TRANSDISCIPLINARITY AND PARTICIPATION:

AN EVALUATION OF TRANSDISCIPLINARITY AND PARTICIPATORY ASPECTS OF THE IDRC ECOSYSTEM APPROACHES TO HUMAN HEALTH PROJECT INITIATIVE

Final Report

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PART I: INTRODUCTION

The Ecosystem Approaches to Human Health Program Initiative focuses on the goal of improving human health through more effective management of the stressed ecosystems within which human beings live and work.

The conceptual rationale put forward by the Ecosystem Approaches to Human Health PI in its original "Prospectus" centers on the following. The goal is

> *"to improve human health by supporting transdisciplinary research on the structure and function of stressed ecosystems on which people depend for their lives and livelihoods and by applying this knowledge to the development of appropriate intervention strategies," and more specifically,*
>
> *"to improve human health and well-being while simultaneously maintaining a healthy ecosystem based on ecosystem management rather than health intervention alone."*

At the core of this conceptionalization is the idea that meaningful intervention can occur where ecosystem and human systems overlap.

The objectives of this work were broken down as follows.

1. Describe, develop, and test new and improved tools and methods for research on ecosystem approaches to human health that incorporate societal needs;
2. Describe, develop, and test the ecosystem approach for assessing causal linkages between human health and the natural and anthropogenic environments;
3. Building on the results of objective 2, support the development and testing of ecosystem management approaches to human health in the context of sustainable ecosystems, with particular emphasis on the use of participatory methods; and
4. Disseminate the concept of improving human health through better ecosystem management that respects human development imperatives.

The core research processes of "transdisciplinarity" and "participation" were singled out as being critical elements that are integral to the implementation of the eco-health paradigm.

In October 1999, the Four Worlds Centre for Development Learning (Cochrane, Alberta) was contracted to "conduct a review of the Ecohealth PI's progress in the use of transdisciplinary and participatory methods on programming its activities and in the

implementation and outcomes of the projects it supports" (from the Offer of Consultancy contract).

For various reasons, internal to the PI's work load, work did not begin on the evaluation until April/May 2000, when all of the PI team members were able to attend an initial retreat workshop.

This document is the final report on an evaluation process that involved the following steps and stages.

1. Initial meetings with the PI team to finalize the evaluation questions, discuss the process and methodology of the evaluation, and to conduct individual interviews with all members of the Team.
2. Review of all relevant documents including the PI's own "Prospectus" documents, all research project proposals, project review documents, progress reports and relevant PI evaluations, as well as selected conceptual papers related to the eco-health paradigm.
3. The facilitation of a PI team retreat to capture an emerging consensus on the working meaning and implication of key concepts and terms central to the PI's work such as "ecosystem," "health," "participation," and "transdisciplinarity." The methodological purpose of this exercise was to ensure conceptual consistency of the Team's evolving thinking, and to utilize these key concepts as a standard against which to compare the underlying concepts animating the core processes of transdisciplinarity and participation within ongoing research projects in the field.
4. The subsequent preparation of a reflective document entitled "Coming to Terms: Toward a Strategic Conceptual Framework for Evaluating 'Transdisciplinarity' and 'Participation' in the Ecosystem Approaches to Human Health Program Initiative." This document is included as Part II of this report.
5. Field visits to six projects in four countries as follows.
   a) Environmental and Health Impacts of Small-Scale Gold Mining in Ecuador (IDRC Project No. 04291);
   b) Human Health And Changes In Potato Production Technology In The Highland Ecuador Agro-Ecosystem (IDRC Project No. 004321);
   c) Urban Ecosystems Health Indicators in Habana, Cuba (IDRC Project No. 03825);
   d) Integrated Approaches to Safe Drinking Water Quality in Santiago de Cuba (IDRC Project No. 03329-03-1);

e) Livestock and Agro-ecosystem Management for Community-based Integrated Malaria Control (East Africa) in Kenya (IDRC Project No. 100482); and

f) Enhanced Human Well-being Through Improved Livestock and Natural Resource Management in the East African Highlands (Ethiopia) (IDRC Project No. 03494).

Note: PI team member Dr. Roberto Bazzani participated in the visit to the Ecuador Gold Mining Project, (a) above, and team member Dr. Don Peden participated in the visits to the Kenya Malaria Control Project and to the Ethiopia Enhanced Well-being Project, (e) and (f) above.

6. Letters and guiding questions were sent by email to project teams not visited inviting comments and insights (only a few substantive responses received).
7. Write up of the case reviews for projects visited (included as Part III of this report).
8. Face-to-face discussion with the Eco-health PI team regarding the outcomes of the evaluation.
9. Preparation and submission of the final draft report.

METHODOLOGY

The engagement of all field research teams and key informants followed the same methodological process.

1. The guiding questions (translated into Spanish where required) was presented to the research teams for reflection (the questions are reprinted in Appendix A).
2. A preliminary meeting was held in which the key questions were discussed in terms of the team's perspective on what the questions meant to them in their context and on the team's view of how the processes of transdisciplinarity and participation were actually being implemented in the project.
3. This was followed by site visits to the "ecosystem" being researched which included a review of project activities, and where possible, meetings with on-the-ground research assistants, stakeholders and partners.
4. Finally, a wrap-up team meeting was held, in which discussions continued on the researchers teams' experience with the processes of transdisciplinarity and participation; and in which I provided initial feedback on what I saw in terms of findings and

recommendations. In this meeting, there was an intentional focus on learning, rather than judging, and teams were encouraged to outline their own capacity building needs.

Consideration of the Gender Dimension

In the development of the overall design for this study, it was extremely difficult not to deal explicitly with the issue of gender, which is always and everywhere present in ecosystem research conceptualization and implementation. While effective participatory processes are also, by definition, gender inclusive, there is more than inclusivity to gender analysis in research. It became evident that a gender integrative approach is really a critical research process, and is too important, and too large an issue to be subsumed under "participation." Since this evaluation contract explicitly called for the evaluation of "transdisciplinarity" and "participation," I have limited the focus of discussion to those issues and have not attempted to address the gender integrative dimension.

ORGANIZATION OF THIS REPORT

Part I: Introduction

Part II: "Coming to Terms: Toward a Strategic Conceptual Framework for Evaluating 'Transdisciplinarity' and 'Participation' in the Ecosystem Approaches to Human Health Program Initiative"

Part III: Case Reviews of Six Projects Visited

Part IV: Summary of Findings and Recommendations

Appendices: A. Guiding Questions
B. Ladder of Participation
C. List of Individuals Consulted
D. Summary of Findings & Recommendations

PART II: COMING TO TERMS: Toward A Strategic Conceptual Framework for Evaluating "Transdisciplinarity" and "Participation" in the Ecosystem Approaches to Human Health Project Initiative.

The concepts of *transdisciplinarity* and *participation* are both technical terms that designate whole fields of dynamic interaction and activity. In order to evaluate these fields within the Ecosystem Approaches to Human Health Project Initiative, three primary levels of engagement need to be considered.

1. *The PI Level* — pertaining to the ongoing action and reflection dynamic that is continuously contributing to an emerging research and development paradigm. This level pertains to how the PI conceptualizes and implements the key concepts and themes of its own model, and how that implementation process reflects the process objectives enshrined within the concepts of transdisciplinarity and participation.

   At this level, both the PI's work with prospective and existing research projects, and the evolving conceptual framework that flows from this work constitute the primary fields within which evaluation can take place.

2. *The Research Project Level* — pertaining to the on-the-ground project development and implementation of research programs funded by the PI, with particular attention to the way processes of transdisciplinarity and participation are integrated into all aspects of project activity.

   At this level, the composition and functioning of the research team, the way research problems are identified, analyzed and articulated, the nature of the relationships between professional researchers and other stakeholders (and most especially the relationship between researchers and the intended beneficiaries of the project), all constitute primary fields within which evaluation can take place.

3. *The Community Level* — pertaining to two distinct categories of people.
   a) the intended beneficiaries of the intervention, i.e. those whose health is to be positively impacted by project activities; and
   b) other stakeholder groups impacted by project activity and proposed outcomes.

   At this level, primary fields within which evaluation can take place include the network of relationships and activities related to field research, specific social aggregates within the impacted community such as women, farmers, youth, etc., specific interest groups

both within and connected to the impacted communities and to the ecosystem(s) impacted by the research, and other stakeholder groups impacted by the initiative.

CLARIFYING THE BASIC CONCEPTS

Fundamental to evaluating the processes of *transdisciplinarity* and *participation* within the still emerging conceptual framework of the PI's approach is to refine definitions of the key concepts that make up the approach (in light of the first four years of PI experience in implementing the model), and to identify critical implementation issues that arise from each of the concepts. Unless process themes such as transdisciplinarity and participation are conceptualized *in relationship* to the conceptual ecosystem to which they are integral (i.e. the Ecosystem Approaches to Human Health Program Initiative), the evaluation will be of little practical use to the ongoing development of that program initiative.

For this reason, a PI team retreat was held in May 2000, and the combined insights and experience of the team was focused on refining a strategic conceptual framework consisting of key definitions and critical issues related to the following foundation concepts that make up the ecosystem approaches to health paradigm.

1. Ecosystem
2. Health
3. Management
4. Participation
5. Transdisciplinarity
6. Gender Integrative Approach
7. Equity

These definitions, along with the implementation issues identified in connection to each of them will serve as a conceptual backdrop and provide a rough standard against which participation and transdisciplinarity can be evaluated in the life of the program initiative.

ECOSYSTEM

Definition

An "ecosystem" is a limited portion of the biosphere that is geographically and functionally coherent, containing both living and non-living components, and the interactions among them. An ecosystem is as much an analytical construct as an active biological entity. Its precise physical boundaries are defined by the purposes and limits of analysis.

Critical Features and Issues

1. Ecosystems function as if they were living organisms.
2. The constituent elements and members of an ecosystem operate within nested hierarchies of mutual support and dependency. Therefore what happens to one level of the system can impact the constituents of other levels that may, at first glance, seem unrelated to the incursion.
3. Ecosystems have boundaries and relatively stable patterns of internal operation that are subject to adaptation, change and disruption.
4. Ecosystems do not exist in isolation, but rather, are in constant state of interaction with elements and aspects of other systems. Hence, they are open systems with relatively continuous input and output.
5. The relatively stable patterns of ecosystem operation are continuously fluctuating and adapting to accommodate shifting conditions and circumstances while at the same time maintaining the basic integrity and life supporting nature of the relationships that exist between the constituents of the system.
6. There are natural limits to the carrying capacity of all ecosystems, beyond which they are no longer able to adapt to stresses which impact their basic functioning. When this happens, ecosystems break down, and the living species that depend on them for well-being and survival are threatened.
7. Ecosystems are, at any given time, a product of the history of both gradual and subtle changes as well as sudden and even catastrophic shifts that have impacted the nature of the system, and its living processes.
8. Human beings are an integral part of many ecosystems and human life and activity have impacted virtually all ecosystems on Earth.

9. Indicators of ecosystem health include such features as
   a) *sustainability*—the capacity to self-regenerate the life sustaining processes of the system into the foreseeable future
   b) *productivity*—the degree of life regeneration that is occurring
   c) *degradation*—the degree of breakdown of basic life support systems within the ecosystem

HEALTH

Definition

The term "health" refers to the individual and collective well-being of people. To be healthy is not only to be free of disease, but also to exercise a well-functioning capacity to effectively sustain well-being in all of those aspects of life that contribute to health.

Critical Features and Issues

1. Human health is multi-dimensional, involving the mental, emotional, physical and spiritual well-being of individuals and families and the political, economic, social and cultural well-being of communities and regions.
2. "Those aspects of life that contribute to health" (see definition above) are usually referred to as the "determinants of health" in health literature. Broad categories of determinants listed in health promotion literature such as biophysical, environmental, socio-economic, ecological, and health and safety-net systems need to be unpacked and mapped in each specific context in order to identify what the determinants of health really are for any given population. Following is a more detailed list that shows specific types of determinants that impact people's health almost anywhere.
3. This list was synthesized from community consultations with Indigenous Nations and dominant culture communities across Canada, the US, Mexico, Papua New Guinea, South East Asia and the former Soviet Union. When community people were asked to name the determinants of health, these are the things they said are critical. The consensus across many communities and cultures is remarkable.[1]

[1] See for example; Evans, Barer and Marmor (1994); Evans and Stoddard (1994); and Oakley (1989).

a) ***Healthy ecosystem and a sustainable relationship between human beings and the natural world*** — the carrying capacity of ecosystems upon which human beings depend for livelihood and well-being is able to sustain the nature and extent of human activity. Economic survival and prosperity are not pursued at the expense of environmental degradation. Human beings work with nature in a mutually beneficial partnership.

b) ***Basic physical needs*** — adequate nutrition, clothing, shelter, pure drinking water, sanitary waste disposal and access to medical services.

c) ***Spirituality and a sense of purpose*** — connection to the Spiritual foundations of all existence and a clear sense of purpose and direction in individual, family and community life, as well as in the collective life of the region.

d) ***Life-sustaining values, morals and ethics*** — guiding principles and a code of conduct that informs choices in all aspects of life so that at the level of individuals, families, institutions and whole communities, people know which pathways lead to human well-being, and which to misery, harm and death.

e) ***Safety and security*** — freedom from fear, intimidation, threats, violence, criminal victimization, and all forms of abuse both within families and homes and in all other aspects of the collective life of the people.

f) ***Adequate income and sustainable economics*** — access to the resources needed to sustain life at a level that permits the continued development of human well-being, as well as processes of economic engagement that are capable of producing sustainable prosperity.

g) ***Adequate power*** — a reasonable level of control and voice in shaping one's life and environment through processes of meaningful participation in the political, social and economic life of one's community and nation.

h) ***Social justice and equity*** — a fair and equitable distribution of opportunities for all, as well as sustainable mechanisms and processes for re-balancing inequities, injustices and injuries that have or are occurring.

i) ***Cultural integrity and identity*** — pride in heritage and traditions, access to and utilization of the wisdom and knowledge of the past, and a healthy identification with the living processes of one's own culture as a distinct and viable way of life for individuals, families, institutions, communities and nations.

j) ***Community solidarity and social support*** — to live within a unified community that has a strong sense of its common oneness and within which each person receives the love, caring and support they need from others.

k) ***Strong families and healthy child development*** — families which provide a strong focus on supporting the developmental needs of children from the time of conception through the early years and all the way through the time of childhood and youth.

l) ***Critical learning opportunities*** — consistent and systematic opportunities for continuous learning and improvement in all aspects of life, especially those connected to key personal, social and economic challenges communities are facing, and those which will enhance participation in civil society.

m) ***Adequate human services and social safety net*** — programs and processes to respond to health emergencies, provide long term primary care, support and enhance social and economic development, as well as to protect and enable the most vulnerable to lead lives of dignity and to achieve adequate levels of well-being.

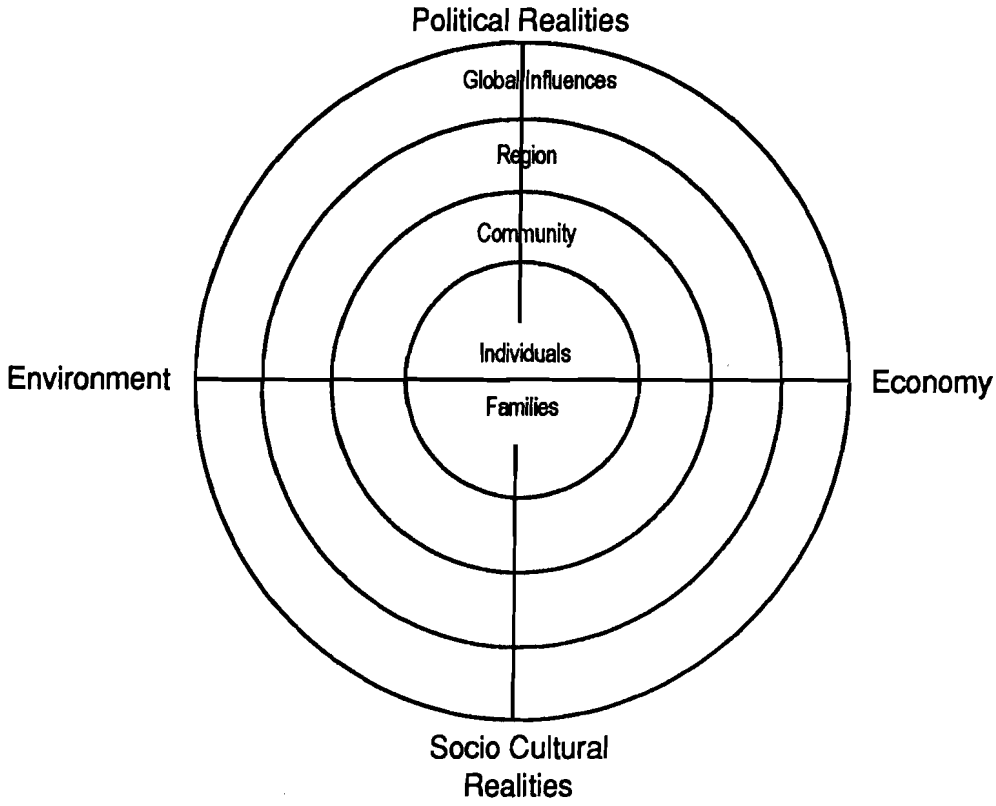
n) ***Meaningful work and service to others*** — Opportunities for all to contribute meaningfully to the well-being and progress of their families, communities, nations, as well as to the global human family.

o) ***Healthy choices*** — Human beings develop patterns and habits of lifestyle choices (such as to smoke or not to smoke), and are capable of choosing a pattern of life that leads to health.

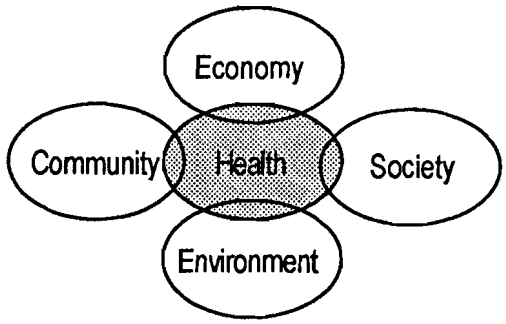
1. Several models each contribute to understanding the dynamics of health promotion within the context of development.

   a) Nested Hierarchies

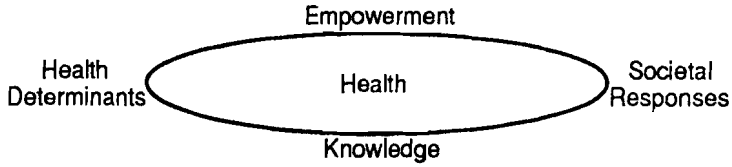
(The Medicine Wheel)



b) Overlapping Domains of Influence



c) Dynamics of Interactive Influence



No one model tells the whole story, but models do help to integrate complex systems-thinking of the type required to grasp the true nature of health related issues and challenges.

4. In order to undertake an intervention within the ecosystem and human health paradigm that will influence people's health in any given context, the following concrete steps are needed.

   a) map the indicators of ill-health (morbidity, mortality, etc.);

   b) map the determinants of health relative to that specific context and population;

   c) intervention needs to address multiple levels simultaneously (individual, community, society); and

   d) focus on specific "entry point" health issues that are susceptible to influence through ecosystem management.

MANAGEMENT

Definition

Management (in the context of managing ecosystems to improve human health) is the process of influencing the relationships between human beings and natural ecosystems in such a way that ecosystem stresses are eliminated or mitigated and human health is thereby improved.

Critical Features and Issues

1. *There are two critical dimensions* within this type of management: (a) the first related to technical questions concerning such issues as ecosystem stability, requirements for minimizing stresses or mitigating degradation and, identification of linkages between the health of the ecosystem and human health; (b) the second critical dimension relates to managing human behaviour and involves identifying all relevant stakeholders, resolving conflicting interests between various stakeholder groups, building sustainable power sharing arrangements into effective co-management or governance structures, and building the capacity of key players to carry out agreed upon solutions.
2. Effective ecosystem management generates a win-win outcome for human beings and for the ecosystem.

3. Research is a critical ingredient in ecosystem management. The role of research is to provide a clear picture (whenever needed) of the health of the ecosystem, of the nature and impact of the stresses the ecosystem is experiencing, of the linkages between ecosystem health and human well-being, and of the nature of the social world(s) that must be influenced in order to effectively manage the ecosystem. The establishment of baseline measures and the monitoring of progress are research related activities that function as essential management tools in ecosystem management processes.
4. Goal setting is a contentious area in ecosystem management. You can't manage without a purpose, but we are often faced with competing sets of interests, and hence competing goals. Managers/groups need to know about a range of alternatives. This can require research, knowledge development and even capacity building to get to the point where reasonable and effective compromises can be made.
5. One obvious goal of any management process is some degree of accuracy in predictions and some degree of control. Ecosystem management is an extremely complex process. There are often many variables that can neither be predicted nor controlled (such as political shifts, civil war and natural catastrophes). Coping strategies to help people and the ecosystem ride through a period of chaos are therefore an essential part of effective ecosystem management. In practice, this usually requires that the management system expand, to engage and even internalize factors (such as political or economic power brokers) that pose a potential external risk to the health of the ecosystem and the well-being of people. During periods where stresses cannot be controlled, safeguards are needed to bolster and protect the well-being of people. This is critical because when people's well-being is threatened, they often have little choice but to exploit the natural world anyway they can in order to survive. This creates a deadly feedback loop. As the integrity of ecosystems are further undermined, their capacity to sustain life, including human life, is further diminished.

PARTICIPATION

Definition

Participation is the active engagement of the proposed beneficiaries of research and development, as well as those who need to be a part of building practical solutions, in the core processes of research and development interventions.

Critical Features and Issues

1. Not all participants are equal. The people whose lives and environments are to be impacted by development interventions are primary stakeholders and their well-being is the pivotal standard against which the success of development interventions must be measured.

2. Authentic participation entails a shift from being passive recipients (i.e. objects) of development interventions to becoming active doers and makers of the process. Development cannot be delivered to the people, because it is fundamentally something that comes from within them.

3. Participation is to real learning, growth and development, as movement is to dance or sound is to music. It is of the essence of the process. If there is no participation, there is no development.

   This is because authentic development entails the building of human capacity to produce and maintain beneficial and sustainable patters of living; and human beings can only learn, grow and develop by directly interacting with, and reflecting upon the world around them.

4. There are levels of participation that range from responding to the initiatives of others to being the initiator and control of the process. One author (Arnstine, 1959) referred to this continuum as the "ladder of participation." Power is the primary determinant that indicates the degree of participation; power to define and analyze the problems, to establish the vision and goals, to devise, carry out and manage the intervention, to create new knowledge, and to evaluate the outcomes.

5. Appropriate levels of participation need to be negotiated in every development context between partners. Everyone does not have the same roles, needs, interests and capacities. The primary work of grassroots' beneficiaries relates to their own well-being and prosperity. The primary work of intervenors relates to building enabling systems that support and assist developing people. Each group needs the other, but every particular development context is different, and appropriate levels of participation of the various stakeholders can only be worked out through collaborative dialogue.

6. Most development contexts have multiple stakeholders. Each set of stakeholders has their own agenda, and also, their own needs related to the participation process itself. Sometimes these agendas and needs collide, and considerable care and skill is needed to build engagement processes that can be equally effective for all participants.

7. Grassroots' beneficiaries are often the most vulnerable to being shut out of effective multi-stakeholder participatory processes. Because of vast differences in power (Who really owns the process?), wealth (to cover the cost of participation related to time, travel, childcare, lost income, etc.), educational differences, language barriers, social status, cultural differences, etc., effective beneficiary participation requires an extra measure of care and patience, the investment of time and resources, the offsetting of the real costs of participation, capacity building, advocacy and support services, and most especially, the will and determination to do what it takes to ensure that the primary stakeholders of the development intervention (i.e. the intended beneficiaries) are able to play a significant and appropriate role in the process.

8. Barriers to effective beneficiary participation can be categorized into three general groups.

   a) *Structural and Administrative Barriers* — having to do with the distribution of power and control in the core processes of development interventions (Who defines and analyzes the problems, designs the solutions, manages the intervention, [i.e. controls the timing, the money, the personnel, etc.] and evaluates the results?). This set of barriers often involves conflicts between the culture and agenda of intervenor organizations versus the culture and agendas of developing people.

   b) *Internal Socio-Cultural Obstacles* — having to do with obstacles inhibiting beneficiary participation that exist within the life patterns of the beneficiary population. Examples of this sort of barrier includes unequal power arrangements and the systematic exclusion of some people from having a voice, deep-seated dependency and dysfunctionality (such as occurs from post-traumatic stress syndrome), or sheer deprivation that prevent the poorest from having the time, energy, resources or even the will to participate, and lack of capacity.

   c) *Professional/Facilitative Barriers* — having to do with the way intervenors interact with beneficiary representatives, either in ways that empower and enable or in ways that disempower and shut out meaningful participation.

9. Outside intervenors are particularly handicapped in attempts to foster meaningful and effective beneficiary participation because they are not sure who "represents" the community. Indeed, who is the community? For this, and many other practical reasons, it is critical, at the outset of development intervention processes, to map the social world the project seeks to influence, as well as to map the ecosystem(s) within which the people are living.

This is, to some extent, a chicken and egg problem because there is no way to map the social world without community insider participation. Nevertheless, it is necessary to make the best maps possible and to continue to improve them as the process unfolds.

10. The use of participatory methodologies for research and evaluation purposes can create a philosophical and methodological conflict, particularly between natural science researchers trained in reductionistic and objectifying approaches (i.e. the scientific method), and social science researchers and development practitioners employing participatory approaches. The harmonization of these approaches within the framework of a single integrated intervention is both possible and necessary.

TRANSDISCIPLINARITY

Definition

The term "transdisciplinarity" (in the context of the Ecosystem Approaches to Human Health Program Initiative) refers to research efforts carried out by teams of experts from a variety of complementary disciplines, through a process in which the researchers transcend the boundaries of their own disciplines (i.e. language, assumptions, theories, models, etc.) and generate new logical frameworks, new methodologies and new knowledge and insights born of the synergy that is created between them.

Critical Features and Issues

1. A transdisciplinary approach is not the same as a multi-disciplinary (sometimes called interdisciplinary or cross-disciplinary) approach. The key difference is that a multi-disciplinary approach involves the collaboration of two or more disciplines on a research problem, but does not require researchers to work beyond the boundaries of their own disciplines. It is rather, an exercise in fitting together multiple lines of action that run parallel to each other and occasionally combine to provide insights from each of the contributing disciplines. By contrast, a transdisciplinary approach requires that researchers from different disciplines create a "virtual discipline" with its own basic assumptions, theories and models, research protocol methodologies, etc. for the life of that specific project.
2. Transdisciplinarity is a process and a way of working that is quite foreign to the dominant culture of the academy (i.e. most universities and research programs), and to the training and expectations of most researchers.

It therefore requires a set of values, attitudes and behaviours that need to be learned.

This learning is unlikely to happen by itself. It needs to be facilitated by someone who understands the true nature of the challenge, and who has the vision and the leadership capacity to inspire others to adhere to the process.

3. A transdisciplinary research process requires a common focus (i.e. an entry point) in the form of a problem or set of problems that the team can approach and begin to grapple with from the points of view of the various disciplines represented on the team. From this starting point, the process can then move forward. It is important not to use the goal of transdisciplinarity to bar the contributions the various disciplines can make to understanding the issues. The foundation of transdisciplinarity is a well executed multi-disciplinary effort that moves beyond itself into uncharted waters. There needs to be room for multi-disciplinary specialist activity within a transdisciplinary framework.

4. There are a number of obstacles to this transdisciplinary approach which needs to be overcome if the approach has any hope of success.

   a) The approach is not supported (i.e. reward system, culture, etc.) by the academy. Education, creating new reward systems, negotiating the "space" to work in new ways, and constant public relations within the academy are all aspects of the work to be done to deal with this set of obstacles.

   b) Taming the primadonnas (within the egosystem) is another challenge. Most research groups have one or more senior researchers with enough success behind them, ambition, ego, and power to expect that they will be able to dominate any research enterprise with which they are associated. Strategies to address this set of challenge include

      i) fostering and building the capacity of effective facilitators ;

      ii) establishing research protocol that requires and rewards transdisciplinary collaboration;

      iii) establishing project co-management structures that keep real power in the team and prevent it from residing in one individual or discipline; and

      iv) the generation of creative and original research results will go a long way to legitimating the transdisciplinary approach, both to (most) participants in the research process and to the academy at large.

5. The establishment of a transdisciplinary research protocol (within which all disciplinary participants can function) requires building a model of the ecosystem under study that

draws on the insights of all participating disciplines, and that shows the dynamic interactions between the various sets of models. *The process will become transdisciplinary as the research team begins to generate new insights* that emerge from the interplay of insights rooted in the participating disciplines.

6. The selection of team members and team building are critical aspects of the process. Participants need to be open-minded, no matter what their disciplinary background, and research teams are bound to go through a normal process of building constructive relationships and learning to function as a team (rather than as individuals operating in a cluster). The group formation process of forming, storming, norming and performing is likely to apply to most transdisciplinary teams as they come together. The longer the team is together, the greater the chance that it will learn to be effective as a transdisciplinary team. Facilitation and leadership are key ingredients that can make a big difference to both the time this process takes, and the success of the outcome.

7. A key problem for transdisciplinary research teams operating within the Ecosystems Approach to Human Health Approach is how to effectively integrate community participation, or more directly, how to include local knowledge as a legitimate "discipline" to be brought into the transdisciplinary process. Subsets of this problem include how to reconcile the communication and group dynamic pattern of professional researchers with those of communities; how to access and integrate local knowledge holders, how to integrate scientific and traditional knowledge, how to decide when to involve community voices and how best to do it; how to work effectively with other (non-researcher) stakeholders from the community, NGO's, governments, etc., and; how to build the community's capacity to participate as co-researchers.

8. When communities are engaged as partners in research processes, there will be costs to the researchers (as well as to the community) in the sense that communities will often ask for help on development issues not directly connected to the research question (in the minds of the professional researchers). The partnership needs to be flexible enough to accommodate this lateral need when it is possible and reasonable to do so, if for no other reason than to give something back to the community *that is important to them* in exchange for their help in the research process.

9. At various stages of the research, the dialogue and collaborative dynamics of the research process needs to be expanded to include all relevant stakeholders (government, business, community, etc.). When and how depends on the situation, but these groups who will have to contribute to solution-building must somehow be incorporated into the

knowledge development activity early enough in the process so that they can contribute to it and develop some ownership for it.

10. Guiding the evolution and development of transdisciplinary projects is challenging, especially when project ideas emerge from one or the other disciplines, and researchers do not "see" the transdisciplinary nature of the problem they are proposing to address. For this reason, the development of transdisciplinary projects should be expected to take time, and require the investment of resources in the project development stage.

GENDER INTEGRATIVE APPROACH

Definition

A gender integrative approach (within the activities of the Ecosystem Approach to Human Health Initiative) is one which *sees* the differentiated roles, power arrangements, basis of knowledge and experience, and capacity to contribute to development of women and men within the population to be impacted by an intervention, and which constructively *engages* these differences such that the intervention is reinforced by the insights and capacity of both genders, and so both women and men are positively impacted by the intervention.

Critical Features and Issues

1. The respective roles women and men play within any given ecosystem are differentiated by many factors: work related role assignments, access to resources, power distribution, cultural factors, basis of experience and traditional knowledge differences between men and women, the impact of previous "development" interventions on women versus men, etc.
2. A gender integrative approach must ensure that, on the one hand, research and development interventions do not somehow negatively impact women or men, and on the other, that the researcher's own cultural standards relative to gender issues are not imposed on other people's cultures and communities.
3. A gender integrative approach is not only about equity. It is also about good science.
   a) men and women often have different spheres of activities, and therefore their impact on the ecosystem and their respective knowledge basis about it are different.
   b) men and women will often be affected differently by development interventions aimed at influencing the health of ecosystems and the health of people

4. An effective gender integrative approach cannot be confined to the level of individuals or households or even communities. There are important domains of impact that must be considered at each level of activity. Following is a simple framework[2] adapted for use in assessing gender integration in development related initiatives.

LEVELS	DOMAINS
• individual	• knowledge and experience
• household	• representation, voice, power
• community	• differentiation/similarity of roles and experiences
• inter-community (subregion)	
• region	• participation (nature and quality)
• global	• development impacts

5. When a gender-sensitive approach is taken to scientific research and development interventions, it leads (in terms of outcomes and impacts) to greater levels of equity (between women and men), greater program effectiveness, and cost effective outcomes.

6. When ecosystems are stressed such that the human beings living within them are impacted, that impact is distributed across the social system differently for women than it is for men. These gender-specific impacts need to be understood and addressed in order for interventions to be effective.

7. When everyone in a social system is highly impacted by stress, it is often possible to shift the dominant social energy from conflict to cooperation, particularly with a strategy that focuses on women.

8. Involving women on research and intervention teams can increase the team's access to important parts of the population.

9. The number of women involved in research teams and on committees is often taken as a measure of empowerment. However, in circumstances of high system stress, their involvement may introduce more stress into the system because of conflicting demands on their time and energy.

[2] Proposed by the team's gender specialist.

Equity-Driven Approach

Definition

An equity-driven approach (within the activities and outcomes of the Ecosystem Approach to Human Health) refers to the recognition that inequality and injustice exists in every society, that some people are poorer than others, and that some have more power, greater access to resources and greater capacity to participate in and benefit from development interventions than others. An equity-driven approach consciously engages the disadvantaged sectors of society in development processes and explicitly strives to ensure that benefits reach them.

Critical Features and Issues

1. Gender is a critical social aggregate related to which equity issues routinely arise, but it is certainly not the only one. Other aggregates such as ethnic differences, class, religious background, and age and stage of life are also important categories and merit considerations.
2. Many of the critical issues related to gender (and identified in a previous section) also apply to other social aggregates. The most notable of these include the following.
    - The disadvantaged tend to play different roles within the ecosystem, than the advantaged. They have different spheres of activity, and therefore their impact on the ecosystem and their knowledge base concerning it are often different.
    - The disadvantaged have different (often less) capacity to respond, to develop interventions, or to participate meaningfully within them.
    - The disadvantaged will often be impacted differently by policy changes and by development interventions than the advantaged.
3. When ecosystems are stressed, the disadvantaged are often stressed more than the advantaged, and are more likely (in turn) to respond by putting even greater stresses on the ecosystem, simply because they have no economic or social buffers to protect them in hard times.
4. The poorest and most disadvantaged are (historically) the most difficult to reach through conventional development intervention approaches. Specially considered measures are usually needed for engaging the disadvantaged in processes intended to benefit them; measures such as
    - carefully planned and well executed participation processes

- offsetting the costs of participation
- building in clearly defined benefits of participation (short term)
- engaging the disadvantaged in capacity building prior to and during projects

5. The most disadvantaged are often an unorganized, unrepresented stakeholder group, whose voices and interests will not be represented unless they are assisted and supported. It is much easier, less costly, and far less time consuming to find reasons not to take the steps needed to ensure their participation and it is also probable that local officials and interest groups will either subtly or overtly discourage efforts to empower the disadvantaged. It often takes considerable will, commitment, and persistence on the part of project implementors to "do the right thing."

PART III: CASE REVIEWS

Case Review No. 1

ENVIRONMENTAL AND HEALTH IMPACTS OF SMALL-SCALE GOLD MINING IN ECUADOR

(IDRC Project No. 04291)

BACKGROUND

Concentrated in the hills above and surrounding Portovello and Zaruma in the state of Eloro in southwest Ecuador, are hundreds of small artesian gold mines operated by independent families and groups and small companies. Working conditions in and around these mines are generally primitive and dangerous. Most of the workers are very young boys and men (ages 14-25 was the age-range of workers we met) who are willing to put up with the bone-crushing heavy labour, the dust, the heat, the bad air below ground and the ever-present danger of cave-ins to make a "fast buck" that will later help to establish a better life on farm "back home." Preliminary estimates say that upward of 80% of the mine labourers working in this area come from somewhere else, and most will eventually go back to where they came from.

No studies (that I know of) have as yet mapped out who the mine owners are, and where they live, but it would seem that many of the owners are long time residents of the area.

From these mines, hundreds of sacks of raw gold are trucked every day to the valley below, where approximately one hundred and fifty (150) small gold refining plants operate, most of them strung out like beads on a string along the edge of the Puyango River. The typical refining process involves the use of large quantities of river water, and a sedimentation and recovery process using mercury and arsenic and the generation of heavy metal byproducts such as lead, mercury, manganese and various cyanides which are all (eventually) flushed into the river system.

It is very clear to local residents that the mining operations are poisoning the river system. They speak of how their use of the river has changed over the past decade; of how a once relatively pristine natural area (below the towns) used for swimming, fishing, and family outings has been abandoned and is now "dead." And they speak of numerous families involved in gold refining operations experiencing serious health problems.

The Portovello/Zaruma area is an important source of pollution entering the Puyango and Tumbez river systems. It seems likely that communities downriver from "the problem" may also be unwitting victims. This possible danger is about to be magnified significantly because of a bi-national (Ecuador and Peru) irrigation damn and canal network is scheduled to be constructed that would distribute the water from the Puyango and Tumbez rivers to a much wider band of agricultural land.

A previous research and development project (Proyecto Mineria Sim Contaminacion - PMSC) worked in the Zaruma/Portovello area to design technical interventions to reduce or limit contamination of the watershed. To date, there has been no formal evaluation of the impacts this work has had on the ecosystem.

THE IDRC PROJECT

Led by FUNSAD (Fundacion Salud Ambiente y Desarrollo) based in Quito, the project goals are

> *"to study the dynamics of the pollution caused by heavy metals and cyanides originating from the gold refining process of small scale beneficiation plants, their impacts on human health and the links with socio-economic cultural and gender issues. This is associated with an active participation of the communities in order to develop a sustainable management of the environment."*
>
> *(IDRC Project Abstract, 1999)*

More specifically, this research work is to evaluate the environmental dynamics of heavy metals in the basin of the Rio Payango and Tumbez; identify the roles, attitudes, values, and nature of participation of women and children in the mining process; identify the impacts of heavy metals on the riparian population of the region; determine the health effects on the study population related to the exposure to heavy metals and cyanides; identify the socio-economic, cultural and gender processes that favorize, limit or prevent human exposure to contaminants as well as the development of environmental management strategies; and identify through active community participation, the solutions (strategies and tools) for sustainable management of the environment. An important methodological agenda is to develop reliable and cost-effective ways to measure the cumulative impacts of low-level contaminants on natural ecosystems and on human health. (Ibid.)

To achieve these goals, FUNSAD and its primary partner, SERVIGEMAB, have chosen to work at three points along the river system (the Portovello/Zaruma area—the source of the problem) a midpoint sampling area and several communities at the "bottom" of the system near the Peru border, although much of the work will be done at the "top" of the system, including most of the social research and intervention development process.

ASSESSING THE PARTICIPATION AND TRANSDISCIPLINARY DIMENSIONS OF THE RESEARCH

The process of the assessment began with a meeting in the FUNSAD offices between the entire FUNSAD team involved in the research project, Dr. Roberto Bazzani of IDRC, and Michael Bopp (the evaluator).

This meeting consisted mainly of a briefing by the research team of what the project is, a summary of what has already been accomplished, and a description of what subsequent stages of the work will entail.

It was evident from the very first moments of this meeting that FUNSAD had put a great deal of thought and advanced work into preparing for the evaluation visit, and that they intended to use the evaluation as a fulcrum for their own learning and project development. The openness the team displayed toward looking at the research questions (provided to them in writing [see appendix]) and willingness to really grapple with challenging issues in terms of their current thinking, their analysis of the evaluation of the project to date, and most especially toward understanding how to strengthen future stages of the research all contributed to the especially toward understanding how to strengthen future stages of the research all contributed to the establishment of a working relationship for the evaluation that was collegial, constructive, frank and oriented to practice.

Following the briefing, two members of the FUNSAD team (Dr. O. Betancourt and Dr. C. Charlen) accompanied me and Roberto Bazzani on a field trip to the Zaruma Marcabelli, Portovello area, where we were met by Manuel Sarango. FUNSAD provided a car and driver, which had to be driven (twelve hours each way) to the project area to meet us (we flew).

In the project area, we were given a thorough tour of the study area at the "top" of the ecosystem. We visited a number of small and medium-sized mines and spoke with operators and miners. We saw first hand the ecological damage occurring in open mine sites, and the deplorable working conditions of miners (many of them very young). We saw ore sacks being picked up for transport to the beneficiary plants. We were able to get a

bird's eye view of the river valley, along which some one hundred and fifty (150) processing plants are located. We visited one processing plant (guided by Carlos Solinas) to view the before and after impacts of various technical innovations that have been designed to reduce the quantity and degree of contamination to the river (and to human beings). From this tour, we were also able to see what processing is like in many of the other plants who still use the old, less expensive, and much more highly toxic methods.

We then visited with key stakeholder groups in Zaruma (a medical director and friends), Marcavelli (a team of 8-10 residents who conducted a household survey in their area) and in Portovello (another survey team). With each of these groups we had in-depth conversations about the research process, the preliminary findings and the perceptions and opinions of local people regarding the true nature of the web of problems the project is seeking to address. The analysis of local people in these gatherings was particularly useful in revealing the impact the project has had to date on local communities, the complexity of the social environment that will need to be mapped in subsequent stages of the research, and the potential strategies for engaging a much wider range of stakeholders than are now engaged in building sustainable solutions.

During this field visit, another research team meeting was also held in which both FUNSAD and SERVIGEMAB representatives explored the transdisciplinary aspects of their work together, as well as other issues related to project methodology.

At the end of the field visit, a final session was held with the research team during which the evaluator presented a summary of preliminary impressions and then invited team members to critique the evaluation process and raise any issues they felt still needed to be addressed.

(1) Transdisciplinary Issues

Observations

When the FUNSAD team first presented their outline of the project objectives and methods, a picture was painted that clearly reflected the ecological and epidemiological issues of the total project, but was strangely silent on the social dimension. It was explained that the team's attention was focused in the first phase of the research work on studying the dynamics of the pollution caused by mining within the ecosystem, and to a lesser extent, in studying the impacts on the human population. There was no mention (at first) of plans to map the social dynamics of the situation.

In the discussion that followed on this point, it appeared that FUNSAD's original analysis did place a higher emphasis on the social dimension, but that they perceived IDRC's interest to be skewed away from the social aspects, and more focused on the environmental epidemiological aspects. [Could this have been an impression given by IDRC representatives during the proposal development phase?]

Clearly, the agreed upon research objectives reflect a balance of environmental, health and social factors, and the team readily acknowledged that the next phases of the research would more directly address social factors.

It is my observation that the overall goals of the project flow naturally from mapping the ecosystem contamination to mapping the health impacts to mapping the social system, and that all of these lines of action flow naturally into the overall objective of engaging the full range of stakeholders in participatory processes leading to sustainable management of the ecosystem with an aim to improving human health conditions.

It seems to me, however, that social system mapping is also required in order to fully understand the health dynamics and to develop adequate strategies for assessing the health impact of mining pollution on various segments of the population, who will need to be aggregated in relation to their social and economic roles both within the industry and within households impacted by the industry.

Furthermore, it is naive to think (and no one does think) that information (resulting from the research) alone will change the environmental behaviour of the industry. There is a complex web of social, economic and political interests that are competing within this project area (and beyond). *It seems to me that mapping the social dynamics and engaging a broad range of stakeholders in building an effective co-management process is at least as complex and as difficult a task as mapping the dynamics of ecosystem contamination* and will require a great deal of the research team in terms of technical expertise and effort, along with the building of co-research partnerships with appropriate stakeholder groups.

To this end, it appears (on the surface) that the project may be under-resourced in the social area; that really what is needed is a full-time social research professional with experience in participatory and qualitative approaches to guide this critical dimension of the work, which I feel should be going on *concurrent* to the other aspects of the research.

In general, the various discipline-based researchers on the FUNSAD and SERVIGEMAB teams clearly have worked very hard to integrate their disciplinary perspectives and to function as collaborators, even within activities that are the "specialization" of one or the other group. So the FUNSAD team has become very active

in thinking through issues related to contaminant sampling and the SERVIGEMAB team were directly involved in designing the household survey. The researchers *consciously* integrate their efforts whenever it is practical to so do. What has not yet been adequately integrated are the social science and the local knowledge dimensions.

Recommendation

One step that would now be very helpful is if the entire research team would meet (perhaps quarterly) to reflect on the research process and the data already gathered. Several key team members commented that after about a year of work, they now see that the research design should have been different. These are valuable insights and the team as a whole needs to carefully consider that has been learned in light of overall project objectives. It is from within the process of this sort of dialogue and cross-disciplinary reflection that truly transdisciplinary insights and outcomes are most likely to emerge.

(2) Participatory Issues

The entire research team is very open to engaging community-level people in the solution building process. However, the working model which the project team seems to be implementing is one in which the scientists study the problem (i.e. the ecological and epidemiological dynamics), figure out what is happening, and then report to various stakeholder groups in the community. It is then hoped that community groups will work with the research team to develop an effective ecosystem management strategy.

What has actually happened in Marcabelli and Portovello is that teams of local people were hired to conduct household surveys, and in both communities, these people have become strongly identified with the entire set of issues being addressed by the project. While hiring these research assistants does not appear to have been an intentional community engagement strategy, it has nevertheless turned out to be exactly that.

What seems to have resulted is that in both communities, a core group of 8-10 fairly educated and committed people have, through the process of conducting household interviews, learned a great deal that is very disturbing about the impacts of mining contamination on people's health. Through this process, they have become educated and motivated to take collective action. (Coincidentally, new knowledge relevant to the research study was uncovered.)

This pattern describes perfectly how a participatory action research approach can work. The basic idea is that stakeholders work together with scientists as co-researchers. One reason for working in this way includes intentionally seeking the sorts of outcomes

described above (community stakeholders are thereby educated and mobilized). Another reason is that community insiders have insider-information about what is happening and how things work. The research process can be greatly enriched and strengthened by local knowledge and insights.

A third important reason for working in this way relates to ownership of outcomes. To the extent that stakeholders participate as *co-producers* of knowledge, they are far more likely to believe and take responsibility for responding to research findings. This is critical if the goals of the "ecosystem approaches to human health" research initiative related sustainable ecosystem management are ever to be achieved.

Observations

1) The survey teams, when seen as stakeholder groups are clearly not widely representative of the categories of stakeholders who will need to be involved in order to effectively address environmental management issues. Nevertheless, they are a good beginning, largely because they are (relatively) educated about the issues, and committed to taking action.

2) A second tier of people who can very likely become engaged are the people who were interviewed in the household survey. Many of these people expressed a strong desire to be informed and involved in subsequent stages of the project.

3) A third pool of people that are already involved to some degree are municipal and state authorities and technical staff. These people include health and education professionals, planners and municipal government representatives. While we were visiting, we met a reporter who had just learned that the water supply of the town of Portovello may be threatened by mining activity. Up until now, the levels of awareness and willingness to respond to municipal authorities has been low. (The municipalities still dump their garbage into the river.)

   It is now likely that the cumulative effect of this and previous projects, combined with other local developments has created a climate of greater general readiness to think critically about environmental issues.

   It is important to note that the Portovello-Zaruma area seems to be relatively *unorganized* in terms of civil society rising up to address critical human problems. This makes it very difficult for the Project team to engage local stakeholders because much of the organizational work has to be done from scratch.

Recommendations

1) It will be extremely important at this stage to develop an adequate map of the social dynamics related to the ecosystem and human health situation in the study area.

   - Who are the various (sociological) groups involve in the industry? What are their roles? What are their interests and needs?
   - Who are the groups that are impacted by the industry?
   - How is power distributed and how is it exercised in relation to the dynamics of land management, the gold mining industry and human well-being? Who is benefiting economically? Who is being exploited? How are those benefiting most protecting their interests? What are the likely sources of resistance to attempts to manage the situation for a healthier ecosystem and for improved human health?
   - Who has to be involved in building a sustainable solution to the current web of problems and issues?
   - What other economic, social and political issues are intertwined with the gold mining contamination issue? (e.g. child labour, adverse regional agricultural market conditions, etc.)

   These and other related questions need to be answered in order to strategically identify the full range of stakeholders, to be able to understand what interests and needs each group is driven by, and ultimately, to design an intervention that will improve human health through environmental management that will not simply be ignored, or directly opposed.

   Some of this research may have already been done by others. A broadbased literature search may be helpful. However, it is probable that much of it has not been done in ways that will provide the project with the map it needs.

   Developing this analysis presents a golden opportunity for engaging local people directly in the knowledge construction process. Indeed, it is difficult to imagine how an accurate map could be developed without the guidance and participation of local people.

2) One of the categories of people who are organized to some degree in the study area are mothers. Careful groundwork needs to be done to build a working relationship with mothers' organizations.

3) Clearly, mine workers, mine owners, beneficiary plant workers and owners are all stakeholders who must be engaged in any viable solution-building exercise. The project needs to develop a practical approach and engagement strategy to reach these groups. In this regard, it will be extremely important *not* to view such groups as homogenous. The social research needs to identify different communities of concern, interest and disposition within each of the groups, and the project will need to build relationships with the most open and susceptible people within each category.

4) The household survey and talk about town in survey communities both point to incidences of children born with malformations, stillbirths, and seriously sick people. A participatory inquiry process is needed to get beneath the surface of these rumours. The community has a story to tell, made up of the collected stories of many individuals, but that is shared and collectively moderated to determine what the *community's* collective experience and analysis are related to health impacts and many other related medical and environmental and social issues.

5) Finally, it is clear that a new baby has been born in Portovello and Marabelli (the survey teams now metamorphosing into community action groups). This is an important development. Following are recommendations for protecting and nurturing their growth in light of the project objectives.

"Development comes from within" is an important participatory principle. Another way of saying this is "you can't make butterflies by sewing wings on caterpillars." These groups need to develop their own identity (apart from the project) and their own vision and plan. Already, their vision is ranging beyond the project objectives to issues (admittedly related), such as the town dumping garbage in the rivers, the management of waterways not in the study design (but certainly within the watershed), and to solutions (very much in the scope of the study) such as the development of a regional environmental code that is enforced by the municipalities.

This learning, creativity and initiative needs to grow in its own way, and the project team much be careful not to try to limit these groups to the fulfillment of necessarily limited project objectives. The potential is that these fledgling groups could be the seed crystal of a broad based environmental action organization rooted in the civil society of the region.

A few things the project could do to help during the remaining project period include the following.

- The provision (or leveraging) of a small seed grant for operating expenses.
- Bringing these groups together with groups SERVIGEMAB knows or is organizing who are working on related issues.
- Bringing the two survey teams together for participation in data analysis and planning days.
- Respond to the direct requests (from both surveyed communities) for medical screening of those impacted by mining.
- Provide training and technical support related to NGO start-up.
- Systematically encourage the broadening of the stakeholder base (something both groups say is necessary).
- Involve the groups as co-researchers in subsequent stages of the work.
- Commit to supporting (and legitimating) these local groups for at least five years.

In general, the orientation, instincts and inclinations of the research team regarding qualitative social research and participatory approaches is very open. I observe that,

a) most team members have had little or no exposure or training in participatory approaches; and

b) while the team as a whole lacks the methodological tools and know-how to carry off effective participatory research, it does possess the requisite social orientation and has built excellent (and mutually respectful) relationships with community groups. Indeed, this research team is doing many things right (guided by intuition) such that a small amount of technical assistance and mentoring would likely make an important difference.

Case Review No. 2

HUMAN HEALTH AND CHANGES IN POTATO PRODUCTION TECHNOLOGY IN THE HIGHLAND ECUADOR AGRO-ECOSYSTEM

(IDRC Project No. 004321)

BACKGROUND

In the fertile highland valleys of Ecuador's Carachi Province (elevations of 2,800-3,300 meters) live some eight thousand (mostly commercial) potato farmers and their families who produce approximately forty percent of Ecuador's annual potato crop. These farmers are among the heaviest pesticide users in the world.

Not only are the farmers themselves directly affected by the health impacts of high exposure to toxic chemicals, but farm families (an estimated population of some 30,000 people) are also directly and indirectly impacted through exposure to pesticide-saturated clothing and equipment brought into the households, and by pesticide residue on potatoes and other foods that are consumed.

An earlier (Canadian) research study had shown that the average farmer (who tends in Carachi to mix potato farming and dairy production), applies pesticides several times during a single crop growth period. Farmers and researchers alike seem to agree that potato production in Carachi would not be commercially viable without pesticide use. Clearly, one research challenge is to develop less toxic pesticides and even non-toxic (to human beings) means of pest control. But another line of action to be pursued is educating farmers and their families about the proper use, storage and exposure-prevention practices related to pesticides now being used.

Currently, farmers use backpack sprayers to apply methamdophus and carbofuran (insecticides) as well as maneb and mancozeb (fungicides), often wearing no protective clothing such as gloves or masks, and often bringing pesticide-saturated equipment and clothing directly into their own homes. Essentially, these practices are occurring because of ignorance of the potential dangers and consequences of exposure to human well-being. Farmers *believe* they need pesticides to produce a commercially viable crop, and so pesticides are simply integrated into the lives of farm families, without regard for health considerations. That belief is certainly an important health determinant.

Indeed, there is little doubt that the health of Carachi farmers and their families are being impacted by both direct and indirect exposure to pesticides. Skin rashes are common. Nervous disorders, such as depression, cognitive impairment, violent outbursts and even suicide seem to be increasing. The pesticide poisoning rate of 171 per 100,000 population match the records of the highest exposure areas in the developing world. What has not been sorted out is the extent to which micro-nutrient deficiencies due to unbalanced diets (and not to pesticides) are also contributing to these symptoms.

THE IDRC PROJECT

This IDRC Ecosystem Approach to Human Health Research Project is part of a cluster of research initiatives occurring concurrently within an integrated program framework being carried out jointly by the Instituto Nacional Autonamo de Investigaciones Agropecuarias (INIAP), Ecuador; International Potato Centre (CIP); and the University of Manitoba. The overall program context is an effort to design and test a multidisciplinary model for integrated assessment of agricultural production systems. The emerging model is being designed to help planners, policy-makers and farmers to weigh the trade-off costs and benefits of various decisions, policies and practices in view of possible alternative choices. Dimensions of agro-ecosystem life such as crop production methods, choices related to agricultural inputs, household practices, poverty levels, dietary habits and family nutritional status, all impact productivity, farm income, the environment and human health. The model is able to quantify (among other things) the impact of pesticide use on former productivity and income levels and the trade-offs being paid for in environmental impacts and measurable declines in human health.

The specific (IDRC funded) research activities aim to achieve a sustainable balance between health and productivity in the potato-dairy farming system through safe pesticide practices. Three primary lines of action are being pursued.

a) The conduct of household surveys and farm level measurements to determine household pesticide management practices, pesticide residue, neuro-behavioral health status, nutritional status and agricultural production patterns and outcomes. This research will seek to answer the question "Do differences in food preparation methods, diets and other household practices affect neuro-behaviour functioning?"

b) This data (disaggragated by gender) is being used to build models that describe trade-offs between agricultural production, environmental impact and human health. Policy

complications related to the management of the trade-offs in order to improve human health will be explored.

c) A primary intervention is testing to what extent education of farmers and farm families can change potato production and household management methods in ways that decrease pesticide exposure and thereby improve human health.

PRELIMINARY RESULTS TO DATE

Some of the key findings to date indicate the following.

1) Exposure to pesticides is having serious health impacts.

2) Farmers who are less impacted (measured by neuro-behavioral test scores) have lower production costs per hectare, in other words, are more productive. Stated simply, this result suggests that pesticides are affecting farmer decision-making capacities resulting in poorer overall farm production.

3) Carbofuron is believed to be the most toxic pesticide being used in the area. Reduction of carbofuron use through substitution of less toxic but equally effective alternatives would greatly reduce toxicity exposure (50%) without affecting potato production.

4) Changing behaviour related to the following would help to reduce pesticide exposure.
   - preparation and application of pesticides;
   - storing pesticides at home;
   - handling pesticide infused work clothing; and
   - keeping children away from application processes, storage sites, clothes and equipment saturated with pesticides.

5) Pesticides are often used by farm household members in suicide attempts.

6) The highest number of hospitalizations due to pesticide poisoning occurs in children under five years of age.

ASSESSING THE PARTICIPATORY AND TRANSDISCIPLINARY DIMENSIONS OF THE RESEARCH

Transdisciplinarity

While there can be no doubt that it was the agricultural disciplines that have shaped and largely driven the implementation of this project, it is fascinating and encouraging to see the extraordinary efforts which the project's lead scientists have made to involve and accommodate the needs of other disciplines.

The starting point of project thinking is agro-ecosystems within which human health is being negatively impacted by pesticides. While it would be easy to say that the project focus is therefore a "pesticide impact reduction control," to say so would not reflect the multidimensional focus of inquiring what is really being attempted.

Some of these important questions are as follows.

1. How can a trade-off model be built that will help farmers and policy-makers to make better decisions about pest control?
2. What ways and to what extent are people's health being impacted, and through which environmental and social dynamics?
3. Is pesticide the primary cause of health problems that have been identified? What role does nutrition play? What about social stressors?
4. What sorts of interventions will induce project participants to change their health impacting behaviours and practices? (The assumption being tested is that non-formal education is an effective strategy.)
5. What sorts of interventions will create sustainable policy and adequate management of farming practices, particularly related to environmental protection (i.e. water, soil and food products management) and the protection of human health.

The roster of principle researchers and core staff *appears* multidisciplinary and balanced (agronomist, medical doctor, social scientist, popular educator, etc.). And still, what one is confronted with on the ground, in dialogue with key project staff is a somewhat different impression.

It was pointed out to me early in my visit that the IDRC project was "integrated" into a larger research framework addressing a complex range of interrelated agricultural issues. In visiting two of the three project sites, and in conversations with both field staff and core research staff, the following seemed clear.

1. There are ongoing (and somewhat uneasy) paradigmatic tensions within the project team between the perceived requirements of "research" versus those of "intervention."
2. The balance of power seems clearly tipped to the side of natural sciences (particularly agriculture and reductionistic methodological requirements such as test and control, pre-test, post-test, etc.).
3. On some occasions, the tensions that exist between the intervention team and the researchers have been resolved through debate and compromise. On other occasions, field staff have simply been over-ruled and their insights and ideas judged to be "outside the scope" of the research project by the project director.

These observations point to a fundamental problem: the project does not appear to have created the cultural space for a truly transdisciplinary engagement process to take place. By this, I mean that there doesn't appear to be a forum that meets regularly within which researchers and field staff working on the project can co-create solutions to practical implementation problems and produce transdisciplinary insights. What seems to be happening instead is that the various disciplinary specialists do their work and feed it (fait accomplit) to the intervention team to be translated into educational and other interventions.

What is entirely missing from this approach is local knowledge as a disciplinary participant. The problem (in terms of transdisciplinarity) with this classical research approach is that the research team is never working with a complete "map" of the territory it is researching.

Within the IDRC Ecohealth Research Approach, the focus of the entire research enterprise is the management of an ecosystem for the expressed purpose of improving human health. In order to do this, a transdisciplinary mapping of the agro-ecosystem and of relevant social systems is a fundamental first step that cannot be assumed, because it is within this comprehensive framework that the various disciplinary contributions can engage each other in collective analysis and solution-building. As far as I can determine, no such comprehensive framework has been built.

The technical problem here is not simply whether or not being among the highest users of severely toxic pesticides in the world presents a health risk. Proving that it does, will, in this instance, be very useful for local people. But the most difficult *technical* problem is related to changing the knowledge, assumptions and beliefs of the people, and ultimately their behavior, related to pesticide use. Discovering how to get people to change their thinking and their behaviour is an essential question that is integral to the research itself. Clearly, the trade-offs model (being adapted for use in this project) is one important

contribution. But the nub of the issue resides at the interface between technical knowledge and social knowledge. The so-called "intervention" team is as much "doing research" as are the health measurement specialists, or anyone else in the project.

So the paradigmatic divide that exists between the "research team" and the "intervention team" actually constitutes a methodological breakdown that will make it very difficult, if not impossible to reach the ultimate objectives of the project.

The following example illustrates what I mean by "methodological breakdown."

Charles Chrissman, the principal investigator, related how the team had struggled to accommodate the tension between "hard science" methodology (agriculture, econometrics, epidimiology) versus the requirements of a participatory approach. The following is taken from my field notes of that discussion.

> *One of the main objectives of the project is to test whether or not and to what extent an educational intervention can change farmer and farm family behaviour related to pesticide use and exposure. Our plan was to randomly select forty families in the study area, and to involve them in various educational intervention activities.*
>
> *The project's participatory methodology specialists argued that random selection of farmers/families violated participatory principles [of engagement from within], and that project participants should self-select.*
>
> *After much discussion, we agreed to allow a self-selection process for project participants. This decision created several problems.*
>
> *1) The self-selection process took too much time. Because we are on a tight timetable, given the contracted duration of project funding, we needed to begin the educational intervention before the self-selection process had been completed.*
>
> *2) This in turn created another problem. What we are trying to test is the impact of an educational intervention. Those coming in late don't get the whole intervention, and may in fact have already been residually influenced by others already in the program (hence compromising the pre- post- test methodology).*
>
> *3) Furthermore, we now have sample problems.*
>
> - *Why did these particular farmers/families self-select?*

- *Why didn't others?*
- *Were those who self-selected the poorest and most vulnerable?*
- *Were they among those with the least to lose? The most disposed to change?*
- *The most concerned about the issues of pesticide?*
- *How representative is our sample?*

4) *Once the forty people did self-select, their continued participation in the full course of twelve sessions of either the farmer field school (for men) or the women's training is required in order to test the primary hypothesis, namely, that risk behaviour can be changed and health improved through an educational intervention.*

It turned out that there has been a relatively high drop-out rate from the educational programs.

This example raises, for me, several important points related to transdisciplinarity and to participation.

1. First, in an integrative transdisciplinary approach, qualitative/participative approaches and empirical/analytical methods should complement and reinforce each other. **Neither line of action should be permitted to weaken or undermine the other.**

   It appears that what happened was that an honest attempt to collaborate across the disciplines ended up with a hybrid of methodological streams that don't quite blend into a single integrated whole.

   A deeper understanding of the transdisciplinarity ideal would have led to a search for methodological solutions that did not compromise the outcomes of any other part of the study.

2. The particular set of educational interventions selected (farmer schools, a non-formal training manual, etc.) do not seem to have been problematized as part of the inquiry process. Let's imagine that the educational interventions turn out to be an unremarkable failure or a mediocre success. Neither outcome proves or disproves what Dr. Chrissman says they are testing. Perhaps, only the "right" set of educational interventions for each particular context will work. There is also ample educational

research literature (particularly related to health education) that shows that education alone *almost never* generates sustainable behaviour change.[3]

It seems to me that this research project needs two things it now lacks (given that testing an educational intervention is a key objective): (a) an education specialist integrated into the research planning process (and not just the intervention phase); after all, one of the research questions relates directly to what works in intervention; and (b) more time. It seems to me that the original project designers were not deeply familiar enough with what it takes to do the type of interventions they proposed to do, and as a result, seriously underestimated the time it takes to do it effectively within the context of the specific population with which the project is working.

3. This leads me to a third critical point. The only effective way (that I know of) to design an intervention of the sort this project is attempting is to work through a participatory process from within the population. This is not merely an intervention requirement. It is also a research imperative. It implies (to me) that a participatory research expert needs to be brought into the core research team, and that the proposed beneficiaries of the project (i.e. community people) need to become co-researchers in the quest for viable solutions.

While it is not the task of the Ecosystems Approaches to Human Health Research Project to complete effective interventions, it is one of the primary research tasks to develop and test effective intervention processes, strategies, tools and mechanisms. It therefore seems to me that this requirement elevates the status of intervention to a discipline that must take its place as an equal research partner on the transdisciplinary team.

PARTICIPATION

Conflicting Perceptions of "The Problem"

On the surface, it would appear that this project is addressing an "obvious" problem. Pesticide use is, in fact, generating serious health problems for farmers and their families, and it is negatively impacting the capacity of farmers to make good decisions (through neuro-cognitive impairment) which is resulting in measurably reduced farm production and family income levels. What could be more straightforward?

[3]See Baum (1998), Brown (1991) and Stokols (1996).

However, the project team reports that the project communities seem to be "in a state of denial," or at any rate, that for too many community people "pesticides are not the problem."

1. Many people seem to suffer from "selective amnesia" when it comes to remembering incidences of pesticide poisoning. They simply don't recall.
2. To most farmers and their families, the "real" problems are the economic crises and more generalized health concerns.
3. Both community participants and even some front-line team members say that the project should broaden its focus to more global health and economic concerns, which of course, raises the question: Where does "research" end, and "development" begin?

In the previous section, an example was cited highlighting some of the tensions that exist within the research team between empirical-reductionist methodologies and participatory approaches. Despite these ongoing struggles, the project has produced an impressive list of accomplishments related to community participation (especially given the short timeframe of the life of the project to date).

When project team leaders were asked to speak about participation in the project they stated immediately that "Our research process has been extractive. We have not used a participatory approach...our scientists say that we have only three years to do this project, and participatory processes are too costly, both in time and money. What would the cost benefit be?" They went on to explain that they were focusing participatory efforts on the intervention aspects of the project.

Despite this initial caveat, participatory approaches were used in the following research related activities.

1. Ven diagram analysis of social issues facing women and their families.
2. Transect walks with farmers and farm wives to identify where pesticide exposure may be taking place.
3. The use of disposable cameras to document pesticide purchase, transportation and storage, and the use and post use handling of pesticide related equipment.
4. Women helped to design household assessment sheets used to monitor pesticide exposure in the homes.
5. Women collected water samples for testing.
6. Women collecting samples of pesticide-saturated clothing for testing.

7. Tracer chemicals that glow in the dark were put into pesticides, and videos taken at night to show the spread of pesticides from the fields, along the roadways and into the houses.
8. Maps were made by community members of pesticide contamination patterns.

It does not appear that community-level people were engaged in the interpretation of this data, but community-level meetings were held in each of the three project sights, and results were reported to those who attended.

Additionally, the project (in collaboration with others) has produced an excellent training of trainers manual on potato production in the Andean region,[4] which focuses on the problem of how to grow a healthy potato crop, and which deals extensively with the problem of pesticides. As well, a 12-part series of lessons were designed for the farmer schools and another set for the women's program. The approach used in these educational initiatives mixes participatory and experiential learning, with didactic lessons on the uses and impacts of pesticides, safe handling, safe storage, and household health protection measures.

Multiple Levels of Work

The project is also working (with others) at a regional and national level to try to change pesticide related policy and regulations. Working with community members and NGO's from the region, a declaration was prepared, saying that no red-label pesticide sales should be permitted. However, this grassroots work does not seem to be significantly influencing policy. Pesticide sales is big business in the region. It is becoming increasingly clear to the project team that natural resource management is really a platform for social change, and therfore represents a much larger set of problems than anticipated; problems which go well beyond the scope of a three year research project.

This raises, for me, a critical question related to participation. Once you engage community level people in change-oriented research processes, you have raised expectations and entered into a relationship with them that bolsters their capacity to address important development issues. But this sort of process takes time, often decades. If the research project team lights the fires (so to speak) and then walks away to let the wind blow as it may, a number of undesirable results may follow.

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[4] Entitled "Herramientas de Apprendizaje para Facilitadores: Manejo Integrado del Cultivo de Papa." Published jointly by INIAP (Estacion Experimental Santa Catalina) and CIP (Centro Internacional de la Papa).

1. The process may collapse, and local populations may be galvanized against future change efforts (we tried that and it failed).
2. Without the technical and political support of professional research organizations, local activists may be left extremely vulnerable to attacks from opposing forces.

The purpose of IDRC's research is basically to map the situation (including the socio-ecological context), and to discover viable solutions. It seems to me that *since this research requires the engagement of local populations as participatory collaborators, the research is also, already, a kind of intervention.* From the moment the first question is asked, local people are learning to see their world differently.

Therefore, it seems to me to be extremely irresponsible to assume that, once a three-year "research" project is over, it is perfectly alright for the research team to withdraw and leave local people to fend for themselves.

The only sustainable solution I can see is that the Ecosystem Approaches to Human Health Project needs to be linked, from the beginning, with a viable development-promoting partner that will remain connected to the people, and will participate in the implementation of solutions discovered during the research phase.

Obstacles and Challenges to Participation

The project team identified a very interesting range of obstacles to the effective use of participatory approaches in the project. Following are a few highlights of this analysis.

1. The political and economic climate is so volatile (100% inflation, high economic uncertainly, very high [perceived] levels of corruption) that trust and belief in the efficacy of collaborative approaches is being undermined.
2. Rapid transition in social and economic conditions is leading to farmer migration, so the population in the study area is fluctuating.
3. Local government personnel keep changing, requiring new rounds of education and relationship building.
4. Knowledge-generating institutions (like universities and research institutes) are generally unwilling to engage in participatory activities because they are seen as "development," and not "research." [Note that this divide reflects the tension within the research project itself between "research" and "intervention."]

5. NGO's often have no core budget, and are forced to work on short-term, narrow project funding. Most are struggling to stay afloat. Therefore, it is difficult for many of them to give sustained time and energy to anything for which they are not funded.

[This last point about NGO funding suggests the need for collaboration between ecohealth research initiatives and NGO's very early on in the project planning phase; the need to provide some (moderate) support for NGO participation during the research phase as well as working with NGO leadership to find ways of sustaining follow-up activities.]

Observations

Upon reflection on the complexities and obstacles which the project has encountered, particularly in integrating research and intervention, it seems clear to me that this project would have benefited from technical assistance if the design and early implementation stages focused on the following.

1. The importance of focusing on the design of effective interventions as a *research* question, rather than assuming that an agricultural extension model or some other training model would suffice.
2. The importance of engaging the beneficiary population, as well as other key stakeholders as partners in the research process, so that they could assist in interpreting research data, and in shaping the design of interventions to follow.
3. Ways of effectively integrating participatory research methodologies and tools and empirical-reductionist approaches such that each complements the other, and the requirements of neither are compromised.

It seems to me the project team has largely focused on producing the right technical information, because that is what they are most comfortable in doing. In general, I feel that the most difficult questions encountered by this study reside in the translation of technical (research generated) knowledge into social knowledge and action. The research questions, in my view, now need to be refocused on the problem of *how to engage relevant stakeholders* in effectively managing the ecosystem such that human health is improved.

I believe that (in isolation from other strategies), the educational interventions now being tested will have very limited long range impacts. Most people who need to be reached will not be reached. At this stage, the drop-out rate is already high. Other ways need to be found to engage the population; ways that are meaningful to them.

The reason IDRC's Ecosystem Approaches to Human Health Project Initiative defines participation as a fundamental requirement of this type of research is precisely because these are problems that scientists cannot solve on their own *on behalf of* community people. Important pieces of the puzzle are hidden within the community's knowledge pool. And the only way (I know of) to get at those critical pieces is through participatory research.

The fact that many research scientists don't yet understand participatory approaches is a challenge, but not an insurmountable one, especially in working with scientists such as Charles Chrissman and his team, who are open and struggling to learn.

Case Review No. 3

CUBAN CITIES PROJECTS

- **Urban Ecosystems Health Indicators (Habana)** ***(IDRC Project No. 03825); and***
- **Integrated Approaches to Safe Drinking Water Quality (Santiago de Cuba)** ***(IDRC Project No. 03329-03-1)***

INTRODUCTION

The two projects discussed in this case review are certainly very distinct projects, but they are both being carried out by the National Institute of Hygiene, Epidemiology and Microbiology in collaboration with other partners. Because there is significant overlap of personnel on the core research teams of both projects, and considerable cross-fertilization in terms of thinking and approach between the two teams, it seems appropriate to streamline the assessment of community participation and transdisciplinarity in both projects by grouping them together in a single case review.

The key questions remain the same. As these projects are being implemented, what is the quality and nature of the community participation component? What are the issues and challenges, particularly in relationship to carrying out the objectives of the research? In order to be effective, ecosystem approaches require both the expertise of many disciplines, and the transcendence of particular disciplinary insights into a transdisciplinary synthesis. And so, not only must we consider the relationship of the professional researchers to the beneficiary community, but also their relationship to each other.

BACKGROUND

Following are very brief descriptions of each of the projects.

Centro Habana

Cuba, under the US embargo, has had to face considerable economic difficulties, and among other challenges, this has led to the gradual deterioration of urban ecosystems, which in turn has had a direct impact on human health and social well-being. Centro Habana is one of the oldest, and also the most densely populated districts in the city of Habana. The people living there face a contaminated water system, overcrowded and seriously deteriorating housing and neighbourhoods, the increasing presence of disease and

social breakdown, problems with waste disposal and sanitation in general, and many other health related issues.

The municipality of Habana requested assistance from the National Institute for Hygiene, Epidemiology and Microbiology (INHEM) to assess a variety of circumstances, health conditions, and previous interventions, and to determine what the best use of scarce resources would be in designing interventions in Centro Habana and other areas like it.

In response, INHEM built a partnership with the Popular Councils (neighbourhood level government) in the Cayo Hueso area of Centro Habana, because it was here that a pilot project to address many of the critical issues facing urban Habana had been carried out between 1995 and 1997. An important part of the methodology of this IDRC-funded Centro Habana study focuses on assessing what worked and what didn't in the already-completed Cayo Hueso pilot project.

Another important partnership INHEM made was with the Taller de Transformation, which is an urban development technical service group (in some ways like an NGO, but with close links to the Popular Council). The Taller de Transformation is really a neighbourhood development group staffed (mostly) by professional and community volunteers that does community animation, participatory meetings, education programs, family life and health programs, community education campaigns, community development planning processes and programs for children and youth. The Taller de Transformation has a long history in Centro Habana. There are now some twenty "Taller Integral" in areas of Habana with "difficult conditions." The importance of this partnership for INHEM is the added capacity it brings to the project for community participation. In the words of one of the Taller's senior team members, "We are very close to the community—we are meeting with the people constantly. We know them and they know us."

Another critical partnership for INHEM in this Project is the University of Manitoba, Department of Community Health Sciences, which brings technical expertise in population health research methodology needed for retro-assessment of the Cayo Hueso pilot project, and the development of a case-benefit trade-off analysis related to strategic options for the future. The University of Manitoba partners also bring an in-depth understanding of the Ecosystem Approaches to Health Research paradigm, which was relatively unknown in the Cuban context. The IDRC project was jointly funded by the University of Manitoba and INHEM.

The Research Project

The goal of the Centro Habana research project focuses on using an ecosystem approach to assess an urban eco-health context, and to determine the most cost-effective choices (given scarce resources) for effective intervention. Specific research objectives include the following:

- studying the processes of the Cayo Hueso pilot program to determine what worked and what didn't in order to help decide how best to shape future interventions;
- developing a set of eco-health indicators to guide future interventions; and
- assessing the likely usefulness of locally generated ecosystem health indicators in carrying out future interventions, given what occurred during the pilot project.

The research design involves the following key steps and stages:

1. an ecological descriptive study;
2. community-based focus group discussions regarding the pilot project's impact and processes;
3. household surveys related to the pilot project's impact, as well as to current conditions, risk perceptions and lifestyle issues;
4. the development and testing of eco-health indicators;
5. evaluation of the processes and content of the pilot project intervention (using a simulated pre- and an actual post-testing process); and
6. assessing the cost-benefit trade-offs of various interventions, and ascertaining the usefulness of the ecosystem and human health approach to Cuban decision makers.

This work is being carried out by a very diverse multi-disciplinary team consisting of several epidemiologists, a sociologist, a psychologist, an economist, a health statistician, several engineers, several community health specialists, an architect, and an adult educator.

Community participation within the Project is conceptualized primarily as a necessary dimension of any successful intervention, and so there is a sincere attempt being made to study the processes of participation that occurred during the Cayo Hueso pilot program in order to understand what worked and what needs to be changed. The methodology for doing this plans to involve a broad range and a significant number of community members in responding to interviews, and then in interviewing others. As well, focus groups are being used to help in the data interpretation process and in the

development of eco-health indicators. Community participants targeted for involvement in the Project include housewives, workers, unemployed people, retired people, students and various levels of community leaders (formal and informal), as well as professionals working with the community.

Santiago de Cuba

The deterioration of the urban infrastructure in Cuba that is needed to maintain public health and a healthy environment has been fairly continuous during what Cubans refer to as "the special period" (from about 1990 onwards), since the Russian and Eastern European economic buffer to the American embargo collapsed along with the Soviet economy.

For example, Cuba's ability to provide its population with treated drinking water "plummeted from 98% in 1988 to 26% in 1994" due to a loss of capacity to produce chlorine.[5] This decline has led in turn to a corresponding rise in waterborne diseases including diarrheic diseases, Guillain-Barre Syndrome and Hepatitis A (800 people were infected with Hep-A in one district of Santiago de Cuba alone).

This district (Veguita de Galo) contains some of the most run-down housing and deteriorated infrastructures in the city. There are frequent water shortages, water wastage due to broken pipes, and poor water system coverage in the area, blocked and broken sewer pipes now causing contamination, and open sewage channels running on the surface between houses. Because of fuel and power shortages, boiling is not an option for many families; and in general, there is a scarcity of water purification chemicals and methods. Most families have no way to purify drinking water. As would be expected, the incidence of diarrhea and other waterborne diseases, especially among the most vulnerable (children, elderly, etc.) is very high.

IDRC has recently developed a generic safe water technology package that contains a cluster of technologies and strategies for community management of drinking water. Parts of this package have been (or are now being) tested in various Latin American countries. A "safe-water technology package" needs to be adapted and tested for each specific context, but consists of a menu of options communities can choose from, including the following.

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[5] Cited from Garfield and Santana (1997) in the IDRC Project description for the Santiago de Cuba Water Project.

- Slow sand filters (household or apartment block size)
- Water storage tanks
- Hand-operated pumps
- Night-soil pits (using latrines to produce fertilizer)
- Community capacity building related to operation and maintenance of the system(s)
- Simple water testing mechanisms to test home supplies
- An education campaign
- Citizen-led initiatives to introduce and maintain the package.

The IDRC Project

This Project consists (basically) of the introduction and evaluation of a locally adapted version of the IDRC Safe Water Package in the Veguita De Galo and Flore districts of Santiago de Cuba. More specifically, the objectives are:

- To introduce and implement, with community participation, a locally adapted version of IDRC's safe-water technologies package;
- To characterize the social processes of appropriating the technologies within the community;
- To assess the impact of the intervention on community health; and
- To determine the cost-benefit ratio to the community of using the technology package.

Origins of the Project

The origins of the Project could be said to be both top-down and bottom-up. On the one hand, IDRC, INHEM, and the Ministry of Hygiene and Epidemiology were looking for appropriate communities within which to test the Safe-Water Technology package in Cuba. On the other hand (and independently), the communities of Flore and Veguita de Galo (through their Popular Councils) and the health officials working with those communities were searching for solutions to the deteriorating environmental and health conditions occurring in their midst. The ideal solution might have been to replace the city's water and waste water disposal system, or at least significant parts of it. Largely because of the embargo, this solution is simply not possible due to a basic lack of even enough money to replace a few brass fittings and valves, let alone replacing a whole water

treatment, storage and delivery system, and a city-wide waste water collection and treatment system.

What was needed was a low-cost appropriate technology-based solution that could be implemented immediately as an interim measure to address immediate and serious public health issues. The two Project communities were selected by INHEM and the Ministry for testing of the IDRC package both because there exists an obvious need for the type of solution the Safe-water Technology Package can bring, and because of community readiness to work for a solution.

The Partners

The partners for this Project are INHEM and the district office of the Provincial Department of Hygiene and Epidemiology, which has assembled a local team and is leading the implementation of the Project on the ground in Santiago. Combined with Habana-based INHEM researchers, the Project team represents an eclectic range of disciplines, including epidemiologists, an engineer, several sociologists, a psychologist, several family physicians, a public health specialist, a statistician, and a health economist (brought in from the University of Manitoba as a consultant to the Project).

The research design involves the following key steps and stages:

1. the formation of "project boards" (juntas) in each of the districts responsible for bridging between the community and household levels and the professional project team, as well as in overseeing a maintenance revolving fund, fed by household purchases of the technology;
2. the introduction (on a test basis) of various technologies, including slow sand filters, home and community water storage tanks, hand pumps, and hypochloride for water disinfectant;
3. selected sewage pipe and valve replacement;
4. a community health education program;
5. engagement of community members to make contributions of labour related to the implementation of the technology package;
6. water quality monitoring in selected households and at water storage facilities;

7. assessing the degree to which community members are "appropriating" (which means making it their own) the technology, as well as the safe water practices promoted by the Project;
8. assessing, as well, the social processes through which this appropriation is or is not taking place; and
9. assessing the cost-benefit of the program (for the community).

Through consultation with the Project team and a visit to one of the neighbourhoods involved in the Project (including visits to four households), I observe the following.

Community participation in the Santiago Water Project seems to be conceptualized as the process of building the capacity of the community to implement the Safe-water Technologies Package and to maintain it. The community was involved, through household interviews and through the mechanism of the local juntas in helping to identify where waste water is escaping, where fresh (supposedly potable) water was contaminated (it usually has a "bad smell" when mixed with waste water), when and where there is not enough water, and where the system was allowing water to escape (leaks). Community members from households selected to receive water filters are asked to contribute labour in sifting sand for the filters, and neighbourhoods impacted by escaping fresh or waste water are involved (through contributions of labour) in repair projects (in one case the Canadian Embassy provided funds to purchase valves and other materials needed for repairs).

The community juntas (selected by the professional research team in consultation with the Popular Council) receive training, and is then asked to select the households who will receive water filters (based on need as indicated by health measures).

In general, it seems that by "the community," the Project team really means the junta, and those who are close to the Project in other ways. The junta seems to be the intermediary mechanism between the professional researchers and the intended beneficiaries of the Project.

AN ASSESSMENT OF TRANSDISCIPLINARITY AND PARTICIPATION IN THE CUBAN CITIES PROJECTS

Transdisciplinarity

1. The social and political context of contemporary Cuba certainly does flavour the processes of transdisciplinary research, as well as the conceptualization of participatory approaches. It was fascinating to observe the dynamics of two Cuban research teams in separate cities. Both teams involved a wide range of disciplines including medicine, epidemiology, sociology, education, civil engineering, social work, architecture, etc. In both cases, what seemed to be happening much of the time, is that team members seemed to be inclined to relate to each other as human beings first, and second as co-researchers. By placing the research problems in the centre (rather than this or that discipline-based model), they seemed inclined to *start* from a transdisciplinary perspective, and to work backwards into the contribution that could be made by their respective disciplines. As problem-solving dialogue proceeded, team members constructively moved to drawing on their training and on each other, while still retaining a working culture of relative egalitarian respect, and even affection.

   This is not to say that Cubans don't have power issues or other human relations problems, but it is to recognize that a different, culturally-based starting point for transdisciplinary efforts seems to have a significant impact on the dynamics of the research process.

   Without anything close to adequate exposure to the Cuban context, I can only speculate as to the relative accuracy of this observation, but I make it nevertheless because it highlights a more general observation I feel I can safely make after visiting seven different eco-health research teams (not counting the Ottawa-based IDRC Program Team) in four countries. *The quality of human relations has a direct bearing on the quality of transdisciplinary work.*

   In a pattern that roughly parallels many indigenous people of the world, the Cuban teams seemed inclined to move from the relational to the functional, and to rely a great deal on relationships to ensure the integrity of the process.

   It seems to me that the strength of the Cuban teams, beyond the obvious disciplinary competence they possess, is the simple fact that the people on the teams seemed inclined to listen to each other, genuinely care for and respect each other, and to be predisposed to working together. As simple an observation as this may seem, I didn't

see these qualities as well developed in any of the other projects I was able to visit. I therefore believe that the potential for transdisciplinary work of very high quality is present in Cuba.

2. Transdisciplinary work requires an integrative scheme of thought within which the participatory disciplinary partners can meet and work. The Ecosystem Approach to Human Health paradigm can provide such a framework, but there are fundamental steps that need to be taken to engage the research team with the framework. Basically, researchers need to collectively construct a map of the ecosystem and the relevant social systems that are the subject of the research, and define together how they will answer questions and build solutions.

   The Santiago Project seemed to lack any integrated map of the socio-ecosystemic context within which the research is taking place. The Centro Habana Project seems, in writing, to have a strong theoretical foundation, but there are noticeable gaps in the implementation process that seem to indicate that the shared integrative scheme of thought is not actually employed at regular enough intervals by the whole team as a tool for pulling the various disciplinary insights together.

   These gaps include:

   a) A focus on quantitative approaches, but a noticeable absence of actual qualitative inquiry.

   b) The absence of participatory approaches that bring the community's local knowledge into the circle of disciplines.

   c) The tendency to see the task of "research" as that of understanding problems and finding solutions and "intervention" as the process of implementing what research has discovered. This view fails to see that research is also an intervention which has its own set of impacts within the community, and therefore that intervention needs to be problematized as part of the research process.

   d) The absence of systems thinking and of integrative models which attempt to capture the dynamics and multi-dimensionality of the ecosystems under study in day-to-day use by the Project teams.

3. I find that the Santiago Water Project actually has great potential as an ecosystem project, but has thus far lacked the theoretical framework. The safe-water intervention has, in fact, engaged the communities in significant ways, and could easily serve as a catalytic entry point for a more systemic approach. The multi-disciplinary team now

involved in the Project is already talking about a complex web of inter-related problems and issues (housing, AIDS, poverty, water, etc.).

4. The application of the ecosystems approach to urban settings represents an interesting paradigmatic challenge, given the predominantly built nature of the "environment" and the critical importance of the social dimension.

I recommend that both projects be encouraged to develop working models of the dynamics of the ecosystems within which they are working (which would need to include a modeling of the social systems), and to test the utility of these models for improving human health. The Centro Habana Project has developed indicators, but I submit that we need to see a picture of the socio-ecological context within which these indicators make sense, in order to be able to develop effective interventions that will assist relevant stakeholders (including, of course, community people) to manage their ecosystem effectively.

Participation

1. The boundaries that did seem to have significant impact in both projects were not so much those of academic disciplines, as those of power and hierarchy within the institutional framework of everyday life (such as within the Ministry of Health or INHEM, or between government agencies and communities).

   On the one hand, there seems to be a decided inclination to make decisions and plans from the top for the perceived benefit of communities. At the same time, there is an ideological and cultural predisposition that seems to favour people's participation and empowerment, reflected in vigorous attempts to involve community people in governance at the neighbourhood level through the Popular Councils. The natural tension between these two inclinations was reflected in the life of both research projects.

   a) The professional researchers and government decision makers identified the sets of problems to be addressed by the Project without significant consultation with the residents of the targeted communities.

   b) Once the problem and site selection was completed, only then were community representatives (usually Popular Council members) approached and involved in the Project.

   c) The interventions, in both Projects, were designed by the research teams.

d) The intended beneficiaries of the Projects were (thus far) primarily involved as sources of information, as contributors of volunteer labour, or as individuals or groups upon whom interventions could be tested. In other words, they were relatively passive. There are plans, in the Santiago Project, to shift ownership and management of what is to become an ongoing program to a local committee, but this too is really a practical engagement of community labour.

2. What has not thus far occurred to any significant degree in either of the Cuban cities projects is the engagement of community people as co-researchers, and co-designers of interventions. In my view, both projects (but particularly the Centro Habana Project) would benefit a great deal if the community's knowledge related to the social processes connected to various issues and interventions were to be explored, and if community members became active co-analyzers of their own situation and co-designers of future interventions.

   Specifically, I recommend that, in the Centro Habana Project, *a community research team be established* that can work with professional researchers in

   - defining research problems
   - developing methodological approaches and tools
   - engaging their own communities in focused dialogue and data gathering
   - interpreting data
   - developing analysis and synthesis that speak to the original research questions.

3. It is important to recognize that the INHEM team readily acknowledge that they are currently engaged in a steep learning curve related to participatory approaches in research. To their credit, they did involve a Colombian consultant as a capacity builder, but it is clear that the Project quickly took them into deeper methodological waters than their brief training encounter was able to prepare them for.

   Project directors from INHEM were very explicit about their need for:

   a) contact and involvement with other researcher struggling with the issue of participation; and

   b) training and on-going mentoring in the application of participatory approaches within on-going research work.

General Observations

Cuba seems to hold a great deal of promise for the Ecosystem Approaches to Human Health Research Initiative for the following reasons.

1. There are many health and environment issues and challenges (both urban and rural) that need attention.
2. Cuba has developed a richly articulated community engagement system for local governance and mobilization.
3. The Cuban health system is world renown for its cost-effectiveness and its closeness to the population.
4. The culture of professional research and service organizations seems to be extremely supportive of collaborative efforts, especially those aimed at improving the well-being of Cuban citizens.
5. Professional researchers in technical fields related to environment and health (at least those I met) are well trained, oriented to excellence, and open to learning.
6. The prevailing ideology that animates the Cuban system from the top to the bottom is (at least officially) supportive of participatory and transdisciplinary thinking and approaches.

From the perspective of transdisciplinary and participatory approaches to research, I propose that much could be learned from further experimentation in the Cuban context.

Case Review No. 4

LIVESTOCK AND AGRO-ECOSYSTEM MANAGEMENT FOR COMMUNITY-BASED INTEGRATED MALARIA CONTROL (EAST AFRICA)

(IDRC Project No. 100482)

BACKGROUND

Malaria accounts for some thirty percent of all out-patient visits to health facilities in Kenya. Currently in Kenya, between seventy-five and one hundred children die each day from the disease (usually cerebral malaria), and another fourteen thousand require hospitalization. Kenya is now considered (by WHO) to be the "epicenter" of cloriquine resistance in Africa. The Government of Kenya is actively committed to the WHO "Roll Back Malaria Program," and this work in part involves a search for new solutions.

A working group of Kenyan researchers and Ministry of Health partners approached IDRC with the idea of exploring the concept of zooprophylaxis[6] in relation to malaria control in a government irrigated rice scheme. It is of course well known that the presence of standing water increases breeding opportunities for mosquitoes. The Mwea Irrigated Rice Scheme involves controlled flooding of thousands of hectares of low-land areas for at least six months of the year. It is no surprise that the incidence of malaria in this area of Kenya is extremely high in comparison to most other areas of the country.

The International Centre for Insect Physiology and Ecology (ICIPE) and a joint WHO/FAO/UNEP/UNCHS panel of experts invited IDRC to participate in a proposal review conference in Nairobi in February of 1999. As a result of these deliberations, the original proposal was broadened from a disease vector focus to include a more holistic inquiry into the nature of the structure and dynamics of both the ecosystem and the social system that are giving rise to high levels of malaria transmission. This broadened framework of inquiry fit well into IDRC's Ecosystem Approaches to Human Health Program Initiative, and the Project was approved and funded in July 2000.

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[6] The term "zooprophylaxis" refers to the practice of using animals, in this case cattle, as a bait to attract Anopheles mosquitoes (the type that carry malaria), because Anopheles Arabiensis prefers to take blood meals from cattle rather than from people. Since Anopheles mosquitoes only bite at night, keeping cattle in or very near the house while people are sleeping has been shown to reduce the incidence of malaria transmission in some Asian countries.

The Project, as approved, involves research on intensified agroecosystems and malaria control in irrigated rice schemes in Kenya. Three critical components of food security, malaria control and ecosystem (including water) management are integral to the Project. A primary long-term goal of the Project is to identify and develop interventions related to "spatial management of natural resources and household and village level infrastructure" (IDRC Project approval document) and how such strategies can "empower local people to address a range of problematic health issues, particularly malaria" (Ibid.).

The Partners and their Disciplines

The Project has drawn together a broad range of partners, including the International Centre for Insect Physiology and Ecology (ICIPE), the Kenyan Government's Ministries for Health, Agriculture and Environment, the Kenyan Agricultural Research Institute, the Kenyan Medical Research Institute, the Kenyan National Irrigation Board, the University of Nairobi, and Windrock International, an NGO that specializes in participatory approaches to grassroots development.

The Research Plan

During the research proposal review process, it was decided to begin the research with a first phase (twenty-four months) that concentrates on characterizing the agroecosystem, the relevant social systems (particularly related to health conditions), and trying to understand the dynamics that are leading to and supporting high levels of malaria transmission. To this end, a number of parallel studies are underway or are planned. These include:

1. A study related to Anopheles mosquito control, including testing zooprophylaxis in combination with other known strategies;
2. A health, nutrition and health conditions study;
3. A farming systems (agriculture and livestock) study (involving livelihood, production and management dimensions);
4. A stakeholder analysis related to the Mwea Rice Scheme (including farmer groups, cooperatives and Scheme management and service agencies, etc.); and
5. A social and economic study related to livelihood, gender and well-being.

For each of these parallel studies, a separate research framework and plan has been made. Most of the studies plan to involve the community in some aspect of the research process, primarily as sources of information. All the studies are still in their early stages.

Assessing the Transdisciplinary and Participatory Dimensions of the Research

Transdisciplinarity

1. The research team reflects a wide range of disciplines, and is clearly a highly talented and enthusiastic group of individuals. It is also clear, however, that this group of talented individuals have not yet learned to work as a transdisciplinary team (as of November 2000).

   What has happened thus far in the research process is that a number of parallel studies (each with its own distinct matrix of questions and methods) has been planned and initiated (as listed above). What is at best embryonic is the following.

   a) An integrated scheme of thought from which all the studies flow and within which all data interpretation takes place. Such a framework would help to generate an ecosystem perspective that is not likely to emerge from the separate disciplinary perspectives.

   b) The harmonization of methods and approaches across disciples to ensure compatibility of outcomes, ensure all inquiry gaps are filled, avoid duplication, and avoid creating community fatigue and even resistance to successive waves of researchers and their questions.

2. Within the various proposed studies (e.g. health, social systems, farming systems, etc.), most of the sub-teams have planned to carry out some form of community participation (ranging from passive to empowering), but it does not appear that the research team as a whole has made any effort to harmonize these strategies into a single framework. This is important from the standpoint of participatory practice because the interface between researchers and community is a kind of intervention, and as such, it needs to be carefully managed.

   While this point will be discussed further in the section on participation to follow, the issue here is that a transdisciplinary framework is required in order to harmonize the various participatory strategies.

3. The problem with saying that the team should be working within an integrated framework is that such a framework has to be built to fit the socio-ecological system within which the research is occurring. This poses a bit of a chicken-and-egg problematic, in that this is the first stage of the research process, the goal of which is to map the socio-ecological system dynamics, especially related to malaria and other prominent health concerns.

   The current plans each of the separate study teams presented are most likely to produce separate maps. Piecing them together (the way Dr. Frankenstein made the monster) may or may not produce an organic *systems view* of the research context. For this reason, it will be important to begin by building the best (theoretical) map possible. (based on preliminary observations, discipline-based knowledge, and the work of other research groups working in the ecohealth field (such as the University of Guelph team).

   The exercise of designing and constructing the framework so that it can be used as a working tool by the team will contribute a great deal to the team's collective capacity to produce transdisciplinary insights.

4. Collaboration with relevant stakeholders outside the research team will require a similar exercise (as that described in #3. above) of building a common framework which describes the *system* upon which the collaboration is focused, as well as the goals and critical processes of that collaboration (i.e. how will the collaborators work together to reach their common goals?). This mutual work will probably need to be repeated at various levels with local community partners, local and regional organizations, at the state policy level, and even with international level organizations and partners. The core of each of these frameworks should remain centered on the socio-ecological systems which are the focus of the research and later interventions, but should also include a description of the role that the various stakeholders will play in bringing health to the system.

5. In meeting the research team and reviewing the plans for the various studies, I feel the team still needs to involve an economist, with a specialization in rural, agricultural economy, and conversant with the tensions between intensive commercial agriculture (such as the rice schemes) and subsistence and livelihood issues.

Participation

1. After carefully considering the guiding questions used for this evaluation related to participation, Clifford Mutero (the principal investigator of the Kenya Project) made the following remarks.

   > *"As researchers, we were conditioned to develop technical solutions which would be implemented by others in communities... Actually, we have had a strained relationship with the communities our work is supposed to benefit. We lack the breadth of knowledge and experience required to contextualize our understanding of what is happening in their world."*
   >
   > *"We knew that participatory methods existed, but we had too much arrogance to be able to seriously consider them until now."*

   Another team member commented:

   > *"We are blessed that the door has opened to applied research. Before, we had to create the knowledge and we had to hope that the Ministries (of government) applied it."*

   Dr. Mutero continued:

   > *"We put participatory analysis into our matrix, but we didn't put our matrix into a participatory process. We tried to bring their world into ours so we could understand it; we did not really put ourselves into their world so they could understand. Both are necessary."*

   These remarks eloquently reflect the Team's relationship with the issue of participation at the beginning of the Project, but they also demonstrate the researcher's openness to learning, as well as a fairly sophisticated understanding of the direction in which they need to move.

2. The research framework for the entire study, as well as the component sub-studies, were all developed without involving community representatives in the design process.

3. Most of the sub-study designs call for engaging community members as data sources, but not as co-researchers; i.e. as co-producers of knowledge.

4. Three of the critical sub-studies (the Health Impact Assessment, the Farming System Analysis, and the Socio-economic Analysis) propose some sort of participatory approach (PRA, PAR, RRA, etc.). ***I recommend that the participatory dimensions of all three studies be integrated so that the community experiences the research intervention as a single, organic process.*** If this is not done, there is a danger that the already over-stressed community will quickly tire of being questioned, will fail to see how the various initiatives are actually part of an integrated whole, and may in fact try to play one group of researchers off against the

other in hopes of deriving some immediate material benefit from the process, or may (however unwittingly) confound the data in an effort to please.

5. ***I further recommend that a community research team be formed.*** The process of the formation of this team should take the following into account.

   Who: The team needs representatives from all critical sectors within the community (i.e. the poorest, women, the most powerful, youth, various villages, leadership, religious groups, etc.). It should also involve representatives from key farmer organizations, and from key agencies serving the community. It may be necessary to have smaller sub-teams with representatives that sit an a coordinating group. Note that "the community" is not homogeneous or necessarily united. An integrated team must find ways of involving the various social groups within the community, aggregated by the socio-dynamics people live within. Care and attention need to be paid to how the selection process is carried out (voting, self appointment?, etc.). Consultation with community representatives and NGO workers familiar with community patterns will help to find an equitable process.

   The function: The function of the community research team is to provide a mechanism through which community members can become active participatory partners in the research process, including the work of identifying research questions, designing (or modifying) data gathering strategies, collecting data, interpreting outcomes, and discovering implementation solutions.

   The local research team will also have a big picture understanding of what the general aims and purposes of the research are, and will be able to explain these to their fellow community members. With the help of the local research team, the logistics and appropriate timing for various research events and processes can be worked out in ways that are harmonized with community priorities, protocol and rhythms.

   Compensation: The issue of how to compensate for the cost of participation (of local research team members) is a sensitive one. The local research team members represent the interests of the community in the research process. Some of them may also work as local researchers or research assistants. Some projects pay honoraria for this work. Others agree to contribute a fixed amount to a local improvement project (such as a well, a soccer field, a school building, etc.). Some projects provide some agreed-upon technical

assistance to the community. Still others agree with the community that the intrinsic rewards of the research process are sufficient payment to community members.

It is important to deal with this issue openly and forthrightly with the community, so that there is no argument later. Whatever is decided should be written down in a memorandum of agreement with copies provided to community representatives.

Integrative scheme of thought to guide local participation: Just as the transdisciplinary team needs an integrative framework, so does the community research team. The professional team should work with the local team members to develop a set of community-appropriate integrated models, principles and strategies that describe what the purpose of the research is, what the boundaries and domains (dimensions) of the inquiry are, what the fundamental dynamics and processes will be, and what the roles and responsibilities are of the various actors (particularly insiders versus outsiders). It is important to keep this modeling relatively simple and accessible, and to maintain the focus on the most important research questions (improved health, well-being, reduction of malaria, environmental and infrastructure management, etc.).

6. Team capacity building - In dialogue with the research team related to community participation, the team made it explicit and clear that there is an immediate need for training and technical support related to both community participation and transdisciplinarity. As Dr. Mutero put it,

> *"We proposed to work in a transdisciplinary and participatory way. We got the funding, and now we're supposed to start working, but we have never worked in this way before. There is no coaching, no guiding. After all, we submitted the proposal. We're supposed to know."*

A few specific questions posed by research team members related to their self-perceived learning needs are revealing.

a) It appears to us that participatory approaches have the weakness of not having a built-in framework of compatibility between the various methods. How do we address this problem?

[Note: It is for this reason, as well as the reasons given in #4. above, that I have recommended that all participatory strategies employed by the sub-studies of the project be integrated within a single conceptual framework and methodological

plan. The only way there will be methodological compatibility within the study is to build it in.]

b) There are many "participatory" research frameworks, including participatory action research (PAR), participatory rapid appraisal (PRA), rural rapid appraisal (RRA), action research and applied research (to name some of the prominent approaches). Which model is best?

[Note: This question reflects a certain level of familiarity with various participatory models, approaches and tool kits, but it also indicates a lack of a deeper understanding of the issues and critical processes underlying all participatory methodology. The question "Which model is best?" is akin to asking which tool in a carpenter's tool kit is "best": a chisel, a saw, a rasp or a planer? They are all tools for cutting away and shaping wood, but which tool to choose depends on the user's purpose, on the nature of the wood itself and on the knowledge and skill of the user.]

c) There seems to be natural tensions and contradictions that arise between normal scientific methods and participatory approaches. Some of these we see are:

- qualitative versus quantitative research requirements
- short- versus long-time frames
- reductionistic versus holistic frameworks of analysis

We need to learn how to work with these tensions.

[Note: These are all good questions and they serve to illustrate something about the nature of the learning that this research team needs to experience in order to carry off their program of research effectively.]

I also recommend that a basic course in participatory research methodology be offered to this team, followed by a periodic (every six months?) monitoring and coaching intervention that works first-hand with the team in the field.[7]

[7] Perhaps some of this mentoring work could be done by Dr. John McDermott (stationed at ICIPE in Nairobi), and team members from the IDRC-funded "Integrated Assessment of Agricultural Communities" project, which seems to have very successfully integrated participatory methodologies and understanding into their work (judging from my interview with Dr. McDermott and fellow team member, Dr. John Githure).

Conflict as Context for the Research

A question that relates to both transdisciplinarity and to participation in this Project concerns the fact that the Mwea Irrigated Rice Scheme (i.e. the study area) has experienced considerable conflict in the past few years. This conflict is basically between farmer groups and the government managers of the Scheme about how the Scheme should be run, about what share of the profits should go directly to farmers, and about the rules and regulations imposed on farmers and their families living on lands managed by the Scheme.

This is a very complex set of issues and problems that has direct bearing on the central questions of the research program. For example:

1. Are conditions farmers are forced to live under within the scheme boundaries keeping them so poor that their health is weakened, and they are therefore more susceptible to malaria and other prominent diseases?
2. Are the rules and regulations imposed by the Scheme preventing farmers from taking remedial measures to improve their health and well-being?
3. Since farmer groups have taken control of the Scheme (from the Government), is their capacity to manage the water and other aspects of the environment so low as to be worsening the conditions farmers must live within (lowering farm incomes, increasing the risk of malaria, etc.)? It appears so.

There is no way to study the socio-ecological system of the study area without directly addressing those questions. Don Peden (representing IDRC on the field visit) asked "How do we root the IDRC Project in the community without having the politics destroy it?"

It is clear that the research team is well aware of the vital importance of engaging the troubles of the Scheme as a basic set of determinants of health within the ecosystem. They (correctly, I feel) view the challenge of understanding the on-going tensions and conflicts as critical health constraints that are central to the research, and not simply as a risk that might interfere with the Project. Indeed, tensions seem to emerge from a history of somewhat oppressive conditions within the Scheme that have direct impact on the health and well-being of farmers and their families. The questionable social and economic viability of life within the Scheme and the absence of any accessible alternatives for the farmers need to be systematically considered. A preliminary community health survey related to health and well-being identified community member concerns and priorities as follows: hunger (80%); diseases (66%) (malaria being the number one disease, with some 10,000 cases a year from the study area alone); and poverty (41%). Related issues

identified were landlessness, exploitation by the National Irrigation Board and school dropout.[8]

One methodological imperative for exploring these issues is to work closely with local people to understand what life is really like for them within the Scheme. In so far as the research process is helping to give voice to the lives and conditions of local communities, it is unlikely that the research program will be seen as anything but a friend and an ally by community members. Indeed by anchoring the research process (at least in part) into the fabric of community life through the mechanisms of a local research team (or teams), it is probable that the research will be viewed as a constructive force working with and on behalf of local communities.

Since the object of the research is to uncover viable solutions to health challenges generated by the socio-ecological conditions of the study area, the communities involved are clearly not the only partners to consider. The National Irrigation Board's technical Centre in Mwea, and other relevant partners must also be engaged in the search for solutions, and indeed, this is the tact the Project has taken. As long as the focus of the work remains the health and well-being of people, and on a partnership-based approach to finding solutions, it is highly probable that the Project will flourish, despite political tensions.

Final Comment

The Project team of the "Livestock and Agroecosystem Management for Community-Based Integrated Malaria Control" Project is an exceptionally well chosen and capable group. Their openness to learning and experimentation makes them (and their research) very likely to benefit from training and technical support. Even if something as simple as an electronic dialogue was to be maintained that continued to raise critical questions and assist the team to access needed resources and tools, I feel this Project should not be left alone. I say this not because they are incapable, but rather because I believe their potential to deeply reflect the overall aims and objectives of the Ecosystem Approaches to Human Health Research paradigm is so great.

[8] From a yet unpublished draft paper by C.M. Mutero, H. Blank, W. Van der Hoek, F. Konradseon, J. Kariuki and J.I. Githure (May 2000) entitled, "Community Perspective of the Health and Economic Burden of Malaria: A Study from a Rice Irrigation Scheme in Kenya."

Case Review No. 5

ENHANCED HUMAN WELL-BEING THROUGH IMPROVED LIVESTOCK AND NATURAL RESOURCE MANAGEMENT IN THE EAST AFRICAN HIGHLANDS (ETHIOPIA)

(IDRC Project No. 03494)

INTRODUCTION

The highlands of East Africa are one of the most densely populated regions of the world. The Ethiopian highlands makes up roughly sixty percent of this large area (3.5 million square kilometers sprawling across Ethiopia, parts of Kenya, Tanzania, Uganda, Rwanda and Burundi), in which severe poverty, malnutrition and soil degradation are not only common, but worsening.

The litany of problems in the Ethiopian highlands includes human population pressure, deforestation, poor water management, declining nutrition and soil productivity, rapidly decreasing cereal crop yields, and a cyclical pattern of droughts for which traditional knowledge provided coping strategies, but which now seem to have been lost or set aside because of the sheer pressure to survive from day-to-day. Livestock production holds a critical place in highland farming systems (forty percent of agricultural GDP), but declining availability of forage is a serious problem.

Inspired by a regional research program for the highlands area, a bio-economic farming systems model was developed (as a part of this IDRC Project) that predicts (theoretically) that it is possible, through the effective use of various low-cost technologies, to increase farm income as much as tenfold, to reduce soil degradation by twenty percent, and at the same time to provide every adult with a minimum of 2,000 calories of food per day.

It has been well known for some time that highland agricultural productivity *can* be significantly increased through improvements in livestock management. Indeed, in the Ethiopian highlands, cattle are "life," in the sense that they provide food, income, fuel, draft power and fertilizer. Traditional knowledge suggests there is a direct correlation between human well-being and the number of cattle a family owns. The results of good management have been shown to contribute significantly to the alleviation of poverty and

malnutrition, and to better natural resource conservation. Currently in the Ethiopian highlands, livestock productivity is kept well below the agricultural potential of the area by animal diseases (mostly carried by tics and tsetse flies) and by the lack of adequate access to nutrients (i.e. high quality food).

THE IDRC PROJECT

A group of partners led by the International Livestock Research Institute (ILRI) in Addis Ababa decided to test the suitability of the "agro-ecosystem health paradigm" in terms of its usefulness in guiding research to address the question, "How can livestock production and related natural resource management strategies improve food security and human health?"

The basic starting point of the Project is the idea that discipline-specific component research approaches of the past have failed to properly understand what is happening in complex "agro-ecosystems," and so, despite doing "good research," these approaches have not been able to develop practical solutions that work within the ecological, production and social systems that overlap in any given real world context.

The basic focus of the Project is to monitor human well-being and environmental quality in relation to a variety of technological and policy innovations introduced in an effort to improve livestock productivity, human nutrition and health, and natural resource conservation.

The Research Plan

Specific *goals* in the research project include the following.

1. to develop an appropriate methodology to describe and to characterize the agro-ecosystem at various scales (farm area, watershed, etc.), with a particular focus on livestock, natural resource management and human health;

2. to identify verifiable indicators of sustainable production systems;

3. to assess the impact of selected technological and policy innovations on agro-ecosystems and human health;

4. to validate viable interventions with end users and other stakeholders through a participatory approach;

5. to assess the impact of various natural resource strategies on gender roles and human well-being; and

6. to assess the efficacy of participatory learning and action mechanisms to enhance the capacity of local people to evaluate their own ecosystem health and to develop strategies for improvement.

The proposed *activities* through which these goals were to be met cross many disciplinary boundaries and would certainly require the involvement of a broad range of experts to carry off. These activities include the following.

1. *A participatory stakeholder consultation and analysis* —of how to best proceed with the *research* process, and an identification (with stakeholders) of locally understood indicators of human health, adequate nutrition, healthy soil, crops and livestock, and effective water management. The research plan called for a consultation process in which scientists shared their discipline-based indicators, and from this discussion, a consensus was to be reached on a final set of indicators to be monitored during the project. Another goal of this stakeholder consultation process was to identify suitable interventions for testing.

2. *Plot, farm and community surveys to understand land degradation*—Formal and informal surveys were planned at the plot, household, and community levels to look at the linkages between current land practices, soil degradation, water quality, productivity and human health.

3. *Development of land management technologies* —for improving productivity and natural resources quality. In this activity, researchers were to work closely with "stakeholders" to delineate different land types and their production potentials, and to develop suitable land-use options for testing. Then farmers or farmer groups were to be engaged in experimentation.

4. *Trials on livestock technologies and management approaches*—This theme involves testing and assessing various options for improving livestock management and production.

5. *Human health and nutrition household assessments*—This line of action involved the development and implementation of a comprehensive household survey aimed at understanding the health and nutrition status of people living in the study area, as well as identifying the major determinants of health.

6. *Bio-economic modeling, adaptation pathway and definition of recommendation domains*—Bio-economic modeling was proposed in order to integrate biophysical and socio-economic factors, so that options could be designed and considered for how to address critical challenges facing farmers related to soil erosion, nutrient depletion, water quality, farm production, economic returns, poverty and ill health. Specific adaptation pathways for proposed solutions would also be modified. The modeling (mentioned in the introduction) which produced the trade-offs analysis demonstrating the possibility of a tenfold increase in farm income and a twenty percent reduction in soil reduction while still providing adults with 2,000 calories a day, was completed as part of this activity.

7. *Training and capacity-building dissemination* —This theme entails a series of interventions through which twenty to twenty-five selected local participants would be trained in participatory research approaches and the agro-ecosystem health framework in order that the insights and processes begun by the research project could continue. As well, knowledge generated through the Project would be shared and disseminated to "the community" in ways that are "simple and can be interpreted by the community" (from the original approved proposal).

The Partners and the Team

Clearly this broad ranging set of research objectives and activities requires a diverse transdisciplinary team of partners and specialists to carry it off. Partner institutions involved in the Project include the following.

1. The International Livestock Research Institute (ILRI)
2. The International Centre for Research in Agro-forestry (ICRAF) via the African Highlands Initiative
3. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
4. The Ethiopian Agricultural Research Organization (EARO)
5. The Ethiopian Health and Nutrition Research Institute (EHNRI)

6. Addis Ababa University
7. The University of Guelph
8. The University of Florida
9. The University of Manchester
10. Farm-Africa
11. Metcha Catholic Mission (Ginchi, Ethiopia)
12. Dendi Werendi Bureau of Agriculture (Ethiopia)

The core team of specialists included several crops and livestock systems scientists, an agricultural economist, several health and nutrition specialists, water and soil scientists, bio-economic modeling specialists, and a gender and livelihood specialist. Linkages to other related projects (such as the Joint Vertisols Project [JVP]) is an important aspect of the team's strategy to ensure that, as the need for additional expertise arises, specialists from other programs can be brought into the process.

Assessing the Participatory and Transdisciplinary Dimensions of the Research

In considering the observations to follow related to the transdisciplinary and participatory aspects of the research underway, it is important to bear in mind that this Project has already completed more than two years of its three-year mandate. It appears to me that the core of this research team already had well-established patterns of thinking and working together that predated the IDRC Project by several years. The dominant "culture" of this core team was anchored in the agricultural sciences. It appears to me that the addition of what team members refer to as "the agro-ecosystem health paradigm" was exactly that, an add-on to an already pre-existent base. This "new" approach to research called for a transcendence of the discipline-specific component study approach, and a movement toward building a more holistic and integrated understanding of the agro-ecosystem, and particularly how that system could be better managed to improve human well-being. Making this shift meant that the research team would have to learn new ways of working and thinking internally (i.e. transdisciplinarity), and new ways of thinking about and working with the people who were ultimately to benefit from their work (i.e. participation).

Transdisciplinarity

This Ethiopian team went further than any other team I visited in reflecting on and documenting their own internal struggles with transdisciplinarity. There can be no doubt that, when considered within the context of the home disciplines participating in the study, this team has achieved remarkable progress in weaving together diverse and rarely connected fields (such as agro-economics and epidemiology), and that this sort of fusion has the potential to produce critical transdisciplinary insights that will speak directly to the key questions animating the research program. Indeed, this team was nominated for an award for excellence in transdisciplinarity.

Despite these very real and significant advances on the path of transdisciplinarity, I also observe that, in terms of achieving the stated goals of the research Project, there is still considerable work to be done that can only be accomplished through multi-disciplinary interaction on the part of research team members that somehow moves beyond reporting discipline-based findings, into a fusion of transdisciplinary insights and experience.

1. While the core team did present several integrative models to describe how their multi-disciplinary work is conceptualized (one focused on five aspects of well-being; namely, food security, community peace, education, physical fitness and income generation; and the other which shows three overlapping research domains or circles of the ecosystem, the production system and human well-being), it does not appear that the team actively uses this (or any other) integrative scheme of thought to guide methodological design, implementation or interpretation. Indeed, it seems apparent that the separate component studies related to farming systems, livestock, health, etc. each have their own (internal) integrative framework. I could observe no indication that any effort has been made (thus far) to harmonize these separate frameworks.

   It seems to me that the Ecosystem Approaches to Human Health research framework requires, as a basic first step, that an integrative model be constructed which describes the various domains of inquiry to be pursued based on *the team's* best understanding (expressed in some kind of a map) of the character of the overlapping ecosystems and social systems that comprise the focus of the study. This integrative scheme of thought (once it has been developed collaboratively by the team members from all participating disciplines) can then be used as a "space" (i.e. common ground) within which the work of achieving a synthesis of insights related to the research questions can take place.

2. A second vital requirement, in addition to the development and utilization of an integrative framework, is that time and energy must be budgeted, at regular intervals, for the whole team to meet in order to reflect upon the research process and to generate transdisciplinary insights which can (iteratively) guide the continuing implementation of the Project.

   The distinct disciplinary components of this team seem to be functioning in relative isolation from each other. Team leaders explained that some of the partners were much slower in beginning the work on their component of the study. Several important components (e.g. participatory development of locally generated indicators and the entire livestock and livelihood study had not even been started at the time of our visit in November 2000).

   There are no doubt many valid reasons why these delays have occurred, but team members ventured several explanations which are worth noting.

   a) One team member speculated that the dominant paradigm of the agricultural disciplines made it difficult for others to have a real voice in building an integrated transdisciplinary framework.

   b) Another team member suggested that the processes of how the team was gathered, how research priorities were set, how plans were made, and how budgetary allocations were decided seemed "less than transparent."

   c) Other team members alluded to the fact that the process of assembling a transdisciplinary team has costs, and that unless adequate rewards for partner participation flowed through the Project's budgets, it was difficult to attract and hold the focus of working partners who are not in the Project's inner management circle.

   All of these factors are probably contributors to the difficulties this team has experienced in engaging all of the partners from the earliest days of the project. The "uneven take-off" (as one team leader referred to it) of various components of the Project certainly presents Project management with a serious challenge in terms of implementing a fully transdisciplinary approach.

   I can't help but speculate that this strong facilitative leadership, which allowed a natural process of community building to unfold among team members, would have, in all probability, led to a much stronger transdisciplinary research process. *I suggest that,*

even at this stage, such a team development process could make a significant difference for the Project in terms of the depth and quality of transdisciplinary insights that emerge from the Project.

3. There seems to be several noticeable disciplinary gaps in the team composition, which would need to be filled in order to effectively address all of the goals and activities of the Project.

   a) The entire social science dimension is not represented and will need to be in order to address the goals of mapping the social context as well as the human system interaction with the eco-system and the production systems.

   b) A participatory research and development specialist will be needed to address the goal of assessing participatory learning and action mechanisms and for effectively engaging community-level stakeholders in the processes of developing indicators and assessing various intervention experiments.

   c) The discipline of local knowledge has not been brought into the circle of disciplines represented on the team, nor could I perceive any indication that this idea had been in any way considered.

4. We visited the Ethiopian Health and Nutrition Research Institute for a morning and they eagerly showed us six laboratories full of technicians and equipment carrying on very specific testing procedures, none of which was at all related to the research Project, or to the Ecosystem Approach to Human Health Research approach. We got no sense, from this visit, that the Institution, or even the scientists participating directly in this study really grasped the essential nature of the ecosystems approach, let alone the relevance of transdisciplinarity and participation.

Participation

The initial goals and activities outlined in the research proposal approved by IDRC contained specific and fairly detailed reference to the role of participation in the Project. An initial participatory stakeholder consultation and analysis was planned. This was to be followed by an ongoing participatory process related to the development of indicators of human well-being and ecosystem health, to the mapping and characterization of the ecosystem, and to the assessment of various interventions. Even more explicitly, one of

the stated goals of the Project is "to assess the efficacy of participatory learning and action mechanisms to enhance the capacity of local people, to evaluate their own eco-system health, and to develop strategies for its improvement."

1. Initial stakeholder meetings took place in March 1999, more than a year after the Project began. A few other community-based meetings (with different participants) took place in subsequent months, but there is no sense that the Project created a community counterpart (stakeholder) circle with an ongoing life of its own. The meetings that were held seem to have been largely extractive in nature (i.e. carried on for the purpose of extracting data and viewpoints) and did not seem to have even approached the problem of building the capacity of stakeholders (and especially intended Project beneficiaries) to participate as co-researchers.

2. At this stage (year three), there is a plan to engage community-level people in the process of developing their own indicators of human well-being and ecosystem health, but only preliminary aspects of this have been completed.

   This raises an important technical question. How is it possible to adequately map the socio-ecological context (in order to understand the dynamics of poverty, and other problems) unless the "map" that is constructed integrates both an outside-in and an inside-out perspective? Is it not critical to understand the inner dynamics of local people's relationship to their world (comprised of the ecosystems, production systems and social systems, to use the Project's own adopted model)? Those relationships are an important part of what is generating compromised levels of human well-being in relation to "livestock and natural resource management" in the study area.

   My point is that participatory methodology should play a very central role in this research program (if for no other reason than to facilitate the process of contextualizing research insights and innovations into the life-world of local people), and currently it is playing almost no role, despite explicit intentions to the contrary. It is therefore important to try to understand why this is the case.

3. The research team members offered several explanations (without prompting) as to why implementing a participatory methodology was difficult for this team. Following are a few of their comments (paraphrased).

   a) We have a previous history of working with these communities and partners and we always worked as research scientists, following the protocols of normal

science. People expect us to work in that way, and won't understand us if we try to act otherwise.

b) Community participation would require our team to have an adequate knowledge of how the social system operates (which we don't have). We would need to know about local networks, local patterns of trust, cooperation and mutual aid, and internal patterns related to power, equity and gender.

[Note: This is of course true, but often the only way to acquire these insights is to engage partners from inside the research population to assist in preparing an initial "map" of the social territory for which participatory processes are targeted. The problem with this suggestion is that researchers would have to at least recognize the gaps in their knowledge, and have roughed out what they would need to know. This team seems not to have applied itself to these questions and clearly did not engage appropriate experts to assist them.]

c) Participatory approaches take a lot of time and energy, which is why the intervention stages of our Project are late in coming.

[A literature search related to participatory research, or anyone familiar with participatory approaches would have told the team that, while participatory approaches can be labour intensive, and they do sometimes take more time than some other strategies, in actual fact participatory methodologies are extremely cost-effective in terms of time, human resources and money for understanding the nature of complex systems such as those which are the focus of study of this Project. My own estimate of the time costs for engaging the study area population and the partners in participatory processes that would satisfactorily address the research questions not yet seriously engaged by the Project is that a ten-to-fourteen-day blitz followed by monthly five-day visits for six months by a team experienced in participatory approaches would achieve most of what needs to be done.]

4. *I recommend that*

a) a local research team be set up in the study area which engages community-level stakeholders as co-researchers; and

b) the services of a consultant (such as an experienced NGO) be engaged to assist the research team to undertake the participatory dimensions of the study.

5. Capacity building is needed for this research team (and relevant partners) on how to harmonize participatory methods and outcomes with other aspects of their work. Other capacity building needed to support the successful completion of the Project include the following.

   a) Research team training, coaching and mentoring related to participatory methods and tools, and the rationale behind them. This should include the experience of other regions and programs with participatory approaches.

   b) Training for community counterparts, related to the agro-ecosystem/health framework (AESH), which they should help to indigenize to fit the local context so they can use it.

   c) Capacity building for development workers with a long-term commitment to the study area, so they can incorporate the AESH framework into their programs and can provide long-term support to local stakeholders in retaining the learning and innovations that come from the Project.

Summary

In summary, I feel this team has needed guidance and coaching related to both transdisciplinarity and participation which it did not receive. Truly, the team leaders have struggled valiantly to understand the issues they face, and there is not a great deal within the professional academic context in which they are working that could help them.

The problem of implementing a transdisciplinary research program in the academic/professional context within which this Project is rooted would take a fairly revolutionary transformation of how the entire enterprise of research is viewed and carried out. To their credit, the team has recognized this challenge from the beginning, and has struggled to address it, without a great deal of help from anyone.

The problem of implementing a participatory approach seems to me to be largely a technical problem for which the team lacked experience and capacity. It seems to me that IDRC should have anticipated this problem and built in the proper supports for success.

PART IV: SUMMARY OF FINDINGS AND RECOMMENDATIONS

The focus of Ecosystem Approaches to Human Health research is always the improvement of human health through improved management of "the ecosystem." It sounds relatively straightforward. In most cases it is anything but. An ecosystem can be defined as a geographically and functionally coherent domain of activity, including all living and non-living components and the interaction among them. The boundaries of "the ecosystem" depend on the purpose of the analysis to be undertaken. (Adapted from Peden, 2000.)

So the first-level problem for a research team is simply to define and describe the context and the interactive dynamics that are giving rise to undesirable levels of human well-being. Again, it sounds straightforward. It is not. In practice, what this means is that researchers must adopt a *systems* view of the context within which they plan to work. Which system? The farming system? The bio-system? The social system? The infrastructure system? The economic system? The political system?

And the answer, of course, is all of them, but all of them in combination. As Nobel laureate Roger Sparry (from Caltech) once quipped, "There are emergent properties that come from the combination that you can't predict or anticipate on the basis of their isolated parts" (cited by David Suzuki, 1999, p. 10). In practice, this means that not only will the research process need the combined insights of many disciplines, but it will also require that discipline-based specialists transcend the boundaries of their training and their respective disciplinary cultures in order to generated a *transdisciplinary synthesis* of insights that describe what is occurring at a systems level.

This evaluation has shown that there are many potential obstacles to achieving transdisciplinarity in the real world within which most researchers live. It is also clear, however, that when research teams are able to achieve transdisciplinary collaboration, their capacity to understand the dynamics of the systems they are studying and to discover interventions that can significantly alter the patterns that have been creating ill health is significantly enhanced.

But there is another complication. Human beings play an active part in shaping the ecosystems that affect their health, and as one senior livestock scientist put it, "human beings are very difficult animals." It is not enough to map the natural world ecosystem (however multi-disciplinary your approach). In order to get at the underlying dynamics

leading to ill health, we also need to understand the dynamics of the human world as it interacts in patterned relationships with the rest of the ecosystem. How otherwise could we hope to change those relationships? The difficulty is that human systems cannot be fully understood, and certainly not transformed, except from the inside out.

For this reason, participatory approaches are also a fundamental and necessary part of the eco-health paradigm. This too creates a set of new problems for most normal science research teams. Most natural scientists were trained to regard "participatory" approaches as "unscientific," or as approaches that belong in "development," but not in research. While some branches of the social sciences have developed active qualitative research programs that include participatory approaches, in general there is very little understanding in the global research community of what participation in research really is and why it is important, and, with notable exceptions, an almost complete lack of technical know-how and tools related to implementing participatory approaches within integrated research programs.

In one way or another, every team visited as a part of this evaluation expressed their gratitude to IDRC for creating a research program that is broad enough to allow for a systems-based, transdisciplinary convergence of theoretical and applied research focused on solving critical human problems. One researcher stated, "In the past we were always trying to do this in pieces, and the pieces never quite added up."

In the same breath, every one of the teams visited expressed a strong need for training and technical support to help them to effectively implement the participatory dimensions of their research programs. Many of the teams were also struggling with the dynamics of transdisciplinarity.

From these observations, I conclude the following.

1. The eco-health paradigm has created an important impetus and road map for carrying on integrative applied research that is seen by participating researchers to be both important to the advance of science and vital to human well-being. As one scientist put it, "This is the way of the future for development-related research."
2. Most on-the-ground research teams have never tried to work in the ways required by this research paradigm. There is no beaten path to follow. They are making the path by walking it.
3. Neither the funded research teams, nor, it appears, the IDRC core team seem to have fully anticipated the degree of learning that would be required to be able to effectively carry off the transdisciplinary and participatory aspects of their projects. It seems to

have been assumed that if a research team built "transdisciplinarity" and "participation" into their proposals and work plans, they would (or should) know how to proceed.

4. IDRC is pioneering a new field of research that carries with it a new set of systems-level knowledge and skill requirements not generally taught in most discipline-based graduate training programs. IDRC is therefore more than a funder of research. In this case, IDRC is really an intellectual partner to the programs it funds, and as such needs to provide other supports, in addition to funding, in order to midwife the birth and early development of the Ecosystem Approaches to Human Health research paradigm.

The observations and recommendations to follow will expand on these themes, and will attempt to show both the nature of the challenges funded research teams are facing related to transdisciplinarity and participation, as well as the straightforward and cost-effective measures that the IDRC Program Initiative Team can take to assist and support its funded research projects to gradually increase their capacity for participatory and transdisciplinary work.

THE ECO-HEALTH PI AS A LEARNING ORGANIZATION

One of the remarkable features of working with the Eco-health PI during the eleven months over which this evaluation process was spread, was the high degree of learning readiness and responsiveness demonstrated by the team.

In saying this, I am not merely pointing to the way the PI interacted with the evaluation process (although that is certainly a good example of what I am talking about), but more generally to the action and reflection cycle that clearly has characterized the PI's work from its earliest days.

For example, during the past four years, the PI has increasingly recognized that most local research teams need technical support and advice in order to help them to build an adequate map (models, frameworks, etc.) to describe the socio-ecological context of their (proposed) work, and to effectively shape the research objectives within an eco-health (systems approach) paradigm of research. For this reason, the PI has invested considerable time and energy into holding proposal development workshops.

In the past few years, workshops have been held in the Ivory Coast, Mexico, Ecuador, Jordan, Ethiopia, Kenya, and Senegal, and a workshop is now being planned for Central America.

On reflecting in these processes during this evaluation, team members have pointed out that they have learned a great deal by working directly with prospective local research teams, but it is clear that the local teams have also made remarkable progress in terms of the transdisciplinary and participatory aspects of their research designs. Many of the current projects began with a fairly narrow discipline-based set of questions and approaches (as a comparison of the first concept papers to the final proposal will show), and it was only through a patient coaching and consultation process facilitated by the PI that these projects gradually emerged as full-blown transdisciplinary studies that found their place within the applied systems research framework of Eco-health. This sort of progress would not be possible if the PI wasn't already focused on strengthening the transdisciplinary and participatory dimensions, and if the research teams on the ground were not generally open, and even eager to learn. Indeed, the proposal development process often requires a compromise, limited by which partners can be induced to work together, and the extent to which partners are oriented to and experienced in field-based and participatory approaches. Often, the entire research project is an ongoing learning process.

What PI team members now observe is that the pre-project workshops need to go even further in helping local research groups to come to terms with the social dimension, with what it really means to do transdisciplinary work within their own socio-ecological context, and what is really required to engage community beneficiaries and other stakeholders in participatory processes both as a part of the research, and as part of the interventions that follow.

Another example of the learning organization response so typical of this PI occurred at the beginning of the evaluation process. Through initial meetings and interviews, it became clear that different members of the team were defining and using key concepts (within the Eco-health framework) such as "ecosystem," "health" or "participation" in slightly different ways. At this point, it was already four years past the original meetings in which core concepts and models were agreed upon, and team thinking had advanced a great deal during that period. What had not happened (due mostly to very heavy workloads), was the consolidation of that thinking into a transdisciplinary update of the PI's Eco-health framework.

A beginning exercise of this evaluation was a workshop (held in May 2000) focused on developing team consensus on the core concepts which make up the Eco-health research paradigm. (The results are reported in Part II of this report, entitled, "Coming to Terms.") Even before this workshop took place, several team members initiated a collaborative project to produce a paper which attempts to clearly articulate the PI's core

concepts.[9] Several months later, another team member produced a monograph which contains short case reviews of the PI's current line up of projects, and introduced the Eco-health approach to the agricultural research community.[10] These efforts emerged, in part at least, from the realization that there was an immediate need for the PI to more clearly articulate the core concepts which animate their eco-health model in a way that could help to guide researchers in the field struggling to implement current projects or develop new ones.

Following the most recent conferences in West Africa and the Middle East, the Ford Foundation (an invited participant at the Jordan meeting) offered to provide $250,000 US for a Middle East Eco-health Research Fund. Similarly, a Swiss research centre which was represented at the Dakar (West Africa) meeting, offered to commit funds to a West African Regional Eco-health Research Fund.

It is clear from these outcomes that the PI is already reaching out to bring other players into a broader world-wide eco-health network. This is a direct result of confronting the reality that the PI cannot carry the full burden of responsibility for promoting eco-health research around the world, and that it is therefore critical that a world-wide network be built, consisting of research institutions, funders and other partners. This emerging network will likely be further developed and consolidated in the years to come through events such as "Forum 2003," (now in planning) to which the PI intends to invite all major players worldwide in eco-health research as well as relevant UN agencies and donors.

What is significant for me as an evaluator, is that the PI has fairly consistently anticipated the outcomes of this evaluation in their evolving program life. For the past several years, for example, prospective research fund applicants have been told that the PI would not participate in a project development workshop unless community stakeholders were adequately represented at the meeting. This is exactly the sort of stimulus that is needed to encourage researchers to seriously consider participatory approaches.

In summary, the PI itself has consistently taken an open learning approach to its own work, and as a result, the impact of that work related to critical core research processes such as transdisciplinarity and participation has been steadily improving in terms of the team's ability to assist projects on the ground. The findings and recommendations to follow need to be read with this backdrop in mind.

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[9] Gilles Forget and Jean Lebel (2001). "An Ecosystem Approach to Human Health" in The International Journal of Occupational and Environmental Health. (In press.)

[10] Don Peden (2000). Is there a Doctor on the Farm? Managing Agro-ecosystems for Better Human Health. Ottawa: IDRC.

TRANSDISCIPLINARITY

"Transdisciplinarity" (within eco-health research) refers to a particular kind of collaborative work that must occur across research disciplines cooperating in a program of research, in which researchers transcend the boundaries of their own disciplines (i.e. language, assumptions, theories, models, methods, etc.) and generate new logical frameworks, new methodologies and new knowledge and insights born of the synergy that is created between them. The fundamental reason transdisciplinarity is required in eco-health research is because research in this field focuses on the nature and dynamics of integrated *systems* (ecological, production, social, etc.), the study of which overlaps many disciplines. As remarked above, the combination of these systems as they interact produces dynamics and outcomes that often cannot be predicted simply by adding up the insights of the separate disciplines. A new synthesis of insights is required.[11]

In the points to follow, findings and recommendations related to transdisciplinarity are summarized.

1. Defining the nature and context of the research problem is the first problem, and should not be taken for granted.

In the American cult movie "The Blues Brothers," a sleazy bar owner remarks to John Belushi and his band, "We like all kinds of music here, country and western." It was fascinating for me, as an applied social scientist, to listen to research teams repeatedly define the nature of their research problems without really "seeing" the social dimensions that seemed to me to be so central and critical to achieving their research objectives. This was especially true in the cases of the Ecuador Gold Mining Project, the Ecuador Pesticide and Potato Project, the Water Project in Santiago de Cuba, and the Ethiopian Highlands Project. What I believe usually happens is that the core scientific team defines the research problem through the lens of their own disciplines.

When a multi-disciplinary team is assembled, there seems to be a tacit assumption that everyone is working with the same map of the territory (i.e. of the socio-ecological context) within which the research is taking place, but I observed the following.

a) There are often disciplinary gaps in terms of who is invited to be a part of the research team, simply because the research problem was too narrowly defined (as seen through the eyes of the principal investigators).

[11] See International Center for Transdisciplinary Research (2001).

b) Most teams do not have an integrated scheme of thought guiding the research. Most have never actually constructed a dynamic transdisciplinary model of the integrated socio-ecological context in which they are working, and have no systematic way of harmonizing participatory methodologies and emergent insights.

c) The absence of this common mapping project (and the resulting map) leaves important gaps in the team's capacity to synthesize transdisciplinary insights because there is no real common ground (i.e. models, language, methods, etc.), and hence no intellectual "working space" within which researchers can meet, share experiences and generate insights.

d) In all of the projects visited, separate component studies were being carried out, each with its own internal (discipline-based) framework which defined the research context and inquiry domains, and described methodologies for data collection and interpretation. Many of the projects were experiencing methodological difficulties as a result of this parallel tracking of component studies without the benefit of a common map.

Recommendation No. 1

The Eco-health Program Initiative Team typically invests considerable time and energy into supporting the front-end work of project formation. I recommend that the IDRC team *require* that a critical "phase one" step in the proposal development process be the production of a transdisciplinary socio-ecological "map" (or models) of the context within which the research is to take place, and an integrative framework describing how the component disciplines will work together. This framework and map should define the domains of inquiry to be investigated related to all of the integrated systems that are relevant to the study (such as the ecosystem, production system, social system, gender relations, power arrangements, economic patterns, etc.). This "phase" could be funded separately (perhaps for about $20,000), and the rest of the project funds released only after the initial framework is completed. The level of detail needed at this initial stage will vary depending on the particular socio-ecological context and on the nature of the research to be undertaken. However, if the PI were to publish a generic model which specifies the *categories* to be mapped (such as natural ecosystems, social systems, gender, etc. as outlined in Part II), this would be very useful as a point of reference for local research teams.

Based on this initial exercise, a careful review of the research team should be made to ensure that all of the required disciplinary perspectives are adequately represented.

It seems to me that the PI could use the occasion of the proposal development workshop to begin building this model and set into motion the dynamics of effective transdisciplinary work. It should be made clear that the "map" produced at this early stage is "preliminary," and that its further evaluation and refinement will come about progressively during the research project to follow as the team further reflects on its work and synthesizes new insights. The map, at this stage, represents "our best understanding at this point" of the nature and dynamics of the systems under study. The continuous evolution of the map should record the ongoing process of discovery in the project.[12]

2. Taking Time

Another basic requirement of effective transdisciplinary work is that the whole team needs to meet from time to time, and to reflect together on what they are learning through the process of the research. As simple as this may seem, most teams are comprised of busy (and often over extended) professionals, who struggle to fulfill the requirements of their own parts of the study, and don't "have time for meetings." Nevertheless, there is a "necessary tension" (to borrow a phrase from Thomas Khun [1962]) to be maintained between the details of component research and the integrated reality of life (as represented in transdisciplinary systems analysis) that is essential to the success of eco-health research.

Recommendation No. 2

I recommend that the IDRC Project Team ask all funded research programs for two updates per year that reflect the outcomes of a transdisciplinary team retreat. These updates should be organized around the concepts and domains described in the framework and map produced as the project began. This should not be a report that updates on project activities. Rather, what is required is a short reflective document that summarizes the collective team insights (to date) as related to a) the socio-ecological context, b) the research problem itself, c) methodological issues, d) the significance of emerging findings, and e) possible interventions and related issues. In short, what has the team learned thus far?

[12] For participatory tools useful in constructing such "maps," see Jones (1996), Hope and Timmel (1984), Smith et al., (1997), Bopp et al. (1994), and Bopp et al. (2000).

3. Dedicating Resources

One of the most common complaints shared across all projects was that unless adequate resources are budgeted to cover the costs of team meetings, as well as the activities of component disciplinary studies to be carried out, the entire research enterprise can be seriously hampered.

IDRC funding is relatively small, and eco-health research is conceptually very big. This tension demands an artfully conceived strategic plan for how to best allocate resources within the project, and between the project and other partners.

In several of the projects, team members perceived that budgetary decision making was kept in the hands of the principal investigators and lead institutions, and that the lack of transparency, as well as the lack of any voice in deciding on budget issues was a disincentive to partners outside the management team to commit their time and energy to the project.

This type of problem (as well as the response to it) is common in community development, and indeed across most human systems. If participants (in this case researchers) are invited to participate in *a circle of inquiry*, the overt culture of which proports to be mutual trust, respect and collaboration, and if they experience a contradiction between the visible culture of collaborative inquiry, on the one hand, and an invisible, hierarchical concentration of decision-making power in regard to the use of the team's resources on the other hand, many people are inclined to withdraw their energy (sometimes covertly) from the process, feeling either a) that they are being used, or b) that they cannot succeed in completing their part of the process, because they have no control over the resources they will need to do their part and no real voice in shaping the flow of what resources are available to bring the best possible result.

This problem is more than anything else a product of the administrative culture of the research community and the accountability requirements of most research institutions and their funders. Nevertheless, the tension between the horizontal culture of collaboration required in transdisciplinary teams, and the hierarchical management patterns of most research institutions and programs presents a challenge that I believe needs to be addressed by the PI.

There are, of course, a variety of possible solutions, ranging from the awarding of funding to research collaboratives (to be jointly managed), to the educating of research institutions and project teams about collaborative management approaches that are better

able to meet both the research team's need to collectively manage the research funds and the institutional requirements related to accountability.

I submit that collaborative research of the kind promoted by the eco-health paradigm does, in fact, require a collaborative approach to project management, including the management of fiscal resources. This does not mean that there can be no one person who serves as a general manager of the project, but it does mean that the resources available have to be strategically allocated to achieve the collective goals arrived at by the transdisciplinary team. The actual allocation of resources is really a critical dimension of the transdisciplinary work, because (especially in some cases) it determines how various lines of action are weighted in terms of overall value to the process.

Recommendation No. 3

That the Eco-health PI undertake to consult with and to educate a) IDRC fiscal managers, b) all funded research teams, and c) sponsoring and potential sponsoring institutional partners about both the need for transparent and collaborative financial management approaches in eco-health research programs, and a range of viable alternative management models. As new programs are being developed, research teams should be invited to specifically address (in their proposal and work plan) the inherent tension between the culture of collaborative inquiry on the one hand, and the need for institutional clarity and fiscal accountability on the other. Whatever project management structure and financial protocols are employed should be agreed upon collaboratively by the research team (including external partners) and the sponsoring institutions.

4. Leadership and Team Building

It is obvious that a pile of lumber and other building materials is not the same thing as a house. Similarly, the simple act of calling together a multi-disciplinary group of researcher does not necessarily result in the creation of a transdisciplinary team.

a) Leadership

In observing team leaders, both formal and informal, of the research projects visited, and subsequently reflecting on what is required of an effective leader of a transdisciplinary research team, the following capacities of leadership emerge (for me) as being critical to success.

i) *Passion — A tangible and often communicated passion regarding the importance of the research related to the improvement of life for the people the*

research is designed to serve. When enthusiasm and a sense of purpose permeate a research team, tremendous creative energy is released. Team members are willing to go the "extra mile," because they believe in what they are doing.

ii) *Facilitation — The capacity to facilitate collaborative consultation processes that draw the best out of each of the participants.*

iii) *Visioning — The willingness and capacity to help the research team to build a collaborative understanding of the research context, problem and process, and to synthesize and articulate that big picture understanding as a guiding light throughout the duration of the research project.*

iv) *Making Spaces — The willingness and capacity to create and protect the necessary "working space" for collaborative inquiry and collective team management of the research process.* By "space" I mean budgeted time and resources, as well as constructive processes and mechanisms in which all team members are enabled to contribute their very best to the process.

v) *Human Relations — The capacity to build and manage constructive human relations among team members, and between the team and the various partners and stakeholders connected to the project.*

b) Team Building

A transdisciplinary team can be viewed as a community of sorts, and the problem of building a viable team can then be seen as a community development problem. From that perspective, the type of facilitative leadership provided to team members is a critical factor for success, particularly at the community-building stage when a consensus is being reached on what the "problems" are, what solutions need to be developed, and what lines of action are required to build those solutions.

In community development (and, I believe, in all human systems development), *the process of growth flows from effective relationships to constructive processes to enabling structures.* By this I mean that the foundation of any successful human system development process occurs in building positive and effective relationships between the people. Once bonds of trust and mutual respect are established, and once the people develop a sense of common purpose and direction, as well as a willingness to work together, then constructive processes (such as the intentional development of an integrative scheme of thought, along with agreed-upon strategies and plans) can be much more effectively facilitated and once the group has

experienced common processes that have helped them to clarify and implement their collective intentions, it is usually relatively easy to establish structures and mechanisms (such as regular team meetings) that are truly enabling and productive.

Many people try to skip the first two stages and jump to the last. By setting up a team structure with "officially" defined roles and responsibilities, it is typically expected that everyone will play their part and the "team" will, of its own accord, grow into an organic whole that achieves the goals for which it was assembled. While this may sometimes happen, it often does not. When it does, it is almost always because the people found a way to connect and to develop constructive processes for working together.

In general, what is needed for transdisciplinary team building is the right kind of facilitative leadership that creates a "space" (i.e. a "holding environment," to borrow a term from Ronald Heifetz)[13] within which the "adaptive work" of building a common framework can be done. When people's hearts and minds are actually engaged in a creative process in which they feel that their contributions are valued and in which they are enabled to contribute to the construction of a common framework and process, most people become committed to the process and are willing and even eager to contribute to it.

5. Inherent Challenges

Transdisciplinarity is absolutely central and critical to the effective implementation of eco-health research processes. There are many inherent challenges that make it difficult for most teams to initiate and carry off a transdisciplinary research program without a special measure of attention, effort and learning; and all of this takes time. Indeed, a three-year research contract is probably enough time to learn the basics, but not enough time (for many projects) to adequately complete a full blown transdisciplinary study, given the level of resources IDRC is able to provide.

Some other inherent challenges include the cultural dominance of discipline-driven research in most universities and research institutes; the ignorance that whole groups of disciplines have about each other; the absence of common models, language, and research methods; and the lack of understanding and support in the research professional community. It should not be surprising that a new paradigm in research requires a new set of skills, processes and methods to carry it off. Indeed, upon

[13] Heifetz, Ronald (1994), Leadership Without Easy Answers, Harvard University Press, Cambridge, Mass.

reflection, it is more surprising that all of the funded projects reviewed in depth have made considerable progress on the path of transdisciplinarity despite the obstacles.

Recommendation No. 4

That training and mentoring in transdisciplinary leadership, team building and project implementation be made available to all funded projects, and especially to projects in the final stages of project design or the early stages of implementation.

Recommendation No. 5

That the PI consider second phase findings for at least some of its projects, to allow the PIs investment in coaching and supporting the research team's learning to bear fruit and ripen. One possible mechanism for supporting this sort of extension would be the establishment of a "research sustainability fund" that is used to carry promising projects to a natural conclusion. Since IDRC funding is comparatively small-scale, some second phase funding involving a scaling up of the research project will likely require support from other donors. Involving other donors in the set-up and operation of the "research sustainability fund" will greatly enhance the PIs capability to achieve its long range goals related to excellence in eco-health research.

PARTICIPATION

"Participation" (within eco-health research) is the active engagement of the proposed beneficiaries of research and intervention, as well as those who need to be a part of building practical solutions, in the core process of inquiry, discovery, and solution building.[14] (Bhasin 1985; Bernard, 1990; Brown 1985; Chambers 1983; Fals-Borda and Rahman 1991; Bopp 1994.)

The central problem of eco-health research is to understand the dynamics of the inter-related systems within a specific field of research (defined as the "ecosystem") that are giving rise to ill-health, and then to discover and test interventions related to the management of those systems which will improve human health.

This work can be understood to consist of four inter-related dimensions of work: a) mapping the natural world (i.e. ecosystem) dynamics, b) mapping the human world (i.e. social system) dynamics, c) uncovering the dynamics of both systems as they interact

[14] See the discussion on participation in an earlier section of this report, entitled "Coming to Terms," for a more detailed discussion of issues that arise relative to the implementation of participatory approaches.

with each other to generate poor health conditions, and d) discovering interventions involving better management of the "ecosystem" that will lead to improved human health. Obviously the boundaries between these activities overlap, but there are several critical points to observe related to the process of participation.

- The "ecosystem" to be managed consists of both natural and human dynamics. How human beings are understanding, categorizing and choosing to interact with the natural ecosystem within which they live, and what forces are pushing them to think and act as they do, are all very central to the problem of managing the ecosystem to improve human health.

  So, for example, in the artesian gold mine project in southern Ecuador (see Case Review # 1), understanding the dynamics of how heavy metals and other toxic substances are released into the natural environment, as well as the chain of events that connects these toxins to neurotoxic disease and other health problems of area residents is vital and important. But all of that is not enough to understand what has to be done to solve the problem. The technical solutions may be clear, but convincing those whose livelihood and fortunes are tied to the gold mining industry in that area to change their practices is not a simple matter of giving out information about the research findings. There are issues of power, political corruption, social capital, fear, intimidation, and violence, and the economic realities faced by local people which also constitute important aspects of the ecosystem problematic.

- *The only way to really understand the world from the point of view of the people whose health is supposed to be improved by the project is to involve them in the process of research.* Methodologically, this requires (at least in part) participatory approaches. (Fals-Borda and Rahman 1991; Hall 1982.)

- The process of engaging local people and relevant stakeholders in identifying the characteristics of the world within which they live is already an intervention, in that people's thinking is being directed to particular sets of questions and issues. Even this level of (often unintended) intervention can have an impact on people's lives. (For example, family dynamics can be impacted by questions about gender roles, labour dynamics can be impacted by questions about power and resource allocation, etc.) Therefore, there is an ethical issue to be addressed concerning the impact outside researchers have on people and communities. Human research is not a neutral process (despite what some research paradigms try to say about it). It is therefore important

that community insiders are involved as partners in shaping the interventions designed to impact them.

- There are also important methodological reasons for including participatory approaches. Insiders can contribute invaluable insights into understanding and mapping the world (natural and human) "as it is" (i.e. local knowledge), in choosing research strategies for gathering important data, in interpreting research outcomes, and in helping to discover effective intervention strategies.

- Finally, "stakeholders" are (primarily) people whose thinking, choices and patterns of living and working are contributing to the current eco-health problematic. When these same people are involved as co-investigators of that problematic through participatory processes, three important goals are achieved simultaneously. First, the process is research in that new knowledge is generated. Second, participants learn. The process is educational, and this learning is usually much more impactful than outside-in didactic approaches. Third, as a result of their engagement, commitment and resolve to address the core issues are often generated, and people are mobilized to action. The process of participatory research is action oriented. (Hall 1995; 1982)

The Ecosystem Approaches to Human Health Program Initiative correctly identified community participation as a core process that is fundamental and necessary to eco-health research. In the points to follow, findings and recommendations related to participation are summarized.

1. There is a general absence of in-depth understanding concerning the implementation of participatory approaches relative to eco-health research across almost all projects reviewed for this study.[15] There is also a very low level of technical capacity in most projects to design and implement practical participatory strategies, processes and tools.
2. At the same time, there is also a general recognition among researchers in nearly all projects reviewed for this study that participatory approaches are a necessary and important part of eco-health research, and that most research teams need capacity building in order to effectively carry off the participatory dimensions of their programs of research. What seems to have happened in many cases is that research teams believed that they understood what "community participation" meant in IDRC's Eco-health Program description, and assumed that they had the necessary knowledge and

[15] The only exception to this (judging from an in-depth interview, but no field visit) is the Uganda community assessment project led by John McDermott, which seems to have very effectively integrated a PRA (participatory rapid appraisal) methodology into the core of the study.

skills to carry it off. But later, when they actually began to design their various program lines of action and component studies and to come into direct contact with stakeholder groups, they found themselves falling back on familiar methodologies, and the goal of employing participatory approaches seemed increasingly elusive.

Following are a few comments from the Kenyan Malaria Control Project team director, Clifford Mutero, that are fairly representative of remarks made by all the teams.

> *"We proposed to work in a transdisciplinary and participatory way. We got the funding, and now we're supposed to start working, but we have never worked in this way before. There is no coaching, no guiding. After all, we submitted the proposal. We're supposed to know.*
>
> *"We put participatory analysis into our matrix, but we didn't put our matrix into a participatory process. We tried to bring their world into ours so we could understand it; we did not really put ourselves into their world so they could understand. Both are necessary.*
>
> *"Our researchers need capacity building in participatory approaches."*

There is a universal desire to learn how to more effectively integrate participatory approaches into eco-health research programs across all projects reviewed for this evaluation.

3. Not all participation is equal. In 1969, Sherry Arnstein published a brief article on citizens participation (Arnstein, 1969), in which she described a "ladder of participation." The lowest rungs of the ladder described processes in which citizens were "told" or "done to" by outside intervenors. At this level, citizens are passive. Their hearts and minds are not engaged. People who refer to this type of process as "participatory" point to the number of bodies that attended meetings as an indicator that people are participating.

   Other low level rungs of the ladder involve giving people information, extracting information from them, or "consulting" them, with no intention of allowing them to actually shape the outcomes of the process being consulted about. Most community meetings put on by government and corporations in Canada as a part of an "environmental review" are of this sort. Arnstein called these levels of the ladder "pseudo-participation."

   In the middle of the ladder, people "participate" by donating labour and other resources to a project, but the objectives and strategies of the project are all determined by external agents. A slightly higher rung has people forming committees and groups to plan for and carry out objectives and strategies predetermined by outside agents.

The top rung of the ladder describes interactive processes in which people co-investigate their own situation, and participate as co-decision makers and implementors in building solutions. The very top of the ladder reverses the power arrangements. Local people are in charge of the process of development, and outside helpers provide guidance and assistance under community direction. (See Appendix B for a more recent version of this model.)

Thinking about participatory processes has come a long way since 1958, and it is now generally recognized (particularly coming out of the experiences of Participatory Action Research) that there are what could be seen as three large categories of participation with variations within each: (a) pseudo-participation—which is called "participation" but really isn't, because people are passive and the process is totally controlled by outside agents; (b) co-participation—in which insiders and outsiders share power, responsibility and benefits of the process and are mutually responsible for outcomes; and (c) community participation—in which the people drive their own research, learning and development processes, and engage outside helpers to provide technical support and advice. (See, for example Fals-Borda and Rahman, 1991.)

Co-participation is an appropriate level of participation for most eco-health research, but it requires skilled facilitation to prevent the process from deteriorating into pseudo-participation as local people are relegated to passive roles by researchers who don't know how to build working partnerships in which *both* professional researchers *and* local people are able to play their respective roles in the process.

In the projects reviewed as a part of this evaluation, what "participation" was occurring would have to be categorized as a pseudo-participation within this framework, with occasional unsustained forays into co-participation. In some of the projects (Habana Centro, Ecuador Gold Mines, and Kenya Malaria Control), there is a clear understanding and desire to move to co-participation and beyond. In the other projects, the level of understanding about participation has prevented the team from understanding that they *should* pursue that goal.

4. There are costs that must be incurred when implementing participatory approaches. There is a perception on the part of some of the natural scientists interviewed during this study that participatory approaches are far "too costly" in time, human resources and money, and that the cost-benefit of using participatory methods makes them too "expensive" for projects with limited resources (which is almost all projects).

While there is some truth in this assessment, it is also a reflection of a basic lack of understanding about both the nature of the research problems for which participatory approaches are fundamental and necessary,[16] and about what can be done in what time frames by skilled practitioners using the right tools.

There are indeed costs attached to implementing participatory approaches, just as there are costs (in skilled human resources, high tech laboratory fees, and often quite a lot of time) in water and soil sampling and testing programs, which are often integral to eco-health research programs.

Due largely (I believe) to a lack of familiarity with what is entailed in conducting effective participatory research and intervention processes, there was generally a tendency on the part of those who developed the budgets and time lines of most of the projects reviewed for this evaluation to inadequately plan and resource participatory work. Specifically, the following costs need to be taken into account.

a) *Participatory approaches require skilled human resources who can guide the planning, implementation and data processing and interpretation processes.* It is important to make a detailed participatory research plan in order to spell out the steps and stages that will be required.

b) *Adequate time must be planned for to accommodate community preparation and capacity building and data collection processes need to be fitted into community time lines and rhythms.* One very commonly used strategy is to assemble a community research committee or team to work in partnership with the scientific team. Adequate time and attention are needed to work with this team in supporting them to play their role.

c) *There are community-based costs, just as there are professional costs.* In some situations, it is appropriate to budget funds to pay for local researchers and honoraria for committee members. There is a danger, however, in choosing to pay some and not others, and it is often better to negotiate a contribution to a community development fund that will benefit everyone.

[16] Often critical questions in eco-health research require that community stakeholders assist outside researchers to understand how the world is put together from the inside-out of the culture or community at the centre of the study. Qualitative and often participatory methods are required to access this type of data, and because it is vital to developing effective interventions (a primary goal of the research), it cannot be ruled out simply because it is not "cost effective."

Other community costs can include the costs of holding a meeting, providing food for a feast, local transportation, child care for those attending meetings, and security costs, all depending on local circumstances.

Community costs need to be negotiated and agreed upon at the beginning of the process in consultation with community representatives. In many cases, it is best that this agreement be written down and copies shared with everyone involved.

d) *There may be additional communication costs, because in participatory work, it is important that community participants receive feedback on the findings of research processes they helped to facilitate.*

5. Challenge to IDRC — There are inherent challenges for IDRC, or any funder of research which requires participatory approaches in order to effectively achieve research goals. These challenges are primarily related to the institution's need for predictability and uniformity of administrative policy and procedures (such as the institution's reluctance to grant time extensions on projects, because of what that does to outstanding financial reserves) versus the need for some amount of flexibility for program managers working with research projects that cannot always fit themselves into the plan they submitted with their original proposal because of changing community conditions. Participatory research approaches do take a certain amount of flexibility to conduct, to manage and to supervise. (Korten, 1990.)

   Since IDRC is dedicated to promoting research that is directly tied to development, it seems to me to be inescapable that at least some of the research the institution funds will have community participation components. I have tired to show elsewhere in this report that there are sound methodological, ethical and strategic reasons for incorporating participatory approaches into development-oriented research. Indeed, the Ecosystems Approaches to Human Health Program Initiative is advancing a paradigm of research in which both transdisciplinarity and participation are *critical processes* that are integral to the essence of the approach.

   It therefore seems to me that an intentional institutional learning process may be helpful to assist senior managers, financial overseers, and program officers to develop policies and procedures that can both meet the institution's administrative needs as well as support, encourage and accommodate the use of participatory approaches in research.

Recommendation No. 6

The critical need reflected across all projects reviewed for this evaluation was for capacity building, coaching and mentoring related to participatory approaches in

research. I recommend that the Ecosystems Approaches to Human Health Program Initiative take the following steps.

a) Undertake a capacity building process for the PI team related to participation in research that involves both theoretical and methodological training and hands-on experience. The goal of this process should be to strengthen the capacity of PI team members to offer coaching and mentoring support related to participation to funded projects.

   [Rationale: I contend that since most graduate training programs still do not provide training in this area, and since participation is central to most eco-health research, a team learning process related to providing leadership in this vital area would contribute significantly to overall program strength and influence in the field.]

b) In consultation with funded projects and other partners, develop a research team capacity-building initiative that addresses the following issues:

   i) what participation is and why it is important.

   ii) indicators of effective participation (i.e. how will you know it when you see it?)

   iii) barriers to participation

   iv) methods and tools related to the implementation of participatory approaches

   v) skill developing and attitudes needed for facilitating participatory processes

   vi) integrating participatory approaches into eco-health research

   vii) processing and interpreting data from participatory research processes

   viii) harmonizing participatory methods and findings with other methods and findings within a larger eco-health research program.

General Recommendations

In this final section, summary recommendations will be offered that are intended to suggest a few practical strategies for implementing the primary recommendations flowing from this study.

The primary findings related to both transdisciplinarity and to participation suggest

a) that transdisciplinarity and participation are *critical core processes* that are integral to the implementation of the Eco-systems Approaches to Human Health research paradigm;

b) that IDRC is advancing and promoting a relatively new research approach for which there are required knowledge and skill sets that do not commonly exist across the global research community in most of the fields relevant to eco-health research; and

c) that researchers now engaged in eco-health projects readily recognize the essential importance of transdisciplinarity and participation to their work, but they also recognize their own lack of capacity to effectively implement those critical core processes and are openly asking for help in assisting them to learn as they go.

d) And so, the primary recommendation flowing from the five separate case reviews and the overall study is for the Eco-health PI*to incorporate capacity building as a primary line of action* that would accompany other activities such as new project development, monitoring and evaluation, and dissemination.

e) Specifically, there is a need for capacity building related to transdisciplinary research program implementation, the implementation of participatory approaches in research, and the integration of both of these into eco-health paradigmatic frameworks (i.e. systems thinking applied to eco-health research).

Recommendation No. 7

That a **global eco-health research learning network,** *focused on critical concepts and core processes* in eco-health research be established (in collaboration with other appropriate partners) that has the following features and functions.

a) Regional learning collaboratives - consisting of groups of research projects and independent researchers living and working within reasonable traveling distances of each other.

b) Annual regional or continental conferences -which focus both on basic capacity building of researchers and sharing of emergent conceptual methodological challenges, rather than on showcasing the research outcomes of particular projects.

c) A global conference every two to three years, perhaps replacing the regional meetings for that year.

d) A core technical team of selected researchers and consultants with expertise and experience in eco-health systems thinking, transdisciplinary research and participatory approaches that acts as facilitators and coordinators of the network. Specific functions of the team would include the following:

- providing technical support, mentoring and advice to ongoing eco-health projects using email, telephone, and, if necessary, field visits

- documenting on the ground experiences, struggles and lessons learned related to critical processes in eco-health research and feeding this learning into the learning network's ongoing processes.
- assisting regional collaboratives to develop their own capacity to provide support to eco-health research programs in their regions.

I fully realize that it is not enough to recommend that the Eco-health PI add capacity building as a line of action to their already over-extended work load. It is also necessary to show how this can be done, given the very real time and resource constraints under which the PI team operates.

One solution is to learn to see every encounter with funded projects as a capacity building encounter, and to consciously incorporate processes and strategies for helping the local team to learn to do their work more effectively, particularly related to critical core research processes such as participation. This skill set can (gradually, over time), be learned by the PI's project officers if there is a systematic in-house capacity building program to help them.

I propose, however, that the task of promoting the learning that is needed (especially related to core research processes) as the eco-health research paradigm extends its influence around the world is far too large for the PI to take upon its own shoulders. That is the primary reason why I have recommended the formation of a global eco-health research learning network.

A second important issue related to implementing a capacity-building program to accompany the eco-health research initiative is money. How will such an expanded venture be paid for?

Recommendation No. 8

I propose that the activity of identifying the learning that is needed, providing learning intervention services to ongoing projects, documenting experiences related to core processes from ongoing projects around the world and feeding this learning back into the learning network all constitutes a kind of system-level meta-research project focused on what it takes to implement effective eco-health research.

I therefore recommend that, in order to kick start the learning network, the core technical team's activities be funded as a research project of the Eco-health program initiative. I suggest that the eco-health research learning network idea has the potential to attract other donors (such as the Ford, Kellogg or Carnegie Foundations) and also that

large research associations and groups such as CGIAR, ILIRI, CIP, UQHM, the University of Guelph and WHO could also be interested in providing support to the process, perhaps on a region-by-region basis.

Recommendation No. 9

This evaluation explicitly did not deal with "gender" integration as a distinct issue. However, it became evident that the issue of gender integration is really a critical core process (like participation) within the ecosystem approach. For that reason, *I recommend that a formal systematic evaluation of gender integration as a critical research process be undertaken by the PI.*

Final Reflection on the Evaluation Process

A primary sub-objective which I consciously sought to implement through the process of the field visits was to utilize the process of the evaluation as a capacity-building input for participating research teams. The primary strategy employed to achieve this was to use the guiding questions (see Part II) as a focus of discussion, and to engage researchers in reflecting on their own processes. In this way, I was able to provide something of a standard against which researchers could compare their own processes with the (generic) description of authentic transdisciplinary and participatory processes. This made the focus of the discussion (in most cases) learning, rather than judgment, and in that atmosphere, most researchers were very forthcoming about their struggles with core research processes, as well as their desire to learn.

There is a Yiddish proverb: "When the shoemaker goes to town, all he sees are shoes." I entered this evaluation process after many years of experience implementing transdisciplinary and participatory processes in research and development work. I came away feeling like I am just beginning to understand what those processes really are and why they are so fundamental to applied systems research.

Whatever it was that prompted the Eco-health PI to undertake a separate evaluation of two of the critical core processes in eco-health research, I can only conclude that it was an exceedingly wise thing to do. I say this because if transdisciplinarity and participation are *integral* to the eco-health research paradigm, then if you're not fully implementing those core processes in your work, you are not really doing what you set out to do. This PI has had the courage to look deeply at a set of very difficult questions, and to not look away until answers emerged. This openness to learning and improvement of practice bodes well for the future of both the program and the paradigm that animates it.

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APPENDIX A

GUIDING QUESTIONS

Guiding Questions

Participation

1) Who's health is being impacted by the ecosystem stresses addressed by the project (i.e. Who are the direct beneficiaries?)?

2) What were the processes of engagement for involving these beneficiaries in the project?
   - in identifying and analyzing the research problems?
   - in mapping the ecosystem(s)?
   - in mapping relevant social systems?
   - in designing the project interventions?
   - in implementing and managing the project?
   - in monitoring?
   - in co-creating new knowledge (i.e. as co-researchers)?
   - in contributing to (iterative) course corrections in the project?
   - in evaluation?

3) What are the barriers and strengths related to beneficiary participation?

4) To what extent is the project building the capacity of beneficiaries to address the determinants of health?
   - biophysical?
   - socio-economic?
   - environmental?
   - other?

5) Who are the stakeholders in this project other than the beneficiaries? What "stake" do they hold (i.e. What are their interests?)?

6) How have the various stakeholders been involved in the project?
   a. What processes of engagement were used?
   b. What stages and aspects of the project were involved?
   c. What roles do/did stakeholders play in,
      - identifying/analyzing the research problem?
      - in mapping the ecosystem(s)?
      - in mapping relevant social systems?
      - in designing the project's interventions?
      - in implementing and managing the project?
      - in monitoring?
      - in contributing to (iterative) course corrections?
      - in evaluations?

7) How have appropriate levels/degrees of participation of the various beneficiaries and other stakeholders been decided upon? Who decided?

8) How have conflicting needs, agendas, and interests (of the various beneficiaries and stakeholders) related to the focus of the research been addressed through the project methodology?

9) How have the real costs of beneficiary participation been addressed by the project? Examples:
   - time away from productive tasks
   - travel
   - security
   - childcare
   - lost income
   - need for capacity building
   - need for advocacy and support services (especially in conflicted situations)

10) What efforts were made early on in the project, to map the social world of intended project beneficiaries, and key stakeholders, in order to determine which segments of the impacted population were adequately "represented," by which voices, and who needed to be included as "participants"?

11) How does the project deal with the tension between naturalistic science methodologies and qualitative and participative social science and development methodological approaches?

12) What kind of learning/capacity building does your team need in order to be more effective at integrating a participatory approach into your research practice?
   - conflict resolution?
   - facilitation?
   - participatory action research methodology?
   - popular education?
   - community development?
   - other?

Transdisciplinarity

1) Which academic disciplines are involved in this research project? Specifically, in,
   - conceptualizing the problem?
   - contributing basic assumptions, models and theories to the logical framework
     and research design?
   - formulating the methodology(ies)?
   - connecting the research to development objectives?

2) Definition

The term "transdisciplinarity" (in the context of the Ecosystem Approaches to Human Health Program Initiative) refers to research efforts carried out by teams of experts from a variety of complementary disciplines, through a process in which the researchers transcend the boundaries of their own disciplines (i.e. language, assumptions, theories, models, etc.) and generate new logical frameworks, new methodologies and new knowledge and insights born of the synergy that is created between them.

Transdisciplinary versus Multi-disciplinary

A transdisciplinary approach is not the same as a multi-disciplinary approach. The key difference is that a multi-disciplinary approach involves the collaboration of two or more disciplines on a research problem, but does not require researchers to work beyond the boundaries of their own *disciplines*. It is rather, an exercise in fitting together multiple lines of action that run parallel to each other and occasionally combine to provide insights from each of the contributing disciplines. By contrast, a transdisciplinary approach requires that researchers from different disciplines create a "virtual discipline" with its own basic assumptions, theories and models, research protocol methodologies, etc. for the life of that specific project.

On a scale of 1-10 ("1" being the multi-disciplinary side of the scale and "10" being the transdisciplinary side of the scale), how would you rank your project?

MULTI-DISCIPLINARY 1 2 3 4 5 6 7 8 9 10 TRANSDISCIPLINARY

Please explain your answer.

3) Tell me the story of the origins of your project? Whose initiative was it at first? What other partners were brought in? Describe the role which the various partners played developing the conceptual framework and methodology for the project?

4) To what extent is the research process co-managed by the various team members representing participating disciplines?

5) What sorts of challenges and issues have you encountered in trying to implement a transdisciplinarity approach?

Examples:

- retreat into discipline specializations?
- paradigm conflicts?
- communication and language problems?
- dominant versus less powerful voices in the process?

- lack of understanding and support in the research/professional community?

6) To what extent have the research team members been able to move beyond "representing" their own discipline, and into a process of co-creating new insights, new models, new approaches, and a new understanding of how to intervene effectively in the management of ecosystems in ways that will positively impact human health?

7) Has the team been able to build a model of the ecosystem being studied (including the human dimensions) that draws on the insights of all participating disciplines? Please explain.

8) Please describe the various roles your core team members play in the overall program. Does the team ever move beyond the contributions of individual members to produce insights and outcomes "greater than the sum of its parts"? In other words, is there a symbiotic "team" effect?

9) How has the team integrated local/knowledge and community participation into the research, knowledge production, and ecosystem intervention processes of the project?

10) How has the team integrated relevant stakeholders into the knowledge production and solution-building processes?

11) What sorts of support and assistance would be helpful to your team in increasing the levels and quality of transdisciplinarity work connected to your research program?

APPENDIX B

LADDER OF PARTICIPATION

From Passive Participation to Self-Mobilization

(from "International Agricultural Development Journal," Feb. 1995)

Passive Participation

People participate by being told what is going to happen or has already happened. It is a unilateral announcement by an administration or poject management without listening to people's responses.

Participation in Information Giving

People participate by answering questions posed by extractive researchers using questionnaire surveys or similar approaches. People do not have the opportunity to influence proceedings.

Participation by Consultation

People participate by being consulted, and external agents listen to views. This process does not concede any share in decision-making and professionals are under no obligation to take on board people's views.

Participation for Material Incentives

People participate by providing resources, for example, labour, in return for food, cash or other material incentives. It is very common to see this called participation, yet people have no stake in prolonging activities when the incentives end.

Functional Participation

People participate by forming groups to meet predetermined objectives related to the project. These institutions tend to be dependent on external initiaors and facilitators, but many become self-reliant.

Interactive Participation

People participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existin ones. These groups take control over local decisions, and so people have a stake in maintaining structures and practices.

Self-mobilization

People participate by taking initiatives independent of external institutions to change systems. They develop contracts with external institutions for resources and technical advice they need, but retain control over how resources are used.

APPENDIX C

LIST OF INDIVIDUALS CONSULTED

Note:

The following is a list of people who have been interviewed for this evaluation. Because this list was compiled from original signatures of the recipients, we cannot guarantee the accuracy of individuals' names.

COUNTRY: **ECUADOR**

PROJECT: **ENVIRONMENTAL AND HEALTH IMPACTS OF SMALL-SCALE GOLD MINING**

Oscar Betancourt (Executive Director, FUNSAD)
Cristine Merino Ocampo (Investigadra en Epidemiologia)
Francisco Cevallos (Medico, Mematologo)
Luis Guerron (Sociologo, Methodology Specialist)
Cason Choley (Salubrista)
Ruben Paez (Salubrista M.D.)
Roberto Sempertegui (Epidemiologia, Control Enfermedady)
Edmundo Granda (Salubrista)
Sandra Chavez C. (Secretaria)
Patricia Constales-Gendre (Consultant)

Community Research Meeting (Marabelli)
Kativska Noblecilla (Estudio Gngenieria en Sistemas)
Honica Armijos (Estudio Marketin)
Oscar Ramirez (Trabajo, Mecamica Automotris)
Rosita Astudillo (Actividades Particulares)
Noemie Astudillo (Trabajo)
Irma Adazco (Trabajo)
Carla Ocana (Actividades Particulares)
Project Team

FUNSAD and SERVIGEMAB
Carlos Solinas Calero (Ingeniero Grologo de Minas)
Manuel de Jesier Saranya Saraugo (Estudios Superiores [cursando] ciencios de la Educacion)

Survey Team (Portovello)
Daniel Vinicio Galvez Gonzalez (Estudiante Informatic)
Mariela Augusta Aluaraso Bermeo (Estudiante Informatic)
Ruth Cumanda Lucoro P. (Estudiante Informatic)
Nelson Aevilar Rosei (Empleado Publico)
Yackeline Ochoa (Maestra in Belleza)
Vivoana Vanessa Ramon R. (Estudiante)
Rosa Laura Pecialoza Castro (Jubilaita)

COUNTRY: **SANTIAGO DE CUBA**

PROJECT: **INTEGRATED APPROACHES TO SAFE DRINKING WATER QUALITY**

Dr. Gracicla Soto Martinez (Vicedirectora Primera, PHEM)
Dr. Mariano Bonet Gorbea (Vicedirector, INHEM)
Dr. Lono Semanat Sanchez (Vicedirector Salud Ambiental Centro Prov. Higiene of Epidemiologia)
Lic. Vicente I. Prieto Dizz (Researcher, INHEM)
Ing. Guido M. Cespedes V. (Asesor de la Junta en la comunidad)
Dr. Ruben Fernandez Ermus (Especialiste en Higiene y Epidemiologia)
Lic. Damaris Correa Requijos (Licenciada en Psicologia)
Ing. Evelin Jones Hamos (Ing. Aidraulica)
Dra. Ana Mercedes Abares Franco (Medico de Famillia)
Tec. Miguel Homurtiner Deaz (Higiene y Cepedenumogia)
Enna Rafaela Cluisjo Calderin (Tecnica en Estadisticas)
Marcia Fumero Arcia, (Tecnico Medio en Contabilidad)
Hugo A. Cuerco Acosta (Presidenta de la Junta del Projecto)
Tealy Rodriguez Barcelo (Prolongacions de Corona)
Dulce G. Proenza Palaers (Prolongacions de Corona)
Rosa Elleca Pema Qracy
Jery?? B??
Calle Hermacios Tudela
Jose A. Flores Portuondo
Isabel
Dr. Gustavo Marzan Delis (Coordinador Provincial del Proyecto)
Dr. Luis Armando Dominguez Nigto

COUNTRY: **KENYA**

PROJECT: **LIVESTOCK AND AGRO-ECOSYSTEM MANAGEMENT FOR COMMUNITY-BASED INTEGRATED MALARIA CONTROL (EAST AFRICA)**

Dr. Clifford Mutero (Sr. Scientist)
Dr. John Githure (Human Health Division, ICIPE)
Dr. Joyce Olenja (African Studies, Medical Anthropologist)
Dr. George Gitau (Epidemiologist)
Dr. Lucy Kabuage (Research)
Charity Kabutha (NGO Rep., Windrock Int'l.)
Dr. Don Peden (IDRC)
Dr. Joseph G. Sennyonga (Anthropologist)
Violet Kamini (Anthropologist, Dept. of Health)
Mr. P. Nganga (Research Asst.)
Mr. P. Barasa (Technician)
Mr. J. Wachira (Local)
Mr. S. Ngai (Deputy Village in Charge)
Mr. Kaumbali (Asst. Dir., NIP)

COUNTRY: **ETHIOPIA**

PROJECT: **ENHANCED HUMAN WELL-BEING THROUGH IMPROVED LIVESTOCK AND NATURAL RESOURCE MANAGEMENT IN THE EAST AFRICAN HIGHLAND**

Mohamed Saleem (Co-Researcher, ILRI)
A. Tall (Deputy Director, ILRI)
Mohammad Jabbar (ILRI)
Iheanacho Okike (ILRI)
Gusaga Abate (human health and nutrition)
Abiye Astatke (water resources, soil conservation)
Tamrat Biri (water resources, soil conservation)
Zinash Selassie (livestock, feed and water)
Azage Tegegne (crossbred cows, human nutrition)
Mohamed Ahmed (crossbred cows, human nutrition)
Mohammad Jabbar (bio-economic modeling)

APPENDIX D

HIGHLIGHTS OF
KEY FINDINGS AND RECOMMENDATIONS

HIGHLIGHTS OF KEY FINDINGS & RECOMMENDATIONS

This evaluation has shown that there are many potential obstacles to achieving transdisciplinarity in the real world within which most researchers live. It is also clear, however, that when research teams are able to achieve transdisciplinary collaboration, their capacity to understand the dynamics of the systems they are studying and to discover interventions that can significantly alter the patterns that have been creating ill health is significantly enhanced.

It is not enough to map the natural world ecosystem (however multi-disciplinary your approach). In order to get at the underlying dynamics leading to ill health, we also need to understand the dynamics of the human world as it interacts in patterned relationships with the rest of the ecosystem. How otherwise could we hope to change those relationships? The difficulty is that human systems cannot be fully understood, and certainly not transformed, except from the inside out.

For this reason, participatory approaches are also a fundamental and necessary part of the eco-health paradigm. This too creates a set of new problems for most normal science research teams. Most natural scientists were trained to regard "participatory" approaches as "unscientific," or as approaches that belong in "development," but not in research. While some branches of the social sciences have developed active qualitative research programs that include participatory approaches, in general there is very little understanding in the global research community of what participation in research really is and why it is important, and, with notable exceptions, an almost complete lack of technical know-how and tools related to implementing participatory approaches within integrated research programs.

In one way or another, every team visited as a part of this evaluation expressed their gratitude to IDRC for creating a research program that is broad enough to allow for a systems-based, transdisciplinary convergence of theoretical and applied research focused on solving critical human problems. One researcher stated, "In the past we were always trying to do this in pieces, and the pieces never quite added up."

In the same breath, every one of the teams visited expressed a strong need for training and technical support to help them to effectively implement the participatory dimensions of their research programs. Many of the teams were also struggling with the dynamics of transdisciplinarity.

Transdisciplinarity

When a multi-disciplinary team is assembled, there seems to be a tacit assumption that everyone is working with the same map of the territory (i.e. of the socio-ecological context) within which the research is taking place, but I observed the following.

a) There are often disciplinary gaps in terms of who is invited to be a part of the research team, simply because the research problem was too narrowly defined (as seen through the eyes of the principal investigators).

b) Most teams do not have an integrated scheme of thought guiding the research. Most have never actually constructed a dynamic transdisciplinary model of the integrated socio-ecological context in which they are working, and have no systematic way of harmonizing participatory methodologies and emergent insights.

c) The absence of this common mapping project (and the resulting map) leaves important gaps in the team's capacity to synthesize transdisciplinary insights because there is no real common ground (i.e. models, language, methods, etc.), and hence no intellectual "working space" within which researchers can meet, share experiences and generate insights.

d) In all of the projects visited, separate component studies were being carried out, each with its own internal (discipline-based) framework which defined the research context and inquiry domains, and described methodologies for data collection and interpretation. Many of the projects were experiencing methodological challenge as a result of this parallel tracking of component studies without the benefit of a common map.

Participation

1. There is a general absence of in-depth understanding concerning the implementation of participatory approaches relative to eco-health research across almost all projects reviewed for this study.[1] There is also a very low level of technical capacity in most projects to design and implement practical participatory strategies, processes and tools.

2. At the same time, there is also a general recognition among researchers in nearly all projects reviewed for this study that participatory approaches are a necessary and

[1] The only exception to this (judging from an in-depth interview, but no field visit) is the Uganda community assessment project led by John McDermott, which seems to have very effectively integrated a PRA (participatory rapid appraisal) methodology into the core of the study.

important part of eco-health research, and that most research teams need capacity building in order to effectively carry off the participatory dimensions of their programs of research. What seems to have happened in many cases is that research teams believed that they understood what "community participation" meant in IDRC's Eco-health Program description, and assumed that they had the necessary knowledge and skills to carry it off. But later, when they actually began to design their various program lines of action and component studies and to come into direct contact with stakeholder groups, they found themselves falling back on familiar methodologies, and the goal of employing participatory approaches seemed increasingly elusive.

Following are a few comments from the Kenyan Malaria Control Project team director, Clifford Mutero, that are fairly representative of remarks made by all the teams.

> *"We proposed to work in a transdisciplinary and participatory way. We got the funding, and now we're supposed to start working, but we have never worked in this way before. There is no coaching, no guiding. After all, we submitted the proposal. We're supposed to know.*
>
> *"We put participatory analysis into our matrix, but we didn't put our matrix into a participatory process. We tried to bring their world into ours so we could understand it; we did not really put ourselves into their world so they could understand. Both are necessary.*
>
> *"Our researchers need capacity building in participatory approaches."*

There is a universal desire to learn how to more effectively integrate participatory approaches into eco-health research programs across all projects reviewed for this evaluation.

HIGHLIGHTS

Case Review No. 1

ENVIRONMENTAL AND HEALTH IMPACTS OF SMALL-SCALE GOLD MINING IN ECUADOR

(IDRC Project No. 04291)

1. The survey teams, when seen as stakeholder groups are clearly not widely representative of the categories of stakeholders who will need to be involved in order to effectively address environmental management issues. Nevertheless, they are a good beginning, largely because they are (relatively) educated about the issues, and committed to taking action.

   It will be extremely important at this stage to develop an adequate map of the social dynamics related to the ecosystem and human health situation in the study area.

   a) Who are the various (sociological) groups involve in the industry? What are their roles? What are their interests and needs?

   b) Who are the groups that are impacted by the industry?

   c) How is power distributed and how is it exercised in relation to the dynamics of land management, the gold mining industry and human well-being? Who is benefiting economically? Who is being exploited? How are those benefiting most protecting their interests? What are the likely sources of resistance to attempts to manage the situation for a healthier ecosystem and for improved human health?

   d) Who has to be involved in building a sustainable solution to the current web of problems and issues?

   e) What other economic, social and political issues are intertwined with the gold mining contamination issue? (e.g. child labour, adverse regional agricultural market conditions, etc.)

   These and other related questions need to be answered in order to strategically identify the full range of stakeholders, to be able to understand what interests and needs each group is driven by, and ultimately, to design an intervention that will improve human health through environmental management that will not simply be ignored, or directly opposed.

2. Some of this research may have already been done by others. A broad-based literature search may be helpful. However, it is probable that much of it has not been done in ways that will provide the project with the map it needs.

   Developing this analysis presents a golden opportunity for engaging local people directly in the knowledge construction process. Indeed, it is difficult to imagine how an accurate map could be developed without the guidance and participation of local people.

3. One of the categories of people who are organized to some degree in the study area are mothers. Careful groundwork needs to be done to build a working relationship with mothers' organizations.

4. Clearly, mine workers, mine owners, beneficiary plant workers and owners are all stakeholders who must be engaged in any viable solution-building exercise. The project needs to develop a practical approach and engagement strategy to reach these groups. In this regard, it will be extremely important not to view such groups as homogenous. The social research needs to identify different communities of concern, interest and disposition within each of the groups, and the project will need to build relationships with the most open and susceptible people within each category.

5. The household survey and talk about town in survey communities both point to incidences of children born with malformations, stillbirths, and seriously sick people. A participatory inquiry process is needed to get beneath the surface of these rumors. The community has a story to tell, made up of the collected stories of many individuals, but that is shared and collectively moderated to determine what the community's collective experience and analysis are related to health impacts and many other related medical and environmental and social issues.

6. Finally, it is clear that a new baby has been born in Portovello and Marabelli (the survey teams now metamorphosing into community action groups). This is an important development. Following are recommendations for protecting and nurturing their growth in light of the project objectives.

"Development comes from within" is an important participatory principle. Another way of saying this is "you can't make butterflies by sewing wings on caterpillars." These groups need to develop their own identity (apart from the project) and their own vision and plan. Already, their vision is ranging beyond the project objectives to issues (admittedly related) such as the town dumping garbage in the rivers, the management of waterways not in the study design (but certainly within the watershed) and to solutions (very much in the

scope of the study) such as the development of a regional environmental code that is enforced by the municipalities.

This learning, creativity and initiative needs to grow in its own way, and the project team much be careful not to try to limit these groups to the fulfillment of necessarily limited project objectives. The potential is that these fledgling groups could be the seed crystal of a broad based environmental action organization rooted in the civil society of the region.

HIGHLIGHTS

Case Review No. 2

HUMAN HEALTH AND CHANGES IN POTATO PRODUCTION TECHNOLOGY IN THE HIGHLAND ECUADOR AGRO-ECOSYSTEM

(IDRC Project No. 004321)

Upon reflection on the complexities and obstacles which the project has encountered, particularly in integrating research and intervention, it seems clear to me that this project would have benefited from technical assistance ifl the design and early implementation stages focused on the following.

1. The importance of focusing on the design of effective interventions as a *research* question, rather than assuming that an agricultural extension model or some other training model would suffice.
2. The importance of engaging the beneficiary population, as well as other key stakeholders as partners in the research process, so that they could assist in interpreting research data, and in shaping the design of interventions to follow.
3. Ways of effectively integrating participatory research methodologies and tools and empirical-reductionist approaches such that each complements the other, and the requirements of neither are compromised.

It seems to me the project team has largely focused on producing the right technical information, because that is what they are most comfortable in doing. In general, I feel that the most difficult questions encountered by this study reside in the translation of technical (research generated) knowledge into social knowledge and action. The research questions, in my view, now need to be refocused on the problem of *how to engage relevant stakeholders* in effectively managing the ecosystem such that human health is improved.

I believe that (in isolation from other strategies), the educational interventions now being tested will have very limited long-range impacts. Most people who need to be reached will not be reached. At this stage, the drop-out rate is already high. Other ways need to be found to engage the population; ways that are meaningful to them.

The reason IDRC's Ecosystem Approaches to Human Health Project Initiative defines participation as a fundamental requirement of this type of research is precisely because

these are problems that scientists cannot solve on their own on behalf of community people. Important pieces of the puzzle are hidden within the community's knowledge pool. And the only way (I know of) to get at those critical pieces is through participatory research.

The fact that many research scientists don't yet understand participatory approaches is a challenge, but not an insurmountable one, especially in working with scientists such as Charles Chrissman and his team, who are open and struggling to learn.

HIGHLIGHTS

Case Review No. 3

CUBAN CITIES PROJECTS

- **Urban Ecosystems Health Indicators (Habana)**
  IDRC Project No. 03825; and
- **Integrated Approaches to Safe Drinking Water Quality (Santiago de Cuba)**
  IDRC Project No. 03329-03-1

1. I recommend that both projects be encouraged to develop working models of the dynamics of the ecosystems within which they are working (which would need to include a modeling of the social systems), and to test the utility of these models for improving human health. The Centro Habana Project has developed indicators, but I submit that we need to see a picture of the socio-ecological context within which these indicators make sense, in order to be able to develop effective interventions that will assist relevant stakeholders (including, of course, community people) to manage their ecosystem effectively.

2. In my view, both projects (but particularly the Centro Habana Project) would benefit a great deal if the community's knowledge related to the social processes connected to various issues and interventions were to be explored, and if community members became active co-analyzers of their own situation and co-designers of future interventions.

   Specifically, I recommend that, in the Centro Habana Project, *a community research team be established* that can work with professional researchers in

   - defining research problems
   - developing methodological approaches and tools
   - engaging their own communities in focused dialogue and data gathering
   - interpreting data
   - developing analysis and synthesis that speak to the original research questions.

3. It is important to recognize that the INHEM team readily acknowledge that they are currently engaged in a steep learning curve related to participatory approaches in

research. To their credit, they did involve a Colombian consultant as a capacity builder, but it is clear that the Project quickly took them into deeper methodological waters than their brief training encounter was able to prepare them for.

Project directors from INHEM were very explicit about their need for:

a) contact and involvement with other researcher struggling with the issue of participation; and

b) training and on-going mentoring in the application of participatory approaches within on-going research work.

HIGHLIGHTS

Case Review No. 4

LIVESTOCK AND AGRO-ECOSYSTEM MANAGEMENT FOR COMMUNITY-BASED INTEGRATED MALARIA CONTROL (EAST AFRICA)

(IDRC Project No. 100482)

What has happened thus far in the research process is that a number of parallel studies (each with its own distinct matrix of questions and methods) has been planned and initiated (as listed above). What is at best embryonic is the following.

1. An integrated scheme of thought from which all the studies flow and within which all data interpretation takes place. Such a framework would help to generate an ecosystem perspective that is not likely to emerge from the separate disciplinary perspectives.
2. The harmonization of methods and approaches across disciples to ensure compatibility of outcomes, ensure all inquiry gaps are filled, avoid duplication, and avoid creating community fatigue and even resistance to successive waves of researchers and their questions.

The problem with saying that the team should be working within an integrated framework is that such a framework has to be built to fit the socio-ecological system within which the research is occurring. This poses a bit of a chicken-and-egg problematic, in that this is the first stage of the research process, the goal of which is to map the socio-ecological system dynamics, especially related to malaria and other prominent health concerns.

The current plans each of the separate study teams presented are most likely to produce separate maps. Piecing them together (the way Dr. Frankenstein made the monster) may or may not produce an organic systems view of the research context. For this reason, it will be important to begin by building the best (theoretical) map possible. (based on preliminary observations, discipline-based knowledge, and the work of other research groups working in the eco-health field (such as the University of Guelph team).

The exercise of designing and constructing the framework so that it can be used as a working tool by the team will contribute a great deal to the team's collective capacity to produce transdisciplinary insights.

Collaboration with relevant stakeholders outside the research team will require a similar exercise (as that described in #3. above) of building a common framework which describes the *system* upon which the collaboration is focused, as well as the goals and critical processes of that collaboration (i.e. how will the collaborators work together to reach their common goals?). This mutual work will probably need to be repeated at various levels with local community partners, local and regional organizations, at the state policy level, and even with international level organizations and partners.

The research framework for the entire study, as well as the component sub-studies, were all developed without involving community representatives in the design process.

Most of the sub-study designs call for engaging community members as data sources, but not as co-researchers; i.e. as co-producers of knowledge.

I recommend that the participatory dimensions of all three studies be integrated so that the community experiences the research intervention as a single, organic process. If this is not done, there is a danger that the already over-stressed community will quickly tire of being questioned, will fail to see how the various initiatives are actually part of an integrated whole, and may in fact try to play one group of researchers off against the other in hopes of deriving some immediate material benefit from the process, or may (however unwittingly) confound the data in an effort to please.

I also recommend that a basic course in participatory research methodology be offered to them, followed by a periodic (every six months?) monitoring and coaching intervention that works first-hand with the team in the field.[2]

[2] Perhaps some of this mentoring work could be done by Dr. John McDermott (stationed at ICIPE in Nairobi), and team members from the IDRC-funded "Integrated Assessment of Agricultural Communities" project, which seems to have very successfully integrated participatory methodologies and understanding into their work (judging from my interview with Dr. McDermott and fellow team member, Dr. John Githure).

HIGHLIGHTS

Case Review No. 5

ENHANCED HUMAN WELL-BEING THROUGH IMPROVED LIVESTOCK AND NATURAL RESOURCE MANAGEMENT IN THE EAST AFRICAN HIGHLANDS (ETHIOPIA)

(IDRC Project No. 03494)

This Ethiopian team went further than any other team I visited in reflecting on and documenting their own internal struggles with transdisciplinarity. There can be no doubt that, when considered within the context of the home disciplines participating in the study, this team has achieved remarkable progress in weaving together diverse and rarely connected fields (such as agro-economics and epidemiology), and that this sort of fusion has the potential to produce critical transdisciplinary insights that will speak directly to the key questions animating the research program. Indeed, this team was nominated for an award for excellence in transdisciplinarity.

1. While the core team did present several integrative models to describe how their multidisciplinary work is conceptualized (one focused on five aspects of well-being; namely, food security, community peace, education, physical fitness and income generation; and the other which shows three overlapping research domains or circles of the ecosystem, the production system and human well-being), it does not appear that the team actively uses this (or any other) integrative scheme of thought to guide methodological design, implementation or interpretation. Indeed, it seems apparent that the separate component studies related to farming systems, livestock, health, etc. each have their own (internal) integrative framework. I could observe no indication that any effort has been made (thus far) to harmonize these separate frameworks.

2. A second vital requirement, in addition to the development and utilization of an integrative framework, is that time and energy must be budgeted, at regular intervals, for the whole team to meet in order to reflect upon the research process and to generate transdisciplinary insights which can (iteratively) guide the continuing implementation of the Project.

3. The distinct disciplinary components of this team seem to be functioning in relative isolation from each other.

4. Initial stakeholder meetings took place in March 1999, more than a year after the Project began. A few other community-based meetings (with different participants) took place in subsequent months, but there is no sense that the Project created a community counterpart (stakeholder) circle with an ongoing life of its own. The meetings that were held seem to have been largely extractive in nature (i.e. carried on for the purpose of extracting data and viewpoints) and did not seem to have even approached the problem of building the capacity of stakeholders (and especially intended Project beneficiaries) to participate as co-researchers.

At this stage (year three), there is a plan to engage community-level people in the process of developing their own indicators of human well-being and ecosystem health, but only preliminary aspects of this have been completed.

This raises an important technical question. How is it possible to adequately map the socio-ecological context (in order to understand the dynamics of poverty, and other problems) unless the "map" that is constructed integrates both an outside-in and an inside-out perspective? Is it not critical to understand the inner dynamics of local people's relationship to their world (comprised of the ecosystems, production systems and social systems, to use the Project's own adopted model)? Those relationships are an important part of what is generating compromised levels of human well-being in relation to "livestock and natural resource management" in the study area.

My point is that participatory methodology should play a very central role in this research program (if for no other reason than to facilitate the process of contextualizing research insights and innovations into the life-world of local people), and currently it is playing almost no role, despite explicit intentions to the contrary.

I recommend that

a) a local research team be set up in the study area which engages community-level stakeholders as co-researchers; and

b) the services of a consultant (such as an experienced NGO) be engaged to assist the research team to undertake the participatory dimensions of the study.

Capacity building is needed for the research team on how to harmonize participatory methods and outcomes with other aspects of their work.

GENERAL FINDINGS AND RECOMMENDATIONS

A. General

1. The eco-health paradigm has created an important impetus and road map for carrying on integrative applied research that is seen by participating researchers to be both important to the advance of science and vital to human well-being. As one scientist put it, "This is the way of the future for development-related research."
2. Most on-the-ground research teams have never tried to work in the ways required by this research paradigm. There is no beaten path to follow. They are making the path by walking it.
3. Neither the funded research teams, nor, it appears, the IDRC core team seem to have fully anticipated the degree of learning that would be required to be able to effectively carry off the transdisciplinary and participatory aspects of their projects. It seems to have been assumed that if a research team built "transdisciplinarity" and "participation" into their proposals and work plans, they would (or should) know how to proceed.
4. IDRC is pioneering a new field of research that carries with it a new set of systems-level knowledge and skill requirements not generally taught in most discipline-based graduate training programs. IDRC is therefore more than a funder of research. In this case, IDRC is really an intellectual partner to the programs it funds, and as such needs to provide other supports, in addition to funding, in order to midwife the birth and early development of the Ecosystem Approaches to Human Health research paradigm.

B. Transdisciplinarity

Defining the nature and context of the research problem is the first problem.

1. When a multi-disciplinary team is assembled, there seems to be a tacit assumption that everyone is working with the same map of the territory (i.e. of the socio-ecological context) within which the research is taking place, but I observed the following.
   a) There are often disciplinary gaps in terms of who is invited to be a part of the research team, simply because the research problem was too narrowly defined (as seen through the eyes of the principal investigators).
   b) Most teams do not have an integrated scheme of thought guiding the research. Most have never actually constructed a dynamic transdisciplinary model of the

integrated socio-ecological context in which they are working, and have no systematic way of harmonizing participatory methodologies and emergent insights.

c) The absence of this common mapping project (and the resulting map) leaves important gaps in the team's capacity to synthesize transdisciplinary insights because there is no real common ground (i.e. models, language, methods, etc.), and hence no intellectual "working space" within which researchers can meet, share experiences and generate insights.

d) In all of the projects visited, separate component studies were being carried out, each with its own internal (discipline-based) framework which defined the research context and inquiry domains, and described methodologies for data collection and interpretation. Many of the projects were experiencing methodological difficulties as a result of this parallel tracking of component studies without the benefit of a common map.

2. The Eco-health Program Initiative Team typically invests considerable time and energy into supporting the front-end work of project formation. I recommend that the IDRC team *require* that a critical step in the proposal development process be the production of a transdisciplinary socio-ecological "map" (or models) of the context within which the research is to take place, and an integrative framework describing how the component disciplines will work together. This framework and map should define the domains of inquiry to be investigated related to all of the integrated systems that are relevant to the study (such as the ecosystem, production system, social system, gender relations, power arrangements, economic patterns, etc.). This "phase" could be funded separately (perhaps for about $20,000), and the rest of the project funds released only after the initial framework is completed. The level of detail needed at this initial stage will vary depending on the particular socio-ecological context and on the nature of the research to be undertaken. However, if the PI were to publish a generic model which specifies the *categories* to be mapped (such as natural ecosystems, social systems, gender, etc. as outlined in Part II), this would be very useful as a point of reference for local research teams.

   Based on this initial exercise, a careful review of the research team should be made to ensure that all of the required disciplinary perspectives are adequately represented.

3. Taking Time

   a) Another basic requirement of effective transdisciplinary work is that the whole team needs to meet from time to time, and to reflect together on what they are learning through the process of the research. As simple as this may seem, most teams are comprised of busy (and often over extended) professionals, who struggle to fulfill the requirements of their own parts of the study, and don't "have time for meetings." Nevertheless, there is a "necessary tension" (to borrow a phrase from Thomas Khun [1962]) to be maintained between the details of component research and the integrated reality of life (as represented in transdisciplinary systems analysis) that is essential to the success of eco-health research.

   b) I recommend that the IDRC Project Team ask all funded research programs for two updates per year that reflect the outcomes of a transdisciplinary team retreat. These updates should be organized around the concepts and domains described in the framework and map produced as the project began. This should not be a report that updates on project activities. Rather, what is required is a short reflective document that summarizes the collective team insights (to date) as related to a) the socio-ecological context, b) the research problem itself, c) methodological issues, d) the significance of emerging findings, and e) possible interventions and related issues. In short, what has the team learned thus far?

4. Dedicating Resources

   a) One of the most common complaints shared across all projects was that unless adequate resources are budgeted to cover the costs of team meetings, as well as the activities of component disciplinary studies to be carried out, the entire research enterprise can be seriously hampered.

      IDRC funding is relatively small, and eco-health research is conceptually very big. This tension demands an artfully conceived strategic plan for how to best allocate resources within the project, and between the project and other partners.

      In several of the projects, team members perceived that budgetary decision making was kept in the hands of the principal investigators and lead institutions, and that the lack of transparency, as well as the lack of any voice in deciding on budget issues was a disincentive to partners outside the management team to commit their time and energy to the project.

This type of problem (as well as the response to it) is common in community development, and indeed across most human systems. If participants (in this case researchers) are invited to participate in a circle of inquiry, the overt culture of which proports to be mutual trust, respect and collaboration, and if they experience a contradiction between the visible culture of collaborative inquiry, on the one hand, and an invisible, hierarchical concentration of decision-making power in regard to the use of the team's resources on the other hand, many people are inclined to withdraw their energy (sometimes covertly) from the process, feeling either a) that they are being used, or b) that they cannot succeed in completing their part of the process, because they have no control over the resources they will need to do their part and no real voice in shaping the flow of what resources are available to bring the best possible result.

b) Recommendation — That the Eco-health PI undertake to consult with and to educate a) IDRC fiscal managers, b) all funded research teams, and c) sponsoring and potential sponsoring institutional partners about both the need for transparent and collaborative financial management approaches in eco-health research programs, and a range of viable alternative management models. As new programs are being developed, research teams should be invited to specifically address (in their proposal and work plan) the inherent tension between the culture of collaborative inquiry on the one hand, and the need for institutional clarity and fiscal accountability on the other. Whatever project management structure and financial protocols are employed should be agreed upon collaboratively by the research team (including external partners) and the sponsoring institutions.

5. Leadership and Team Building

It is obvious that a pile of lumber and other building materials is not the same thing as a house. Similarly, the simple act of calling together a multi-disciplinary group of researcher does not necessarily result in the creation of a transdisciplinary team.

a) Leadership

In observing team leaders, both formal and informal, of the research projects visited, and subsequently reflecting on what is required of an effective leader of a transdisciplinary research team, the following capacities of leadership emerge (for me) as being critical to success.

- *Passion* — A tangible and often communicated passion regarding the importance of the research related to the improvement of life for the people the

research is designed to serve. When enthusiasm and a sense of purpose permeate a research team, tremendous creative energy is released. Team members are willing to go the "extra mile," because they believe in what they are doing.

- *Facilitation* — The capacity to facilitate collaborative consultation processes that draw the best out of each of the participants.

- *Visioning* — The willingness and capacity to help the research team to build a collaborative understanding of the research context, problem and process, and to synthesize and articulate that big picture understanding as a guiding light throughout the duration of the research project.

- *Making Spaces* — The willingness and capacity to create and protect the necessary "working space" for collaborative inquiry and collective team management of the research process. By "space" I mean budgeted time and resources, as well as constructive processes and mechanisms in which all team members are enabled to contribute their very best to the process.

- *Human Relations* — The capacity to build and manage constructive human relations among team members, and between the team and the various partners and stakeholders connected to the project.

b) Team Building

A transdisciplinary team can be viewed as a community of sorts, and the problem of building a viable team can then be seen as a community development problem. From that perspective, the type of facilitative leadership provided to team members is a critical factor for success, particularly at the community-building stage when a consensus is being reached on what the "problems" are, what solutions need to be developed, and what lines of action are required to build those solutions.

In community development (and, I believe, in all human systems development), the process of growth flows from effective relationships to constructive processes to enabling structures. By this I mean that the foundation of any successful human system development process occurs in building positive and effective relationships between the people. Once bonds of trust and mutual respect are established, and once the people develop a sense of common purpose and direction, as well as a willingness to work together, then constructive processes (such as the intentional development of an integrative scheme of thought, along with agreed-upon strategies

and plans) can be much more effectively facilitated and once the group has experienced common processes that have helped them to clarify and implement their collective intentions, it is usually relatively easy to establish structures and mechanisms (such as regular team meetings) that are truly enabling and productive.

Many people try to skip the first two stages and jump to the last. By setting up a team structure with "officially" defined roles and responsibilities, it is typically expected that everyone will play their part and the "team" will, of its own accord, grow into an organic whole that achieves the goals for which it was assembled. While this may sometimes happen, it often does not. When it does, it is almost always because the people found a way to connect and to develop constructive processes for working together.

6. Inherent Challenges

a) Transdisciplinarity is absolutely central and critical to the effective implementation of eco-health research processes. There are many inherent challenges that make it difficult for most teams to initiate and carry off a transdisciplinary research program without a special measure of attention, effort and learning. Some of these inherent challenges include the cultural dominance of discipline-driven research in most universities and research institutes; the ignorance that whole groups of disciplines have about each other; the absence of common models, language, and research methods; and the lack of understanding and support in the research professional community. It should not be surprising that a new paradigm in research requires a new set of skills, processes and methods to carry it off. Indeed, upon reflection, it is more surprising that all of the funded projects reviewed in depth have made considerable progress on the path of transdisciplinarity despite the obstacles.

b) Recommendation — That training and mentoring in transdisciplinary leadership, team building and project implementation be made available to all funded projects, and especially to projects in the final stages of project design or the early stages of implementation.

c) That the PI consider second phase findings for at least some of its projects, to allow the PIs investment in coaching and supporting the research team's learning to bear fruit and ripen. One possible mechanism for supporting this sort of extension would be the establishment of a "research sustainability fund" that is used to carry promising projects to a natural conclusion. Since IDRC funding is comparatively small-scale, some second phase funding involving a scaling up of the research

project will likely require support from other donors. Involving other donors in the set-up and operation of the "research sustainability fund" will greatly enhance the PIs capability to achieve its long range goals related to excellence in eco-health research.

C. Participation

1. Findings

a) Co-participation is an appropriate level of participation for most eco-health research, but it requires skilled facilitation to prevent the process from deteriorating into pseudo-participation as local people are relegated to passive roles by researchers who don't know how to build working partnerships in which both professional researchers and local people are able to play their respective roles in the process.

In the projects reviewed as a part of this evaluation, what "participation" was occurring would have to be categorized as a pseudo-participation within this framework, with occasional unsustained forays into co-participation. In some of the projects (Habana Centro, Ecuador Gold Mines, and Kenya Malaria Control), there is a clear understanding and desire to move to co-participation and beyond. In the other projects, the level of understanding about participation has prevented the team from understanding that they should pursue that goal.

b) Due largely (I believe) to a lack of familiarity with what is entailed in conducting effective participatory research and intervention processes, there was generally a tendency on the part of those who developed the budgets and time lines of most of the projects reviewed for this evaluation to inadequately plan and resource participatory work. Specifically, the following costs need to be taken into account.

- *Participatory approaches require skilled human resources who can guide the planning, implementation and data processing and interpretation processes.*
- *Adequate time must be planned for to accommodate community preparation and capacity building and data collection processes need to be fitted into community time lines and rhythms.*
- *There are community-based costs, just as there are professional costs.*

- *There may be additional communication costs, because in participatory work, it is important that community participants receive feedback on the findings of research processes they helped to facilitate.*

c) Challenge to IDRC — There are inherent challenges for IDRC, or any funder of research which requires participatory approaches in order to effectively achieve research goals. These challenges are primarily related to the institution's need for predictability and uniformity of administrative policy and procedures (such as the institution's reluctance to grant time extensions on projects, because of what that does to outstanding financial reserves) versus the need for some amount of flexibility for program managers working with research projects that cannot always fit themselves into the plan they submitted with their original proposal because of changing community conditions. Participatory research approaches do take a certain amount of flexibility to conduct, to manage and to supervise.

Since IDRC is dedicated to promoting research that is directly tied to development, it seems to me to be inescapable that at least some of the research the institution funds will have community participation components. I have tired to show elsewhere in this report that there are sound methodological, ethical and strategic reasons for incorporating participatory approaches into development-oriented research. Indeed, the Ecosystems Approaches to Human Health Program Initiative is advancing a paradigm of research in which both transdisciplinarity and participation are *critical processes* that are integral to the essence of the approach.

It therefore seems to me that an intentional institutional learning process may be helpful to assist senior managers, financial overseers, and program officers to develop policies and procedures that can both meet the institution's administrative needs as well as support, encourage and accommodate the use of participatory approaches in research.

2. Recommendations

a) Undertake a capacity building process for the PI team related to participation in research that involves both theoretical and methodological training and hands-on experience. The goal of this process should be to strengthen the capacity of PI team members to offer coaching and mentoring support related to participation to funded projects.

b) In consultation with funded projects and other partners, develop a research team capacity-building initiative that addresses the following issues:

- what participation is and why it is important.
- indicators of effective participation (i.e. how will you know it when you see it?)
- barriers to participation
- methods and tools related to the implementation of participatory approaches
- skill developing and attitudes needed for facilitating participatory processes
- integrating participatory approaches into eco-health research
- processing and interpreting data from participatory research processes
- harmonizing participatory methods and findings with other methods and findings within a larger eco-health research program.

3. General Recommendations

a) The primary recommendation flowing from the five separate case reviews and the overall study is for the Eco-health PI *to incorporate capacity building as a primary line of action* that would accompany other activities such as new project development, monitoring and evaluation, and dissemination. Specifically, there is a need for capacity building related to transdisciplinary research program implementation, the implementation of participatory approaches in research, and the integration of both of these into eco-health paradigmatic frameworks (i.e. systems thinking applied to eco-health research).

b) That a **global eco-health research learning network**, *focused on critical concepts and core processes* in eco-health research be established (in collaboration with other appropriate partners) that has the following features and functions.

- Regional learning collaboratives - consisting of groups of research projects and independent researchers living and working within reasonable traveling distances of each other.
- Annual regional or continental conferences -which focus both on basic capacity building of researchers and sharing of emergent conceptual methodological challenges, rather than on showcasing the research outcomes of particular projects.
- A global conference every two to three years, perhaps replacing the regional meetings for that year.

- A core technical team of selected researchers and consultants with expertise and experience in eco-health systems thinking, transdisciplinary research and participatory approaches that acts as facilitators and coordinators of the network. Specific functions of the team would include the following:
  - ◊ providing technical support, mentoring and advice to ongoing eco-health projects using email, telephone, and, if necessary, field visits
  - ◊ documenting on the ground experiences, struggles and lessons learned related to critical processes in eco-health research and feeding this learning into the learning network's ongoing processes.
  - ◊ assisting regional collaboratives to develop their own capacity to provide support to eco-health research programs in their regions.

c) I propose that the activity of identifying the learning that is needed, providing learning intervention services to ongoing projects, documenting experiences related to core processes from ongoing projects around the world and feeding this learning back into the learning network all constitutes a kind of system-level meta-research project focused on what it takes to implement effective eco-health research.

I therefore recommend that, in order to kick start the learning network, the core technical team's activities be funded as a research project of the Eco-health program initiative. I suggest that the eco-health research learning network idea has the potential to attract other donors (such as the Ford, Kellogg or Carnegie Foundations) and also that large research associations and groups such as CGIAR, ILIRI, CIP, UQHM, the University of Guelph and WHO could also be interested in providing support to the process, perhaps on a region-by-region basis.

d) That the PI consider second phase findings for at least some of its projects, to allow the PIs investment in coaching and supporting the research team's learning to bear fruit and ripen. One possible mechanism for supporting this sort of extension would be the establishment of a "research sustainability fund" that is used to carry promising projects to a natural conclusion. Since IDRC funding is comparatively small-scale, some second phase funding involving a scaling up of the research project will likely require support from other donors. Involving other donors in the set-up and operation of the "research sustainability fund" will greatly enhance the PIs capability to achieve its long range goals related to excellence in eco-health research.

e) This evaluation explicitly did not deal with "gender" integration as a distinct issue. However, it became evident that the issue of gender integration is really a critical core process (like participation) within the ecosystem approach. For that reason, *I recommend that a formal systematic evaluation of gender integration as a critical research process be undertaken by the PI.*