) Research projects 5) Lectures	1) Water Conservation 2) Preservation and restoration of the Rio SF 3) Pollution (Industrial) 4) Preservation of native flora (riparian vegetation and Brazilian Steppe (<i>cerrado</i>))	Lack of funding for material resources, field work etc.	We need to make students aware of the importance of preserving our planet and we are ready and interested in starting!
E.E. Santo Antonio	Integrated: Portuguese Sciences Geography Religion	1) Lectures 2) Field trips 3) Environmental team competitions	Preservation of the Rio SF		
E.E. Coronel Ramos			1) Habitat 2) Preservation of flora and fauna	Lack of continuity in partners and proposals	
E.M. Rui Barbosa		Environment Week activities	1) Water Issues 2) (Endangered) Extinct Animals	1) Lack of partnerships 2) Heavy workload	We need to make our children more aware about preserving our environment
E.M. Maura Dias da Costa		Activites related to days commemorating themes like the environment, river, etc.	1) Preservation of the Rio SF 2) Preservation of (native) flora and fauna 3) Preservation of the enviro. and consequences of not doing so	1) Lack of (working) partnerships 2) Lack of continuity for our proposed work	We need to educate our children while they're young

Table 6: Results for Pirapora, continued

CESEC Umbelina Deniz	Integrated: small interdisciplinary projects	1) Coleta Seletiva do Lixo 2) O homem e o Meio Ambiente	Ethics and the environment	1) [Achieving] cohesion amongst everyone 2) Bringing enviro. education beyond the school e.g. reaching society as a whole (not just students)	We work with youth and adults.
E.E. Fernao Dias		1) Activities related to commemorative days related to the environment (trees, spring etc.) 2) Guest Lectures 3) Field trips	1) Preservation of the Environment 2) Sustainable management of the environmental	1) Lack of support 2) Lack of financial Partnerships to support such a large project	1) We need a multi-disciplinary approach in order to succeed and are ready to take it on. 2) We many environmental problems in our area that need attention.
E.M. Dona Candida Mendes Alvares	Integrated, incl: Sciences History Portuguese Geography	1) Preservation of the Rio SF through: Secretariat of Education for Pirapora and City Hall	1) Illegal Fishing 2) Destruction of Springs (<i>veredas</i>) 3) Preservation of the environment	Developing awareness amongst educators and mobilizing them	There is support for educators in the form of training and resources.
Colegio Cenecista de Pirapora (Private School)	Integrated, incl: Science Math Biology Chemistry Portuguese Geography Ethics Art	1) Projeto Piracema 2) Matricula Verde (with support from MESFA and IBAMA) 3) Lectures 4) Field trips 5) Research 6) Áções Solidarias	1) Sustainability 2) Awareness about personal responsibility and involvement in global issues	1) Finding enough time for collective planning that includes educators and students 2) Finding a way to sustain the program and use participative planning and management to ensure that plans are modified as needed 3) To find a way to reach students and measure changes in behaviour	1) We need to share experiences and work together to bring existing projects to new levels. 2) We need to look for alternatives and solutions to problems that span environmental and social issues.
E.E. Anesia Goncalves Longuinho E.M. D. Rita Santos Braga E.M. Mathilda Cordeiro de Aquino E.M. Coeli Ribas Andrade e Silva E.M. Dr. Olavio Viara Machado	Integrated, incl: Sciences Math Portuguese Art History Geography Phys. Ed.	1) Sporadic environmental projects 2) Recycling (Municipal support) 3) Semear ...	1) Preservation of the Rio SF 2) Recycling 3) Pollution 4) <i>Cerrado</i> 5) Water	1) Financial resources 2) Working conditions 3) Providing training for educators 4) Working EE projects into the school curriculum	Conditions are great: the community is concerned, educators are engaged and projects related to preservation of our river have been implemented.

Table 7. Summary of Questionnaire Results for Buritizeiro Schools

School	In School Programs	Other Programs	Important EE themes	Challenges	Other Comments
E.E. Benedita Conceicao Roquette	Integrated: All subjects	1) Project Aqua Fonte de Vida 2) Project Semeando 3) Support from SEE and Paroquia Imaculada Conceicao 4) Lectures 5) Field trips 6) Special events (e.g. during Semana da Agua)	1) Preservation of <i>veredas</i> , <i>mananciais</i> , rivers and lakes 2) Increased public awareness of environmental issues.	Lack of partners	1) We would like to become partners 2) EE [needs to] integrate everyone in the school, independent of the discipline, in order to implement the projects successfully.
E.E. Prfa. Silva de Alencar Zschaber	Integrated: All subjects	1) Project Agua Fonte de Vida 2) Projeto de Arborizacao da Escola 3) Special events (like during Semana da Agua) 4) Lectures for students and parents 5) Support from SAAE, Buritizeiro, Paroquia Imaculada Conceicao	1) Preservation of <i>veredas</i> , river sources (<i>mananciais</i>), rivers and lakes 2) Increased public awareness of environmental issues		1) We would like to become partners 2) EE [needs to] integrate everyone in the school, independent of the discipline, in order to implement the projects successfully.
E.E. Marieta Amorini V.	Integrated: All subjects	1) Project Agua Fonte da Vida 2) SAAE programs 3) Guest lecturers from SAAE, IBAMA, Military Police, Fire Fighters etc.	1) Water 2) Environmental degradation 3) Conservation	1) Lack of resources 2) Lack of public awareness in the community	1) We are very connected to the Rio SF
E.M. Inacio Alves Moreira	Integrated: Portuguese Math, Sciences Geography	1) Project Semeando 2) Support from MEC and Municipal Secretariat of the Environment	1) Global awareness about environmental issues 2) Water	Availability of diverse material resources to support these initiatives	Our students are really positive and interested in discussing these themes

Table 7: Buritizeiro results, continued

E.M. Maria de Sales Souza	Integrated: Portuguese Science Geography Math	1) Project Semeando 2) Project Agua Fonte de Vida 3) Support from FAEMG, SENAR-MG and SAAE 4) Ecological field trips 5) Lectures 6) Videos 7) Special events	Sustainable management and use of the environment incl. issues like: garbage, recycling, pollution, diseases, and conservation of water	Increased municipal support will be needed for rural education in order to make this project work	1) Involvement in this project will help widen our horizons; since we are a riverine city, this will be very valuable for our community 2) Increased awareness will lead to an increased of personal sense responsibility for our environment, by our students
Creche Casa da Crianca Pai Grande					We want to participate in the project
Creche Santa Terezinha				1) Training for teachers 2) Little interest from appropriate (support) agencies 3) Lack of resources	It is important and valuable that our children be brought up to be aware of the need to preserve our environment.

Table 8. Summary of Questionnaire Results for Varzea da Palma Schools (town of Barra do Guaicui)

School	In School Programs	Other Programs	Important EE themes	Challenges	Other Comments
E.M. Profª. Dulce Lopes de Oliveira Mota	Integrated incl: Geography Portuguese Art Religion Sciences History	1) Projeto Manualzão 2) Waste Management Project 3) Beautification Projects	1) Water 2) Waste management (garbage and sewage) 3) (Native) flora and fauna	1) Lack of interest from public agencies 2) Lack of interest from some professionals 3) Lack of funding 4) Implementing projects that extend beyond the school	Involvement in Project Manualzão, student interest and community involvement are already in place
E.E. de Guacui	Integrated, incl: History Geography Sciences Portuguese	1) Pequenos Combatantes 2) Agentes Mirins de Guaicui 3) Rio das Velhas Pedre Socorro 4) Agua Fonte da Vida 5) SOS Guaicui 6) Field trips 7) Public parades (environmental) 8) Community education (drama, theatre, signage etc.) 9) Guest lectures 6) Support from FUNASM, churches, Municipality	1) Health and diseases 2) Restoration of the Rio das Velhas watershed	1) Lack of partnerships 2) Resistance from authorities 3) Lack of funding (support from other groups)	1) Partnership with PPA: we want to work but need help to implement environmental projects

Table 9. Summary of Questionnaire Results for Ibiaí Schools.

School	In School Programs	Other Programs	Important EE themes	Challenges	Other Comments
E.E. Bom Jesus da Vereda		1) Guest lectures 2) Field work	1) Water 2) Deforestation 3) Garbage 4) Preserving springs and <i>veredas</i>	1) Lack of time 2) Lack of resources 3) Lack of partnerships	1) We are enthusiastic, brave, united and competent 2) We have an urgent need to collaborate with Project PPA
E.M. Boa Vista	Integrated, incl: Sciences Geography History and others	1) Project about the Rio SF 2) Awareness about water in the community Note: lack of support from outside agencies	1) Preservation of vegetation, animals and water 2) Importance of clean water 3) Garbage	Need for increasing awareness amongst all community groups incl: students, parents, teachers, fishers, hunters, charcoal producers	1) Solidarity within the school community 2) We like the idea of Project PPA and hope it is implemented and sustainable
E.M. Joao Cardoso da Cruz			1) Water 2) Deforestation 3) Garbage 4) Rio SF	1) Lack of availability 2) Lack of enthusiasm	1) Participation, communication and partnerships with other schools in the Municipality 2) We urgently need to collaborate with Project PPA
Centro Educacional 1 Primeiros Passos (Pre-Escola)		Field trips Note: support from the Municipality	1) Deforestation 2) Pollution of the Rio SF	The need for training to learn how to work with such small children	1) Easy access 2) Very connected with the rural areas and people living along the river
E.E. São Fransisco		1) Guest lectures 2) Small projects	1) Preservation of the Rio SF 2) Water 3) Deforestation 4) Garbage	1) Lack of time 2) Lack of resources 3) Lack of partnerships	1) Staff and students enthusiasm 2) Rio SF as a focal tool
E.E. Cel Aristides Batista		1) Field trips (to the river) 2) Participation in <i>passeatas</i> and activities related to the environment	1) Recycling 2) Preservation of water 3) Combating fires 4) Preservation of native <i>mata</i> forests, <i>veredas</i> , flora and fauna	1) Lack of physical and material resources 2) Lack of adequate knowledge and training 3) Lack of (support) structure within the schools	1) Awareness within the community 2) Easy access to the Rio SF and projects that would address issues of concern

Table 9: Ibiaí Results, continued

Creche Mae Angela		Just starting to implement projects e.g. about garbage	<ol style="list-style-type: none"> 1) Garbage 2) Preservation of the Rio SF 3) Caring for the Riparian Zone and forests in general 	People resist becoming engaged in the issues [and], in general, tend not to worry	<ol style="list-style-type: none"> 1) This interest of countries that want to preserve our global environment is very important 2) To make people aware, starting from a young age and continuing into old age, of the importance of EE
UNIMONTES Ibiai Nucleus	Lectures on environmental themes		<ol style="list-style-type: none"> 1) Water 2) The Rio SF 3) Deforestation 4) Preservation 5) Garbage 	<ol style="list-style-type: none"> 1) Lack of available representatives from each segment 2) Lack of time to plan and implement the projects 3) Lack of continuity of projects 	This kind of collaborative work is urgently needed