

PAN AMERICAN HEALTH ORGANIZATION
ENVIRONMENTAL HEALTH SERIES 2

ECOSYSTEM APPROACH TO HEALTH:
Perspectives for its adoption in Brazil
and Latin American countries

Pan American Health Organization
World Health Organization
Ministry of Health
Health Surveillance Secretariat
Oswaldo Cruz Foundation

Ecosystem Approach to Health – Perspectives for its adoption in Brazil and Latin American countries

Environmental Health Series 2

Brasília
2009

2009 © Pan American Health Organization – PAHO / Ministry of Health

All rights reserved. Total or partial reproduction of this document is allowed, except for commercial purposes, and provided that the source is mentioned.

Printing: 1st Edition – 2009 – 1,000 copies
Environmental Health Series 2

Preparation, distribution and information:

Pan American Health Organization – PAHO/WHO
Setor de Embaixadas Norte, Lote 19
CEP 70800-400 – Brasília-DF – Brazil

Oswaldo Cruz Foundation

Leônidas and Maria Deane Institute – Amazonian Fiocruz
Rua Terezina, 476, Adrianópolis
CEP 69057-070 – Manaus-AM – Brazil
Internet: <http://www.amazonia.fiocruz.br/>

The Sergio Arouca National School of Public Health

Avenida Leopoldo Bulhões, 1480, Manguinhos
CEP 21041-210 – Rio de Janeiro-RJ – Brazil
Internet: <http://www.ensp.fiocruz.br/>

Organizer:

Carlos Machado de Freitas – The Sergio Arouca National School of Public Health – Fiocruz

Collaboration:

Antonio Levino – Leônidas and Maria Deane Institute – Amazonian Fiocruz
Brani Rozemberg – The Sergio Arouca National School of Public Health – Fiocruz
Carlos Corvalan – PAHO/WHO – PWR Brazil
Carlos Machado de Freitas – The Sergio Arouca National School of Public Health – Fiocruz
Daniel Forsin Buss – Oswaldo Cruz Institute – Fiocruz
Jean Remy Davee Guimarães – Institute of Biophysics – UFRJ
Josino Costa Moreira – The Sergio Arouca National School of Public Health – Fiocruz
Leandro Luiz Giatti – Leônidas and Maria Deane Institute – Amazonian Fiocruz
Marcelo Firpo de Souza Porto – The Sergio Arouca National School of Public Health – Fiocruz
Marcus Vinicius Polignano – Faculty of Medicine – UFMG
Marisa Soares – Oswaldo Cruz Institute – Fiocruz
Paulo Chagastelles Sabroza – The Sergio Arouca National School of Public Health – Fiocruz
Sergio Luiz Bessa Luz – Leônidas and Maria Deane Institute – Amazonian Fiocruz

Revision:

Mara Lúcia C. Oliveira – PAHO/WHO – PWR Brazil
Caroline Habe – PAHO/WHO – PWR Brazil

Cover, Graphic Design and Layout:

All Type Assessoria Editorial Ltda

Printed in Brazil

Pan American Health Organization Documentation Center – PWR Brazil Cataloguing in Publication Data

Organização Pan-Americana da Saúde.

Enfoques ecossistêmicos em saúde – perspectivas para sua adoção no Brasil e países da América Latina. / Organização Pan-Americana da Saúde. – Brasília: Organização Pan-Americana da Saúde, 2009.

51 p: il.

ISBN

1. Ecossistema - Brasil. 2. Saúde Pública - Brasil. I. Organização Pan-Americana da Saúde. II. Título.
NLM: QT 230

Index

5	Presentation
7	Introduction
11	The two large views of Ecosystem approach
19	Ecosystem approach and public health – A brief overview for Brazil
21	Ecosystem approach in Latin American public health journals
29	Ecosystem approach to health – summary of the Manaus <i>workshop</i> presentations
39	Perspectives for the adoption of ecosystem approach
41	Bibliography
45	International Workshop of the Health and Environment Working Group of the Pan Amazonian Network of Science, Technology and Innovation in Health ¹

Ecosystem approach in Health – Perspectives for its adoption in Brazil and Latin American countries¹

Abbreviations

AM	Amazonas State
C	Carbon's chemical symbol
CETAM	Technology Education Center of the Amazonas State
DDT	DichloroDiphenylTrichloroethane
EAH	Ecosystem Approach to Health
EEP	Engineering School of Piracicaba
EHA	Ecosystem Health Approach
ENSP	National School of Public Health
FUNASA	National Health Foundation
GIS	Geographic Information System
GTA	Technical Support Group
Hg	Mercury's chemical symbol
IBRD	The International Bank for Reconstruction and Development
IDRC	International Development Research Centre
ILMD	Leônidas and Maria Deane Institute – Amazonian Fiocruz
IMF	International Monetary Fund
MDG	Millennium Development Goals
MEA	Millennium Ecosystem Assessment
MeHg	Methylmercury chloride
N	Nitrogen's chemical symbol
PAHO/WHO	Pan American Health Organization/World Health Organization
Pb	Lead's chemical symbol
PCB	Polychlorinated biphenyls
PEC	Peer Extended Community
PLUPH	Poor Land Use - Poor Health
PR	Paraná State
PSF	Family Health Programme
SARS	Severe Acute Respiratory Syndrome
SCIELO	A Scientific Electronic Library Online
Se	Selenium's chemical symbol
SOHO	Self Organizing Holarquic Open
SP	São Paulo State
SUS	Unified Health System
UFMG	Federal University of Minas Gerais State
UFPA	Federal University of Pará State
UFRJ	Federal University of Rio de Janeiro State
UNEP	United Nations Environment Programme
UQAM	Université du Quebec à Montreal
USP	University of São Paulo
VPSRA	Vice-Presidency for Reference Services and Environment
WHO	World Health Organization
WTO	World Trade Organization

¹ Text prepared for the Workshop “Ecosystem Approach to Health”, held in Manaus on November 18-19, 2008 at the Leônidas and Maria Deane Institute of the Oswaldo Cruz Foundation (ILMD – FIOCRUZ), in partnership with the Pan American Health Organization/World Health Organization (PAHO/WHO), PWR Brazil.

Presentation

The Pan American Health (PAHO/WHO) Office in Brazil, in partnership with the Ministry of Health through the Leônidas and Maria Deane Institute of the Amazonian Fiocruz (ILMD/FIOCRUZ/MOH), present the second volume of the Environmental Health publications series, which is entitled “Ecosystem approach in health – perspectives for its adoption in Brazil and Latin American countries”, produced as a subsidy for the debates which occurred at the Workshop “Ecosystem Approach to Health”, held in Manaus on November 18-19, 2008.

The workshop, organized by ILMD/FIOCRUZ/MOH in partnership with PAHO/WHO, counted with the participation of representatives from 15 federal, state and local institutions, which operate in the area of health and environment of the Amazon Region, as well as students and researchers in the field of health and Ecosystem approach.

The Millennium Ecosystem Assessment was developed between 2001 and 2005 in order to have a better understanding of the consequences of ecosystem changes on human welfare, as well as to establish a scientific basis for the actions required regarding improvement, conservation and sustainable use of ecosystems and their contributions towards human welfare. The Ecosystem approach links environmental management to the holistic understanding of human health, given the inherent social, economic and cultural factors of an ecosystem.

The objective of the event was to get more familiar with the ecosystem assessment proposal and to raise awareness among health professionals for its application with a view to understanding how changes in ecosystems services influence human welfare.

As a complement to the Spanish and English editions we included the report of the International Workshop of the Working Group of Health & Environment of the Pan-Amazonian Network for Science, Technology and Innovation in Health, held in Belem / Pará during 19 and 20 August 2009.

The Pan-Amazonian Network is a cooperative network formed by universities, research institutes, the Amazon Cooperation Treaty Organization (ACTO), Pan American Health Organization / World Health Organization (PAHO / WHO), Oswaldo Cruz Foundation (Fiocruz) from the Brazilian Health Ministry and the Ministries of Health and Social Protection of the eight member countries of the Cooperation Treaty Organization (ACTO) - ie: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Surinam and Venezuela

It is hoped that this edition will provide, both in Brazil and other countries of the region, a contribution for health and environment managers and workers as well as representatives from the society who are interested in the issue, and that a more effective performance from everyone is sought towards health protection.

Diego Victoria
PAHO/WHO Representative in Brazil

Roberto Sena Rocha
Director of the Leônidas and Maria Deane Institute
of the Amazonian Fiocruz



Source: www.fmc.am.gov.br/floresta-amazonica1.jpg
Aerial view of the Amazon forest

Introduction

According to a synthesis prepared by WHO on the results of the Millennium Ecosystem Assessment¹, promoted by the United Nations with the purpose of understanding and assessing the consequences of existing relationships between environment and human welfare, an effort was made to answer the issue as to why ecosystems are so important to human health, an answer which is associated with the fact that they constitute the support systems and the various forms of life, including the human specie (Corvalan, Hales McMichael, 2005). This answer originates from the findings that ecosystems services are indispensable to human welfare and health anywhere, involving complex causal relationships between environmental changes and human health, which are indirect and involve different spatial and temporal scales, depending on several forces of change (PAHO, 2005).

We can consider that the referred document represents a great effort of a trajectory, particularly in the transition from the XX to the XXI century, which tries to increasingly understand and solve problems that result from human actions in the change of structure and function of ecosystems. This endeavour occurs in a moment where it is uncovered, as from the second half of the XX century, if from one hand human actions on ecosystems have created benefits for welfare and health, on the other hand they are resulting in increasing costs, with the degradation of 60% of ecosystems services, exacerbation of poverty and growth of social and environmental disparities. Ecosystem approach is gaining prominence in Latin American countries in this context, thus representing a potential for the ways of understanding and searching for solutions in public health and, consequently, requiring a critical analysis of its limitations.

Feola and Bazzani (2002), from the Regional Office for Latin America and Caribbean of the International Development Research Center (Canada), located in Uruguay, started their final reflections in the publication *“Challenges and Strategies for the*

Ecosystems and Human Health: some results of the Millennium Ecosystem Assessment¹

The Millennium Ecosystem Assessment was developed between 2001 and 2005 in order to assess the consequences of ecosystem change on human welfare as well as to establish the scientific basis of the actions required for the improvement, conservation and sustainable use of ecosystems and their contributions towards human welfare.

The assessment is based on links between ecosystems and human welfare, particularly ecosystems services, that is, the benefits that people obtain from ecosystems. These include the provision of “services”, such as: water and food supply; wood and fibre; services which affect the climate, floods, drought, diseases, water residues and quality; cultural services that bring recreational, aesthetical and spiritual benefits; and support services, such as the ones given to soil formation, photosynthesis and nutritional cycle. While adapting to environmental changes through culture and technology, the human specie ultimately totally depends on the flow of ecosystems services.

The Millennium Ecosystem Assessment aims at assessing how the changes in the ecosystems services influence human welfare. It is believed that human welfare has multiple components. These include health, considered as feeling well and having a healthy surrounding physical environment, clean air and access to clean water; the minimum material for a good life, safe and adequate forms of living, sufficient food at any given moment, housing, clothing and access to products; social relationships, including social cohesion, mutual respect and helping others, especially children; safety, safe access to natural and other resources, and surveillance of natural or human-provoked disasters; finally, the freedom of choice and action, including the opportunity to achieve what an individual values how to be and do.

1 The Millennium Ecosystem Assessment process, boasted by the United Nations, is a great effort by the scientific community to understand and assess the consequences of the existing relationships between environment and human welfare that generated large reports which may be accessed at the following link: <http://www.maweb.org/en/index.aspx>

Source: “Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)” (Corvalan et al, OMS 2005).

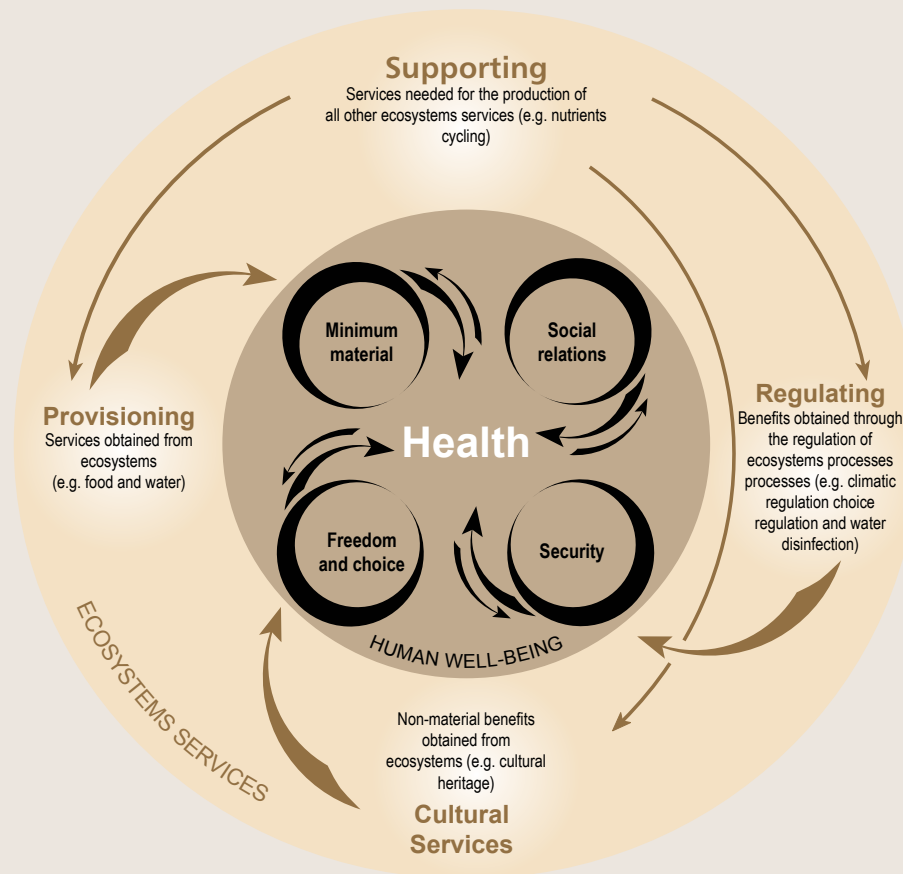
1 The document “Ecosystems and Human Health: some results of the Ecosystem Assessment” is a synopsis prepared by the World Health Organization (WHO) and translated into Portuguese by PAHO/WHO Representative Office in Brazil.

Why are ecosystems important to human health?

Ecosystems essentially form support systems to life on the planet – for human species as well as all other forms of life. The biological need of a human being to have food, water, clean air, shelter and a relatively constant climate condition is basic and unalterable in its essence.

Ecosystems services are indispensable for the well-being of all people, everywhere in the world. The causal link between environmental change and human health are complex, due to the fact that they are often indirect, displaced in time and space and depend on a number of modifying forces. .

Figure: Relationship between ecosystems services and their impacts on human welfare, with an emphasis on health



Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005).

Implementation of an Ecosystem approach for Human Health in Developing countries: reflections on the regional consultations performed" with an enunciation that draws attention to the challenges set for this type of approach: *The Ecosystem approach for human health (ecohealth) presents many challenges since it crosses the traditional borders of research. It actually consists of a new focus which links integrated environmental*

management to the holistic understanding of human health, considering the important social, economic and cultural factors that are inherent to an ecosystem (Feola & Bazzani, 2002:67). It is possible to infer that the Ecosystem approach in health represents, as an integrated approach, important possibilities of application in Latin American countries as well as challenges regarding the possibilities of an

integrated work for the diagnosis and management of environmental and health problems. Based on this text, as well as on others that are seeking to approach this focus in its theoretical, conceptual, practical and research aspects, both in Brazil – (Possas, 2001; Minayo, 2002; Freitas, 2007) – and other countries (WRI, 2000), mainly Canada (Waltner-Toews, 2004; Lebel, 2003), it is considered that it involves at least three presuppositions:

- 1) It involves the gathering of various information which allows the demonstration of interfaces between goods and services of the several ecosystems that must be balanced with environmental, political and social goals in order to be integrated;
- 2) It involves the formulation of large public policies and more effective institutions for their implementation in order to produce integrated environmental management proposals;
- 3) It must involve public participation in the management of ecosystems, particularly local communities, in order to be more holistic in the understanding of problems and result in a more effective environmental management.

Based on these three presuppositions, we have organized the present text in a way that provides subsidy for a reflection on the perspective of adoption of this focus, especially in Brazil and, in a more general manner, in Latin America. In the first part, we describe and compare the two threatviews that are present in the theoretical and methodological debate on the Ecosystem approach:

a) Ecosystem Health Approach (EHA)

b) Ecosystem Approach to Health (EAH)

In the second part, we perform a brief analysis of the Brazilian scientific production, based on articles, books and books chapters. In the third part, we analyze the scientific production based on articles published in Latin American public health journals. In the fourth part, we display the summary of works presented at the Workshop “*Ecosystem Approach to Health*”, held in Manaus on November 18-19, 2008 at the Leônidas and Maria Deane Institute of the Amazonian Fiocruz. In the last part, we make a short analysis of the Ecosystem approach in Brazil and Latin America.





The two large views of Ecosystem approach

According to Freitas and col. (2007), we can currently identify two large threats that are the basis of studies that adopt an Ecosystem approach. The first one strongly values the development of measuring ways which can identify signs and symptoms as to how changes in ecosystems can affect their health and, consequently, display a present or future potential of affecting human health (Rapport, 1998a; Jorgensen and col., 2005; Aron & Patz, 2001). The other one strongly values the development of contextualized and participative approaches for the understanding

and search for solutions regarding changes in ecosystems of certain settings (e.g. villages, small cities, etc.) and their consequences on the health of local communities (Kay e col., 1999; Waltner-Toews, 2004; Lebel, 2003). The first one favors the construction of scientific information which can aid decision-making. The second one favors the collective construction of information in order to enable local stakeholders to participate in the demands or even decision-making in a more qualified way.

Have changes occurred in ecosystems? And what are the implications for human health?

The structure and functioning of world's ecosystems changed more rapidly modified in the second half of the 20th century than in any other time of human history. Humans are fundamentally – and to a significant extent irreversibly – changing the diversity of life on Earth. In general and for most countries, changes caused to world ecosystems in the recent decades generated substantial benefits for human welfare and development. Many of the most significant changes to ecosystems have been essential to meet growing needs for food and water; these changes helped to reduce the proportion of people suffering from malnutrition and improve human health. However, such gains have been achieved with growing costs in the form of degradation of the various ecosystem services, an increased risk of non-linear and large magnitude changes in ecosystems and the exacerbation of poverty for a certain number of people, thus contributing towards a growth of iniquities and disparities across groups of people.

Major inequalities exist in the access to ecosystem services. Within and between countries, poverty is a consistent underlying determinant of under nutrition and diseases caused by lack of clean water and sanitation and other public services. Many of the people and places adversely affected by ecosystem changes and declining ecosystem services are highly vulnerable and ill equipped to cope with further loss of ecosystem services. Human alterations of ecosystems and ecosystem services shape both the threats

to which people and places are exposed and their vulnerabilities to the threats. Highly vulnerable groups include those whose needs for ecosystem services already

exceed the supply, such as people lacking adequate clean water supplies and people living in areas with declining agricultural production (including a number of regions in Africa).

The regions facing the greatest challenges in achieving the Millennium Development Goals largely overlap with the regions facing the greatest problems related to the ecologically sustainable supply of ecosystem services. Many of these regions include Ecosystems and Human Health large areas of drylands, in which a combination of growing populations and land degradation are increasing the vulnerability of people to both economic and environmental change.

Vulnerability has also been increased by the growth of populations in ecosystems at risk of disasters such as floods or drought. Populations are growing in low-lying coastal areas and in dryland ecosystems. In part due to the growth in these vulnerable populations, the number of natural disasters (floods, droughts, earthquakes, etc.) requiring international assistance has quadrupled over the past four decades.

Diminished human health and well being tends to increase the immediate dependence on ecosystem services, and the resultant additional pressure can damage the capacity of those ecosystems to deliver services. As well being declines, the options available to people that allow them to regulate their use of natural resources at sustainable levels decline as well. This in turn increases pressure on ecosystem services and can create a downward spiral of increasing poverty and further degradation of ecosystem services.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud, un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)

Ecosystem Health Approach (EHA)

EHA aims at being an integrating science by trying to cross the borders of ecological stress, a field which is strictly directed to the biophysical aspects of environmental problems. EHA attempts to integrate natural (biophysical dimension), social (socioeconomic dimension) and health (human health dimension) sciences by using the metaphor resource of the ecosystem being a patient, which implies the following:

- 1) To diagnose ecosystems dysfunctions through the monitoring of signs and indicators, with the objective of identifying deterioration risks, discriminating between “healthy” (desirable) ecosystems and those considered “pathological” (undesirable);
- 2) To offer options for changes in the state of ecosystems, focusing on the preventive strategies in order to reduce post-damage interventions costs as well as loss of economic opportunities, human health risks and social ruptures resulting from the occurrence of environmental degradation (Rapport, 1998b; Rapport, 1998c).



Flood in the Amazon region 2009 – Picture: Ana Fischer, SVS/MS

As an integrating science, EHA seeks to overcome the limits of the dominant economic (focused on prices of markets that reflect the current scarcity of local resources and not considering the consequence for future generations), ecological (tendency to set aside society and economic activities, both viewed



Environmental survey – Picture: Leandro Giatti

as “external” forces) and engineering (search for tailor-made solutions based on command and control strategies) approaches. The integration proposed by EHA is done through the analysis of several dimensions and attributes. With reference to dimensions, four large analysis strategies are considered. In the *biophysical dimension*, ecosystems structures and functions are assessed, investigating factors associated with nutrients cycles, energy flows, diversity, dominance of biological species, toxic substances cycles and capture and *habitats* diversity. In the *socioeconomic dimension*, economic and social aspects are dealt with jointly, emphasizing the differences in the capacity of productivity of ecosystems, as well as the different values attributed by the population to the environment, which have a direct repercussion on the economic policies of countries, regardless of their development stage. In the *human health dimension*, the causal link between diseases and human health risks and the unbalance of ecosystems health status is established, despite of whether they are infectious or chronic degenerative diseases. Finally, considering the *space-temporal dimension*, several ecosystems responding to various forms of stress are approached. This may either be unicausal or multicausal, as they produce changes with a cumulative and/or synergic effect, thus affecting the system’s viability. For example, signs of dysfunctions observed in isolated components in the local scale through a traditional and reduction analysis may end up considering that the subject ecosystem is healthy. However, complex patterns that are inherent to the responses of ecosystems under stress may signify, on a large spatial and temporal scale, dysfunctions that render the subject system not healthy (an example of agricultural activities at the local level which may turn into impacts for the whole agriculture and livestock system) (Rapport, 1998b; Rapport, 1998c).

Regarding the attributes, EHA suggests eight criteria/indicators for HEALTHY ECOSYSTEMS that are applicable in the integration for dimensions stated above. The first three criteria/indicators (strength, resilience and organization) are characterized by their predominantly biological origin, allow the assessment of ecosystems structure and functions, and are considered the primary health components of ecosystems health. The remaining criteria/indicators represent the capacity of management, planning and sustainability of mitigation, and compensation measures taken by society in environmental damage situations (Rapport, 1998b; Rapport, 1998c). The eight attributes are described in Table 1.

The use of the patient's metaphor in EHA represents a fundamental requirement for the success of this approach, operating as a powerful communication tool with the public in general. Its importance resides in the

possibility of expanding the notion of individual and/or collective health to the comprehension and assessment of ecosystems health, as well as the dependence of individual health on health of the ecosystems. This new perception about health causes the integration exercise of natural and social sciences and also brings to light discussions that aim at a better understanding of the complexity associated with the behaviour of ecosystems under various pressures (Rapport, 1998a).

EHA understood as a proposal of sciences integration joins two different perspectives: (a) a scientific perspective, with the main purpose of clarifying how a certain ecosystem works, analyzing possible desirable (healthy) ecosystems patterns through the use of quantitative multidisciplinary indicators; (b) an evaluative perspective, which considers social values, interests and rights which, assisted by the monitoring of indicators, would allow the ecosystem health

Table 1: Attributes of the Ecosystem Health Approach

Name of criteria/indicator	Definition of criteria/indicator
Strength	<ul style="list-style-type: none"> Energy or activity of an ecosystem. Although ecosystems stress is associated with lower strength with regards to productivity and power/yield, this does not imply that the higher the power/yield, the healthier the ecosystem will be, because it may depend on external subsidies.
Resilience	<ul style="list-style-type: none"> Ability of a system to face the stress and return to the earlier state, when stress diminishes or ends.
Organization	<ul style="list-style-type: none"> Inter-relationships among the various biotic and abiotic elements of each ecosystem. Ecosystems that are under pressure display a reduction of species, little symbiotic relationships and more opportunist species among its elements.
Ecosystems Services Maintenance	<ul style="list-style-type: none"> Criteria for the assessment of ecosystems health. It refers to the blessings that benefit human communities, such as supply (food, drinking water, genetic resources, etc.), regulation (climate, water cycles, etc.), support (soil formation and nutrients cycles) and culture (leisure and tourism, spiritual and religious value).
Management Options	<ul style="list-style-type: none"> Healthy ecosystems offer a greater diversity of potential uses, such as harvests of renewable resources, recreation and water supply for human consumption. Stressed ecosystems do not offer a lot of options for potential use or cannot maintain/support such options for long periods.
Reduced Subsidies	<ul style="list-style-type: none"> Healthy ecosystems do not require a SUBSIDIES increase for its productivity. In agriculture, work and the use of agrototoxic products and fossil fuels are additional supplies. Subsidies also occur in the form of economic incentives which encourage the exploitation of natural resources, with a production obtained that does not incorporate environmental and health costs. Generally, these costs tend to be passed on to society and not to the enterprise which causes degradation.
Damages to Neighbouring Systems	<ul style="list-style-type: none"> Ecosystems can prosper at the cost of others. This occurs when residues or contaminants of a certain region are carried beyond its borders, causing damages to ecosystems which did not produce them.
Effects on Human Health	<ul style="list-style-type: none"> Human health may be a synoptic measure of the ecosystem's health. Healthy ecosystems are characterized by their ability to sustain healthy human populations.

Source: Adapted from Rapport, 1998b

How might ecosystems change in the future? What would the health implications of these changes be?

In all four scenarios of the Ecosystem Assessment, the projected changes indicate a significant growth in the consumption of ecosystems services, a constant loss of biodiversity and further degradation of some ecosystems services.

- Over the next 50 years, projections indicate that the demand for food should grow between 70 and 80 per cent, and the demand for water between 30 and 85 per cent. Water withdrawals should significantly increase in developing countries.
- According to scenarios of the Ecosystem Assessment, food safety will not be achieved by the year 2050, and child malnutrition will be difficult to eradicate despite increasing food supply and more diversified diets.
- A severe deterioration of services provided by freshwater resources (such as the aquatic habitat; fish production; water supply for households, industry and agriculture) is found in the scenarios affected by environmental problems. Less severe, but still important declines are expected in the scenarios which are more proactive about environmental problems.
- Habitat loss and other ecosystems changes are projected to lead to a decline in local diversity of native species by the year 2050.

In the more promising scenarios related to health, the number of children suffering from malnutrition is reduced, and the burden of epidemic diseases such as HIV/Aids, malaria and tuberculosis will also falls. An improvement in the development and distribution of vaccines could allow populations to better deal with the next influenza pandemic, at the same time that the impact of new diseases, such SARS, should also be limited through well coordinated public health measures.

In one of the least promising scenarios, social and health conditions of rich and poor countries would diverge, and a negative spiral of poverty, declining health and degraded ecosystems could develop. Ecosystems changes may occur on such a large as to have a catastrophic effects upon the economic, social and political processes upon which good health is dependent. For example, widespread food insecurity, secondary to severe climate change, institutional failure and increasingly damage soil could worsen the inequities and lead to widespread conflict.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)

assessment for the possible future scenarios of the current behaviour (Rapport, 1998b; Rapport, 1998c).

Ecosystem Approach to Health (EAH)

The proposal presented by the EAH involves three fundamental aspects: the complex systems theory, the hierarchy among various groups (holons) and the ecosystems dynamics before the different scales (spatial and temporal) and aspects which must be utilized for its study and understanding. EAH starts with the premise that disease and health manifestations occur in complex socio-ecological contexts, characterizing ecosystems as *self-organizing holarquic open* (SOHO) systems. This approach seeks to determine links between human health and activities or events that disturb the ecosystem state and function (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

The theoretical-methodological framework developed in EAH was outlined due to the complexity inherent to socio-ecological systems that involve a set of hierarchic groups in multiple scales (spatial and temporal) which tend to organize themselves in social and ecological feedback circles. The objective of the analysis of this complexity is to identify critical points of instability which can sometimes result in the spontaneous emergence of new structures and organization forms that lead to abrupt changes of the systems and may result in small alterations to even environmental tragedies involving the appearance of plagues or epidemics (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

Under this view, uncertainties are inherent to socio-ecological systems and lead to an approach that is mainly oriented to local and regional ecosystem and health problems. It is based on methodological pluralism and strongly incorporates the principles of social participation so that, although the proposed methodology contains some basic guidelines, the construction of the ecosystems investigation and analysis approach, as well as the proposal of management strategies and public policies, concentrates on the processes of social and collaborative learning among specialists and local social stakeholders (Waltner-Toews, 2004; Kay and col., 1999).

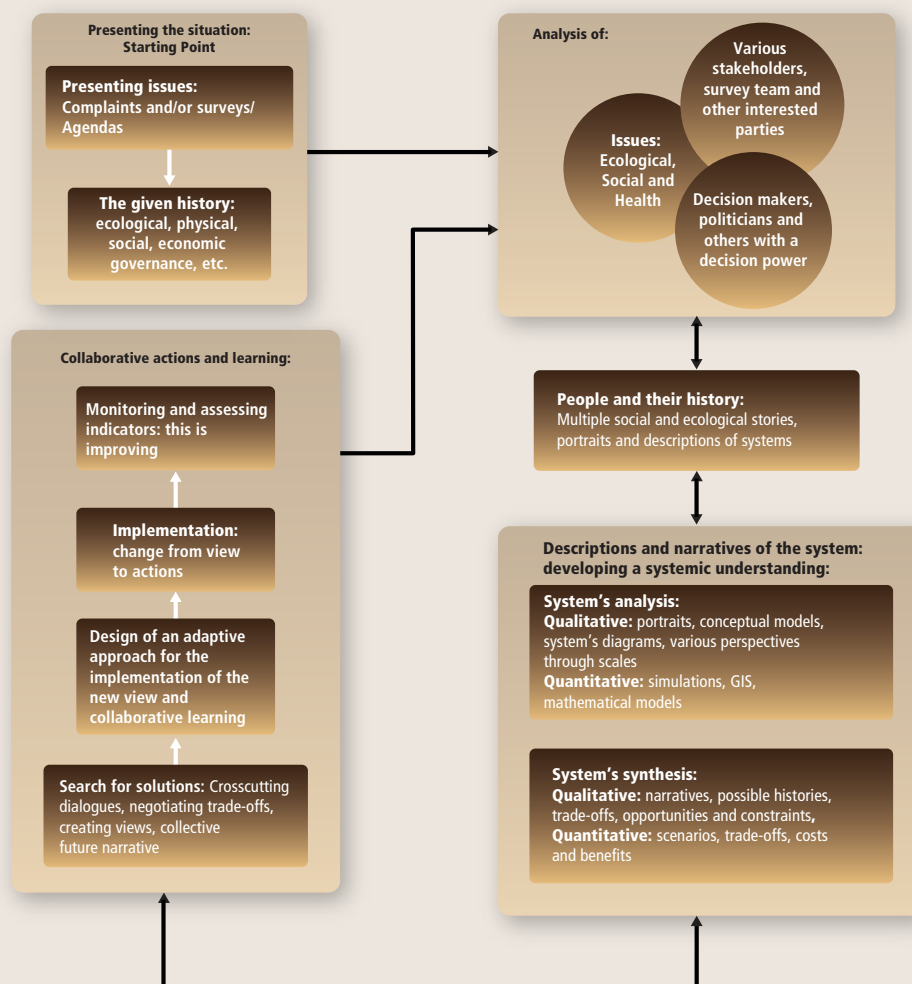
The participation and the processes of social and collaborative learning may lead to a type of adaptive management, which arises as an alternative and at the

same time a complement to traditional anticipatory management. In adaptive management, differences between how the future really reveals itself and how it was forecasted that it would reveal itself are seen as learning opportunities. EAH adaptive focus assumes that decisions regarding environmental issues involve the mapping of the view of how territories or environments must co-evolve as a self-organized entity. This path also allows the identification of social stakeholders and interests at stake, of life stories, worries and future perspectives (Waltner-Toews, 2004; Lebel, 2003).

Although, as with EHA, EAH also considers attributes/indicators that allow the identification of whether an ecosystem is healthy or not, its

methodology is centered in the process established in four articulated stages, as can be seen in **Figure 1**. In the stages described below, two fundamental aspects are considered: 1) the borders of an ecosystem and/or environmental problem are established through negotiation among the various social stakeholders involved; 2) the roles and responsibilities of the various social actors are defined at every step. These two aspects require from those who dedicate themselves to this approach the establishment of clear negotiation rules, ways of involving at appropriate times the various stakeholders with conflicting interests, and ways of solving conflicts and strategies in order to ensure the participation of stakeholders until the end of the process (Waltner-Toews, 2004; Lebel, 2003).

Figure 1: Diagram of the Ecosystem Approach to Health Stages



Source: adapted from Waltner-Toews and col., 2002

The first stage consists in defining the situation/problem, done by articulating an agenda about the problems which must be understood and solved through the involvement of the local community. From that moment on, develop a narrative about key-changes, and tendencies and patterns of the present and the past perceived and identified by the community and researchers. This stage, which is not exhaustive and offers a rich context, provides a basis which allows the understanding of how a certain socio-ecological system reached the present state (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

The second step involves the analysis of three components: 1) The various social stakeholders and interests involved; 2) the socio-ecological issues; 3) the public policies and governance strategies. The analysis of the various social stakeholders and interests not only tries to identify who can and must be part of the various stages of research and management of the problem, but also the several “versions” of reality, displaying the plurality of perspectives in a variety of groups. This analysis provides the elements for the incorporation and reconciliation of the various social stakeholders and interests into the research and management agenda.

The analysis of the socio-ecological issues occur from participative techniques that involve the various stakeholders and enables the identification of problems and opportunities for their management. Both endogenous and exogenous variables of each issue and their interaction with other issues, are identified through this analysis as well as key-elements that local stakeholders consider important in the description of the system and which will represent elements for the changes or maintenance of the *status quo*. The analysis of public policies and governance must allow the description of a larger context and their relevant structures which constrain or facilitate the local ability in dealing with the problems. In a larger context, it provides elements for the identification of what needs to be transformed in order to facilitate local societies search for sustainable goals (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

The result of the two stages is a series of narratives, tables and descriptions about the situation of the socio-ecological system and also a view of what must change in the current situation. In their various forms, such narratives serve as a basis for a more formal process of developing a systemic understanding of the situation (Waltner-Toews, 2004; Kay and col., 1999).



Community meeting
Source: www.manuelzao.ufmg.br

What actions are required to address the consequences of ecosystems change for health?

There are two routes to avoiding disease and injury caused by ecosystem disruption. One is to prevent, limit or manage environmental damage; the other way is to make whatever changes will protect individuals and populations from the consequences of ecosystem change. Two aspects need to be considered to understand the potential negative health impacts of ecosystem change: the current (and likely future) vulnerability of populations and their future capacity for adaptation. These two aspects are closely related. The forces that place populations at risk (such as poverty and high burdens of disease) in many cases also impair the capacity of these populations to prepare for the future.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)

The third stage is the development of a systemic understanding of the descriptions and narratives of the socio-ecological system. It involves two components, namely, the quantitative and qualitative analysis of the system and the synopsis of the system's descriptions. These allow the understanding of how the various narratives interact with each other in order to create what is recognized as a system. The system's analysis consists essentially in building a conceptual model that spatially and temporarily describes what the key-elements of the situation are and how these are interconnected and inter-related, by identifying the important processes that formed it. This analysis may start as a qualitative one and provides in a simple way important insights and suggestions for action. When data and information are available, a quantitative analyses may involve statistical models, simulations and special analyses. The synopsis of the system's descriptions aims at rebuilding a model of the system as a whole and analyzing it in terms of health and sustainability through the identification of the intersection key-points among the various sub-models and the future narratives (scenarios) that form the basis for the preparation of hypotheses over the probable results of particular interventions. Such models and future narratives become the basis for public policies that consider the multiple perspectives and goals involving and enabling the decision makers to define a set of feasible management options and balance

the inter-relations among the social, economic and ecological aspects (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

With the description and understanding of the socio-ecological system at hand, the fourth stage begins and consists of the following components: 1) working with the various stakeholders related to the ecosystem in order to discover ways that enable the negotiation of interchangeable elements; 2) projecting an adaptive approach for the implementation of a collaborative learning; 3) implementing changes; 4) monitoring and assessing changes, in order to learn from them. The objective of this stage is to trigger an adaptive and collaborative learning process for ecosystem and health sustainability (Waltner-Toews, 2001 and 2004; Kay and col., 1999).

At the same time that it draws support from the current understanding of complex systems, EAH intends to be participative and practical, both in the way we formally analyze and synthesize the understanding of multidimensional systems and the aspects related to interventions and their monitoring and also the necessary adjustments.

How can actions to address the consequences of ecosystems change for health be prioritized?

The prioritization of actions to address the consequences of ecosystem change for human health should reflect the priorities and values of all those affected by the proposed actions. The final decisions about prioritization therefore should be taken either by individuals, or their legitimate political representatives, with reference to these values. Scientific assessments can inform these decision-making processes. Burden-of-disease evaluations, conducted within the context of a Health Impact Assessment, are appropriate for aggregating health impacts that arise through a range of mechanisms. Such evaluations can potentially aid in priority setting and decision-making in the context of ecosystem change. However, they must be considered as only one component of evidence, as they cannot fully account for complex causal pathways, long time scales and potential irreversibility. These important properties need to be included in the final considerations about any response to ecological change.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)



Ecosystem approach and public health – A brief overview for Brazil

In Brazil, in books or chapters or even journals, we find texts that have been dealing with ecosystem approach in health since at least 2001.

Possas (2001), in the article *Social ecosystem health: confronting the complexity and emergence of infectious diseases*, deals with the complexity of epidemiological transition and points out that it should simultaneously involve social and ecological aspects in the understanding of the emergence and re-emergence of infectious diseases. According to the author, emerging and re-emerging diseases, when analyzed from a perspective that integrates the social and the ecological aspects, are setting a series of challenges to public health both at national and global levels. The author argues that traditional and isolated approaches are insufficient to face the complexity of the problems, thus requiring multidisciplinary approach, labeled as

“social ecosystem and health”, which must incorporate the different perspectives in a comprehensive theoretical referential.

Minayo (2002), at the onset of the chapter “Health and quality of life ecosystem approach” of the book *Health and Sustainable Environment: straightening ties*, considers the “health ecosystem approach as one of the possibilities for the theoretical-practical building of relationships between health and environment at microsocial levels, dialectically articulated towards an expanded view of both components” (Minayo, 2002:173). In this text, the author draws the attention to the several possibilities of this focus which, besides being integrated, foresees a large social participation in the analysis of environmental problems and search for their solutions. However, she considers that, for a focus that is expected to be integrated, there are still



Project "Caruso" Picture: Jean Remy



Mosquitoes breeding spots
Picture: Maria Pia Quiroga. PAHO/WHO collection

methodological and operative challenges which must be worked out in order to make answers possible to its central theoretical problems. Among the challenges, she mentions, as examples, sociological and anthropological diagnoses and analyses of the subject problems, including historical, economic, cultural, social factors, the exercise of power and the productive and reproductive activity.

Augusto, Carneiro and Martins (2005) organized a book entitled “Ecosystem Approach to Health – Trials for the Control of Dengue”, that contains a specific chapter, authored by Abrahão (Abrahão, 2005: 137-145), which is devoted to the book’s topic and is entitled “Dengue: an ecosystem approach”. According to the author, dengue’s epidemics represented the evidence of environmental and social crisis more than anything else. This kind of understanding would require an ecosystem approach to replace the dependent chemical model, in order to respect the life-supporting environmental systems of interdisciplinary and transectorial projects, and the positive, intelligent and continuous actions from the participative and

social networks regarding the socio-environmental determinants.

Freitas (2005), in the chapter of the published book “Social sciences and the ecosystem approach in Health”, published in the book organized by Minayo and Coimbra *Criticism and Actors – Social and Human Sciences in Health in Latin America* carries out a reflection on the challenges of Social Sciences in the issues related to environmental health based on the ecosystem approach in health. He tries to present it as a problem and reflects on its interfaces with social sciences from an integrative and understanding perspective that involves both the biophysical and social aspects, without, however, resulting in an impoverishment of social theories on environmental problems, as it is currently occurring and in the majority of studies that adopt ecosystem approach in health.

Gomez and Minayo (2006) attempt at placing historically health approaches for environmental health problems back in the XVIII century, in order to point out the proposal for changes in the paradigm of the health area that are highlighted in the Lalonde Model (Canada) and the Ottawa Chart. From then on, they present the ecosystem approach that is mainly being developed in Canada and, among its advantages, can understand problems in a contextualized manner and in their complexity, involve the various social stakeholders by empowering subjects through social participation and adopt inter and transdisciplinary perspectives. The authors emphasize that there is no paradigm that is established as a scientific model for this focus, and it can therefore be considered that it is rather a model and a metaphor that includes all the involved in its building.

Finally, Freitas and col. (2007) perform a review of scientific articles published in Latin American public health journals. Considering the details of results, that provide us with more elements for reflection, these shall be dealt with in the next item.

However, before proceeding to the next item, it is worth emphasizing two aspects. The first one is that there is a clear connection between the ecosystem approach in health adopted in the texts mentioned and the perspective proposed by EAH. The second one is that there is a predominance of theoretical and conceptual works and a lack of texts that can result in empirical works.

Ecosystem approach in Latin American public health journals

In this section, we give continuity to the analysis carried out by Freitas (2007) on studies that included the words *ecohealth*, *ecosystem* or *ecosistema* as terms of the subject performed by researchers of Latin America or on its countries, published in Latin American public health journals that are available at Scielo (<http://www.scielo.org>). A refinement of this survey was performed in two special supplements of the *Reports in Public Health* on ecosystem approaches in health, in volumes 17 (*An ecosystem approach to human health: communicable and emerging diseases*, 2001) and 25 (*Ecosystem approaches to controlling vector-borne diseases: dengue and Chagas disease*, 2009), considering that, mainly in the latter volume, some articles, although adopting these approaches, did not contain in the title, summary or key-words any of the descriptors used in the search. This survey, which was carried out in the largest possible way and not just limited to summary, title or key-words, portrays a situation which is not exhaustive but important for reflection on the potentials, limits and challenges of this subject in our countries.

In total, 45 articles were identified, covering a period between 2000 and 2009, mainly published in the *Reports in Public Health* (N=36), followed by the *Public Health Magazine (in Portuguese)* (N=5) and *Science & Collective Health* (N=2) and one article each in other two journals (*Public Health Journal (in Spanish)* and *Public Health Cuban Journal*). About a quarter of the articles (N=11) talked about the ecosystem as a place that was modified and became prone to diseases with the presence of vectors and pathogenic agents, 10 were epidemiological studies where the ecosystem was an environmental variable (of all studies, only 2 dealt with chemical agents, specifically mercury), 6 had as reference the vector ecology focus; 2 made an interface between vector ecology and ecosystem as a modified setting; 2 were studies on the assessments of programs or population's understanding by using questionnaires combined with quantitative data on the environment and health problems. Finally, 14 articles adopted Ecosystem approach which, to a greater or



Picture: All type Assessoria Editorial

lesser degree, had the presuppositions to combine the following: (1) gathering various information which allows to demonstrate the interfaces between goods and services of the several ecosystems that must be balanced with the environmental, political, social and economic goals; (2) formulation of large public policies and more efficient institutions for their implementation; (3) public participation in the management of ecosystems, particularly local communities.

Of the 14 articles that adopted ecosystem approach, a quarter (N=5) had a theoretical-conceptual character, 2 by researchers from Brazilian institutions (Possas, 2001; Freitas, 2007) and 3 by researchers from Canadian institutions (Nielsen, 2001; Waltner-Toews, 2001; Boischio and col., 2009). The other articles which involved field work were distributed as follows: 7 published by researchers from Latin American institutions, such as Peru (Murray & Sanchez-Choy, 2001), Colombia (Carrasquilla, 2001; Rojas, 2001), Paraguay (Rojasde-Arias, 2001), Argentina (Sosa-Estani and col., 2001), Ecuador (Breilh, 2007), Cuba (Diaz and col., 2009); 1 published by a researcher from Swedish institutions (Foller, 2001). The last article, although published in a Latin American public



Picture: All type Assessoria Editorial

health magazine, was not from researchers of the continent or on its country, as it involved cooperation among researchers from Kenya, Switzerland and Italy (Baumgartner and col., 2001).

Data from the survey performed in scientific journals specific to public health in Latin America reveals that words *ecohealth* and *ecosystem* have only been incorporated recently (the oldest articles dated back to 2000) and that in the majority of articles the ecosystem is not handled in a systemic way, but rather as a variable or a place for vectors (vector ecology), host, pathogenic agent, disease and intervention. We can affirm that scientific production that is expressed in the form of articles that considers ecosystems and human health interface is still small and restricted to this interface through the development of ecosystem approach in health. The Brazilian case calls for attention, since, although it concentrates a large part of its scientific production in its journals, with two special editions on the topic, the country lacks publications of field work studies that adopted this approach.

Thus, we can observe that, although ecosystem approach for human health is increasingly gaining space in the agenda of research oriented to environmental health problem solving, there are still few works developed and field work results. Regarding this matter, It is important to note that about a third of the identified articles using this approach (5 out of 14) are of theoretical-conceptual character, which may mean that we are still in a stage of formulation and dissemination of this approach and not of an elaboration resulting from an accumulation of works that involve field research. Also noteworthy is the fact that of the 14 articles, 12 directly involved the financing from the International Development

Research Centre (IDRC) from Canada, both for research and publication of their results in two special supplements of the *Reports in Public Health*. If, from one hand, this indicates a clear incentive from IDRC for research that adopts this focus, it also reveals some dependency on this financing agency.

Collecting several information

The majority of articles involved the collection of various information that can be classified into two large groups.

The first group deals with the main variables that were dealt with in such articles. In this group, we find at first the environmental, ecological or ecosystem-related variables, considering them: sources of natural resources. Also, modified landscape that deregulates the relationship between humans and the ecosystem and favors diseases. Moreover, a result of interactions between the several aspects that regulate ecosystems and cause or not the emergence of diseases, such as rain, humidity, temperature and global warming, El Niño, La Niña, etc. In addition to these, economic, social and cultural variables were found, besides diseases being the ecosystem context indicator, as well as on impacts for the reduction of diseases following interventions that involved from cultural and social aspects to those related to the context of the ecosystem.



Picture: Maria Pia Quiroga. PAHO/WHO collection

The second group deals with the main scales that were treated in the articles. In the closest level to individuals, we find approaches that dealt with the familiar/domestic/residential scale. From that point on, the considered scaled treated the topics of neighborhood, village, community, landscape, municipal district, region, country and even the global scale (mainly for climatic changes).

Regarding scales, it is important to observe that both EHA and EAH deal with those worked upon in the articles. Notwithstanding, EAH approach favors much more the interface between the domestic/residential and neighborhood/village/community/landscape levels, and thus, although they refer to other scales, the local ones prevail. However, as observed in the Millennium Ecosystem Assessment (MEA, 2005), a complete assessment of interactions between humans and ecosystems requires a multi-scaled approach, so that the analysis of exogenous forces of a given location or region enables the assessment of the differential impact of ecosystems changes on human welfare and health and indicate differentiated and combined responses in the various scales. Thus, although the fact that the analyzed studies are centered in the local scale is important, it still appears limited in the search of solutions to problems.

In the articles, of the eight attributes considered by EHA, just the effects on human health have been effectively considered, being specific diseases, such as Chagas disease, malaria, leishmaniasis and dengue have been the starting point in the majority of studies. To a lesser degree, the maintenance of ecosystems services, attribute which is emerging as a key criterion for the assessment of ecosystems health, was considered, although in a very limited way.

Ecosystems services is an attribute which refers to the functions that benefit human communities, such as support (soil formation and nutrients cycles and primary production), supply (food, drinking water, fuels, fibers, biochemical compounds and genetic resources), regulation (climate, water cycles and water purification, diseases, floods, droughts and soils degradation), and cultural (leisure and tourism, spiritual and religious value, educational, cultural heritage and place sensation). It is being considered in programs such as MEA and incorporated by the Pan American Health Organization and World Health



Picture: Maria Pia Quiroga. PAHO/WHO collection

Organization (PAHO, 2005) into key-attributes for the consideration of health and human welfare aspects.

According to the document *Ecosystems and Human Health: some results of the Millennium Ecosystem Assessment*:

The Millennium Ecosystem Assessment aims at assessing how the changes in the ecosystems services influence human welfare. It is believed that human welfare has multiple components. These include health, considered as feeling well and having a healthy surrounding physical environment, clean air and access to clean water; the minimum material for a good life, safe and adequate forms of living, sufficient food at any given moment, housing, clothing and access to products; social relationships, including social cohesion, mutual respect and helping others, especially children; safety, safe access to natural and other resources, and surveillance of natural or human-provoked disasters; finally, the freedom of choice and action, including the opportunity to achieve what an individual values how to be and do.

With reference to MEA (2005) and PAHO (2005) documents, we can conclude that the health, welfare and ecosystems services relationship is very complex and requires the collection of several information about ecosystems and the social, economic and cultural aspects humans are inserted in.

The 7 articles which involved field work of researchers from Latin American institutions (Murray & Sanchez-Choy, 2001; Carrasquilla, 2001; Rojas, 2001; Rojasde-Arias, 2001; Sosa-Estani and col., 2001; Breilh, 2007



Picture: Maria Pia Quiroga. PAHO/WHO collection

and Diaz and col., 2009) were able to gather a very diverse set of information and, although in a very general way, demonstrated the interfaces between goods and services of the various ecosystems and their interfaces with economic, social and cultural aspects. It is worth observing that, although these aspects are not exclusive to EAH, their approach favors a more contextual treatment. The most limiting aspect of these articles refers exactly to the fact that, in spite of quoting other scale levels or ecological dimensions, they have not handled them in an articulated way with the others, by concentrating on settings. Only 2 articles tried to establish the relationship of local problems with the global dynamics (Murray and Sanchez, 2001; Breilh, 2007).

Anyway, in order to proceed with the collection of various information and build indicators with an ecosystem approach, Freitas and col. (2007) argue

that there are still obstacles to be overcome in Latin American countries, both with respect to the quantity of available data and its quality, which limit the potential for the collection of various information, one of the presuppositions of integrated approaches such as ecosystem approaches. These obstacles are:

- 1) Little tradition and a restricted availability of environmental and ecosystems data, as compared to social or economic data (Jannuzzi, 2004; IBGE, 2008);
- 2) Data and measurements that are ideally specific to a given ecosystem present limitations in their extrapolation to other scales (bioregions and ecodistricts) and they do not usually fit in the political administrative limits of municipalities or states (Niemeijer, 2002);
- 3) The institutional fragility (absence of or precarious human, technical and financial resources) with a consequence of both inexistence or even discontinuance of ecosystems monitoring programs, as well as low quality of most of the available data.

Besides these obstacles stands a general issue, which is the difficulty of determining values or health status of ecosystems that have been taken as reference, since it involves many times subjective judgments over what should be considered “normal” or “acceptable”.

Formulating changes in institutions and policies

The second presupposition considers that an ecosystem approach necessarily involves the formulation of large public policies and more effective institutions for their implementation. The basic idea is that, once the problem is known through the collection of various information, this knowledge must be connected to what needs to be done with it. This involves formulating a series of policies or measures – legal, economic, financial, institutional and social interventions – which reduce or limit the direct and indirect impacts on ecosystems and which directly and indirectly affect health and human welfare (Freitas and col. 2007). This basic idea is found in the two threats approached in the present text, namely, EHA and EAH.

Of the 7 analyzed articles, 3 focused on the diagnosis of environmental problems, and did not propose institutional changes or even formulate public policies

oriented towards prevention and control of the problem. Another 3 articles linked diagnosis with proposals of institutional changes and formulation of public policies, and almost all of them focused on the residential/community scale, reaching at most the municipal scale. Even the articles that included the global scale (Murray and Sanchez, 2001; Breilh, 2007) did not progress in propositions regarding the need

for changes in the institutions that operate at regional or global scale (UNEP, PAHO, IBRD, World Bank, IMF, WTO, etc.) and whose decisions affect the local level, as well as in interventions for the reorientation of the global policy and economy (which are known to contribute towards the sharpening of poverty and generation of global problems, such as climatic changes and loss of biodiversity).

What are the policy implications of the threats that ecosystems change present to health?

Measures to ensure ecological sustainability would safeguard ecosystem services and therefore benefit health in the long-term.

Where a population is weighed down by disease related to poverty and lack of 'entitlement' — culturally or socially determined right of access to essential resources such as shelter, nutritious food or clean water — the provision of these resources should be the first priority for healthy public policy.

Where ill-health is caused, directly or indirectly, by excessive consumption of ecosystem services (such as food and energy) substantial reductions in consumption would have major health benefits while simultaneously reducing pressure on life-support systems.

Growing populations and growing economies are associated with higher consumption. This increases certain health risks, such as from over nutrition and physical inactivity, as well as increasing global pressures on ecosystems.

Implementing better transportation practices and systems could lead to decreased injuries, increased physical activity in sedentary populations leading to decreased obesity and cardiovascular disease, as well as reductions in local air pollution and greenhouse gas emissions.

Integrating national agriculture and food security policies with the economic, social and environmental goals of sustainable development could be achieved, in part, through ensuring that the environmental and social costs of production and consumption are more fully reflected in the price of food and water. Reduced consumption of animal products in rich countries would have benefits for human health and for ecosystems.

Cross-sectoral policies that promote ecologically sustainable development and address underlying driving forces will also be essential. Agenda 21 and the Rio Declaration on

Environment and Development describe a comprehensive approach to ecologically sustainable development incorporating cross-sectoral policies. Of specific relevance to health are the following strategies:

- Mitigation strategies that reduce drivers of ecosystem change while simultaneously improving human health.
- Adaptation strategies to reduce the effect of ecosystem disruption on health (addressing direct, mediated, and long-term health impacts).
- Integrated action for health, such as health impact assessment of major development projects, policies and programmes, and indicators for health and sustainable development.
- Inclusion of health in sustainable development planning efforts such as Agenda 21, in multilateral trade and environmental agreements and in Poverty Reduction Strategies.
- Improvement of intersectoral collaboration between different tiers of government, government departments and NGOs.
- International capacity-building initiatives, that assess health and environment linkages and use the knowledge gained to create more effective national and regional policy responses to environmental threats.
- Dissemination of knowledge and good practice on health gains from intersectoral policy.

The ongoing degradation of ecosystem services is a significant barrier to achieving the Millennium Development Goals. Ecologically unsustainable use of ecosystem services raises the potential for serious and irreversible ecological change. Ecosystem changes may occur on such a large scale as to have a catastrophic effect upon the economic, social and political processes upon which social stability, human wellbeing and good health are dependent. This suggests that a precautionary approach to environmental protection is most likely to protect and enhance health. Unavoidable uncertainties about the impacts of global environmental changes on public health should not be an excuse for delaying policy decisions.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)

Involving public participation in the management

As already pointed out, the participation of the public, particularly local communities, in the management of ecosystem approach is considered an essential element. In EHA, participation of the public, although considered important, is not developed as an integrating element of its methodology. The researcher is the main formulator of hypotheses and analyst of results. On the contrary, in EAH, participation is considered an integrating element. The researcher attempts to involve the various stakeholders in the formulation of hypotheses and analyses of results, based on the perspective of involving social and collaborative learning processes between specialists and local social stakeholders which lead to the adaptive management of problems.

Among the 7 articles published by researchers from Latin American institutions, the majority involved the direct participation of the public or the local community in the research. In more than half of them, participation predominantly occurred during the development of tailor-made and local prevention strategies, focused on education and with the participation of the community taking place during the elaboration of educational materials and the production and distribution of mosquito nets for the prevention of malaria.

In other 3 articles of this universe (Murray and col., 2001; Breilh, 2007; and Diaz and col., 2009), the participation of community members emerges as inherent to the adopted methodology, involving community members such as active stakeholders as from data collection. In these articles, the large participation, as from the early stages and which is closer to EAH, was the basis for the promotion of an extensive dialogue between community members and started the building process of an environment where the community can, in Murray and col. (2001) and Diaz and col. (2009) studies, organize and plan an action plan for the future resolution of problems, which is the expected next stage in Breilh (2007) study.

Thus, although participation of the public is crucial in the implementation of ecosystem approach, it is not yet an effective practice in the majority of studies which still tend to consider participation restricted to education programs for the change in habits and attitudes. In addition, we should consider that it is very complex for two reasons. First, the involvement of both a large diversity and conflicting values. Second, it occurs in poverty and social inequality contexts which characterize several locations of Latin American countries, where survival issues prevail on issues related to the improvement of environmental quality or even ecosystems integrity (Freitas and col., 2007).

Ecosystems services and human health

FRESH WATER

Freshwater is a key resource for human health; it is used for growing food, drinking, washing, cooking and for the dilution and recycling of wastes. Globally, the amount of water available per person has decreased from 16 800 m³/person/year in 1950 to 6800 m³/person/year in 2000. One third of the world's population lives in countries experiencing moderate to high water stress, and this fraction is increasing as population and per capita water demand grow. The main consequences are negative impacts on food production, disease transmission and economic development

Over 1 billion people lack access to safe water supplies, while 2.6 billion people lack adequate sanitation. This has led to widespread microbial contamination of drinking water. Water-associated infectious diseases claim up to 3.2M lives each year, approximately 6% of all deaths globally. The

burden of disease from inadequate water, sanitation, and hygiene totals 1.8 million deaths and the loss of greater than 75 million healthy life years. It is well established that investments in safe drinking water and improved sanitation show a close correspondence with improvement in human health and economic productivity. Each person needs 20 to 50 liters of water free of harmful chemical and microbial contaminants each day for drinking and hygiene. There remain substantial challenges to providing this basic service to large segments of the human population.

FOOD

In poor countries, especially in rural areas, the health of human populations is highly dependent upon the services of local productive ecosystems for food. Aggregate food production is currently sufficient to meet the needs of all, yet of the present world population of just over 6 billion, about 800 million are underfed with protein and or energy,

while a similar number are overfed. At least an additional billion people experience chronic micronutrient deficiency. In richer urban communities human dependence on ecosystems for nourishment is less apparent, but ultimately no less fundamental.

The nutritional imbalance between rich and poor has been driven primarily by social factors, though ecological factors may play an increasingly important role in the future.

Food production has not kept pace with population increase in many countries. Under-nutrition is strongly related to poverty and among the poorest countries, about a quarter of the burden of disease is related to childhood and maternal under-nutrition. Worldwide, under-nutrition accounts for nearly 10% of the burden of disease. In the richest countries, diet-related risks (mainly over-nutrition) in combination with physical inactivity accounts for about a quarter of the burden of disease.

Despite causing local resource depletion, gains in the total supply of food (as well as water, timber and other provisioning services) have often been achieved by expanding production into new regions. These options now have largely been exhausted. Providing sufficient food for an expected human population of 8-9 billion people will require investments in poverty alleviation or a profound redistribution of resources. There are important tradeoffs that have to be made between various possible uses of productive land. Including population health considerations in this weighing up of choices could have important policy implications.

TIMBER, FIBERS, FUEL

The generation of power causes a range of health impacts. Outdoor air pollution aggravates heart and lung disease. Indoor air pollution, most typically from the combustion of biofuel in poorly ventilated heating and cooking environments causes a major burden of respiratory diseases amongst adults and children. About 3% of the global burden of disease has been attributed to indoor air pollution from this source. In areas where the demand for wood has surpassed local supply, and where people cannot afford other forms of power, there is increased vulnerability to illness and malnutrition from consuming microbiologically-contaminated water, from exposure to cold, and from a lack of properly cooked food. Poor women and children in rural communities are often the most affected by wood fuel scarcity. Many must walk long distances searching and carrying firewood (and often, water) and therefore have less time and energy for tending crops, cooking meals or attending school. For these reasons, adequate energy supplies are fundamental for sustainable development.

BIOLOGICAL PRODUCTS

Billions of people around the world depend partly or fully on products collected from ecosystems for medicinal purposes. Even when synthetic medicines (which

themselves often originated from natural sources) are available, the need and demand for wild products persists. Some of the better-known pharmaceuticals from natural sources include aspirin, digitalis and quinine.

NUTRIENT AND WASTE MANAGEMENT, PROCESSING AND DETOXIFICATION

Any reduction in nutrient levels can impair soil fertility resulting in reduced crop production, which in turn negatively affects the nutritional status of households. Deficiencies in diet (both macro-and micro-nutrients) have been demonstrated to harm children's physical and mental growth. Therefore, this can impair the livelihoods of farmers and also limit the options open to their children. Humans are also at risk from the consequences of eutrophication (such as algal blooms).

Humans are at risk from inorganic chemicals and from persistent organic pollutants in food and water. This can occur both when attempts to access water resources leads to contamination from natural sources (as occurred with arsenic contamination of water in tubewells in Bangladesh), and where human actions result in release of toxic chemicals into the environment (for example through use of pesticides). Toxic chemicals

can cause a variety of adverse health effects in various organ systems. Some chemicals present in industrial effluent or used as pesticides, such as PCBs, dioxins and DDT, may act at low exposure levels as "endocrine disruptors" which interfere with normal human physiology, undermining disease resistance and reproduction.

REGULATION OF INFECTIOUS DISEASES

The magnitude and direction of altered infectious disease incidence due to ecosystem changes depend on the particular ecosystems, type of land use change, diseasespecific transmission dynamics, and the susceptibility of human populations. Anthropogenic drivers that especially affect infectious disease risk include: destruction or encroachment into wildlife habitat, particularly through logging and road building; changes in the distribution and availability of surface waters, e.g., through dam construction, irrigation and stream diversion; agricultural land use changes, including proliferation of both livestock and crops; deposition of chemical pollutants, including nutrients, fertilizers and pesticides; uncontrolled urbanization or urban sprawl; climate variability and change; migration and international travel/trade; and either accidental or intentional human introduction of pathogens.

CULTURAL, SPIRITUAL AND RECREATIONAL SERVICES FROM ECOSYSTEMS,

Cultural services may be less tangible than material services, but are nonetheless highly valued by people in all societies. People obtain diverse non-material benefits

from ecosystems. They include recreational facilities and tourism, aesthetic appreciation, inspiration, a sense of place and educational value. There are traditional practices linked to ecosystem services that have an important role in developing social capital and enhancing social well being.

CLIMATIC REGULATION

Each of the ecological services referred to in the previous sections is sensitive to climate, and will therefore be affected by anthropogenic climate change. Although climate change will have some beneficial effects on human health, most effects are expected to be negative. Direct effects such as increased mortality from heat waves are most readily predicted, but indirect effects are likely to have a greater overall impact. Human health is likely to be impacted indirectly by climate-induced changes in the Ecosystems and Human Health distribution of productive ecosystems, and the availability of food, water and energy supplies. These changes will in turn affect the distribution of infectious diseases, nutritional status and patterns of human settlement.

Extreme weather events, including floods, storms and droughts, and sea level rise are expected to increase as a result of climate change. These have local and sometimes regional effects, both directly through deaths and injuries, and indirectly through economic disruption, infrastructure damage and population displacement. This can in turn lead to increases in communicable diseases resulting from crowding, lack of clean water and lack of shelter, poor nutritional status, and adverse effects on mental health.

Globally, the annual absolute number of people killed, injured or made homeless by natural disasters is increasing. An important reason for this is increasing settlement on coasts and floodplains that are exposed to extreme events. Case studies at the local scale have shown that environmental degradation has reduced the capacity of ecosystems to buffer against climate extremes, for example reductions in the capacity of coral reefs and mangroves to stabilise coastlines and limit the damaging effect of storm surges. In many areas the only land available to poor communities has little natural defence against weather extremes.

Source: "Ecosistemas y bienestar humano: Síntesis de la salud Un informe de la Evaluación de los Ecosistemas del Milenio (EM)" (Corvalan et al, OMS 2005)



Picture: Maria Pia Quiroga. PAHO/WHO collection



Picture: Maria Pia Quiroga. PAHO/WHO collection

Ecosystem approach to health – summary of the Manaus *workshop* presentations

The workshop was held as part of the project ‘Ecosystem approach for the development of indicators and environmental sustainability and health scenarios in the city of Manaus – 2020’². The event was coordinated by Fiocruz and ENSP and counted on the support of PAHO/WHO Representative Office in Brazil.

In the first day, all the morning part was devoted to the opening ceremony and three presentations that focused on environmental and health issues. These may be addressed with ecosystem approach in health and the theoretical and conceptual aspects, which are: *Ecosystems and health*; *Perspectives for the ecosystem approach in Brazil*; and *Theoretical and methodological basis for the ecosystem approach*. The afternoon part of that same day and the morning part of the second day were dedicated to the panels

with the presentation of some ongoing projects in the Amazon Region or projects that adopted approaches which were aligned with Ecosystem approach in health, with their summary occurring immediately after the synopsis of the morning presentations of the first day.

Ecosystems and health

Carlos Corvalan, OPS/OMS

The presentation demonstrated how various diseases have a high environmental attribution which results in an environmental burden of diseases that have as “causes of causes” the global environmental changes (urbanization, use of energy, etc.) which alter ecosystems and their services, such as quality water or food supply and global and regional climate regulation. Such changes, combined with social and economic inequalities generating inequities, result in an environmental burden of diseases which disproportionately affects the poorer populations, mainly those living in the poorest countries.

² This project is financed in the context of the call for tender “Healthy Cities: Health, Environment and Development”, by the Vice-Presidency for Environment, Health Surveillance and Promotion of Fiocruz, Ministry of Health.



Slums – Rio de Janeiro
Picture: Maria Pia Quiroga. PAHO/WHO collection

Theoretical and methodological basis for the ecosystem approach

Brani Rosemberg, Fiocruz

The presentation starts with the fundamental hypothesis of this approach, which is that community health requires acting on its social, ecological, and economic determinants through a participative management of the ecosystem based on a holistic focus of health. The mission to promote healthy community, through an appropriate management of its ecosystems, is based on research and strengthening of local abilities for the production of knowledge with a view to understanding in order to perform. The premises of this hypothesis and mission would be based on the understanding of ecosystems structures on which the population depends for its subsistence, since it considers that healthy communities are found in healthy ecosystems. This leads the approach to propose: 1) the identification of an interactive set of ecological and social factors that influence human health (diagnoses); 2) the acknowledgement of social, environmental and economic factors; 3) the search for convergence in integrated responses to problems; 4) the implementation of research and intervention (research-action); 5) the strengthening of articulation between research and public policies; 6) the dissemination of experiences, exchange and “trainings”. With these bases taken as reference, the IDRC project in partnership with the VPSRA of

Fiocruz (2005-07) “*International Training Program on Ecosystem Approaches for Environmental Pollution Assessment and Management*” was presented.

Perspectives for the ecosystem approach research in Brazil

Josino Moreira, Fiocruz

The presentation started with the existing reductionism in the disciplinary approaches which end up removing the study object from their context through their classic hierarchy of nature’s organizational levels and not approaching the complex systems and their emerging properties. In this setting, the ecosystem approach to health, which is based on an integrated management for the sustainability and improvement of community health and welfare, presents a great potential for overcoming this reductionism. This is because it tries to assess the social and ecological interactions in the analyses of health determinants, understood from a systemic perspective as part of a complex socio-ecological context in the temporal and spatial scales, in response to health problems. Three essential elements of this approach have been pointed out:

- 1) The production of transdisciplinary knowledge, and which incorporate scientific and non-scientific knowledge, through the involvement of a collaboration between researchers from various disciplines and academic and non-academic groups that are interested in the problems that are under investigation;
- 2) The fact that it is an action-oriented approach, where the problems to be studied emerge through consultation and interaction among the involved parties (academic and non-academic) and that its solutions are for social, practical, effective and sustainable use;
- 3) It is reflexive by involving a proposal to operate in a continuous flow among the generation of knowledge and its applications in a process that enables the dissolution of groups and the establishment of new groups during the process.

Next, it presented a summary of Fiocruz experience in the induction of transdisciplinary projects in health and environment. It concluded by observing the importance of the Amazon Region and the perspectives in the ecosystem approaches to health, considering some regional characteristics, such as: the elevated dynamics of alterations (deforestation,

etc.) and their effects on climate and biota; the socio-cultural and biological diversity (plants and animals); the importance of hydrology; power generation: hydroelectric and thermoelectric power plants; agriculture and livestock (use of fertilizers, alteration in the normal cycles of C, N and water, etc.) and the use of agrotoxics; the importance of mineralogy.

Integrated and participative mapping of socio-environmental dynamics of Rio Pardo's Settlement

Sergio Luiz Bessa Luz (Leônidas and Maria Deane Institute – Amazonian Fiocruz)³

This project emphasizes the application of Ecosystem Approach to Health for the study of two groups of diseases: i) caused by microorganisms transmitted by water and food (bacteria, viruses and parasites) and ii) arboviruses (vector-transmitted viruses). The central hypothesis is that the transmission of these pathogens is not homogeneous in the community: different combinations of social and ecological factors configure differential risk situations. The comparative analyses investigates the dynamics of pathogenic agents circulation in various landscape units (forest, countryside, small towns), in residential geographical groupings (railroads, vicinal roads) or in different human groups (defined according to age, gender, economic activities, forms of water use, etc.). The acknowledgment of the system's complexity and inherent uncertainties require transdisciplinary and participative strategies for the resolution of environmental and health problems. The basic design of the survey attempts to understand these dynamics from the observation of three different pilot-situations, chosen in view of their differentiated positions in a socio-ecological gradient: 1- areas with a low anthropization degree; 2- areas with a moderate anthropization degree; and 3- areas with a high anthropization degree.

The work setting was area 1 described above, in Rio Pardo's rural Settlement, Presidente Figueiredo (AM), located at 200 km from Manaus, with approximately 160 homes and a population of 700 people, and the option for this area was due to social, ecological and



Floods located in the Amazon Region
Picture: Ana Fischer. SUS/MS

structural and political nature factors – it is located in a colonization area that is recent and with little modifications.

The general objective was to implant a participative process integrated mapping of the socio-environmental characteristics and dynamics and the incidence profile of arbovirose and waterborne diseases in a low anthropization area in the Central Amazon region. The specific objectives were:

- 1) To encourage the collective construction of the area's socio-environmental history;
- 2) To perform a survey of arboviruses vectors communities, by determining the natural infection rates in the most abundant vectors;
- 3) To perform a quality assessment of supply waters and *igarapés* (including a survey of bacterial, viral and parasitic pathogenic agents) using an integrated and participative methodology;
- 4) To define the incidence profile of acute diarrheal diseases (bacterial, viral and parasitic etiology) and arboviruses (*Alphavirus*, *Flavivirus* e *Bunyavirus*) and determine the main environmental and social factors that are the modulators of the epidemiological risk;
- 5) To develop, test and improve an integrated and participative methodological proposal to be applied in the subsequent stages of the project.

Of the five specific objectives, we concluded the first one with the participative video documentary VOICES OF THE RIO PARDO, where a group of inhabitants constructed the narrative of the settlement's history using audiovisual resources. Objectives 2, 3 and 4 can be considered in the set of measures that were discussed with the Settlers, since mosquito capture

³ Presentation resulting from the project "Integrated and participative mapping of socio-environmental dynamics of Rio Pardo's Settlement", financed by the covenant IDRC/Fiocruz, with the participation of Daniel Buss (IOC-Fiocruz), Ricardo Agum (CPqL&MD-Fiocruz), Fernando Abad-Franch (CPqL&MD-Fiocruz) and Sérgio Luz (CPqL&MD-Fiocruz).



Source: http://www.pbase.com/lucianoeh/holambra_2006&page=8

points, as well as samples for water analysis have been collected in workshops and focal groups that aimed at discussing these topics by taking into account age, gender, economic activities and residence setting. The results from the water analysis and parasites were discussed with the population, allowing them to own the information, and also as an opportunity to meet the group being studied.

We can conclude that the first studies indicated that the local problem may be perceived with greater clarity when their view is considered. Work became swifter regarding the Settlers understanding of our work, as well as the visualization of the possibility of solving local problems through partnerships. We consider that work is in its establishment stage and that the improvement of information channels aims at full participation of local agents.

Ecosystem approach to health: a perspective for the control of schistosomiasis transmission

Marisa da Silveira Soares (Instituto Oswaldo Cruz – Fiocruz)⁴

Schistosomiasis is a public health problem which persists in Brazil, mainly due to the difficulty in the control of transmission. The main contributing factors to this situation are: precarious sanitation; vast distribution of intermediary hosts, favored by dams, irrigation, etc.; parasite dissemination due to migrations and tourism; socio-ecological precariousness of urban suburbs; competition with endemic diseases for scarce resources; diagnosis and

population's adherence problems in low endemic situations; social representations disregard for control; health education errors; pessimism due to previous experiences and the disbelief in public power; conflicts of interests and dialogue difficulties between population, scientists, managers, etc.

Acting in various combinations, these and other factors usually characterize complex situations, full of uncertainties and conflicts, which make decisions difficult for the control of schistosomiasis. The current recommendations for this confrontation, although guided by the idea of multiple perspectives and various aspects under consideration, are based only on the biomedical paradigm which is insufficient to deal with the complexity of the health-disease processes. Scientific works that assume the complexity perspective are rare.

Considering that this biomedical paradigm insufficiency contributes towards the persistence of schistosomiasis in Brazil and rethinking the alternatives of understanding and intervention models for the control of the transmission of this endemic disease, the “Ecosystem Approach to Health” offers a promising perspective.

With this perception in mind, a case study was performed at the Tourist Ranch of Holambra (SP), of the Grande Campinas municipality, of around eight thousand inhabitants, with its main economic activity being agribusiness focused on floriculture. The choice had, among other reasons, the presence of autoctonous cases, which are imported and mainly questionable, the large number of immigrants from endemic areas, the existence of official data that indicates a 100% coverage of PSF(health family program) and sewage treatment, the virtual presence of “political will” in the municipality and state, besides the large distribution of shellfishes that are intermediary hosts of the *Schistosoma mansoni* due to hydric collections networks that serve agribusiness. The initial studies aimed at the analysis of the context where schistosomiasis occurs in Holambra (SP) and the identification of stakeholders and conditions for the establishment of a Peer Extended Community (PEC), gathering researchers, technicians, population's volunteers, representatives from the municipal and state sectors, from the economic, political, Civil Society sectors, etc. Documental research, direct observation, interviews, focal groups, serum, epidemiological, malacological and parasitological inquiries and water

⁴ Presentation resulting from the project bearing the same title, with participants: Marisa da Silveira Soares, César L. P. A. Coelho da Silva, Magali G. Muniz Barreto and Denise A. Borges, from the Environmental Health Promotion Assessment Laboratory (IOC – Fiocruz); Célia Maria Thomé, from the Health Department (Holambra, SP); Rita Silva, from the Adolfo Lutz Institute; Marcelo F. de Souza Porto (CESTEH – ENSP – Fiocruz).

analysis were carried out. At the conclusion of this stage, Workshops were held in order to analyze the case and start a quality assessment process of PEC results.

Results showed a great exposure potential of the population to schistosomiasis vectors through health, ecological, social, economical, cultural factors, etc. On the other hand, there was evidence of intense contamination of water resources by agrotoxics, which represents an obstacle for the transmission of this endemic disease. It is worth pointing out that such chemical pollution represents serious risks to environmental and human health. Other relevant findings were:

- 1) Inequality in the access to the SUS and schistosomiasis control by various groups of workers;
- 2) Intense turnover of workers and population mobility, with diverse courses, which usually include endemic areas and involve aspects that are difficult to predict, also related to the Brazilian development model;
- 3) Difficulty to include in the PEC the interests of individuals that are without access to or visibility for the SUS;
- 4) Shortage of “social capital”;
- 5) Difficulty to establish a PEC during election years.

Ecosystem approach for the development of environmental and health sustainability indicators and scenarios in the city of Manaus/AM – 2020

Carlos Machado de Freitas (National School of Public Health ENSP-Fiocruz)⁵

The project's theoretical and methodological background are studies of scenarios performed in environmental area, still incipient in the health area and with a general objective of developing an ecosystem approach for the development of environmental and health sustainability indicators and scenarios for the municipal level. The specific objectives are:

- 1) To offer subsidies for the building of environmental and health sustainability indicators from an ecosystem perspective that enables the identification of current conditions and trends through the collection of information that is municipality-based and of easy access to researchers and the general public;
- 2) To offer subsidies for the building of indicators for the monitoring of ecosystems changes consequences for human health, also through the collection of information that is municipality-based and of easy access to researchers and the general public;
- 3) To build scenarios considering plausible changes in the primary and secondary driving forces and identify the consequences for ecosystems, their services and human health welfare through the analysis of conditions and trends, as well as interviews and focal groups with key-stakeholders of the health and environment areas;
- 4) From the analysis of conditions, trends and scenarios prepare propositions for responses to environmental and health sustainability considering a set of policies and measures – legal, economic, financial, institutional, social or cognitive interventions – that have an impact on the current status and functioning of ecosystems, involving a municipal planning which affects direct and indirect driving forces and human welfare.

Biological monitoring and public participation in the management of watershed RIVER basins

Daniel Forsin Buss (Oswaldo Cruz Institute – Fiocruz)⁶

The objectives of this work were the standardization of biomonitoring methods, the popularization of science and the public involvement in the management of water resources through information produced by biological monitoring.

It was based on Law 9.433/97 that deals with decentralized management and the incentive for public participation in the management processes of water resources, as well as Decree 2.519/98 where Brazil

⁵ Presentation resulting from a project with the same name, financed in the context of the call for tender “Healthy Cities: Health, Environment and Development”, of the Vice-Presidency for Environment, Health Surveillance and Promotion of Fiocruz, Ministry of Health, with participants Leandro Luiz Giatti, Antonio Levino da Silva Neto, Marcilio Sandro Medeiros, Mircia Betânia Costa e Silva and Maria Bernadete Ribeiro Chagas from ILMD – Fiocruz; Carlos Machado de Freitas, Marcelo Firpo de Souza Porto, Paulo Chagastelles Sabroza and André Sobral from ENSP – Fiocruz.

⁶ Presentation resulting from the “Water Agent Program – participative monitoring for the environmental quality assessment of rivers from the Paraná 3 Hydrographic Basin” with participants of the research group Daniel F. Buss, Caroline Cichoski, Michelli Ferronato and Simone F. Benassi, being executed by the Environmental Health Assessment and Promotion Laboratory (IOC – Fiocruz).

undertakes commitments related to the Convention on Biological Diversity.

Internationally accepted indicators should be developed for the biological monitoring, given the several aspects of managing water resources for social stakeholders, so that their results would be understood and related to other areas. Such principle oriented the development of river water quality bioindicators techniques in the *Rapid Bioassessment Protocols*.

The project involved simultaneously a participative monitoring program which arose from various difficulties: the community in getting access to information and participation; public power in having efficient tools for the environmental assessment; research institutions in coming close to the public that is the subject of their research.

The combination resulted in the development of an assessment process of the possible taxonomic level for the identification of volunteers, through a course for students and professors which qualified *Water Agents* in the following locations: 1) RJ: Guapimirim, Paracambi, Eng. Paulo de Frontin, Nova Friburgo, Rio de Janeiro; 2) ES: Domingos Martins, Santa Maria de Jetibá; 3) PR: Xaxim and Sabiá Rivers communities (municipalities of Matelândia, Medianeira and Céu Azul); Toledo and Lopeí Rivers (municipality of Toledo). This process resulted in the legalization and establishment of networks and contributed towards the resolution of environmental problems in the settings where they were detected.



The Caruso Project. Picture: Jean Remy

The Caruso Project: Mercury contamination in the Brazilian Amazon Region

Jean Remy Daveé Guimarães (Biophysics Institute of the Federal University of Rio de Janeiro)⁷

The project started in 1994 and involved various communities living along the Tapajos River, with Phase I being from S. Luís do Tapajos to Santarém, Phase 2 being from Brasília Legal to Cametá and Phase 3 being from S. Luís do Tapajos to Aveiro. Over time, this long-term study was organized as follows: 1) 1994: preliminary study to determine the spatial and temporal characteristics of the ecosystem; 2) 1994-1996: identification of the origin, distribution, transmission, human exposure and effects on health; 3) 1998-2000: search for solutions with the community, for the short-term (fish consumption practice); for the medium-term (Hg incorporation into fish – methylation); for the long-term (agroforestral systems); 2000: reassessment of exposure and health; 5) 2003-2005: study's regionalization in 13 communities over 300 km of the Tapajos River (Hg, food, Hg and MeHg in food chains); 6) 2005-2008: Hg and sight, Hg x cardiovascular functions, selenium as modulator of Hg effect; social communication networks.

The intervention involved: 1) Workshop in the community (women, fishermen, farmers, local authorities) in order to discuss the results; 2) campaign at school and at the village: *eat more fish that does not eat other fish*, distribution of posters with Hg levels of local species; 3) work with a group of 30 women from the community in order to analyze food habits and their temporal variation; this activity lasted 12 months and was coordinated by the community's midwife.

After the intervention, the population health assessment noted, with reference to mobility a 10% improvement in manual dexterity and the alternating movements test (Branches Test). In 1995, 64% displayed disorderly movements as against 32% in 2000. However, high levels of Hg remain associated with visual dysfunctions of the population. The next steps will involve projects

⁷ Presentation resulting from the Caruso Project 1994-2006, financed by the International Development Research Centre (IDRC – Canadá), involving the academic institutions of Université du Québec à Montréal (UQAM), the Federal University of Pará State (UFPA) and the Federal University do Rio de Janeiro State (UFRJ), with participating coordinators Marc Lucotte, Donna Mergler, Robert Davidson, Jean RD Guimarães, Maria da Graça P. Sablayrolles, Marúcia Amorim, Frederic Mertens, Johanne Saint Charles, Carlos José S. Passos and Delaine Sampaio.

with local social stakeholders for an agroforestry management which minimizes soil erosion and the lixiviation of Hg and brings economically viable alternatives to slash-and-burn agriculture (PLUPH project); inclusion and deepening of new knowledge about the effect of fruit consumption and the planning of agricultural and food practices; Se x Hg assessment, effects on vision; cardiovascular effects; assessment of Pb in the blood (flour houses); biogeochemical analysis of Hg in the environment and food chain, relationship between soil Hg and water Hg.

Despite progress made, much remains to be done to obtain conclusive results.

The “Manuelzão” Project – Health, environment and citizenship – Rio das Velhas Basin

Marcus Vinícius Polignano (Medicine Faculty – UFMG)⁸

The Manuelzão Project/UFMG⁹ has been developing an ecosystem approach for the last 12 years, with the study unit being the hydrographic basin of the Rio das Velhas (Minas Gerais State – Brazil). The basin is formed by the set of tributaries spread over 51 municipalities that drain their waters into the main channel. About 4,800,000 people and millions of other beings of the biodiversity live in it.

The Manuelzão Project was idealized in 1997 by professors of the Faculty of Medicine rural residency UFMG, with the following premises: health is not basically a medical problem, but the result of the quality of life and environment; the “health assistance” model has a much greater commitment with the disease industry than with health promotion; the entrance door to a true health system must be health promotion – improvement of the quality of life and environment; the anthropocentric actions are causing environmental unbalances and compromising the existence of biodiversity, including the human being; it is necessary to build a new man-nature relationship centered on biocentrism – basic condition for the provision of support to life and collective health; the building of health-environment relationship enables the incorporation of a systemic vision into



The Manuelzão Project. Rio das Velhas. Picture: Clarissa Dantas

health policies management with a view to seeking intersectoriality and interdisciplinarity.

The ecosystem approach to health presents new possibilities for the understanding and analysis of environmental issues and a new focus for the notion of health beyond the biomedical paradigm. The advantage of this focus, which is the basis for the elaboration of adaptive models for health and sustainability, is that its premise consider that a sustainable society should maintain itself in the context of a greater ecological system which it is part of.

This approach enables the perception of the health-environment relationship in a more systemic way, and such is the focus of the Manuelzão project in the Rio das Velhas basin, since it represents a socio-environmental unit for diagnosis, planning, organization, action and assessment of results. The basin allows the integration among nature and history, environment and social relationships, delimiting an area and enabling a social system to be referenced in the biodiversity of the basin's water bodies. Upon making this movement, we understand that man cannot be deprived from his socio-environmental relationships and that the “health” sector cannot deprive man from his cultural



Rio das Velhas. Picture: The Manuelzão Project.

⁸ Presentation resulting from the Manuelzão Project, coordinated by Marcus Vinícius Polignano, Apolo Heringer Lisboa and Thomaz da Mata Machado (Faculty of Medicine – UFMG)

⁹ <http://www.manuelzao.ufmg.br>

relationships with nature. The discussion regarding the integrity of the health issue, which is understood not under the welfare view but rather the humanist and planetary view, is introduced in the agenda. Human beings depends on complex environmental relationships in order to live and have health and, at the same time, he interferes in the socio-environmental context by causing important impacts to his own life and that of the remaining existing species in the planet.

According to Lisboa¹⁰, *“the topical axis: ‘health, environment and citizenship’ gives room for the questioning of the hegemonic concept of considering health a product of industry and care services for patients. This ideological hegemony of the “disease industry” is perpetuating an excluding social model which is incompatible with collective health and associated with the high profitability of the most morbid sectors of economy. Health is correlated with quality of life and quality of life with environment and the character of social relationships”*.

Also according to Lisboa, *“the anthropic paradigm of dominance over nature ignored two issues: that nature associates the human being to the remaining fauna and flora; and that current social relationships exclude the vast majority of human beings from social and technical-scientific conquests and revokes their citizenship and right to health. In these relationships,*

money confers citizenship. This paradigm entered into an acute antagonistic confrontation with environment and society and is threatening the life of current and future generations. Diseases are also signs and symptoms of a paradigmatic crisis. Health stock in this society is far below what is acceptable”.

Health as a positive affirmation – and not merely as the denial of disease – must be seen as the maximum expression of quality of life and environment. Health socio-environmental determination paradigm leads to a new proposal for the registration of health as a field of knowledge in the interdisciplinary order and a social practice in the intersectorial order.

The great challenge of an ecosystem approach project is to define a specific common objective which should be simple and, at the same time, be able to respond to the complexity of the approach. In the case of the Manuelzão Project, the objective defined was the fish returning to the river. This is the biological indicator. Fish returning to the river means: sewages are being treated; garbage is having an adequate destination; soil occupation and use laws are being obeyed; cities are taking better care of water management; people are healthier; civilization would have received a better education and learned to be supportive with Planet Earth and the future of new generations.

To make its objectives viable, the project established a transdisciplinary team which produces a set of actions, and they are: social mobilization with the creation of Manuelzão nucleuses that involve civil society, the private initiative and public power; environmental education in schools and basin communities; research related to biomonitoring, health and environment and others; incentive to healthy public policies; communication (newspaper editing, site, scientific publications, maps production, textbooks); cultural and scientific river expeditions; institutional participation in the basin Committees of Rio das Velhas and São Francisco; cultural action (Festivalhas).

In a general assessment, it is affirmed that the project has contributed towards the discussion and implementation of public policies in the Rio das Velhas basin context with a view to consolidating healthy and sustainable environments for the human being and biodiversity, thus reverting the basin's degradation process and interfering with the civilizatory mentality which generated it.



Sanitation in an indigenous area. Picture: Leandro Giatti.

10 Lisboa, A.H. Concepção do Projeto Manuelzão. In: Projeto MANUELZÃO/UFMG. Conceitos para uma prática de saúde e cidadania. Belo Horizonte: UFMG, 2001.

Research-action development in an indigenous community for the reading of the ecosystem approach – Leandro Luiz Giatti (Leônidas and Maria Deane Institute – Amazonian Fiocruz)¹¹

The seat of the District of Iauaretê, with a multi-ethnic population of 2,706 inhabitants distributed over ten villages, is the second largest human concentration complex of the Municipality of São Gabriel da Cachoeira. It is located northwest of the Amazonas State and stands out in terms of urbanization in indigenous land, a process motivated by the offer of healthcare, education and employment.

Population growth, indigenous health practices and the precariousness of basic sanitation form a peculiar and relevant situation in public health.

Focused on the need for improvement in health and healthy habits, this research aimed at building knowledge by involving local and scientific knowledge, as well as involving the local population and government instances for the implementation of basic sanitation.

The method used was research-action, which started in 2005 with meetings in the participating villages and the application of participative activities for the diagnosis of problems and proposition of solutions. To this end, talking maps, panels with pictures taken by the indigenous people, interviews, lectures and debates, involving 300 people were applied¹². Water, soil and intestinal parasite analyses were performed as a study of the local health conditions. Starting in 2007 and based on a synopsis report produced, a social mobilization course was offered to 30 residents aiming at the appropriation of products and articulation of the students with the decision-making process.

It was noticed that 89.2% of the available water sources were contaminated, that high prevalence of intestinal parasitosis (69.3%) occurred and that some parasitarian



Indigenous community. Picture: Leandro Giatti.

form was found in 57% of soil samples – cysts, eggs or larvae; besides, irregular deposits of solid residues of that place were also located and characterized. The results of health conditions and local environmental health indicators studies were discussed with the participation of the community and thus promoted means for residents to get a hold of the information. Although the knowledge about transmission of diseases such as malaria, diarrhea and worms infections and about the cause-effect relationship of damages regarding the inexistence of sanitation has been verified, this knowledge was resignified in the indigenous culture, and a mythical background prevailed in it¹³. The adopted participative tools enabled local inhabitants to perform educational interventions with the process of discussion about local health problems.

Some political and institutional organization and concern about the solution of the problem was also noted. In this context, the organization of a course for 30 local residents made technical information accessible which is subject to subsidize a militancy in favor of the right to a healthy environment. A regular waste collection process started and the participation of indigenous people in the discussions about water supply being constructed by the public power took place during the research. Participants of the project contributed towards local discussions of the municipal directive plan, with a focus on basic sanitation.

The developed research-action method was considered compatible with premises of the ecosystem approach and sufficiently adequate for the facing of the local problem for being established based on an interdisciplinary study, thus enabling the involvement of indigenous people and the dialogue and involvement of governmental spheres later on.

11 Presentation resulting from the project "Research-action in the District of Iauaretê of São Gabriel da Cachoeira: Proposal for the improvement of health and habits", financed by the National Health Foundation, with participants Aristides Almeida Rocha (Public Health Faculty – USP), Maria Cecília Focesi Pelicioni (Public Health Faculty – USP), Leandro Luiz Giatti (CPQL&MD – Fiocruz); Leonardo Rios (Engineering School of Piracicaba – EEP), Luciana Pranzetti Barreira (Public Health Faculty – USP), Luciane Viero Mutti (Technology Education Center of the Amazonas State – CETAM), Renata Ferraz de Toledo (Public Health Faculty – USP), Silvana Audrá Cutolo (Public Health Faculty – USP), Geraldo Juncal Junior (Technical Support Group – GTA).

12 Toledo RF, Pelicioni MCF, Giatti LL, Barreira LP, Cutolo AS, Mutti LV, Rocha AA, Rios L. Comunidade indígena na Amazônia: metodologia da pesquisa-ação em educação ambiental. *O Mundo da Saúde* 2006; 30(4): 559-569.

13 Giatti LL, Rocha AA, Toledo RF, Barreira LP, Rios L, Pelicioni MCF, Mutti LV, Cutolo SA. Condições sanitárias e socioambientais em Iauaretê, área indígena em São Gabriel da Cachoeira/AM. *Ciência & Saúde Coletiva* 12 (6): 1387-99, 2007.



Perspectives for the adoption of ecosystem approach

The first item of this text describes and compares the two threats that are found in the base of the theoretical and methodological debate on ecosystem approach: (a) Ecosystem Health Approach (EHA); Ecosystem Approach to Health (EAH), with the objective to better differentiate how ecosystems are being treated in their interface with health problems. On performing a brief analysis of the Brazilian scientific production and the scientific production published in the Latin American public health JOURNALS, there is evidence that, to date, shows a more dominant trend of focus on EAH, although the majority shows little development with respect to the formulation of management and public policies strategies, and this is more emphasized when it is about involving a more effective participation of the public.

In the second item, a brief analysis of the Brazilian scientific production is made, with a clear trend of a link of the proposed approaches with EAH becoming being evident, as well as the predominance theoretical and conceptual work. None of the texts resulted directly from field investigations, although each of the authors had the experience in this type of work, even if they did not directly involve studies that adopted ecosystem approach.

In the third item, a brief analysis of scientific production based on articles published in Latin American public health journals suggest important aspects related to three basic presuppositions of the ecosystem approach in health. The first one is that there are still limitations in the studies with reference to the collection of various information about the variables (ecological, political, social, cultural, economical and health) and scales (from local to global) which enable the demonstration of interfaces between ecosystems and human health in an integrated way. The second is that integrated environmental management proposals, the formulation of extensive public policies and more effective institutions for their implementation are not incorporated into the totality of studies that adopt ecosystem approach in health. The third one is that

public participation in ecosystem and health problems management, particularly local communities, even as a presupposition is still little developed, and studies where participation occurs from diagnosis to the formulation of strategies for the management of problems are rare.

In the fourth item, the summary of presentations reveal a diversity and richness of works which are getting closer or even adopting the theoretical and methodological aspects of ecosystem approach, mainly EAH. They also contribute towards bringing to light a series of issues raised by the debaters of the first (Marcelo Firpo de Souza Porto) and second day (Paulo Chagastelles Sabroza) and which represent challenges to ecosystem approach in health.

The first aspect is the issue of time and historicity. The near totality of works tends to freeze time at the period of the study, not dealing with change processes in ecosystems and their services, as well as the health-disease process as the result of an historical process which, if maintained in its structural aspects, will tend to perpetuate or even worsen much of the analyzed problems.

The second aspect is the issue of space and scales. A large part of studies are performed in non-urban areas, with no connection between these and the urban areas whose “ecological track” goes far beyond them. Moreover, it is rare to find studies that connect changes that occur at the local level in ecosystems and their services, as well as the health-disease process, with the ecological, social and economic changes that occur at the global level.

These first two aspects lead to a third one, which is the trend of the vast majority of studies that adopt ecosystem approach in health not dealing with the issues related to political and economic powers that are exerted over the territories, as well as the socio-environmental conflicts originating from them. There is a predominance of local approaches that end up not

discussing the social determinants that are present in the development models which from the global level reach the local level, contributing towards the fact that certain populations in specific territories assume a large part of their social, ecological and health costs.

And finally, the third aspect unfolds into a fourth, which is related to social conflicts over the several perspectives and interests. Scientists, civil society and managers are stakeholders with different experiences, languages, education, interests and perspectives, with the adoption of focuses that enables them to work jointly to collect various information and create public policies for the solution of problems not being automatic and not even conflict-free. The deepening of problems understanding in a contextualized way and through a peer extended community that enables the engagement with the local reality and reveals its complexities and vulnerabilities always involves a negotiation process and, therefore, conflicts, something which has been little approached in the majority of studies.

A greater development and application of ecosystem approach in health as an integrated approach must involve the following aspects: an extensive review of studies performed from field research, in order to allow a theoretical, conceptual and methodological development that enables to identify theoretical, conceptual and methodological flaws for a more consistent formulation of the ecosystem approach in health that goes beyond the sum of the two existing threats (EHA and EAH). A continued and monitored investment for research that adopts effectively the three presuppositions of ecosystem approach in health (collection of various information, formulation of public policies with changes in the institutions and effective participation of the public) in different scales and with a diversified range of ecological, social, cultural and health variables, so as to allow the unfolding of the theoretical, conceptual and methodological development based on dialogue originating from the tensions between the empirical and the theoretical-conceptual-methodological forms.



Picture: Mara Oliveira. PAHO/WHO collection

Bibliography

- ABRAHÃO, CEC. Dengue, abordagem ecossistêmica. In: Augusto, LGS, Carneiro, RM, Martins, PH. *Abordagem Ecosistêmica em Saúde – Ensaios para o controle de dengue*. Recife: Editora da UFPE., 2005. pp 137-145.
- ARON JL, PATZ JA. *Ecosystem change and public health – a global perspective*. Baltimore: John Hopkins University Press. 2001.
- BAUMGÄRTNER J, BIERI M, BUFFONI G, GILIOLI G, GOPALAN H, GREILING J, et al.. *Human health improvement in Sub-Saharan Africa through integrated management of arthropod transmitted diseases and natural resources*. Cad Saúde Pública 2001; 17(Suplemento): 37-46.
- BOISCHIO A, SÁNCHEZ A, OROSZ Z e col. *Health and sustainable development: challenges and oportunities of ecosystem approaches in the prevention and control of dengue and Chagas disease*. Cadernos de Saúde Pública 2009; 25 (Suplemento 1): S149-S154.
- BREILH J. *Nuevo modelo de acumulación y agroindustrial: las implicaciones ecológicas y epidemiológicas de la floricultura en Ecuador*. Ciencia & Saúde Coletiva 2007: 91-104.
- CADERNOS DE SAÚDE PÚBLICA. *Uma Abordagem Ecosistêmica à Saúde Humana: Doenças Transmissíveis e Emergentes* (suplemento especial). Cad Saúde Pública 2001: 17.
- CADERNOS DE SAÚDE PÚBLICA. *Enfoques ecosistêmicos para el control de enfermedades transmitidas por vectores: dengue y enfermedad de Chagas* (suplemento especial). Cad Saúde Pública 2009: 25.
- CARRASQUILLA G. *An ecosystem approach to malaria control in an urban setting*. Cad Saúde Pública 2001: 17(Suplemento): 171-79.
- CORVALAN, HALES, McMICHAEL. *Ecosystems and human well-being*. WHO, 2005.
- DÍAZ C, TORRES Y, CRUZ AM e col., *Estrategia intersectorial y participative con enfoque de ecosalud para la prevención de la transmisión de dengue en el nivel local*. Cadernos de Saúde Pública 2009 (Suplemento 1): S59-S70.
- FEOLA G, BAZZANI R, editores. *Desafios y estrategias para la implementación de un enfoque ecosistémico para la salud humana en los países em desarrollo – reflexiones a propósito de las consultas regionales*. Montevideo: CIID. <http://www.idrc.ca/lacro/docs/conferencias/ecosalud.html> , 2002
- FOLLÉR M-L. *Interactions between global processes and local health problems. A human ecology approach to health among indigenous groups in the Amazon*. Cad Saúde Pública 2001; 17(Suplemento): 115-126.
- FREITAS CM, Oliveira SG, Schutz GE, Freitas MB, Camponovo MPG. *Ecosystem approaches and health in Latin America*. Cad Saúde Pública 2007; 23: 283-296.
- FREITAS CM. *As Ciências Sociais e o Enfoque Ecosistêmico em Saúde*. In: Minayo MCS e Coimbra Jr CEA. *Críticas e Atuantes – Ciências Sociais e Humanas em Saúde na América Latina*. 2005. pp. 47-59.
- GOMEZ, CM, MINAYO, MCS. *Enfoque ecossistêmico de saúde: uma estratégia transdisciplinar*. Interfacehs – Revista de Gestão Integrada em Saúde do Trabalho e do Meio Ambiente 2006; 1(1): 5 p.
- JORGENSEN SE, XU F-L, SALAS F, MARQUES JC. *Application of Indicators for Ecosystem Health Assessment*. In Jorgensen SE, Costanza R, Xu F-L, editors. *Handbook of ecological indicators for assessment of ecosystem health*. London: CRC Press. 2005.
- KAY JJ, REGIER HA, BOYLE M, FRANCIS G. *An ecosystem approach for sustaibility: addressing the challenge of complexity*. Futures 1999; 31: 721-42.
- LEBEL J. *Health – an ecosystem approach*. Ottawa: International Development Research Centre. 2003.
- MILLENNIUM ECOSYSTEM ASSESSMENT. *Ecosystems and Human Being – Synthesis*. Washington: Island Press; 2005.
- MINAYO MCS. *Enfoque ecossistêmico de saúde e qualidade de vida*. In: Minayo MCS e Miranda AC, organizadores. *Saúde e ambiente sustentável: estreitando nós*. Rio de Janeiro: Editora Fiocruz; 2002. p 173-89.
- MURRAY TP, SÁNCHEZ-CHOY J. *Health, biodiversity, and natural resource use on the Amazon frontier: an ecosystem approach*. Cad Saúde Pública 2001; 17(Suplemento): 181-91.
- NIELSEN NO. *Ecosystem approaches to human health*. Cad Saúde Pública 2001; 17(Suplemento): 69-75.
- ORGANIZAÇÃO PAN-AMERICANA DA SAÚDE (OPAS). *Ecossistemas e Saúde Humana: alguns resultados da Avaliação Ecosistêmica do Milênio*. Brasília: OPS/OMS, 2005.

- POSSAS CA. *Social ecosystem health: confronting the complexity and emergence of infectious diseases*. Cad Saúde Pública 2001; 17: 31-41.
- RAPPORT D. *Defining ecosystem health*. In: Rapport D, Costanza R, Epstein PR, Gaudet C, Levins R, editores. Ecosystem Health. London: Blackwell Science. Inc.; 1998b. p. 18-33.
- RAPPORT D. *Dimensions of ecosystem health*. In: Rapport D, Costanza R, Epstein Gaudet C, Levins R, editores. Ecosystem Health. London: Blackwell Science. Inc.; 1998c. p. 34-40.
- RAPPORT D. *Need for a new paradigm*. In: Rapport D, Costanza R, Epstein PR, Gaudet C, Levins R, editores. Ecosystem Health. London: Blackwell Science. Inc.; 1998a. p. 3-17.
- ROJAS CA. *An Ecosystem approach to human health prevention of cutaneous leishmaniasis in Tumaco, Colombia*. Cad Saúde Pública 2001; 17(Suplemento): 193-200.
- ROJAS-DE-ARIAS A. *Chagas disease prevention through improved housing using an ecosystem approach to health*. Cad Saúde Pública 2001; 17(Suplemento): 89-97.
- SOSA-ESTANI S, SALOMÓN OD, GÓMEZ AO, ESQUIVEL ML, SEGURA EL. *Diferencias regionales y Síndrome Pulmonar por Hantavirus (enfermedad emergente y tropical en Argentina)*. Cad Saúde Pública 2001; 17(Suplemento): 47-57.
- WALTNER-TOEWS D. *An ecosystem approach to health and its applications to tropical and emerging diseases*. Cad Saúde Pública 2001; 17(Suplemento): 7-36.
- WALTNER-TOEWS D. *Ecosystem sustainability and health – a practical approach*. Cambridge: Cambridge University Press. 2004
- WALTNER-TOEWS, D., KAY, J., MURRAY, T.P. and NEUDOERFFER, C., *Adaptive methodology for ecosystem sustainability and health (AMESH)*. Network for Ecosystem Sustainability and Health. (<http://www.fes.uwaterloo.ca/u/jjkay/pubs/amesh/>) 28 p. 2002
- WORLD RESOURCES INSTITUTE. *World Resources 2000-2001 – People and ecosystems: the fraying web of life*. Washington DC: United Nations Development Programme, United Nations Environment Programme, World Bank, World Resources Institute; 2000.

Participants of the *workshop*

Alexandre de Souza Vieira
Ana Felisa Hurtado Guerrero
Ana Paula de Souza
André Sobral
Antonio Levino da Silva Neto
Brani Rozenberg
Carlos Corvalán
Carlos Machado de Freitas
Cristiane Barbosa
Daniel Buss
Deuzilene Marques Salazar
Edila A. F. Moura
Érika Luciene Almeida Soares
Evelyne Marie Therese Mainbourg
Fabian Bezerra de Oliveira
Fernando Abad-Franch
Israel Brito de Souza
Jarine Rodrigues Reis
Jean Remy Daveé Guimarães
Josino Costa Moreira

Leandro Luiz Giatti
Marcelo Firpo Porto
Marcilio Sandro de Medeiros
Marcio Augusto R. Halla
Marco Aurélio Quintanilha
Marcus Vinícius Polignano
Margareth Monteiro
Maria Luiza Garnelo Pereira
Marisa Soares
Marlene Mineiro Pereira
Michele Alves
Mircia Betânia Costa e Silva
Patrícia de Góes Cruz
Paulo Chagastelles Sabroza
Reinaldo César Santos Zuardi
Renata Ferraz de Toledo
Ricardo Agum Ribeiro
Roberto Sena Rocha
Rodrigo Rego Barros Caruso
Virginia da Silva Almeida Martel



1ª CONFERÊNCIA NACIONAL
DE SAÚDE AMBIENTAL
Saúde e Ambiente,
vamos cuidar da gente.

International Workshop of the Health and Environment Working Group of the Pan Amazonian Network of Science, Technology and Innovation in Health¹

Belém/Pará, Brazil – August 19-20, 2009

Final Report

1. Red Pan Amazónica de Ciencia Tecnología y Innovación en salud

The Pan Amazonian Network of Science, Technology and Innovation in Health is a cooperative network composed by universities, research institutes, the Amazon Cooperation Treaty Organization (ACTO), the Pan American Health Organization/World Health Organization (PAHO/WHO), the Oswaldo Cruz Foundation of the Brazilian Ministry of Health and the Ministries of Health and Social Welfare of the eight countries member of the Amazon Cooperation Treaty Organization (ACTO), that is, Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Surinam and Venezuela.

The Network was conceived and established in 2006, it was politically legitimated through the demand of Health and Social Welfare Ministers of ACTO's countries who recognized the importance of the regional development of TS&IH and its

strengthening in this sub-region. This initiative has been boasted by the Pro-Pan Amazonian Network Management Committee formed by ACTO, PAHO/WHO, UNAMAZ, the President of the Amazonian Intergovernmental Committee of TS&IH and Fiocruz (executive unit of the Network).

The mission of the Pan Amazonian Network is to encourage and contribute towards the implementation of regional integration policies in the Amazon region for the development and use of scientific and technological research and innovative products and processes with a view to promoting health equity and the creation of technical abilities to face the global, regional and national problems and challenges. Therefore, the Network aims at developing cooperation projects in strategic issues for the scientific and technological development of the Continental Amazon region, with an emphasis on the following areas which are considered priorities under its action plan and which shall be conducted by each corresponding working group:

- Health and Environment
- Telehealth
- Pan Amazonian Health Virtual Library (HVL) of TS&IH
- Technology Innovation and Intellectual Property
- Research on Malaria
- Research on Amazonian Health Systems and Services

¹ Participaran del taller los representantes de los Ministerios de Salud da Venezuela, Perú, Guyana y Brasil, de las Oficinas de país de la Organización Panamericana de Salud de Colombia, Guyana y Venezuela; de la UNAMAZ e de la FIOCRUZ/Manaus

2. Main background for the structuring of the Health and Environment Working Group of the Pan Amazonian Network of ST&IH

During 2008, the Pan Amazonian Network of ST&IH and PAHO/WHO organized, with the support of the Brazilian Ministry of Health and the Amazon Cooperation Treaty Organization (ACTO), a number of events in the context of environmental health and its specific topics, such as the formulation of cooperation projects in the region, which counted on the large participation of ACTO member countries. At the onset of the event held in Belém in August 2009, an effort was made to inform the participants about the results and the recommendations of the events organized in 2008 among the countries of the region.

Events held:

Regional Workshop on “Climatic Change and its Effects on the Health of the Americas: Preparation of an Action Plan”, held at PAHO/WHO Representative Office in Brasília, Brazil, from April 9 to 11, 2008, with the participation of delegates from the following countries: Ecuador, Guyana, Brazil, Bolivia, Barbados, Costa Rica, Argentina and Panama. Countries presented their profile on Climatic Change and Health and prepared the proposal for the Regional Plan on Climatic Change and Health for Latin America and the Caribbean.

Pan Amazonian Medical Congress: Two activities were performed during the Congress held in Belém, Brazil, from April 27 to 30, 2008, namely, the 1st Pan Amazonian Workshop on Environmental Health, organized by ACTO and PAHO, and the Panel on Climatic Change and Environmental Health.

Some of the recommendations which emerged from the two events are as follows:

- To emphasize the need of a sustained articulation among Amazonian countries in order to promote transborder joint actions, the harmonization of norms, the exchange of information and experiences that contribute towards the solution of common problems, which will bring mutual benefits to their respective countries.
- To establish intersectorial and interinstitutional strategies of actions between countries, especially between borders.
- To prepare a scientific and technological cooperation agenda for the performance of shared benefits projects, with a special emphasis on the attention to the social demands of the Amazon region.

- To request PAHO/WHO and ACTO a structuring cooperation in environmental health and climatic change and health which is necessary for the execution of strategic actions coordinated among countries, by supporting their institutions and human resources.

National and Sub-Regional Workshop on Climatic Change and Health (Brazil, MERCOSUR and ACTO) with advisors from the EHSGC/HSS, held in Belém/Pará, Brazil, from October 1 to 3, 2008, counted on the participation of representatives from: Brazil, Bolivia, Colombia, Ecuador, Peru, Surinam and Venezuela.

Among the objectives of the workshop was the revision of the document produced during the 48th PAHO/WHO Directive Council, in order to establish a work plan in the Amazon Region.

Recommendations of the Amazon group were:

- To strengthen information and knowledge management systems with a view to reducing the vulnerability to environmental and ecosystemic risks.
- To establish instances or mechanisms of articulated work with other sectors, such as Environment, Agriculture, Education, among the main ones.
- To raise awareness on the effects of climatic change on health, both in the general public and various sectors where health workers are located, by promoting the communication and dissemination of information with a multidisciplinary focus.

Regarding the topic of operating research:

- To perform quantitative and qualitative assessments of the climatic change effects on health.
- To establish experts and institutions networks that can contribute towards the regional integration of adaptation and mitigation activities, in order to exchange information on climatic change and its effects on health.
- To establish exchange programs with other countries that have a view about health and environment.
- Articulation work and other Latin American networks: to incorporate the environmental topic into public health.
- To incorporate climatic change into risk management and preparedness and response plans for emergency situations and disasters.

With respect to the community:

- To create and strengthen health surveillance systems.

- To use and disseminate the Geo Health and Geo Amazonia (under process) documents.
- To produce the Geo Health for the Amazon region.
- To promote distance education through the preparation of material and contents for the various sectors and stakeholders.
- To work with the curricula of the educational systems of universities and other disciplines.
- To perform articulated works with the Amazonian Universities (international programs) in order to obtain a chair or program that can produce environmental work-oriented human resources.

With respect to the exchange of information:

- To prepare periodically a publication on climatic change in the Amazon region.
- To create a network of Amazonian means of communication.
- To strengthen country information systems.
- To disseminate the information produced by the communication networks, such as web pages and the virtual library.
- To strengthen Technical Cooperation among Countries (TCC) Projects.

III International Meeting of the Pan Amazonian Network of Science, Technology and Innovation in Health held in Quito/Ecuador, from August 21 to 22, were countries formed the alliance, resulting in the structuring of the Health & Environment Working Group of the Pan Amazonian Network of ST&IH. This group committed to developing cooperation projects in the area, triangulated by PAHO/WHO and ACTO, as well as to systemizing the relevant technical-scientific information regarding the topic of Health and Environment in the Pan Amazonian HVL of ST&IH.

3. International Workshop of the Health and Environment Working Group of the Pan Amazonian Network of Science, Technology and Innovation in Health

This initiative took place in the context of national discussions related to the preparation of the 1st National Health and Environment Conference (NHEC) “Environmental Health in the City, Open Country and Forest: building citizenship, quality of life and sustainable territories”. The Brazilian Ministry of Health organized a national seminar in Belém in order to make topics on environmental health in the forest in terms of society known, to discuss the topic with

the non-governmental organizations and to attempt to establish associations for the dissemination and discussion during the state conferences and the national stage which will occur in December 2009. Around 100 representatives from non-governmental organizations, universities and health and environment institutions of state and local governments of the Brazilian Amazon region participated in the seminar.

On this occasion, the Pan Amazonian Network of Science, Technology and Innovation in Health, with the support of the Pan American Health Organization/World Health Organization (PAHO/WHO), invited the Amazonian countries representatives who participate in the Health & Environment Working Group of the referred Network to discuss and systematize recommendations of the sub-regional block of the Continental Amazon region regarding the topic of health & environment in the Amazon forests, as a contribution of the countries for the 1st NHEC.

4. Objective of the International Workshop

To discuss and prepare an environmental health agenda for the Continental Amazon region which can support the development of environmental health in the countries and can also be a contribution of neighbouring countries for the 1st NHEC.

5. Participants:

- Representatives from the Ministries of Health of Venezuela, Peru, Guyana and Brazil who act in the national programs of health and environment.
- Advisers from PAHO/WHO Offices in Brazil, Colombia, Guyana and Venezuela.
- The Leônidas and Maria Deane Institute/FIOCRUZ-Manaus (Executive Unit of the Pan Amazonian Network for ST&IH).
- Representative from the Association of Amazonian Universities (UNAMAZ).

6. Methodology:

In the first day, participants of the international workshop initially participated in the wide agenda and the presentations of the organizers of the 1st NHEC. During the afternoon and the whole next day, the working group of the Pan Network met to prepare its recommendations in a preliminary document of the sub-regional position.

7. Recommendations of the International Workshop of Belém, August 2009

Table 1 - Recomendation of the International Workshop of Belém, August 2009.

CONTEXT (TOPICS / PROCESSES / PROBLEMS)	GROUP SUGGESTIONS
AXIS 1	
<ul style="list-style-type: none"> Environmental health problems at the border are similar in every country and, in each country, are different than problems of other regions in the same country. The most serious problems of environmental health are: lack of sanitation, chemical contamination, mercury, metal and hydrocarbons contamination, forest exploitation, forest fires, drinking water, water-related diseases, endemic diseases (malaria, dengue, yellow fever), climate-sensitive diseases, floods and extreme events (natural and anthropogenic catastrophes). 	<ul style="list-style-type: none"> Establish different policies and strategies for the border with an interdisciplinary focus (for example, the assessment methodology of the impact on environmental health, the TCCs, the bilateral commissions, the bilateral integration engines, the cooperation networks). Strengthen the local structure at the border and an information system and the communication among countries. Propose actions of regional and local associations of the countries (national guidelines and local actions). Identify partners and necessary counterparts in every country. Support studies on the impacts of the environment on health through research institutes and universities of the region. Promote the exchange of an environmental health surveillance model. Propose laws and the functioning of a harmonized environmental health model with integration strategies among countries.
<ul style="list-style-type: none"> Chronic malnutrition in the indigenous communities – the most vulnerable in the region. Rain forest emerging diseases that reach the coastal population – In Guyana, 90% of the population resides in 10% of the territory – the coastline, for example. Climatic change is a threat to the life of the indigenous and quilombola vulnerable population who survives through hunting and fishing which has been diminishing in the region. The sanitation structures that were built in the indigenous areas with unsustainable and inadequate projects for the characteristics of the population. 	<ul style="list-style-type: none"> Develop EH programs for the integration among countries and harmonize procedures for environment-related diseases. Promote environmental education actions with an intercultural focus (languages, identities, traditional knowledge, etc.). Develop and/or apply EH programmes for the vulnerable populations of the region (indigenous, riverine, quilombola and traditional). Strengthen nutrition programmes for the vulnerable populations of the region and the exchange programmes and experiences in order to improve the food quality of the indigenous population. Assess food safety strategies for the vulnerable populations of the region and the exchange programmes and experiences in order to improve the food quality of the indigenous population. Support countries of the region in order to apply PAHO/WHO plan on Climatic Change and Health. Identify possible financial resources in order to support climatic change and health actions proposed by PAHO/WHO. Emphasis on the assessment of vulnerability and the adaptation of climatic change. Expand and review water and sanitation programmes for the indigenous communities. Advance the application of international norms and covenants related to the health sector (chemical products, climatic change, biodiversity, agreements, etc.)

CONTEXT (TOPICS / PROCESSES / PROBLEMS)	GROUP SUGGESTIONS
<ul style="list-style-type: none"> Government structures are fragile, both in the health sector and other sectors (environment, agriculture and tourism). 	<ul style="list-style-type: none"> A need to reaffirm and the importance of ACTO/IDB project on EHS. Strengthen the development of the EHS structuring project coordinated by ACTO/IDB. Identify focal points (EH managers). Strengthen work initiatives on the topic of healthy surroundings and communities and train the local level in environmental health diagnosis and management. Expand the qualification of human resources at regional level in environmental health sciences, environmental engineering, environment and community health. Strengthen regional and bilateral integration for the consolidation of governmental structures. Develop the presented regional projects in order to strengthen both the capacity for action in environmental health activities and the environment. Create a commission of Amazonian countries for environmental health.
<ul style="list-style-type: none"> Large works that cause the degradation of the environment and reduce the quality of life of the population, especially the more vulnerable one. 	<ul style="list-style-type: none"> Propose strategies for the monitoring and assessment of the execution of projects by large companies which operate in the region with the degradation actions of the environment. Propose methodologies for the environmental assessment of impacts on human health. Develop a risks communication methodology for the health sector and the political responsible persons about the impacts on human health. Train the health sector to perform studies and reports on the works and environmental licenses. Incorporate the environment assessment, an environmental health component, into the national policies / programmes and involve the participation of the sector in the issuance of work licenses. Improve access and health services that are intended for the vulnerable population. Adopt and implement the healthy environments programme.
<ul style="list-style-type: none"> Undue use of natural resources. Scarce articulation of environmental health (EH) policies among the countries of the region. 	<ul style="list-style-type: none"> Promote the organization of sustainable production chains. Promote the development of water safety plans (WSP). Support the exchange of EH experiences among countries. Strengthen discussion forums on EH (for example, the Pan Amazonian Network of ST & IH, other intergovernmental networks, regional integration structures, etc.) Recommend to IO and NGO the intensification of support to countries of the region in Environmental Health Policy. Prepare regional guidelines for a harmonized EH policy.

AXIS 2	
<ul style="list-style-type: none"> Weakness of the environmental health topic in the region. 	<ul style="list-style-type: none"> Identify and know the network / groups / social individual organized in various countries in order to support regional structuring and strengthening. Expand the participation of social stakeholders in the NHEC, considering it a privileged forum for the discussion of EH topics. Strengthen regional structures such as UNAMAZ, the PAN Network, BVS Network and research institutions in the region. Recognize the regional and cultural specificities in the elaboration and application process of public health policies. Make good use of dates such as the World Water Day 2009 (transborder waters) for the harmonization of water quality for human consumption. Advance the discussion of the EH topic in health councils.
<ul style="list-style-type: none"> The development models of urban and industrial areas are antagonic to sustainable development. 	<ul style="list-style-type: none"> Totally expand the healthy environment focus (housing, school, work, leisure, consumption). Review the development model for the Amazonian bioma. Establish local strategies in order to achieve the Millennium Development Goals (for example, PAHO/WHO initiative "Faces, Voices and Places").
AXIS 3	
<ul style="list-style-type: none"> Prepare an agenda for a technical cooperation in environmental health among countries. Prepare a survey on studies, projects, initiatives and research groups and regional actions in Environmental Health in South America. Advance studies and research in environmental health in universities and research institutions of the region. Strengthen information and comparable indicators systems and national observatories in environmental health. Establish strategies for integrated intersectorial policies and the harmonization of norms and models in order to improve local management. Prepare strategies for a more efficient communication among borderline territories or states, provinces, countries and regions. Prepare a study on existing services and initiatives in the Amazonian region on the training in environment and health sciences topics. Apply strategies and the creation of service capacity for environmental health managers, political in-charge and technical officers. Implement comprehensive education strategies of human resources in environmental health in lato and stricto sensu for professionals of the Amazonian region. 	

8. Agenda

August 19, 2009

9h00 - 12h30

Opening ceremony

Introduction of participants

Conference: Environmental Health: concept and relationship with the topic of the 1st NHEC

Presentation: 1st National Environmental Health Conference: Basis and activities for the organization of the 1st NHEC

14h00 - 18h00 - International Workshop

- Introduction of the participating countries
- Historical Background – Recommendations of events held in 2008 and the objectives of the international meeting;
- Information about the actions of the Pan Amazonian Network for Science, Technology and Innovation in Health and possibilities of identifying focal points for the development of the environmental health topic.
- Discussion of the Axis:
 - Development and socio-environmental sustainability in the open country, city and forest.
 - Work, environment and health: challenges of production and consumption processes in the territories.
 - Democracy, Education, Health and Environment: policies for the construction of sustainable territories.

August 20, 2009

8h00 - 12h30

Preparation of the environmental agenda for the region which can support the development of environmental

health in the countries and also be a contribution of the Amazonian countries for the 1st NHEC.

14h00 - 18h00 Plenary Session

Presentation of results from the various groups of the seminar

Report of the International Workshop

Closing ceremony

9. List of participants

Brazil

Guilheme Franco Netto – SVS/MSALUD

Andre Fenner – SVS/MSALUD

Roberto Senna – FIOCRUZ/Manaus

Carlos Corvalan – OPS/OMS

Bernardino Vitoy – OPS/OMS

Haroldo Bezerra – OPS/OMS

Mara Oliveira – OPS/OMS

Colombia

Teofilo Monteiro – OPS/OMS

Guyana

Bissoon, Mr Devindranauth - OPS/OMS

Ashok Sookdeo – MSalud

Peru

Percy Cárdenas Claudio – Environmental Health Director of the Regional Health Directorate of Loreto

UNAMAZ

Rosa Carmina de Sena Couto

Venezuela

Ing. José Rincón – National Coordinator of Substances and Materials/MOH

Mayira Sojo-Milano – PAHO/WHO



Printed on Recycled Paper

