UBC’s experience in building partnerships for community sustainable development in Ecuador – 2. “From the bottom up”: Creating environmental health communities of learning and practice

Yassi A\textsuperscript{1,2,3,4}, Cabarcas F\textsuperscript{1,2}, Fujii R\textsuperscript{4}, Orrego E\textsuperscript{1}, Silva F\textsuperscript{1}, Andrade R\textsuperscript{1}, Rojas A\textsuperscript{5}, Spiegel J\textsuperscript{1,2,4,6}

1. Centre for International Health, University of British Columbia (UBC)
2. Department of Healthcare and Epidemiology, Faculty of Medicine, UBC
3. Department of Medicine, Faculty of Medicine, UBC
4. College for Interdisciplinary Studies, UBC
5. Faculty of Land and Food Systems, UBC
6. Liu Institute for Global Issues, UBC

*[For Section III: Partnerships in Development]*

UBC (Canada)
- William Black, BC Centers of Disease Control (BCCDC), Canada
- William R Bowie, Department of Medicine, Faculty of Medicine, UBC
- Winnie Chu, School of Occupational and Environmental Health, UBC, Canada
- Ray Copes, BC Centers of Disease Control (BCCDC), Canada
- Bonnie Henry, BC Centers of Disease Control (BCCDC), Canada
- Eduardo Jovel, Institute for Aboriginal Health, UBC, Canada
- Veronica Moreno, UBC Centre for International Health
- Margot Parkes, UBC Centre for International Health
- Laurie Pearce, School of Community and Regional Planning, UBC
- Alejandro Rojas, Department of Land and Food Systems, UBC, Canada
- Marcello Veiga, Department of Mining Engineering, UBC, Canada

Ecuador
- Jaime Breilh, Universidad Andina Simón Bolívar & CEAS, Ecuador
- Arturo Campaña, Centro de Estudios y Asesoría de Salud – CEAS, Ecuador
- Marcelo Cevallos, ESPE (Escuela Politécnica del Ejercito) & Fundación María Luisa Gómez de la Torre
- Maria Lourdes Larrea, c/o Centro de Estudios y Asesoría de Salud – CEAS, Ecuador
- Maria Merchán, Universidad de Cuenca, Cuenca, Ecuador
- Joscelito Solano, Universidad Estatal de Bolívar, Guaranda, Ecuador
- Iván Villacrés, Universidad Técnica de Machala, Machala, Ecuador

Cuba
- Mariano Bonet, National Institute of Hygiene, Epidemiology and Microbiology (INHEM), Cuba
- Miriam Concepción, National Institute of Hygiene, Epidemiology and Microbiology (INHEM), Cuba
- Vicente Prieto, National Institute of Hygiene, Epidemiology and Microbiology (INHEM), Cuba

Mexico
- Enrique Cifuentes, National Institute of Public Health, Mexico
- Rogelio Perez-Padilla, National Institute for Respiratory Diseases, Mexico
- Celso Ramos, National Institute of Public Health, Mexico
ABSTRACT

Developing knowledge, while building solutions to fundamental challenges of sustainable development, calls for innovative approaches to learning. UBC’s award-winning Sustainably Managing Environmental Health Risk in Ecuador project has championed problem-based learning (PBL), and community-based learning (CBL) to respond to this challenge, building on Canadian experiences in this area, while acquiring new insights. Following the successful delivery of 13 training modules and 2 thesis seminars in Ecuador that introduced new learning and teaching processes (including PBL and CBL), teams involving Ecuadorian thesis directors, international faculty and coordination assistants have been established to provide ongoing mentoring and direction for 30 students of the Masters of Health (with an Ecosystem Focus) programme at three Ecuadorian universities. These students are now conducting their thesis work as university-community research partnerships in 15 communities. Furthermore, a teachers’ manual is now being prepared. Transforming learning from a largely passive experience to one of intense interaction through small groups and direct community engagement requires systematic mentoring to guide students through this process, so that more sustainable outputs and impacts can be consolidated. This paper discusses the challenges of interactive learning in university-community partnership research, as well as the processes of transformation and how to support it, so that the lessons can be shared.
Community-based learning: aiming to transform the learning process to achieve impact

Developing knowledge, while building solutions to fundamental challenges of sustainable development, calls for innovative approaches to learning. As discussed by Spiegel et al., our interdisciplinary international team is carrying out an ambitious 6 year project based at the University of British Columbia (UBC), funded by the Canadian International Development Agency (CIDA) University Partnership in Cooperation and Development (UPCD) Program to improve the environmental health conditions of some vulnerable populations in Ecuador. A hallmark of this approach is empowering involved communities as active partners in the learning process by applying innovative approaches to teaching, learning, international collaboration and community interaction. This paper focuses on the challenges of community-based interactive learning in university-community partnership research, as well as the processes of transformation and how they are being supported, so that the lessons can be shared.

The overall project, *Sustainably Managing Environmental Health Risk in Ecuador* project, described in detail by Spiegel et al., has championed problem-based learning (PBL), and community-based action research (CBAR), while fortifying international partnerships and acquiring new insights through the collaborative process. The project brought together a multi-faceted consortium of university faculty from a variety of centres and institutes at the University of British Columbia, a network of Ecuadorian universities, an Ecuadorian NGO, and centres of excellence in environmental health in the Latin America and Caribbean. The development of a “flagship” *Master of Health using an Ecosystem Approach*, the central focus of this paper, has been the cornerstone to fulfilling project objectives. Emphasis was purposely placed on the development of a first Master’s cohort as a “train the trainer” investment in establishing a firm foundation for achieving sustainable impact through the project’s activities. The focus for all training components is to involve and reinforce well-designed community interventions, with the community involved not as “objects” of studies and interventions, but as “subjects”, that is, as active partners, with a critical role to play in achieving and sustaining positive change.

The training program encompasses a wide range of disciplines needed for an “ecosystem approach to human health”, which emphasizes three pillars of transdisciplinarity, participation and equity. The program curriculum goes beyond the topic areas traditionally associated with environmental health such as basic environmental health risk assessment and management, water and sanitation, food and agriculture, air pollution, urbanization, energy, industrialization and chemical contamination and ethical issues. However, to ensure adequate knowledge and skills necessary for achieving impact in the Ecuadorian context, the curriculum was expanded to include additional areas such as community sustainable development with a special focus on indigenous health issues; disaster preparedness and management; ecosystem approach to vector-borne and other infectious diseases; an agro-ecological approach to food and agriculture; critical epidemiology; and the health impacts of global change.
students in the first cycle of the Master’s program received instruction in basic quantitative and qualitative methodologies applicable to community-based action research, alongside conceptual frameworks for integrating a range of disciplinary perspectives. A central program orientation is the building of partnership networks to put the theory of participatory sustainable community development into action.

As summarized by Israels and colleagues, community-based research in public health focuses on social, structural, and physical environmental inequities through active involvement of community members, organizational representatives, and researchers in all aspects of the research process. Partners contribute their expertise to enhance understanding of a given phenomenon and integrate the knowledge gained with action to benefit the community involved. There is a growing body of literature documenting this approach. For example, Corburn described how activists in the environmental justice movement are challenging expert-driven scientific research by taking the research process into their own hands and speaking for themselves by defining, analyzing, and prescribing solutions for the environmental health hazards confronting vulnerable communities. He explains how the community-based research process aims to engage community members as equal partners alongside scientists in problem definition, information collection, and data analysis, citing examples of how a community addressed asthma and risks from subsistence-fish diets. Arcury et al. reported on a collection of studies focusing on health disparities resulting from pesticide exposure in agricultural communities, particularly the communities of migrant and seasonal farm workers. These authors note that common features for success in this approach are taking the time to interact with the community, using multiple approaches to engage the different parts of the community, understanding that different participants often have different goals, appreciating each group's strengths, valuing community knowledge, and being flexible and creative in conducting research. Additionally, as summarized by Liam and colleagues epidemiologists have come to the realization that applying a risk-factor paradigm overemphasizes the individual level of risk to the exclusion of other organizational levels of risk. They note that to address the social dynamics of disease, as proponents of the sanitary movement once did, health and disease must be studied at a population level within a social context. Thus, they observe, that consistent with the call for a paradigm shift, epidemiologists are also calling for increased community participation in the research process.

In order to train students to be able to work effectively to study and address the social context of health and disease, new approaches to learning have developed over the last few decades. One internationally prominent early initiative was the PBL approach used at McMaster Medical School (beginning in the mid-1970s - with author AY in one of the first cohorts using this approach). Here, clinical cases were used as context for students to study basic and clinical sciences. Its possible advantages over traditional approaches have been noted to include its greater relevance to actual practice, its ability to promote retention and application of knowledge, and its encouragement of self-directed life-long learning. Possible disadvantages include higher costs, both in resources and staff time. The PBL approach has been strongly embraced by our project team, and applied to teaching an ecosystem approach to health.
approach also was the underlying approach to an innovative community-based research training program at UBC entitled Partnering in Community Health Research (PCHR), (designed and led in part by author AY). In PCHR clusters were formed of community learners, university graduate students, community mentors, and faculty members who worked together to use a scientific approach to address real-world problems.

As discussed by Spiegel et al., the “Sustainably Managing Environmental Health Risks in Ecuador” project actually arose as a follow-up to a previous CIDA-funded UPCD project in Cuba (that one a “Tier 2” undertaking, signifying objectives primarily focused on capacity-building - not impact, as is the case with our “Tier 1” Ecuador project). That project was initiated in 2000 by the project’s directors (JS, AY) while at the University of Manitoba and then brought over to UBC. The basic approaches and methodologies of that experience in Cuba greatly informed what was subsequently enriched in Ecuador in its encounter with the knowledge base of an experienced and internationally recognized network of scholars working in critical epidemiology, agro-ecology and popular education. As in Ecuador, the emphasis in Cuba was placed on applying transdisciplinary, problem-focused, community-based interactive teaching methods, with the goal of the learner becoming an agent of change.

Community-based-action research and community-based action learning involving communities as partners in collaborations aiming at overcoming the problems under investigation are rapidly gaining influence everywhere. In Latin America, this is better represented by the 1960s tradition of popular education initiated by Paulo Freire and Orlando Fals-Borda. These branched out in many directions in academic work, in cultural and artistic creativity, and in the practice of social movements. More recently, CIDA international collaborative projects aiming at building capacity in rural communities have demonstrated once again the efficacy of community-based action research.

Implementing our vision in Ecuador “from the ground up”: the curriculum, the students, the communities and the students’ projects

The launch of the program in Ecuador was met with great interest, with over 150 applicants, 70 of whom were selected for interviews. Using criteria that explicitly weighed academic disciplinary aptitudes alongside capacity for undertaking community-based interventions and knowledge translation, as well as cultural diversity, 30 students were selected and formally began the program in November 2005. These 30 students come from diverse backgrounds – including 15 with disciplines ranging across engineering, chemistry, biology, disaster preparedness and planning, 7 physicians, 3 nurses, 2 lawyers, a veterinarian, and others. Four of the 30 are indigenous leaders of their local communities or organizations. Ten students are affiliated with each of the three university centres (Universities of Machala, Bolivar and Cuenca – Figure 1), with 5 of these 10 from each centre having university positions and the promise of continued university faculty positions after completion of their program. The expectation is that these latter 15 individuals will play a key role in delivering subsequent iterations of the Master’s program, serving as the lead individuals in their respective universities alongside other members of a community-of-practice that is being developed.
The Master’s is being delivered in two phases, as shown in Table 1. Phase 1 consists of a series of training modules. Concurrent to this, the students prepare the plans for their community-based action research projects. Modules cover a range of methodological and subject areas. The format of each module varies, but typically they contain a combination of didactic sessions, case studies, field trips and usually involve community participation, journal clubs, and student-led presentations. (See photos in Figures 2 showing some of these activities: group work, role play; community-based field trips; problem-based learning). There are pre-module assignments, usually conducted in groups of 5, during module assignments based on exercises and field trips; and post-module reflective exercises and assignments. Assignments before and during modules are usually presented during the module, and post-module assignments are handed in afterwards.

Three thesis preparation seminars have also been incorporated in the curriculum. These projects are all being conducted in collaboration with communities, and apply CBAR. In keeping with that goal, all thesis projects must meet five explicit criteria:

1. Clear research and impact objectives;
2. Focus on relationships between human health, ecosystem health, and community wellbeing;
3. Significant community participation;
4. Collaborative relationships with other students, key stakeholders, and the community; and
5. Rigorous and clear methodology.

Although each thesis is expected to stand on its own individual merits, in the vast majority of situations, projects are being conducted by 2-5 students in each community to both facilitate input from and impact in those communities. The projects are highly diverse, as shown in Table 2 and Figure 3, including for example, the following:

- Within one Indigenous Agricultural Community in the province of Cañar, three projects focus on:
  - Sustainable management of ‘paramo’ (upper highland) water sources;
  - Health and ecosystem impact of pesticide use; and
  - Evaluation of residual/waste water contamination and options for community response.

- Within the pesticide-intensive Floriculture Industry, three projects focus on:
  - Ecuadorian regulations governing the floriculture industry and water usage;
  - Evaluating health and environmental impacts of the “Flower Label Program”; and
  - Trialing a bio-assay to assist with community conducted water-monitoring.

- Within a poor urban community vulnerable to mosquito-borne dengue disease in the region of Machala, three projects focus on:
  - Surveillance of risk factors to better prepare prevention-oriented activities;
  - Promotion of behaviours/actions to reduce the spread of disease; and
  - Alternatives to reliance on pesticides to reduce presence of the disease vector.
• In the small Andean highlands community of Salinas where numerous micro-enterprises have been developed, two projects focus on:
  - Occupational health services for workers, especially at the wool mill
  - Better wastewater management to improve health and reinforce local tourism

The integration of the Master’s students’ thesis work with the various components of the full *Sustainably Managing Environmental Health Risk in Ecuador* project is perhaps best illustrated in relation to work underway that addresses the challenge of heavy metal contamination associated with mining activity:

1. One of the Master’s program training modules was conducted on site at mining communities (Portovelo and Zaruma), with field visits applying monitoring techniques and interactions with small-scale gold miners; (see Figure 4)
2. A PhD student at UBC who is a professor at the University of Machala is examining effective ways to monitor and mitigate heavy metal contamination in an affected watershed;
3. Three Ecuadorian Master’s students are working with affected communities to examine factors involved in adopting protective technologies and better health promoting adaptations to mercury intoxication and contamination;
4. Meetings at the community level are being conducted to strengthen understanding and capacity of community members to address these issues, with certificates for participation being awarded;
5. A workshop of practitioners, communities and policy-makers involved in mining activities will be held once results of the student theses are completed, addressing an area being increasingly recognized as a priority on the national level.

In all of the projects, members of the affected communities are active partners. Although these studies focus on building effective interventions to improve conditions, for the first Master’s cycle, there is a stronger emphasis on a baseline analysis and initial design of interventions. The plan is for future iterations of the Master’s to build on the relationships established, so that the experience can be analyzed, and the lessons applied in wider contexts and disseminated in scholarly publications.

**Preliminary observations on the Master’s program progress**

The overwhelming impression is of student successes, excitement and commitment. The students are a diverse group in terms of roles, training, cultural upbringing and experience. This has made delivery of modules more complex, but has greatly enhanced the learning experience for the students, the Ecuadorian faculty, and certainly the international faculty. In essence, the 30 students have evolved as a “community-of-practice”, with the program stimulating the creation of sub-communities within each collaborating university, as well as inter-university and indeed international (Figure 5). This notably is including professors who have become involved by virtue of their serving as thesis directors (in conformity with university rules) but who had not previously been exposed to the participatory development themes that are stressed in our program.
The students have repeatedly demonstrated their ability to work together, and to rapidly incorporate new skills in joint projects. Particularly exciting in this regard was the exercise of preparing and presenting quite sophisticated team posters to local and international research funding agency representatives, followed later on by individual research project posters displayed at an Open House conducted as part of Canada Week activities organized by Canada’s ambassador to Ecuador (Figure 6). It is hoped that many of the student thesis projects will lead to successful grant applications and publications. One initiative between a UBC PhD student (co-author FC) and an indigenous student in the Master’s program has already been funded by the International Development Research Centre (IDRC), and another student has linked his project to a project subsequently funded by the European Union. Students are further benefiting from other initiatives that have been pursued as a complement to the project itself, such as an exchange funded by CIDA’s Indigenous Peoples Partnership Program where Canadian (Musqueam community in British Columbia) and Ecuadorian (Totoras community in the Province of Bolivar) are partnered, providing three Ecuadorean Master’s students with the opportunity to visit Canada.

**Staying on Course: Innovations to meet the Challenges**

Spiegel et al. 2007 discussed the process of facilitating change “from the top down”. In undertaking a complex and unconventional initiative such as our Ecuador project, our UBC team itself has had a variety of very practical issues to address in ensuring that our plans could be well executed to produce the desired outputs, outcomes and impacts. Some of these, along with the innovations we developed to meet the challenges, are discussed below.

**Innovations in Bi-directional Learning:** Members are all busy, with many commitments. The nature of participation in modules repeatedly led to intense heavy time commitments to fulfill what was needed, with even more pressures to ensure follow-up with students in the face of competing demands. Language furthermore remains a major issue for some of the UBC faculty with limited knowledge of Spanish. This had some impact on the preparation for modules, which had largely been done in Canada, but has severe consequences for conduct of the modules and in planning meetings in Ecuador. For those Canadian faculty with no or suboptimal Spanish, verbal communication has been highly compromised, even with translation. This impairs ability of the faculty and students to communicate, greatly lessening the learning and impact for both. It also greatly compromises the ability to work effectively with senior decision-makers in Ecuador. And the closer we get to the sectors in need of strengthening in the Ecuadorian public universities, the more we find that very limited English capacity among both students and faculty.

The method we found for addressing the challenges related to student supervision, in light of the above, was the creation of a team of four senior UBC-based trainees who were all fluent in both English and Spanish and had sufficient understanding of the content and methodology of the project to serve as excellent liaisons between the students...
and the international faculty. This team – called the Thesis Assistant Coordinators, or CATs from the Spanish acronym, themselves constitute an international interdisciplinary group (a senior PhD student from Colombia, with a background in medicine and social science- co-author FC; a post-doctoral student, co-author RF from Brazil via doctoral training in Japan, with a background in toxicology and occupational medicine; a research associate, co-author EO from Chile, with a strong background in anthropology, alternative health and social science methodology; and a technical associate from Mexico with a good understanding of the context of the work, co-author FS).

Project faculty (including co-authors AY, AR, JS and others) credit the CATs as the saving grace of this ambitious project. Each CAT member has been assigned between 5 and 13 of the 30 students as their primary responsibility to assist, although the CATs functions as a team, with members helping out on whichever projects can use their expertise. In Canada the use of Teaching Assistants is commonplace. However, we originally did not think about budgeting for this function, not having realized the complexities and time-consuming nature of this transformative learning approach – especially to facilitate effective interaction with academic faculty in line with the new challenges encountered in CBAR. Having discovered that establishing such a team not only helps the host country, but also assists in building capacity of trainees in the developed country, this has been an especially useful addition to our initial design.

A particularly valuable contribution of the CATs has been the timely alerting of project leaders to emerging issues and potential solutions. The challenges described below, and the solutions that have been developed, include the following:

Institutional Commitments of Community Learners:  Spiegel et al. 2007 ² discussed the importance of frequently visiting and communicating with the rectors of the partner universities, keeping authorities informed and involved in all aspects of the project. What we initially did not adequately anticipate is the need to also ensure that the employers of our community-based learners also need to have on-going communications, especially when changes occur in supervisory structures. On several occasions we found that the community-based learner applicant had the full support of his or her supervisor when the program began, but by almost two years into the project, with considerable time now being spent on community field work, a new supervisor, not fully informed and in agreement with the capacity-building program, created difficulties for our students. In one case, the student had been conducting her project in a community, and her supervisor instructed her to stop visiting that community as the department had other priorities. The student, well into her community-based research was, understandably, quite upset. Moreover, the community was concerned. The community then formed a committee to visit the supervisor in question to explain why the project was important and why they wanted the department to continue the work. Meanwhile, the CATS advised the international project director to also write a letter, informing the supervisor in question about the goals of the project and the benefits to his department. We thus learned that just as we had to ensure that our academic learners have adequate institutional support for community-based work, we also have to ensure that our community-based learners also have this support.
Managing Differing Academic Backgrounds: The richness of bringing together intercultural, interdisciplinary, interregional, and international perspectives needs no elaboration. However, how to manage these different perspectives in the evaluation process is a considerable challenge. Linked to this is the fact that many academics expect a certain proficiency in academic language as a pre-condition to a student being awarded a Master’s degree. Some of our indigenous students, for example, whose first language is Quichua, have trouble writing proficient Spanish. Other students, who were explicitly recruited for their community-leadership abilities, have less developed academic backgrounds to support a requisite level of eloquence in thesis writing. However, they have been observed to excel in oral storytelling and oral story telling recording, expressing themselves in strong metaphorical and poetic language that is not easily accessible to the conventionally trained scholar. The project leadership had originally proposed to manage this challenge by merely emphasizing clarity of objectives, clarity of defining activities to meet these objectives and clarity of discussing community impact – but not necessarily eloquent writing. However, this proved difficult to operationalize, and the solution recommended by the CATs, currently being implemented, is the providing of on-site writing tutors, contracted to help the students phrase their ideas. This expense was not initially anticipated, but has now been deemed necessary, as otherwise the CAT team felt that they had to re-write the students’ work. So, the new challenges of creating a community of learning and practice is clearly creating new demands, prompting agile responses to ensure excellence in academic standards.

Managing Different Expectations from Different Team Members: The richness of bringing together intercultural, interdisciplinary, interregional, and international perspectives is not only a challenge with respect to evaluating student progress; it also presents a challenge to the student in deciding whose advice to follow. Often comments from the Canadian faculty members focused on improving academic rigour, whereas the Latin American faculty tended to focus more on addressing practical realities. Better communications amongst the thesis committee team members, with a role for the CATs is helpful. However, it is essential to ensure that the student knows that the process and final product, is ultimately his or her own decision. Being told that they must “use their own judgment” was often scary to students who, even as adult learners, are accustomed to being told what they must do. Nonetheless, our conclusion is that this is the message that must prevail in the end if we are indeed to create problem-solvers and life-long learners.

Final Observations and Concluding Remarks:

This project is still at an early stage, so while preliminary, self-administered “process” evaluation has provided constructive, positive and critical reflections, we readily acknowledge that the project warrants external review as well as sufficient time to assess true impact. Evaluating the effectiveness of participatory development is itself a challenge.
The student thesis projects all have great potential for community impact and capacity building. Because they are on topics of significance for many communities both inside and outside Ecuador, they also have the potential to contribute to world knowledge and link to further research and implementation with local and international collaborators. As Master’s programs are sustained in the partner Ecuadorian universities (assisted by the preparation of a detailed “teachers guide”) and international involvement changes from being the delivery agent to providing collegial collaboration, these impacts will be perpetuated and expanded. Furthermore, the transformations involved (of students, universities, and communities in Canada, Ecuador and elsewhere) have the potential to stimulate wider applications of the methods that have been undertaken in this endeavour.

Despite all the complexities, and all the challenges still to address, this project has been successful beyond our already high initial expectations, from the perspective of the international group, the participating Ecuadorian institutions, and the students. The multiple teaching methodologies with a focus on student learning and meaningful community participation is highly promising in terms of likely success of the individual and group research projects having real community impact. Additional local and regional opportunities for research, sharing of information and findings, and development of new programs are also looking promising.

Transforming learning from a largely passive experience to one of intense interaction through small groups and direct community engagement requires systematic mentoring to guide students through this process, so that more sustainable outputs, impacts and commitments can be consolidated. As noted by Spiegel and colleagues, the project has already been awarded the BC Centre for International Education Innovation Award. Our team is especially delighted with the progress made in transformations fundamental to participatory development:
1. From didactic to problem-based interactive teaching
2. From passive to change agent learning
3. From individual disciplinary to group transdisciplinary frameworks
4. From technocratic to critical thinking
5. From uni-cultural to intercultural perspectives
6. From university isolation to facilitating engagement and impact
7. From community-based to community-driven knowledge transfer, and
8. From international “assistance” to “community of practice” networks.

Our overall conclusion is that international, interdisciplinary, intercultural community-based learning is challenging, but well worth the effort.
LIST OF TABLES AND FIGURES:

FIGURES

Figure 1: Map of Ecuador – identifying partner universities

Figure 2: Photos from Master’s Program training module activities

Figure 3: Photos from Master’s students’ community-based thesis work

Figure 4: UBC partnering with small scale mining community - Zaruma, Ecuador

Figure 5: Community of Learning and Practice – working together

Figure 6: Canada Week Open House of thesis posters

TABLES

Table 1: Institutional and disciplinary contributions to the project

Table 2: Community-based Masters thesis projects
Figure 1: Map of Ecuador – identifying partner universities

- University Andina “Simon Bolivar”
- University of Cuenca
- University of Machala
- University of Bolivar
Small group problem-based learning is the major teaching method — incorporating UBC graduate students where possible (far right is the program’s first Ecuadorian PhD student).

Interviewing community members during the vector-borne disease training module.

Field visits are key to training in CBAR – so we did several – this one to an indigenous agricultural community where 3 Master’s students live and work.

Role play was used to dramatize the Texaco-in-the-Amazon Dispute and discuss environmental justice issues.

Students across disciplines, regions and cultures work together to prepare to present their findings.
Figure 3: Photos from Master’s students’ community-based thesis work

**Figure 3a:** Discussing Occupational Health in Salinas

**Figure 3b:** Discussing Water issues in Costa Rica

**Figure 3c:** Inspecting slaughter house in Bolivar

**Figure 3d:** Discussing land use in Cañar
Figure 4: UBC partnering with small scale mining community - Zaruma, Ecuador

A UBC professor, Ecuadorian students and community members discuss the hazards of mercury exposure.

A student assisting a mine worker to assess his mercury level.

Burning a mercury-gold amalgam, releasing mercury into the air.
**Figure 5: Community of Learning and Practice – working together**

<table>
<thead>
<tr>
<th>a. Doing field observations with communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](96x525 to 272x663)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. Analyzing results</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](88x368 to 271x488)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. Discussing implications and options</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](289x430 to 526x607)</td>
</tr>
</tbody>
</table>
As part of Canada Week activities organized by the Canadian ambassador to Ecuador to raise the profile of Canadian-Ecuadorian collaborations, over 400 colegio (senior high school) students visited posters prepared by the 30 masters students at an Open House held at the Universidad Andina Simon Bolivar.
Table 1: Two phases of the Masters Program

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Twelve Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.  Introduction (Ecosystem Approach to Human Health)</td>
</tr>
<tr>
<td></td>
<td>2.  Design, Methods and Evaluation of Community-Based Health</td>
</tr>
<tr>
<td></td>
<td>Interventions (Methods I);</td>
</tr>
<tr>
<td></td>
<td>3.  Waste, Water, Sanitation;</td>
</tr>
<tr>
<td></td>
<td>4.  Housing and Community Planning;</td>
</tr>
<tr>
<td></td>
<td>5.  Mining Communities;</td>
</tr>
<tr>
<td></td>
<td>6.  Pesticides/Agricultural Communities;</td>
</tr>
<tr>
<td></td>
<td>7.  Food, Nutrition and Sustainable Agriculture;</td>
</tr>
<tr>
<td></td>
<td>8.  Ancestral Knowledge;</td>
</tr>
<tr>
<td></td>
<td>9.  Vector-Borne Disease;</td>
</tr>
<tr>
<td></td>
<td>10. Air Pollution and Respiratory Disease;</td>
</tr>
<tr>
<td></td>
<td>11. Global Change;</td>
</tr>
<tr>
<td></td>
<td>12. Disaster Preparedness;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 2</th>
<th>Thesis and Preparation for Future Sustainability of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Thesis Seminars (interaction with Thesis Directors and International Committee</td>
</tr>
<tr>
<td></td>
<td>(‘Asesores’)</td>
</tr>
<tr>
<td></td>
<td>• Community-based Research Projects. Five criteria are used to evaluate research</td>
</tr>
<tr>
<td></td>
<td>design, process and impact:</td>
</tr>
<tr>
<td></td>
<td>i.  clear objectives of investigation with and impact on the community;</td>
</tr>
<tr>
<td></td>
<td>ii. focus on the relationships between human health, ecosystem health, and</td>
</tr>
<tr>
<td></td>
<td>wellbeing of the community;</td>
</tr>
<tr>
<td></td>
<td>iii. significant community participation;</td>
</tr>
<tr>
<td></td>
<td>iv. collaborative nature of relationships (throughout investigation and action)</td>
</tr>
<tr>
<td></td>
<td>with other students, other key actors, and the community; and</td>
</tr>
<tr>
<td></td>
<td>v.  rigorous clear methodology that is consistent with the subject and object</td>
</tr>
<tr>
<td></td>
<td>of the study</td>
</tr>
<tr>
<td></td>
<td>• Teaching for future phases of training and capacity building</td>
</tr>
<tr>
<td>Subject Area</td>
<td>Title</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dengue control</td>
<td>“Dengue vector control with an ecosystem approach and community participation in the Machala Libre community, Ecuador 2007-2008”</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dengue control before and after having applied the “cleaned backyard campaign in Machala”</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Organophosphorated and pyrethroid pesticides dynamic used in vectorial control campaigns, their impact on biological indicators and the development of alternative strategies in the Jubones community”</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Water improvement and management control in the Ecuadorian Pacific</td>
<td>“Participate action in a human consumption water management plan in Costa Rica Island”</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Implementation of a solid wasted management plan with sustainable development alternatives in Costa Rica Island community”</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evaluation of the impact on the environment and human health of mining practices</strong></td>
<td>“Evaluation of the dynamic of the mercury in the air during gold extraction process in the Portovelo community and its forms of community intervention to mitigate human health impacts”</td>
</tr>
<tr>
<td></td>
<td>“Participative action to promote health in the handcraft miners of Portovelo, Province of El Oro”</td>
</tr>
<tr>
<td></td>
<td>“Determination of mercury balance in the amalgamation process and attitude and perception analysis against contamination and public health problems”</td>
</tr>
<tr>
<td></td>
<td><strong>Water improvement and management control in the Ecuadorian Pacific</strong></td>
</tr>
<tr>
<td></td>
<td>“Prevention of diseases caused by hydric transmission throughout a community intervention plan in El Retiro community”</td>
</tr>
</tbody>
</table>
| Water analysis and participatory management in the upper highlands of Ecuador (Tucayta, Cañar) | “Evaluation of water contamination from residual water in Cañar city its impact and possible mitigation with community participation of Tucayta” | Segundo Alulema | • University of Cuenca  
• Community of Tucayta  
• Community leaders and local farmers and agricultural organizations |
| “Sustainable participatory management of the Patococha highlands” | Marcelo Verdugo | • University of Cuenca  
• Community of Patococha, Tucayta |
| “Mitigation and evaluation proposal of the quality of water used in the Communities of Corrueco, La Posta, Chaglaban and Cuchucun” | Cesareo Guaman | • University of Cuenca  
• Community and authorities of Corrueco, La Posta, Chaglaban and Cuchucun |
| “Curricular health proposal with an ecosystem approach to the Faculty of Medical Sciences within the University of Cuenca 2007-2008” | Jorge Parra | • University of Cuenca (Faculty of Medical Sciences)  
• Internal student and workers association |
| “Infectious and gastrointestinal diseases: Prevention, antibiotics use and bacterial resistance in children. Corrueco community. Tucayta Organization, Cañar, Ecuador” | Georgina Munoz | • University of Cuenca  
• Community of Corrueco, Tucayta, Cañar |
| Water improvement | “Water and Health for development: Proposal for healthy water management and community development in San Juan de Gualaceo community” | Ulises Freire | • University of Cuenca  
• Community of San Juan de Gualaceo |
| Water management | “Management and water administration in the Tacabay watershed river, Azogues Community, Ecuador” | Leonardo Medina | • University of Cuenca  
• Community of Azogues |
| Air analysis | “Handcraft brick and tile rescue as an ecosystem health defense for the San Jose de Balzain population” | Lorena Mosquera | • University of Cuenca  
• Community of Jose de Balzain, Cuenca  
• Popular coordinator against mining companies |
| Pesticides | “Application of Bio-assays with onion bulbs and monitoring water safety in Azuay” | Orlando Felicita | • Community of Azuay  
• Centro de Estudios de Asesoría en Salud (CEAS)  
• University of Cuenca |
| Pesticides | “Exposure to pesticides and their effects on nutrition in the community of Santa Rosa de Totoras” | Guillermo Lombeyda | • University of Bolivar  
• Community of Santa Rosa de Totoras |
| Pesticides | “Elements for an alternative and regulatory mainframe proposal in the production of flowers” | Alex Zapatta | • University of Cuenca  
• Community of Cayambe |
<table>
<thead>
<tr>
<th>Occupational Health</th>
<th>“Health determinants and intervention strategies to improve occupational health in the Salinas communal spinning mill factory. Province of Bolivar”</th>
<th>Mary Mosso</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancestral practices and knowledge applied to Health and water conflicts</td>
<td>“Ancestral practices to resolve land and water conflicts in the indigenous communities of Corralpampa, Rodeopamba and Guantucoto in Guaranda, Province of Bolivar, Ecuador”</td>
<td>Vicente Ninabanda</td>
</tr>
<tr>
<td></td>
<td>“Ancestral knowledge and reproductive sexual health in Santa Rosa de Totoras community and Ambrosio Lasso”</td>
<td>Alicia Chela</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>“Study of labor condition in the Guaranda municipal slaughter house and its relation with contamination”</td>
<td>Alex Garcia</td>
</tr>
<tr>
<td>Water analysis</td>
<td>“Evaluation of the Salinas river contamination and measurements identification for its mitigation in the province of Bolivar, Ecuador.”</td>
<td>Juan Gaibor</td>
</tr>
</tbody>
</table>

- University of Bolivar
- Community of Salinas, Bolivar
- Urban centre of Salinas
- Management of the Spinning Mill Factory
- Foundation of farmers organizations in Salinas
- Community leaders in Santa Rosa de Totoras
- University of Bolivar
- National Institute of Indigenous Health
- Agriculture and Indigenous organizations in Santa Rosa de Totoras
- Municipal Government of Guaranda
- Local Ministry of Health
- Management of the slaughter house
- University of Bolivar
- Community of Salinas, Bolivar
<table>
<thead>
<tr>
<th><strong>Disaster preparedness</strong></th>
<th><strong>“Evaluation of the Salinas river contamination and measurements identification for its mitigation in the province of Bolivar, Ecuador.”</strong></th>
<th><strong>Raquel Gavilanes</strong></th>
<th><strong>University of Bolivar</strong>&lt;br&gt;<strong>Municipal Government of Guaranda</strong>&lt;br&gt;<strong>Community of La Curgua</strong>&lt;br&gt;<strong>Local Minister of Health</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water analysis</strong></td>
<td><strong>“Implementation of an education and communication strategy for environmentally risk prevention and their influence on health quality of life in the Santa Rosa de Totoras, Bolivar Ecuador”</strong></td>
<td><strong>Esthela Guerrero</strong></td>
<td><strong>Community of Santa Rosa de Totoras</strong>&lt;br&gt;<strong>University of Bolivar</strong></td>
</tr>
<tr>
<td><strong>Pine plantations and its impact to the ecosystem</strong></td>
<td><strong>“Evaluation of the impacts caused by contaminated residual waters, solid waste and tourism in Las Cochas, Province of Guaranda, Ecuador”</strong></td>
<td><strong>Jimmy Mena</strong></td>
<td><strong>Community of Las Cochas</strong>&lt;br&gt;<strong>Municipal Government of Guaranda</strong>&lt;br&gt;<strong>University of Bolivar</strong></td>
</tr>
<tr>
<td></td>
<td><strong>“Influence of the pine plantations (Pinus spp) on the change of the ecosystem structure in the highland and its links with the loss of natural resources in the Casaca Totoras forest”</strong></td>
<td><strong>David Silva</strong></td>
<td><strong>Community of Totoras</strong>&lt;br&gt;<strong>University of Bolivar</strong></td>
</tr>
</tbody>
</table>
References


