Ecosystems and Human Health
Program overview 2010–2015
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Note: This is a shortened version of the Ecosystems and Human Health prospectus approved by the IDRC Board of Governors in March 2010.
1. Executive Summary

The world is facing unprecedented environmental challenges that are impeding equitable human and economic development and affecting human health. Climate change threatens to exacerbate health risks for millions of people who are without adequate shelter, food, and protection from infectious diseases. Rapid urbanization and industrialization, intensification of land use, and population mobility are increasing the risk of emergence of new diseases (and the re-emergence of old ones) in developing regions. The world’s poor face malnutrition and inadequate access to food. Underlying these acute problems, environmental hazards continue to impose a considerable health burden on people living in poverty.

Since 1996, IDRC has been supporting the generation of evidence that can be used to improve the health of both humans and ecosystems. This work has helped establish the field of “ecohealth” research as an innovative and effective way to address the trade-offs between livelihood improvements and environmental and human health. Ecohealth researchers, especially those based in developing countries, are making substantial contributions to improving the health of people and the ecosystems that support them. However, the field needs stronger leadership and self-reliance in developing countries, better links to policy processes, and a greater contribution to debates around development, environment, and health issues. Improved connections among researchers, civil society, and decision-makers are needed to translate innovative ideas into ecologically sound policies and actions that address local and global health concerns.

To address these needs, Ecosystems and Human Health (Ecohealth) will implement activities to strengthen southern leadership in ecohealth, enhance networks, and support scaling-up of ecohealth research. The program will also support research in two thematic areas: environmental change and emerging and re-emerging diseases; and improving the health and environmental benefits of agriculture.

In five years, the program will achieve the increased participation and impact of developing-country research in regional and global environmental health (and ecohealth) debates. Higher-capacity regional networks will advance the field, responding to pressing problems of human health and ecosystems and identifying and pursuing new areas of importance with the support of national and international donors. Their work will be recognized for its innovativeness, high quality, and impact. Systems will be developed to influence policies and programs, so that they improve ecosystems and protect people from environmental health hazards. The program will be able to point to practical strategies informed by ecohealth research that reduce risks from emerging and re-emerging diseases in vulnerable populations. A greater understanding of the ecological and social drivers of new disease threats will inform health, agriculture, and development policies. More systematic links between health and agricultural practices will lead to policies that enhance health and protect ecosystems, while also being adaptive in the face of climate change.
2. Context and Background

a. Development Challenge and Situational Analysis

The key determinants of health are the circumstances in which people are born, grow, live, work, and age (Marmot 2008). A combination of social and cultural dynamics, politics, economics, and the condition of ecosystems affects these circumstances. As the world’s population nears seven billion and its global ecological footprint grows, the world’s carrying capacity is overstretched. Understanding the ecological and social underpinnings of development and their impact on health is no longer simply good practice, it is essential.

The world is facing unprecedented environmental changes that are impeding equitable human and economic development and affecting human health. In an increasingly interconnected world, environmental changes on one continent can affect wider economic and environmental conditions, such as climate change, food insecurity, and pandemic threats. Research is needed to find innovative ways to tackle and resolve such problems. The world’s capacity to generate and share knowledge — helped by the expansion of information technologies — has never been greater. However, the magnitude and urgency of today’s development challenges and the uncertainty that characterizes them require a different kind of science. Such a science must go beyond technical innovation to develop people-oriented, equitable, and innovative interventions that make sense locally, do not cause harm to people or ecosystems, and are based on rigorous and defensible evidence. To do this, scientists must collaborate with practitioners, civil societies and decision-makers in the design and implementation of new strategies that support healthy, equitable, and sustainable societies and economies. With the support of IDRC, the field of ecohealth is evolving to respond to these challenges.

Environmental hazards, such as inadequate access to water, poor air and water quality, disease vectors, depleted soils, and extreme weather, contribute to a quarter of all disease worldwide (Prüss-Üstün and Corvalán 2006). Developing countries bear the greatest proportion of this burden (Fig. 1) at considerable cost: 1.5–4% of gross domestic product (World Bank 2009). Poor management of agroecosystems continues to add to this burden by creating chemical and microbial pollution, depleting soils, and causing exposure to infectious diseases, such as malaria and avian influenza. In addition, environmental changes are contributing to the emergence of new infectious diseases, mostly originating in animals (Jones et al. 2008) and the re-emergence of known diseases. Meanwhile, many developing countries still struggle to overcome familiar but neglected infections (Hotez and Kamath 2009), many of which are due to, or magnified by, degraded environments.
Globally, progress has been made in reducing poverty, although it is well short of the Millennium Development Goals, and women continue to benefit less than men from the progress made (UN 2009). Poverty traps people in degraded environments and poor livelihoods that are harmful to health. The poor have the least capacity to adapt to environmental change or to protect themselves from environmental hazards. They may have little choice but to resort to using ecosystems in ways that put their health at risk. Because of poor environmental conditions, poor people bear an unfair burden of illnesses that impair learning and development, prolonging poverty over generations.

Evidence from research is needed to inform multi-sector responses to climate change, food insecurity, and new infectious disease and to foster healthier, ecologically sound development. Increasingly, developing countries are generating their own evidence and capacity to innovate in response to development challenges. There is an opportunity to accelerate this process by supporting local and national research systems — strengthening research in universities, supporting other high-quality research organizations, facilitating research-policy interfaces, and fostering the application of research.

Developing regions face increased risk from new diseases (Fig. 2). Global environmental and social changes are increasing the risk of infectious diseases, which are emerging in new locations, among new populations, through new pathways, or re-emerging where they were once controlled. In addition, new infectious diseases, such as influenza viruses (including H5N1 [avian] and H1N1) are appearing at unprecedented rates. Most of these new diseases originate in wild animals, sometimes spreading through domestic animals or invertebrate vectors (Patz et al. 2004, Weiss and McMichael 2004, Wolfe et al. 2007). This can occur, for example, in regions where development has resulted in rapid urbanization and industrialization, intensification of land use, rapidly increasing urban incomes, and increased demand for meat (Steinfeld
and Chilonda 2006). Modernization combined with traditional food practices — such as the purchase of live animals for butchering, hunting, and the raising of livestock in urban areas — add to the risk of infectious disease in developing regions. Public health, animal health, and other relevant governance systems are not usually well prepared or able to deal with the increased risk and, in any case, do not collaborate effectively (Patz et al. 2004, Weiss and McMichael 2004, Wolfe et al. 2007). Populations in these regions are thus more vulnerable to outbreaks of disease and the unintended negative consequences of disease-control programs (Scoones and Foster 2008).

**Figure 2. Distribution of risk of disease from wildlife sources. Red = high risk, yellow = intermediate risk, green = low risk**

Emerging infectious diseases (EIDs) are no longer simply a matter for human and animal health experts. They can also indicate broader socioeconomic and ecological problems, such as deforestation, excessive crowding of animals or people, or unfair distribution of resources (Farmer 1996, Patz et al. 2008 Wolfe et al. 2005). There is a need to address the links between cross-species disease transmission and land-use change, food insecurity, poverty, and agricultural development (Damania et al. 2005, Wolfe et al. 2005).

Pandemics may cause great harm on a global scale. However, each new disease first appears in a local context (see Box 1). Better understanding of the roots and drivers of disease emergence may be crucial to preventing further disease spread. Many international organizations (notably the World Health Organization) and some governments recognize the importance of inter-sector and community approaches to EIDs. This presents an opportunity for IDRC to explore the application of ecohealth in addressing the challenge of EIDs.

In a development context, ecohealth research is intended to contribute to national and international research systems that generate valid locally grounded knowledge and facilitate its application in preventing or solving environmental health problems.
Although past IDRC programming, together with other work, has demonstrated the effectiveness of ecosystem approaches to human health, there are few incentives to engage in this type of transdisciplinary research in most developing countries. Governance systems are often divided by sectors and rivalries that impede collaboration. Developing countries require continued support in facilitating research and other activities to introduce and translate new ideas into policies and actions that will solve pressing problems of environmental change and health.

Ecosystem Approach to Health
Our program builds on more than a decade of experience in building the capacities of researchers around the world in an ecosystem approach to health. This emerging field of research, education, and action recognizes that health and well-being depend on healthy environments, equitable and productive livelihoods, and strong and resilient communities. Ecohealth practitioners work across disciplines and sectors and engage communities and decision-makers in tackling environmental challenges that affect human health and development. This transdisciplinary research takes a systems approach, addressing gender and social inequities and poverty, while developing ecologically sustainable strategies for improving health and livelihoods in developing countries.

Ideas consistent with those of the program have been adopted, further developed, and put into practice. Research is validated through peer-review and demonstration of impact. Ecohealth has become a field in its own right, albeit one that is still young. However, there is a need for better tools for integrated data analysis and knowledge sharing; application of ICTs for data collection; stronger ecological analysis; economic evaluation of the societal, environmental, and economic dimensions of health problems and of the costs and benefits of interventions informed by ecohealth research to meet the needs of policy audiences more effectively.

Next Steps
Emerging strengths in the field, converging donor interests, and more receptive policy audiences are creating an opportunity to focus on strengthening hubs of ecohealth expertise and leadership in developing regions. There is a need to support southern ecohealth experts in further developing their organizations and networks, refining theory and practice, creating and participating in organizations dedicated to field building, engaging policy audiences, influencing development debates, and leveraging

Box 1: From local to regional: an ecohealth approach to controlling Chagas disease
Chagas disease, caused by a blood borne parasite, is spread by several species of large biting insects throughout Latin America. A debilitating chronic infection acquired in childhood, Chagas has infected 11 million people. The insect vectors have adapted to mud brick houses typical of rural areas, typically hiding in wall cracks. Usually controlled by periodic spraying of homes with long-lasting insecticide, the vector frequently re-infests homes. IDRC-sponsored research in Guatemala changed the way national and regional health authorities control the disease. After establishing a cooperative relationship with the community, researchers also collaborated with engineers to develop a durable plaster to seal the walls. Non-toxic, made from mostly locally available materials and easily applied by hand in the traditional manner, it was rapidly adopted by villagers. The simple technology blocks infestation by the disease-carrying bugs, costs less than repeated spraying with insecticides, and is safer for both people and the environment. Guatemala’s Ministry of Health, engaged in the research from the outset, adopted this technology in its national Chagas control program. Thanks to the combination of spraying and housing improvements, Guatemala recently eradicated one species of vector. Similar approaches are being promoted by the Pan-American Health Organization throughout the region.
resources. To do achieve this, the program will provide field-building leadership grants and continue with selected complementary activities (e.g., support to networks and capacity-building workshops).

The program will also emphasize two themes. First, key knowledge gaps in terms of environmental change and EIDs merit further ecohealth research and there are opportunities to improve research capacities to address the social, economic, and ecological dimensions of EIDs. Second, a renewed push for agriculture research has created an opportunity to consolidate longstanding ecohealth research on links between agriculture and health.

3. Approach to Programming

   a. Goal

The Ecohealth program will help strengthen and consolidate the field of ecohealth research to improve both human health and ecosystems in developing countries. It will focus on further empowering ecohealth research leadership in partnership with organizations and institutions in developing countries. The program will support these partnerships to improve the state of knowledge of health problems rooted in ecosystems, reinforce research capacities, and improve the application of research to guide policy and practice. The program will also apply ecohealth approaches to filling key development-related knowledge gaps in the areas of EIDs, agriculture, and health.

   b. Expected Outcomes

The program strives to achieve outcomes in two areas: building leadership in the field and filling knowledge gaps in terms of the impact of environmental change on disease emergence and re-emergence and improving human health through sustainable agriculture. In both areas, the program will emphasize the use of research to design interventions, change conditions and practices in the community, and influence policies for improved human and ecosystem health.

Table 1 summarizes outcomes for each area along a gradient from those expected to be achievable and clearly attributed to the program within the five-year period to those that may take more time or may be more challenging to attain and that are more dependent on a host of external factors beyond IDRC’s sphere of influence. The minimum outcome level represents what can be expected after five years. Intermediate outcomes are possible, but may be hampered by lack of favourable circumstances, contingencies, or the need for more time or research to achieve them. The high level of outcomes includes paradigm-changing research results, large-scale uptake of findings, and research benefits reaching a large population. These outcomes are rarely achieved within a program cycle, and direct attribution to IDRC support is often challenging. However, when they occur, they reflect a high level of success.
## Table 1. Summary of expected program outcomes

<table>
<thead>
<tr>
<th>Field-building leadership</th>
<th>Baseline</th>
<th>Minimum</th>
<th>Medium</th>
<th>High</th>
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<tr>
<td>Fragile and limited ecohealth leadership in developing countries.</td>
<td>Autonomous well-organized developing country actors demonstrate leadership in field-building</td>
<td>Regional networks and multi-institutional partnerships establish a presence in regional and global debates.</td>
<td>Regional networks and multi-institutional partnerships are internationally recognized and influential.</td>
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<td>Important ecohealth findings are not always transformed into policy and practice.</td>
<td>Several examples of improvements to health and ecosystems are attributable to research conducted by field-building leadership grantees and other collaborative efforts.</td>
<td>Regional networks and multi-institutional partnerships systematically translate research results into policy and practice.</td>
<td>Ecohealth-led policy and practice innovations are brought up to scale to benefit large numbers of people.</td>
<td></td>
</tr>
<tr>
<td>The field of ecohealth is not self-reliant or sustainable, notably in developing regions.</td>
<td>New field-building leadership grantees contribute to the uptake of research findings by target audiences.</td>
<td>Field-building leadership grantees and other partners establish and develop a diversified funding base.</td>
<td>Regional networks and multi-institutional partnerships become consolidated. Regional networks and multi-institutional partnerships become self-sustaining.</td>
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## Filling knowledge gaps

| Connections between EIDs, poverty, and environmental change are not being made, impeding effective prevention. | Examples of innovative strategies protect people from EIDs, better environmental management reduces risks from EIDs, and policy audiences have greater awareness of the ecological and social dimensions of EIDs. | There is evidence that local policies are influenced by research. The effect of global environmental change on EID risk in developing countries is elucidated. | Based on ecohealth research, large-scale EID prevention strategies are developed and are adaptive to climate change. |
| Links between agricultural production, health, and agroecology are not being made, to the detriment of human health. | Examples exist of ecologically sound technological developments in agriculture that also improve human health. This research will take into account global environmental change. | Organizations systematically consider health and ecology factors in planning agricultural research. | There will be linkages between health and agricultural policies in developing countries that will be adaptive in the face of climate change. |
c. Strategy

Programming will fall into two areas corresponding with the outcome areas described above: activities that support field building and leadership in ecohealth; and support for research on the links between environmental change and infectious disease emergence and re-emergence and on agriculture and health. Capacity building for improved knowledge translation and uptake of results will be emphasized in both outcome areas.

_field-building Leadership Grants_

These grants are intended to enhance the ability of leading ecohealth research organizations to respond to knowledge and policy needs with respect to ecosystems and human health. With IDRC support, these organizations will eventually become effective regional centres of knowledge and expertise on environmental and health challenges of developing countries. They will also become active contributors to the international field of ecohealth, with strong scientific work and engagement in development issues internationally. Such organizations will be in a position to continue the development of ecohealth thinking and its application to new environment and health challenges, acquire a strong reputation within their client base, and attract the human and financial resources necessary to do this. Ideally, they will not rely on IDRC funding to continue their work beyond the term of the grants.

Research on Environmental Change, Agriculture, and Emerging Diseases

The program will emphasize research on the ecological, social, and economic drivers of EIDs to improve the lives of the poor. How EID risks may be compounding other health problems will be addressed. Environmental change due to climate, agricultural development, other changes in land use, and their effect on disease ecology will be considered. The program will focus on links among development processes, environmental and social change, and changing infectious disease threats — topics receiving little attention from other donors active in EID research.

The program will explore how agricultural research can better contribute to improved, health, food security, and environmental sustainability. It will also emphasize healthier and more environmentally sustainable and adaptive agricultural policies in developing countries. The program will encourage all recipients to make their research “part of the policy process” (see Carden 2008) by understanding the complexity of policymaking, leveraging their networks, and learning how to recognize opportunities for influence, including the exploration of social and economic trade-offs and possible synergies.

d. Regional and Thematic Priorities

Asia

The program will continue to build on existing work on EIDs in this region with a field-building leadership grant. Emphasis will be on having a greater impact on regional health policy debates and strengthening ecohealth research capacities. The program will develop and maintain its niche while connecting with other key initiatives in the region.

Latin America and the Caribbean
This region will build on substantial ecohealth research and strive for greater impact, especially in regional health and environmental policy debates, while broadening the agenda beyond the health effects of toxic substances. A strong base of research on vector-borne diseases and existing networks will support a field-building leadership grant in this region. Opportunities for research on agriculture and on EIDs will explore impacts of land use transformation (expansion of agriculture and deforestation) on health and risks from animal-transmitted diseases.

**Sub-Saharan Africa**

An increasing number of strong research organizations, a greater role in research for universities, and better governance in many parts of Africa are improving conditions for research, although challenges remain. Several centres of expertise in health and adaptation to climate change are emerging. The region is also facing challenges from new disease emergence. The Ecohealth program is developing new relationships with African organizations working on this issue, but it will need to manage its niche in light of several new major initiatives in the region.

**The Middle East and North Africa**

In this region, the decreasing availability and quality of water are posing health challenges, and climate change is aggravating the water crisis and contributing to food insecurity. Some countries are ill equipped to deal with emerging diseases, such as influenza H1N1, while vector-borne diseases appear to be spreading or emerging in previously unaffected areas. The program will emphasize organizational capacity-building efforts with a focus on change agents in academia, research, government agencies, and civil society organizations.

4. **References**


