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**Methodological Innovation, Intercultural Knowledge Building and  
Empowerment  
The Case of Participatory Research in an Agro Industrial Region**

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SESSION: ENVIRONMENT II

**Methodological Innovation, Intercultural Knowledge Building and Empowerment:  
The Case of Participatory Research In an Agro Industrial Region<sup>1</sup>**

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**PREMISES FOR RENEWING OUR SCIENTIFIC ARGUMENTS AND AGENDA**

Conventional health research is conceptually and methodologically linked to the reproduction of the 10/90 research gap, and its logic poses theoretical and practical obstacles to the fulfillment of true millennium development goals.

Predominant paradigms of mainstream research are frequently characterized by reductionism and unicultural thinking, which tend to decontextualize our scientific objects, and divorce our knowledge building and action from collective community needs, values and goals.

Conventional health analysis applies a triad of *reductionist thinking* that: a) disintegrates the object in factors or causes, giving preeminence to individual health events and making invisible their social, collective determinants (Cartesian reasoning that considers priority of part over whole – Levins & Lewontin: 1985-) ; b) uses the risk paradigm to analyze their supposedly “external” associations; and c) derives from that atomized view of reality a functionalist approach to health action, focused on those isolated factors. For instance, the whole conceptual and methodological building of positivistic health analysis is based on the disintegration of health as a *study object*. A factorial view of reality, which corresponds to a factorial conception of health action. The main assumption then, is that practice (or action) is external to knowledge.

Lineal and reductionist reasoning has separated, conceptually and practically: *individual health* (personal diagnostic and therapeutic measures) and *collective or public health* (that implies the understanding of: general societal health determinants; particular health group patterns imbedded in the general social relations; and corresponding mechanisms for health prevention and promotion). Prevention not only includes personal, individual measures -like vaccination or supplementation-, but mainly implies the changing of destructive work or occupational patterns, consumer patterns, negative cultural patterns and overcoming the weakness of socially organized collective supports, all of which are health determinants deeply rooted in social injustice and gaps. Unfortunately, the individual/collective health rupture has generated a fetishist discourse that undermines the emancipatory potential of categories like: “inequality”, or “poverty”, or “gender/ethnic discrimination”, or “participation”, which therefore become irrelevant (Breilh: 2003).

That is why we must emphasize that the 10/90 research gap is not a merely an ethical or moral, fund allocation problem; we must deal with it also as a political dilemma of changing

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the rules of the game, and a logical dilemma of changing our ways of constructing science. As I have stated before, there is a logical and strategic congruence between much of the conventional scientific work about health, with its gaps and incongruities, and the power structure that molds scientific thinking through direct, forceful or financial mechanisms, which impose priorities and agendas, but many other times, also through internal or inherent scientific constructions, that obscure the social determinants of health and undermine the empowerment of emancipatory reasoning (Breilh: 2003).

During the last three decades the liberalization of world economy has facilitated the expansion of a so called neo-conservative framework in the social sciences, characterized by a regression to an extreme logic of individualism, and provoking a crisis of all holistic interpretations. In the health field, as well as in other applied sciences, this meant the extinction of crucial categories like: inequity, dominance, exploitation; State; class analysis, etc. (Wallerstein: 1996; Boron: 1997; Breilh: 2003).

The 10/90 research gap then places political and moral issues about the relation between economic political power and scientific design; but also conceptual / methodological issues about the “internal”, less evident issues, that also help reproduce the logic of inequity, the gaps and irrationalities of our agendas.

If we want to surpass positivistic reasoning in health assessment and assume an integral paradigm to tackle the problem of health’s complexity, we must analyze health in its dynamic and complex unity and diversity.

Scientifically speaking, we must assess health inter-connectedly as an *object*, as a *concept* and as a *field* of action. In all three dimensions it is a process explained both by generative or determining conditions and by empirical outcomes; those conditions and outcomes are neither mainly an individual problem, nor a medical care problem; nor a policy dependent problem; they depend on an complex and multidimensional process of social determination, deeply influenced –as we will illustrate latter- rooted in the quality of different modes of life of specific population groups; a part of which is the access to human rights satisfaction. So those rights are not carried out by decree, nor are they reinforced essentially by norms and codes, even if they appear as theoretically good. The social economic system in totality, and its corresponding political and cultural power structure, and not only the market nor isolated institutional policies, distribute the quotas of well-being to the different groups, according to their possible ways of life and in agreement with their quota of power. A triple structure of power exists -socio-economic, ethnic, and gender- which operates as the determining logic of the whole and unfolds in five main dimensions of the mode of living: a) working conditions; b) the quality and enjoyment of consumption goods; c) the capacity to create and to reproduce cultural values and identity; d) the capacity for empowerment and to organize actions in benefit of a group; and, finally, e) the quality of our ecological relationships.

The *health profile* of a group is defined in the movements of the contradictions between the protective and destructive processes that operate in those characteristic ways of life, which, at the same time, posse limits upon the *individual lifestyles* of people. Life and health depend on these movements between the processes that protect us and those that deteriorate us, and the development of all of these depend on the capacity of enjoyment of human rights which relies, certainly, upon the level of equity or inequity that characterizes the structure of power in which life is unfolding. A social system that institutes the proliferation and deepening of inequity and that increasingly deteriorates human rights within those ways of life, will thus institutionalize mechanisms for the deterioration of health; these systematically affect the physiological patterns, norms of genetic reaction, morbidity and mortality

patterns of that population's organisms, and produce signs of over-aging. In contrary circumstances, when they open up possibilities for the enjoyment of an equity that allows for the satisfaction of rights, such as those in which personal and family supports and the physiological defenses and possibilities are potentialized, then the quality of physiological and genetic life increases, we witness the appearance of patterns of mental and physical health, as well as improved survival indexes.

And finally, when updating alternative methodology we must keep in mind that the ontological problem of redefining the *study object* (as we have discussed) is strongly intermingled with the epistemological problem of redefining the *study subject*, so in this sense we are strongly emphasizing the need to incorporate intercultural and community-driven research.

It is all to clear that theory really matters and that we should open bridges between the academic and local technical and institutional scenarios, not falling in the trap of the false dilemma that “either theory is about unraveling the historical logic of capitalism or it is about prescription for action” (Hall: 1996). Because theory applies as much to the understanding of the reproductive structure of capitalism, as well as that of the generative processes of social participation and organization; we must connect both in order to avoid a reductionist, one plane construction of epidemiological and political research and action.

Finally, in order to translate these ideas into practical terms let us illustrate them through our research program in floriculture. There we have developed a *critical process matrix* which enables us to cover the different domains and dimensions of social health determination. Our experience with community organizations and flower worker unions, developed in one of the most important cut flower production regions of the World, could be interesting to illustrate our theoretical and methodological framework and could be taken as a case example of integral and participative human and ecosystem health assessment.

### **METHODOLOGICAL INNOVATION, INTERCULTURAL KNOWLEDGE BUILDING AND EMPOWERMENT: THE CASE OF PARTICIPATORY RESEARCH IN AN AGRO INDUSTRIAL REGION**

The Granobles Basin in Northern Andean Ecuador holds one the main cut flower productions areas and the main World cut rose production. This relatively new agribusiness exemplifies a typical result of the type of productive agricultural modernization of recent decades; ancestral agriculture of indigenous and “mestizo” communities, traditional crop “haciendas” and dairy farms have undergone changes and pressures, because of the fast penetration of high tech green revolution systems.

This new agricultural industry, geared towards exportation and profit concentration, is viewed by some as a panacea, but many communities, their leaders and the scientific community are increasingly recognizing the socio economical, health and environmental problems that this type of production causes -specially when only a small percentage of farms –nearly 20% of the 150 farms that exist in this region- comply to international standards for a sustainable agriculture-, and there are increasing evidences of a growing incidence of: forms of toxicity; respiratory problems; malnutrition; stress and mental illness; feminine reproductive disease; immune system depression; genetic instability and malformations; hypoplastic (toxic) anemia; and cancer.

## **Building and Integrated Health and Environment Approach (IHEA): Developing a Conceptual/Methodological Framework to Deal with Dominance and Complexity**

CEAS developed an initial proposal for an *Ecohealth Program* that was enriched by a community oriented design process, with the participation of local leaders, representatives of municipal government, experts from the ministries of health and environment, flower workers, women peasant organizations, members of the regional health system and even some enthusiastic flower entrepreneurs.

Inspired by its own experience and by the integrated health and environment approach of the International Development Research Center (IDRC), our center proposed and expansion of the IDRC model -that considers the principles of: transdisciplinarity; stakeholder participation and social/gender analysis, as cornerstones of health ecosystem research- and we introduced in our project's model the categories of: *multiple subject research* (that adds intercultural knowledge building to the principle of transdisciplinarity); *collective driven research* (which adds the implication of counter-hegemonic strategy to stakeholder participation); and finally, we incorporated the notion of *power structure analysis* (to include the important existence of a social subordination matrix, as source of a triple inequity (social / gender / ethnic-cultural) that conditions the access to human rights enjoyment and health.

To deal with the complexity of our study object (floriculture ecosystem health), we implemented as basic research design tools: a) a multi-dimensional matrix of what we called "critical processes" of the floricultural ecosystem; and b) the epidemiologic or health group profile (Breilh: 2003).

### *Floriculture and Health: Critical Processes Matrix and Epidemiologic Profiles*

It establishes the three main dimensions in which health determinants operate: the general determinant social relations of the broad societal domain; the particular groups with their typical *modes of life*; and the singular or individual every day *life styles*.

We need to observe the interrelation between general (structural processes), particular or generative processes and singular patterns of exposure and protection to health determinant processes. In all three domains we must analyze the operation of health destructive and health protective processes (Breilh: 2003b; Franco; 2002).

Cut flower production in the Cayambe/Tabacundo ecosystem is conditioned by crucial structural oppositions between destructive and protective processes. On one side, the logic of maximum rentability, overexploitation of labor force and nature, the overdose of chemical control for "perfect" flower production, the State deregulation and the unnecessary environmental deterioration (soil, water); and in the other side the potential cooperative, integral plague management and successful application of FLP international cut flower code of conduct.

In the particular group domain, the opposition between hazardous/unprotected work patterns; unhealthy consumption patterns; lack of class /gender consciousness; weak cultural identity to support reproduction of ancestral ecological and protective conducts; lack/weakness of collective organization supports, and to the other side the possibility for safe/protected cut flower labor; integrated plague management; social security available resources; signs of initial class and gender emancipatory trends; healthy collectives life style and leisure patterns.

And finally on the individual level, the reproduction of contaminating daily life styles and the physiological vulnerabilities (stress and immune depression related vulnerabilities) that facilitate toxic initiation (biotransformation, circulation and tissue fixation); genetic instability and malformations (see annex N° 1: Agrochemicals Toxic Human Impact); transmissible diseases (specially respiratory and parasitic), as part of a typical pathological group pattern, that is only counterbalanced by protective healthy daily practices, psychological protective resources and reserves and psychological protective family and personal daily life styles. But we should keep in mind that all these effects are embedded in a complex process of health determination, characterized by a dynamic interaction movement that takes place among the social modes and life patterns that condition exposure mechanisms, absorption routes and toxicokinetic processes (biotransformation, transport, and tissue fixation); and finally, toxicodynamic toxic site actions (Duffus: 2001; Routt & Roberts: 1999; Peres & Moreira: 2003).

#### *Instrumental Contribution for Research and Incidence*

After nearly two years of work, the project provides us now with an interesting set of research instruments for academic and community applications.

One problem of considerable complexity was the development of a *pesticide dynamics and water sampling methodology*. We first organized some community workshops with the local water board leaders and after some previous field observations we came to understand that the transect methodology was inadequate, so we build on the idea of a microbasin and hydrologic network approach. We designed a preliminary water use survey that allowed us to understand the local irrigation water management system that made it possible to identify and locate with GPS precision the points where water, sediment and cow milk samples were to be studied (see study parameter table). At the same time and in this same direction, two other complementary studies were undertaken to establish the patterns of chemical use in different strata of flower farms (classified according to size and technological development), also a study of technical flower production itineraries and chemicals use in those different farm types; and finally the use of agrochemicals in other local crops (mainly potatoes and pasture).

After analyzing a list of nearly two hundred different chemicals (insecticides, fungicides, herbicides) used in the region we established a group of 12 of the most frequently used chemicals (including some only used in flower production, some only in potato production and some in both).

The final step in this design was choosing an experienced pesticide research laboratory with adequate chromatography standards, willing to train our field team. The Ecuadorian Atomic Commission Lab was finally chosen.

An interesting complement of contamination analysis is the understanding of floriculture water demand. An striking finding was that flower farms use more cubic meters per month and per hectare (in average 950 m<sup>3</sup>/ha/month) than traditional agricultural haciendas (16m<sup>3</sup>/ha/month) and much more than small family farmers (0,97 m<sup>3</sup>/ha/month). To underline the magnitude of water consumption needed for flower production, we can compare it with the rate of urban industrial and human consumption per month and per hectare in the Metropolitan area of the capital city of Quito, which is to less (887 m<sup>3</sup>/ha/month).

An interesting example of intercultural instrumental is the production of *community biodiversity impact checking lists and community biodiversity impact mapping*.

Another crucial accomplishment of the project is the *reframing of the conventional human toxicity screening model* (specially in the cut flower worker population) which is almost totally dependent on the so called erythrocyte acetylcholinesterase reduction test (AChE). Our ecohealth research team placed this indicator under suspicion, because even though it is the only screening tool that has been applied for many years in farms that maintain a basic toxicity control system for their personnel, it almost never yields positive cases. Our hypothesis was that AChE only works in cases of acute carbamate and organophosphate exposure and its not sensible to insensible to chronic low dose exposure.

The validity study had to select a test battery with a set of screening instruments for human impact outcomes to operate as reference criteria for evaluating AchE screening capacity; and also a set of control variables. We selected efficient components of the *NES2 computerized battery* of tests (reaction time; figure memorization; hand-eye coordination; symbol-digit correspondence; and finger tapping), not culturally dependent; sensitivity discriminator test; hand muscular strength pinch gauge; grooved peck board fine coordination movement test; and a group of blood tests (liver transaminase; blood marrow toxicity –RBC, WBC and platelet; and a genetic test (lymphocyte DNA comet).

The results showed that AchE is definitively not a sensitive tool for screening (sensitivity rates of less than 48% with most compound reference criteria); and therefore, our project demonstrated that AchE based public health exposure control systems that are employed in our country are ineffective, mostly due to low density exposure; non carbamate and organophosphate chemicals that AchE doesn't detect; and finally because adequate AchE testing requires previous an expensive and difficult set of measurements: base line measures in non exposure phase, and then at least three replicate measures.

One additional valuable validity analysis proved that CEAS Pentox community toxicity screening test is sufficiently sensitive to be used alone or in combination with other tests (60% sensitivity and 70% specificity).

Epidemiological instruments were also designed to study modes of life and exposure patterns.

The health condition of cut flower population in our study area shows severe deterioration; the three main problems being toxicity (69% non standardized estimated prevalence); stress (56% prevalence); and malnutrition –obesity and overweight- (43% prevalence). Also psychological assessment was established using phrase completion spontaneous response testing.

In the urban Cayambe area the project is conducting a psychological and toxicity screening study to respond to demand from the Cayambe Technical High School board of directors. An also the impact on young children is being assessed through the measurement of neurobehavioral deterioration, using age adjusted tests (ASQ test that measures communication, movement, problem solving and socialization capacities of <5 year old children.

Even though a finer epidemiological analysis is pending, all preliminary results strongly suggest a massive morbidity, probably associated to activities and environmental conditions

related to linked to group floriculture and typical modes of life of populations exposed to working or community conditions in the affected ecosystem. That is why the project will need to expand its incidence efforts and propose legal reform measures and precautionary measures to act upon and prevent all health destructive processes.

Socio anthropological research is also an important line of work. The fast transformation of traditional hacienda systems of production, which did not affect strong community ties and cultural supports, to high tech agribusiness, based on modern wage relations and social rupture of community life and supports, are provoking cultural and psychological impacts related to gender transformations (mainly the transference of feminine labor force from household agriculture to cut flower industrial work, which to a great extent implies the exchange of ancestral rural patriarchal bonds with feminine modern enterprise socio economic bonds and abuses). Also the new patterns of socialization and leisure of younger age group workers that have arisen with floriculture start to show close ties with the appearance of new epidemiological phenomena as AIDS and violence that were almost absent before the appearance of agribusiness.

#### *Bioassays for Community Driven Monitoring*

Even though international research results provided by the IDRC -Watertox and Aquatox projects- do not demonstrate the utility of bioassays for water network monitoring, our project does believe in the potential of this tool for community involvement in water monitoring, and is therefore developing experimental research geared at standardizing onion (*Allium cepa*) root inhibition by agrochemicals assays, as an important resource for community driven control of presence of biologically destructive chemical residuals in water of floriculture or potato effluents. Two initial laboratories have been implemented to provide initial proofs of the efficiency and effectiveness of simplified biotic impact methodology. The idea is not to detect specific products (bioassays are not product specific), but to demonstrate presence of biologically hazardous substances in the network as a precautionary measure that conducts towards further. As part of this effort our center is developing standardized and cheap onion bulb production and simple inexpensive root inhibition procedures that will be applied by a group of community labs in the near future. In fact, many rural organizations like UNOPAC and Pueblo Cayambi are demanding this kind of instrument.

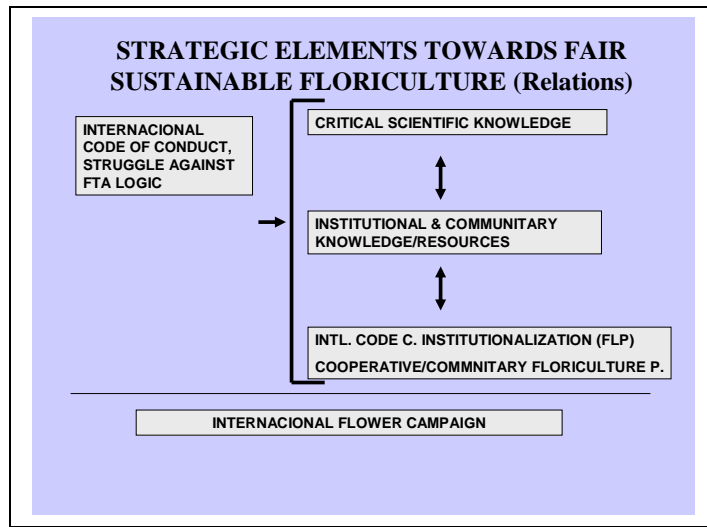
#### *FLP (Flower Label Program) Farm Certification*

The international code of conduct for fair, safe and ecologically sound cut flower production was developed in Europe. It was the German unions, importers and environmental NGOs that conceived this instrument of human and ecosystem protection. Farms that apply for FLP seal for their flowers have to fulfill social security, worker protection and organization standards, quality of health services and ecological protection procedures. This has initiated a trend of sustainable production which our project considers a seed of future legal national norms.

An integral approach for health research and certification related to cut flower production and distribution takes into consideration not only the knowledge of terminal results like the process/product conditions that affect worker and consumer in the final respective stages of the chain, but all conditions that encompass the whole set of relations which operate as determinants of healthiness and safeness of human activity related to flower production, not only for workers and consumers, but to the whole society. That is, it has to understand the trade conditions that impose quality and rhythms and the business practice modes and styles



which determine the nature and logic of the whole flower activity, nationally and internationally. The *product* has to be safe for consumers, not only good for trade, and the *process* has to be healthy, firstly inside the plants -so that the working process that affects workers lives is healthy, safe and equitable, and the plant's environmental relations are healthy and safe-, and also in the "outside" world of *business practice*, because concentrative monopolization and corrupt organization of the business destroys the human benefit derived from flowers (Breilh: 2001).



The EcoHealth project has embedded de certification process as part of on international strategy.

#### *Software for Health Management (Clinical and Preventive) in Cut Flower Farms*

Finally the incidence on farm health management has been accomplished through the design and elaboration of a software, inscribed in CDRom format, which allows for high quality health care management (automatic clinical history); individual health monitoring; preventive farm section monitoring; and other useful resources to be used by health personnel. This system was also design with participation of community, worker and academic experts. Already six farms are applying a pilot trial of this useful tool.

#### **Intercultural Knowledge, Organization and Incidence Building**

The project's aim was not only to reframe the study object but also the subject of research. All along the different phases of design and operational implementation, we incorporated community experts and organization representatives in many project workshops and group sessions.

In the *local level* the ideas and contributions of the regional water boards and provincial water forum were key elements for water network impact study design; together with experts from the health council and environmental department of the municipalities; members of the provincial ministry of health, and representatives of the social and indigenous organizations like Pueblo Cayambi (the leading indigenous branch of the powerful National Confederation of Indigenous Peoples –CONAIE). Not only program conduction decisions, but also instrumental designs, like the community biodiversity impact mapping system, have depended on the ancestral knowledge and local experience of the community and social organizations.

Under formal inter-institutional agreement between CEAS and the School of Agronomic Studies of the local branch of the Technical Salesian University many sampling design decisions, surveying tasks and community health monitoring labs have been accomplished.

At the *national level* our project was decisive in the promotion and implementation of a National Agrarian Research System (SIPAE), supported by ten of the most important institutions related to agrarian development in our country, created to organize and coordinate a research program to provide scientific services to different institutions dedicated to: local development programs; educational and training activities; and agrarian policy and incidence towards integral development goals.

At this same level our EcoHealth project also established formal agreements with the Ecuadorian Atomic Commission for pesticide tracing laboratory activities; with the National Water Fund to consolidate actions for the protection of water sources of the floricultural ecosystem. Finally all throughout the programs general and specialized workshops th, E presence and contribution of experts from the provincial health government, and from the local social security office were crucial.

And finally, we must also summarize in relation to the *international level* of actions, three fundamental lines of incidence: firstly, our project was chosen among other scientific institutions by the European Flower Label Program to develop a certification program –called FLP Program- to be the qualifier of those farms that accept to comply to international labor, social, gender and ecological protection standards; secondly, an international postgraduate research internship program with students from North American, European, and Latin American universities, has provided substantial scientific contributions to our project; and finally, the initiation of a “Just and Ecological Flower Campaign” in USA to promote consumer demand of FLP flowers.

Fair and ecological floriculture is on the way. One day the people of the Granobles River Basin will consolidate the new spirit that makes possible a healthy ecosystem. The *EcoHealth* Program will have taken part of that struggle to protect human life and nature.

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**ANNEX N° 1: AGROCHEMICALS TOXIC HUMAN IMPACT**

<b>TOXIC-DYNAMIC SITES</b>	<b>PRINCIPAL PHYSIOPATHOLOGICAL IMPACTS</b>
NERVOUS	*Muscarinic effect: autonomic system neurotransmitters *Nicotinic effect: motor neurons (neuromuscular synapses) *Central nervous system impact: cerebral development retardation *Peripheral nervous system: loss of sensitivity and discrimination
BLOOD MARROW	Hypoplastic anemia , WBC and platelet reduction ( normal Ferritine & Transferrine levels)
RESPIRATORY	Ciliairy structures, ventilatory function, inflammatory, enphysema, cyanosis & hemorrhage
RENAL	Inflamatory, tubular épithélium damage, Filtration
LIVER	Inflamatory, malfunction, (SGOT y SGPT) transference enzymes accumulation
GENETIC	DNA damage, genomic instability, adherence as aducts, could provoke mutation and neoplasms or cellular death (apoptosis); single gene damage (mutagenesis) or chromosome structure damage that leads to theratogenicity and neoplasm
DERMIC	Dermatosis (specially contact dermatitis and photo sensitivity
REPRODUCTIVE	*Mimetization or estrogen and testosterone blocking ; reproductive / endocrine system anomalies and hypo function; adrenal gland deterioration; *Endometriosis; *Degenerative changes of seminal epithelium; testicular atrophy.
IMMUNE	Immunoglobulin; loss of macrophage adherence