

Tools for Thoughtful Action: The Role of Ecosystem Approaches to Health in Enhancing Public Health

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ABSTRACT

The intimate interdependence of human health and the ecosystems in which we are embedded is now a commonplace observation. For much of the history of public health, this was not so obvious. After over a century of focus on diseases, their biologic causes and the correction of exposures (clean water and air) and facilitation of responses (immunizations and nutrition), public health discourse shifted to embrace the concept of *determinants of health* as extending to social, economic and environmental realms. This moved the discourse and science of public health into an unprecedented level of complexity just as public concern about the environment heightened. To address multifactorial, dynamic impacts on health, a new paradigm was needed which would overcome the separation of humans and ecosystems. *Ecosystem approaches to health* arose in the 1990s from a rich background of intellectual ferment as Canada wrestled with diverse problems ranging from Great Lakes contamination to zoonotic diseases. Canada's International Development Research Centre (IDRC) played a lead role in supporting an international community of scientists and scholars who advanced ecosystem approaches to health. These collective efforts have enabled a shift to a research paradigm that embraces transdisciplinarity, social justice, gender equity, multi-stakeholder participation and sustainability.

Key words: Environment; public health; determinants; community participation; social environment; gender identity

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Milestones in the advancement of public health have often been marked by trenchant observation (Edward Jenner), application of observationally derived knowledge (John Snow), experimentally derived principles of causation (Robert Koch), new technology (Louis Pasteur) or development of programmatic responses (e.g., smoking bylaws). More subtle milestones have addressed multifactorial and dynamic determinants of health. These developments are especially relevant to populations with broadly "acceptable" water to drink, air to breathe and food to eat, who face the new public health frontier of complex social, economic and environmental interactions, and demand research and action able to engage with real-life, real-time situations. While the separate study of health, economics, ecosystems and society has led to great advances in knowledge, and has also illuminated certain associations critical for population health (for example, poverty–obesity, obesity–diabetes, diabetes–vascular disease, etc.), persistent, interrelated public health challenges demand new approaches.

The limits to what can be conceptually and practically achieved by attempting to *disaggregate* chains of causation between particular influences and the state of a population's health have been reinforced in recent decades. Frustrated by limited efforts to address complex issues such as environmental degradation, sustainability, poverty and chronic illness, scientists, practitioners and policy-makers began to encourage *integrative* science through such mechanisms as the Canadian Tri-council environmental health and sustainability programs of the early 1990s. Subsequently, several

lines of exploration have converged into an evolving field of research and practice called *ecosystem approaches to health* (also known as *ecohealth*). There is mounting evidence of the effectiveness of these approaches in addressing systemic challenges in population health, particularly among vulnerable populations. The development and application of ecosystem approaches to health has clear relevance to all twelve of the "Great Achievements" outlined by CPHA and warrants designation as a Population and Public Health Research Milestone.

The Milestone

Ecosystem approaches to health draw upon a variety of paradigms, including complex systems analysis, community engagement, and

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gender and equity analysis. It appears that the term “ecosystem approaches” was first used in writing in 1978 in a Great Lakes Research Advisory Board report to the International Joint Commission, which argued that water cannot be adequately managed without considering broader ecosystem and human–environment interactions.¹ This shift in focus heralded significant Canadian leadership in applying systemic thinking to address challenges as varied as integrated water and natural resources management, sustainable development, adaptive management of social-ecological systems and an ‘ecological’ orientation in health promotion and healthy settings approaches.^{2–4} The social determinants of health and *la medicina sociale*, originating in Latin America, are similar frameworks with less emphasis on environmental sustainability.

Canadian scholars have consistently been at the forefront of applying ecological and systems thinking to health and well-being. Early approaches were primarily concerned with healthy ecosystems, integrating social and health sciences into environmental management, and orienting to the ecosystem services that sustain human communities.^{5,6} Meanwhile, ecologic approaches to human health emphasized interactions among determinants of health, including environmental, social, lifestyle and genetic factors and a more comprehensive and inclusive concept of health.^{2,7,8} This movement was built on a growing interest in early biological alterations that not only indicate disease risk, but also reflect diminished well-being.

The evolution of ecosystem approaches to health in the 1990s was fuelled by developments in ecologic approaches to human health and ‘ecosystem health,’ efforts to merge the two and a growing dissatisfaction with a sole focus on particular disease outcomes as the basic indicators of health.⁹ Canada’s International Development and Research Centre (IDRC) became an active champion of ecosystem approaches to health. The IDRC supports ecohealth research projects around the globe and funds several regional Communities of Practice in Ecosystem Approaches to Health including one in Canada (CoPEH-Canada), but does not take part in conducting the research.¹⁰ The IDRC has played a significant field-building role by expanding the reach of the journal *EcoHealth* and the International Association for Ecology & Health.¹¹ Ecosystem approaches to health have developed with ongoing input and innovations from researchers around the world, such as the attention to historic context and power dynamics emphasized through collaborations with practitioners of *la medicina sociale* in Latin America.

“Ecohealth approaches are systemic, participatory approaches to understanding and promoting human health and wellbeing in the context of complex social and ecological interactions”.¹² They reflect humanity’s best, collective, scholarly and practical understanding of ourselves as social and ecological beings, and seek to promote healthy, equitable and ecologically sustainable modes of production and living conditions through research and action. Recognizing that health is contingent on biophysical, social, economic and political environments (justice and sustainability) necessitates an approach that transcends disciplines (transdisciplinarity), takes into account various perspectives (multi-stakeholder participation) and is aware of systemic inequities and difference (social and gender equity).¹³ Ecosystem approaches to health consider population health as arising within nested physical, socio-cultural and political hierarchies, all of which are embedded in the biosphere.

...any complex system is subject to interpretation from different legitimate perspectives and, hence, problem resolution cannot depend only

on objective technical or scientific expertise. Rather, drawing on various bodies of accepted knowledge, stakeholders must negotiate a continuing series of resolutions within basic ecological constraints. Thus, sustainability does not result from adopting a package of technologies and practices, but from establishing a process of learning and investment in local governance.⁹

Moving from an increasingly specialized, disaggregative approach to multiple, integrative approaches and methodologies in an attempt to have the lens of science match the complexity of the focus of study is a significant advance in public health research.

Impact

Beyond the scholarly milestones represented by these conceptual advances, ecosystem approaches to health have been notable for their range of application in research, education and practice, with far-reaching influence on population health in Canada and beyond.

An example of the subtlety and effectiveness of ecohealth approaches is exemplified in how we currently address the question of toxic contaminants in nutritious foods. Studies using ecosystem approaches have served to identify contaminant sources, transmission and health effects, as well as the ecological, social, cultural and dietary influences, allowing us to go beyond the confrontational debate about nutrition and toxics to one that seeks to understand how to maximize benefits and minimize risks. Such approaches have been successfully applied to various forms of fish consumption across aboriginal, fisher and urban communities from the Amazon to the Great Lakes.¹³ Extensive, iterative interactions between academics, communities, policy-makers and activists in the Amazonian basin, where fish is the dietary mainstay,¹⁴ informed applications in Canada and the United States.¹⁵

The international reach and impact of ecosystem approaches to health is indicated by the scope of research and policy innovations supported by the IDRC,¹⁶ and particularly well exemplified by application to vector-borne diseases such as Chagas disease, malaria, West Nile, etc. A practical expression of this was during the dengue epidemic of 2001–02 in Cuba, when Cuban authorities relied on an ecosystem approach to identify and control dengue-related risk factors.¹⁷ Supported by the IDRC, researchers, communities and local government worked together to comprehensively characterize the underlying driving forces, pressures and states that lead to exposures to *Aedes aegypti* mosquitoes in human populations, and plan interventions for sustainable prevention and control.^{18,19}

Ecohealth approaches are especially relevant to addressing emerging health concerns most strongly felt by vulnerable populations. Ecohealth approaches have been applied to identify vulnerabilities to climate variability in Canada and as a complement to developments in Aboriginal health.^{20,21} The application of ecohealth is informing how the public health sector engages with the combined social equity and ecological implications of water governance.²² The approach has also led to a compendium of 31 international One Health case studies detailing the use and impact of ecohealth approaches in addressing the human–animal–ecosystems interface.²³ The recognition, necessity and utility of this approach was highlighted internationally in a recent Chatham House meeting:²⁴

...better prevention and control could be achieved by addressing the underlying factors which, although not traditionally seen as related to

animal and human health, facilitate the emergence and spread of these diseases. These factors shape disease risks by changing the nature of interactions among and between wildlife, livestock and humans – through, for instance, land-use change, trade practices and climate change.

These selected examples – both international and Canadian – of application, reflection and consolidation over the past decade highlight the potential for ecohealth to inform, and be integrated with, research and policy discourse on social determinants of health, global health inequities, climate change and food and water resources management.^{12,20-22,25} Canadian research and policy innovations in ecosystem approaches to health are at the forefront of these developments internationally, and are well positioned to continue Canada's leadership and capacity to address the complexity of contemporary public health issues.

CONCLUSION

Ecosystem approaches to health and related concepts represent an important and timely paradigm shift. Simultaneously and systematically embracing *environmental sustainability, transdisciplinarity, social justice and gender equity*, and *stakeholder participation* provides a pathway, not only to understand complex problems in public health but also to translate that knowledge into effective policy and action at the local, national and global levels.

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RÉSUMÉ

Il est aujourd'hui courant d'observer l'interdépendance étroite entre la santé humaine et les écosystèmes où nous sommes enracinés. Pendant la plus grande partie de l'histoire de la santé publique, ce n'était pas si évident. Après plus d'un siècle d'attention aux maladies, à leurs causes biologiques, ainsi qu'aux moyens de corriger les risques auxquels nous étions exposés (en purifiant l'eau et l'air) et de faciliter les réponses appropriées (les vaccins, la nutrition), le discours de la santé publique a changé en adoptant le concept des déterminants de la santé, qui s'étendent aux domaines social, économique et environnemental. Ceci a amené le discours et la science de la santé publique à un niveau de complexité sans précédent au moment même où la préoccupation du public pour l'environnement augmentait. Pour aborder ces impacts multifactoriels et dynamiques sur la santé, il fallait un nouveau paradigme qui effacerait la séparation entre l'être humain et l'écosystème. Des approches écosystémiques de la santé sont nées du riche ferment intellectuel des années 1990, alors que le Canada était aux prises avec divers problèmes, de la contamination des Grands Lacs aux zoonoses. Le Centre de recherches pour le développement international (CRDI) du Canada a joué un rôle prépondérant en appuyant une communauté internationale de scientifiques et d'érudits qui ont fait avancer les approches écosystémiques de la santé. Ces efforts collectifs ont opéré un changement vers un paradigme de recherche qui englobe la transdisciplinarité, la justice sociale, l'équité entre les sexes, la participation de groupes à intérêts multiples et la durabilité.

Mots clés : environnement; santé publique; déterminants; participation communautaire; environnement social; identité sexuelle