

Presentation to the C4D Alliance, IDRC
Resilience Thinking: The Only Way to Survive Climate Chaos!
Susan Walsh, USC Canada, January 22, 2014

Warm thanks for the opportunity to present on a subject dear to my heart. I know that many of you were hoping to hear Dr. Fikret Berkes, a prominent Canadian and international expert on the subject of resilience. I was myself! I am delighted, however, that he thought of me to replace him. I certainly won't fill his very big shoes but I do hope that I will have a take on this theme that you might not have considered or some insights from some applied experience that you will find of interest.

I first got to know Dr. Berkes when I took his graduate course on sustainable development within the University of Manitoba's Natural Resources Institute, about 18ish years ago. The course introduced me to a very new and I must say intriguing concept – resilience. For sustainable development, Dr. Berkes argued, resilience thinking is a must. Other than ecologists, there weren't too many people at that time talking about resilience, not in my anthropology or development circles at any rate. Dr. Berkes' lectures and my reading soon convinced me that resilience theory did not simply represent the latest development fad but a way of thinking about change, about community building and about rural livelihoods that would be central to my doctoral research. So I asked Dr. Berkes to join my PhD committee – one of my best professional decisions. Resilience theory indeed proved key to my studies with Indigenous farmers in the Andes and has since become central to the work of my organization. Because Professor Berkes was absolutely right – and here is my thesis for this talk – ***unless we approach food security, community development, and climate change through a resilience lens, this weary planet of ours will not survive the climate chaos of today and into the future.***

Now, I read the blurbs many of you filled in about your backgrounds and experience with this concept. Several of you I discovered are well versed in this theory and could probably be up here presenting. In your case, I look forward to strategizing with you later on how to turn this approach into a more mainstream one. For those of you who are comparatively new to this concept, I think you will recognize that there is a lot of common sense within a resilience framework. I suspect that your work already includes resilience thinking whether defined that way or not. However, if we look at the approaches that dominate the development industry today, at least in the area of food

security that I am most familiar with, I would venture to say that there is an unfortunate dearth of solid resilience thinking. And the stakes, as we know, are incredibly high.

This presentation has three parts to it. I'll provide a brief overview of resilience theory and share with you a resilience lens I developed that you might find useful to an assessment of the social change work we engage in. I will then explore two very different development assistance field programs, both in regions where climate challenges are already considerable. The first captures programming developed **without a resilience framework**; the second **with one**. You can maybe guess which one has the happier ending!

A quote to begin...

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This habit of observing natural objects and natural processes in their isolation...detached...from the whole vast interconnectedness of things... [presents them]... not as essentially changing, but as fixed constants; not in their life, but in their death.

Can any one suggest who said these words and when?

Those were the thoughts of Frederick Engels, (*circa 1875*). Another big thinker, albeit more on the Liberal end of the political spectrum, and from almost a century earlier made a very similar observation:

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All effects we observe in the world of experience are interrelated in the most constant manner and merge into one another. From the first to the last, they form a series of undulations.¹

Any guess who authored this quote? This time it was philosopher, scientist, poet and, I would add, pioneer ecologist, Johann Wolfgang von Goethe. He challenged his fellow citizens to consider nature and humanity's role within it as dynamic and interconnected, an ever-changing *web* of activity. Now those of you who have studied indigenous knowledge systems undoubtedly recognize such thinking. Great minds do

¹ Naydler 1996: 3.

² Berkes 2008 (cited in Pretty 2010:3) asks us to consider that the division commonly made between nature and culture is hardly universal, but rather reflects industrialized thought that seeks to control and manage nature. ² Also see Berkes, Folke and Colding 2003: 5.

³ Ibid.

⁴ Berkes et al. 2003: 14.

⁵ Swedish Ministry of the Environment 2002: 147.

⁶ Ibid. A note of caution is warranted for those wanting simply to super-impose ecological resilience on social resilience. If we are to avoid the biological determinism and reductionist thinking this concept attempts to bury, it makes more sense to consider social resilience as having borrowed concepts from ecological resilience to help us to understand the human dimension. See Adger 2000: 351.

⁷ Human-induced climate change and climate extremes also influence forest fires or insect outbreaks of

think alike and if I had more time, I would love to talk about the parallels. What I would like to stress now is that our Cartesian hurry to order, compartmentalize, and sequence nature's component parts² had its critics early on. And that while the field of 'resiliency science' is comparatively young, resilience theory is rooted in a well-established history of systems thinking and complexity theory.

Ecologists concerned about species losses and other troubling patterns they were witnessing in the natural environment, as well as the **inadequacy** of linear, compartmentalized models to understand the impact of such loss, stepped forward in the latter half of the twentieth century to grab the baton these earlier complexity theorists offered. To understand and steward complex ecosystems, they proposed, we needed to ask questions about the resilience of the interconnected parts of these natural and social systems.³ But what exactly did they mean by resilience?

One of the earliest resilience definitions came from C.S. Holling (generally referred to as Buzz) in the early 1970s. Resilience, he suggested, is the ability of a system to adapt to change and disturbance while still remaining within a critical threshold. Resilient systems, in short, cope with disturbance, stress, or change *without altering their fundamental character or identity*. There must be built-in options and enough redundancy in the system to better respond to stressors.

So resilience is correctly associated with diversity.⁴ Inter and intra-species diversity, for example, enhances an ecosystem's capacity to "withstand shocks and surprises, and if damaged, to rebuild itself".⁵

The broadening and popularization of resilience as a leading concept among development and environmental agencies occurred in the early days of this new century. In June 2002, a group of scientists from across the globe – many ecologists— gathered in Stockholm (Rio plus 10) to review progress on conservation initiatives launched at the original Earth Summit. They subsequently formed the Resilience Alliance determined to advance the notion **that environmental management and climate change work must be assessed through a resilience lens**. Members emphasized three critical features of

² Berkes 2008 (cited in Pretty 2010:3) asks us to consider that the division commonly made between nature and culture is hardly universal, but rather reflects industrialized thought that seeks to control and manage nature. ² Also see Berkes, Folke and Colding 2003: 5.

³ Ibid.

⁴ Berkes et al. 2003: 14.

⁵ Swedish Ministry of the Environment 2002: 147.

resilient systems:⁶

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This is how the Resilience Alliance first and then Dr. Berkes second capture the dynamism in resilience systems. Some of you will recognize the use of this graphic in current organizational development theory.

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Slide 5

Disturbances within a system of course are not only generated through naturally occurring events like forest fires and insect outbreaks⁷, but human-induced ones, like pollution or overfishing. So increasing attention has been paid to the interaction between ecological and social disturbances. That's where socio-ecological resilience enters the picture. A natural system's responses to resource use and the reciprocal response of people to changes in the natural ecosystems constitute **coupled, dynamic systems that exhibit adaptive behavior**".⁸ Dr. Berkes would describe these as nested systems:

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While ecologists appear to have taken the lead in the championing of this concept, more recently psychologists, mental health specialists, and a still wider range of social scientists have entered the field, paying particular attention to an **individual or group's capacity** to deal with adversity.⁹ The intimate connection between ecological and social resilience has also fostered research into the resilience of social systems. The emphasis here is on the notion of how social cohesion and a society's ability to *innovate* build resilience. And I would like to emphasize the importance of innovation. Resilience isn't just about rolling with the punches. It is also about the capacity to learn and innovate in

⁶ Ibid. A note of caution is warranted for those wanting simply to super-impose ecological resilience on social resilience. If we are to avoid the biological determinism and reductionist thinking this concept attempts to bury, it makes more sense to consider social resilience as having borrowed concepts from ecological resilience to help us to understand the human dimension. See Adger 2000: 351.

⁷ Human-induced climate change and climate extremes also influence forest fires or insect outbreaks of course.

⁸ Berkes et al. 2003: 14; Gunderson 1995.

⁹ See Berkes and Ross 2012: 2.

order to adapt – so fundamental to its definition is the idea of creativity. When one path, one approach, one opportunity is blocked, you need new ideas about moving forward. When we think about strengthening resilience, therefore, we need to think about the **space and scale** that permit creative thinking.

Holling's definition, as noted, includes the notion a **critical threshold**. When resilience is strong, disturbances may modify but not fundamentally change the system's core structure and strength. When resilience is weak, a disturbance can overtake a critical threshold, contributing to what ecologists have termed a "flip", the shift to a state that is less desirable and often irreversible.¹⁰

Social systems of course also have critical thresholds, with less resilient social systems particularly vulnerable to environmental, social, economic or political upheaval. In the short term, they may be able to "weather the storm" and continue to generate resources and services; but only as long as the disturbances or stresses do not exceed the systems' capacity to cope. Once at the threshold – the tipping point – even the smallest of disturbances – the proverbial "straw that broke the camel's back" – can send a social system over the brink and into a new reality. One of our clearest examples of a human-induced flip is the loss of the cod fishery in Newfoundland.

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Not only did the fishing industry collapse, but related businesses failed sparking significant outward migration. Villages were emptied and even the survival of the cod fish itself is in question, with scientists now suggesting that cod numbers might never revive to viable commercial fishing levels.¹¹

The catch of one too many cod off the Eastern seaboard is linked, of course, to the institutional systems that governed and guided fishers' activities. The Halifax Chronicle Herald's headline that went with this photo was: "Ottawa kills the cod fishery". I would suggest that when a community resource like cod becomes a diffuse global commodity, exploited in huge volumes in an effort to gain the competitive advantage – an uncaught fish being a lost opportunity – you ignore declining stocks until they are quite visibly threatened. The community resource becomes an industrial commodity divorced from its

¹⁰ Berkes et al. 2003: 15.

¹¹ MacKenzie 2009.

place in the natural environment and its role in building a thriving community-based and culturally important enterprise.

The socio-cultural context within which change takes place is thus central to the resilience of institutions and communities. So too are the knowledge systems that influence human interaction with the environment.¹² Princeton ecologist, Dr. Simon Levin, developed a list of eight commandments for the management of complex environmental systems. To guide my research in the year 2000 and more specifically to help me to assess the community or socio-ecological resilience within my research region, I borrowed from and adapted Levin's insightful "commandments" to develop a social or community resilience lens with nine key interconnected indicators. When you turn the indicator into a question, you can begin to understand the capacity to change without compromising one's identity and integrity.

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First, **is the community (or organization for that matter) acting in ways that reduce uncertainty and risk?** Is it carefully reading and monitoring internal and external forces that can affect their status and deliberately spreading risk? Within mountain farming systems I studied in Bolivia, for example, risk reduction involved knowing the diverse ecosystems and their functions really well and consciously producing on landscapes with diverse growing conditions.

Second, **is the community prepared for surprises?** Have rigid structures been avoided and is change and innovation embraced? Rules and protocols need to be, constantly monitored, adjustable, and changed on the basis of new information or insight.

How heterogenous is the community; or its institutions or social systems? Heterogeneity is a third fundamental component of a resilient system. Within ecological systems, the maintenance of biological diversity, in all its forms, is key. As we lose species and varieties within those species, we lose options. Cultural or generational homogeneity similarly contributes to a narrower knowledge base from which to problem-solve.

Fourth, is the community designed in such a way that component parts have some independence? Sustaining modularity within a system – independent components that are inter-linked but can be disconnected when necessary -- is a fourth

¹² See Adger 2000: 351.

important element in a resilient system. Within ecosystems, modular structures provide a buffering against “cascades of disaster”. Community institutions likewise have a better chance of survival against internal or external upheaval if they are decentralized and multifaceted.

Fifth, is there enough redundancy in the community’s operations? A lack of redundancy in tightly rationalized institutions can mean the loss of critical functions when unexpected disturbances require institutional memory and experience. Similarly, the knowledge of seniors and elders within a community can be critical to coping with an unexpected crisis.

Are there tight feedback loops in the decision-making structures? is the sixth question to ask. To encourage behaviour for the good of the commons and its inhabitants, the distance between decision, activity and benefit must be shortened and a sense of shared responsibility and ownership of the activity strengthened. **Consideration of the scale of an activity is therefore especially important.**¹³

Linked to adequate and tight feedback is the building of trust, the seventh key ingredient in a resilient community. Trust building is perhaps one of the most difficult characteristics to sustain but essential. The question then becomes: **Is the governance system at a size or scale that allows for the negotiation of a common agenda and confidence building.**

Characteristic eight is the commitment to act for the collective good. **So the question becomes how is the collective good understood and how does competition help or hinder it?** Unbridled competition and divisiveness can send a community into an abyss of conflict and destruction. Again, the decline of the cod fishery is instructive.

Finally, any worthwhile assessment of a community’s ability to maintain heterogeneity and diversity, to learn to live with and learn from change and disturbance, to carve out meaningful spaces for the building of trust and for practices in favour of the common good and finally, to nurture and act on knowledge that is helpful to the community, must assess the question of power and who gets to make the decisions and who benefits. **Question nine** (and this was a subject Levin did not address directly) : **Is the community open, willing to address control and ownership in inclusive ways, and willing to share knowledge?**

¹³ See Wilbanks and Kates 1999.

Viewing community through a lens like this one is clearly not the only, or necessarily definitive, way to understand a community's socio-ecological resilience. There are other models: Fikret Berkes captured resilient systems this way:

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And I know that the Resilience Alliance has an entire workbook available on line. I simply want to suggest that if these kinds of questions are posed and discussed through open, collaborative processes, we might begin to have a sense of inherent strengths and matters in need of attention and support.

I should also add that like all concepts that come into vogue within the field of international development assistance, there are critics of resilience as a development tool, largely, I believe, when it too is offered from the outside in a prescriptive or mechanistic fashion. Misuses aside, as a guiding framework for sustainable change, the strengthening of resilience is an extremely attractive alternative to the more limiting, too often pejorative, concept of poverty reduction. When we think about poverty, we tend to think about what is lacking either within disadvantaged communities or among the residents themselves. The dearth of healthy soils for food production, for example, leads to conclusions about a lack of local knowledge about soil health. This conclusion can, in turn, contribute to an outsider-driven program to fix the problem or fill the void, often with recipes that either worked for the outsider or that suit their outsider interests. When a resilience lens is applied, you start instead with strengths that can be built upon, then you trouble-shoot. Even in the direst of circumstances, there is resilience to be found, since the act of survival is often an example of core strength and staring down adversity.¹⁴

To help illustrate these points, I would like us to leave Canada for a bit to share with you an abridged story of my Bolivia experience with indigenous potato farmers, called *Jalq'a*, in the year 2000. I had already worked in the international rural development field for about fifteen years when I headed to their highlands. But it was

¹⁴ In the year 2000, and arguably still today, the term resilience was not a significant part of the development discourse I encountered in Bolivia or, for that matter, more broadly within the Andes. Resilience does not even translate well into Spanish. When I used it with many of my Latin American colleagues, they first interpret the word as resistance, which is, of course, a kindred word. The concept that was deeply 'in vogue' in 2000 within Latin America was "—interculturalism. The concept reflects an approach to interaction between and within cultures that does, however, share some characteristics with resilient principles. Its proponents stress the importance of our inter-relationships and mutual learning. They also insist on the power sharing needed for more equitable engagement and development.

these indigenous potato farmers who really taught me about the importance of first looking carefully at the knowledge, natural resource assets, and resilience already on the farm if we really want to keep people on landscapes with climate extremes.

The Andean highlands of western South America are imposing, at times merciless, filled with arched-backed ridges, sculpted rock faces, bright patches of green, purple, red and gold at harvest, and ribbon-thin roads connecting villages of adobe. Their beauty can take your breath away (the altitude too, for that matter!); but their splendor reaches beyond a commanding appearance. Their indigenous residents can lay claim to one of the world's greatest shares of cultivated plants and more particularly to the center of origin and diversity for potatoes, the world's fourth most important food crop. What a privilege it was to hike into my research communities on paths like this one

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and to study with people like these incredibly hard-working Jalq'a farmers from Mojón.

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One slopes like these,

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they were growing this kind of potato diversity:

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For a host of very complex reasons, these potato farmers were not doing particularly well in the year 2000. Part of the problem – the paradox I discovered -- was that the development assistance they were receiving was steadily eroding the inherent strengths of their local farming systems. Development institutions and non-governmental organizations or NGOs, from the political right and left, had failed, to varying degrees, to take seriously their differing worldviews and knowledge systems. Most particularly they ignored a centuries-old resilience strategy called ecological complementarity which was at the core of the land management and food production systems I studied in Bolivia.

Some of you may know the system as *doble domicilio*, vertical farming, or dual homesteading. Farmers produce their food at different altitudes, growing several

varieties of root, bean and certain cereal crops in the highlands, and corn, wheat and fruit crops in the valleys. This multiplicity of lands, spaced between highland and valley ecosystems and generally within a few days hike, serves both as an adaptation to high levels of climatic risk and as an effective method of generating wealth. It is a longstanding approach to food security that waves of external actors – from the Spanish colonizers to ‘modern’ governments and development experts – had not managed to eradicate completely in that region, despite their best attempts. And it is very strategic since the long-term security of any population is based not, I would argue as Rod Burchard did, on its average level of production and consumption, but on the way in which it is able to weather periods of maximum scarcity.

There are several other dynamic and complementary components within this system but for the sake of time let me highlight just one more, an especially clever, collaborative land-management strategy still practiced in one of my research communities called “*manta*”. In addition to their own family fields, each family had a community *manta* field for food production. They got to keep and exchange or sell the produce of their *manta* field; but the broader community determined the crop cultivated each year, as well as the rotation cycle and fallowing period, oversight that not only benefited the commons, but with its built in supply-management mechanism, the community economy as well. At one point in their history, it was the dominant system.

Mantas and the multi-faceted ecological complementarity more broadly, was and continues to be, a resilience strategy par excellence in my books, as the next slide suggests. Note the outer ring could be moved as one might with a kaleidoscope, and the resilience principle would still hold.

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Unfortunately, this resilience thinking was not well understood or appreciated by the development workers supporting these farmers. To the contrary, dual landholding was generally considered a nuisance. Valley travels disrupted NGO training programs. So producers were encouraged to stay put, intensify production, and adopt introduced “*Green Revolution*” potatoes bred with a focus almost exclusively on yield.

It didn’t seem to matter terribly that these introduced spuds would need a costly dose of fertilizer, pesticides and insecticides to grow well on their semi-arid high mountain hillsides. Nor was their plasticity – productivity on differing landscapes considered. The extra time and fuel needed to cook them was not factored in or the fact

that the water content of these new potatoes was much higher, with protein, antioxidant and minerals levels significantly lower. Compared to the pockmarked, odd shaped local varieties, these foreign interlopers were handsome with few blemishes so they would do well in markets seeking uniform quality control and shapes that fed easily into... French-fry machines.

Fortunately, at least half the families in my study continued their dual homesteading with almost all resisting a complete abandonment of their local tubers, holding on to at least a handful of their favourite, tastier, and more nutritious varieties. But the commercial potential of the faster growing and higher yielding new potatoes was too attractive to pass up. Yields **were great** during the first two years. So farmers planted most of their potato fields with the introduced tubers, abandoning or neglecting up to 60% of the varieties that their ancestors had nurtured over generations. Commercial potato monoculture took hold with a vengeance.

The competitive nature of market conditions also seems to have been overlooked by the well-intentioned development experts. In those first few years, the new potatoes performed well. The supply increased quite substantially but surprise, surprise, the price per kilo dropped like a stone. So, as this next slide suggests,

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to make-up for considerably lower unit prices farmers had to produce more. To produce more introduced potatoes on semi-arid soils, they needed more synthetic inputs. To purchase more inputs they needed credit. To pay back the credit, they needed more volume. To increase the volume, they needed more credit. Do you see the pattern here? Farming shifted from ensuring enough surplus production to obtain a modest level of disposable income to one of trying desperately to make credit payments. Fallowing periods were shortened. Overused fields and drug-addicted crops made the soils less and less fertile. And the introduced seeds started to deteriorate after year two, as did women's health since they were the ones that handled chemicals with labels they could not read.

The trade-off, in short, did not pay off. In the year 2000, the average family farming income among respondents in one of the communities I studied – the one with a twenty year history of development funding -- was approximately \$311 Canadian dollars – less than a dollar a day for their backbreaking labour.

It would be unfair to point only an accusing finger for this state of affairs at the development community alone. But the blind eye to the sophisticated resilience systems that had been in place, meant that the assistance offered neither reaped the economic results anticipated nor curbed the most repeated complaint among farm families in the region: land deterioration and soil infertility. And, “to survive, a group needs not only to produce its means of subsistence, but to reproduce the conditions that allow survival”. The biodiversity that remained within these communities had been maintained *in spite of rather than because of* outsiders sent to help. It was not, I concluded, what the smallholder farmers lacked that merited a helping hand, but what they already had – highly threatened but sophisticated ecosystem management and resilience strategies. And of course this hubris is all too common as we know. Guess which potatoes survived the frost of the previous week? The green ones were the farmers’ *vairiteis* while the blackened one came from the national research institute.

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So how can we do things differently? Let’s head now a country that in 2013 earned the dubious distinction of being either the most disaster prone in the world or close to it and where, for the sake of our beloved Chikita banana, or the tins of pineapple we add to our fruit salades, smallholder farmers were pushed onto steep hillsides, less fertile landscapes, and into hunger. The country... Honduras.

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In an attempt to redress such injustice, with CIAT support, the University of Guelph’s, Dr. Sally Humphries, together with a prominent bean breeder, José Jimenez, launched in 1993 a pilot program in participatory agricultural research that featured an innovative strategy to bring farmers into the center of the research process. They formed farmer-researcher teams, called CIALs, convinced that the research need to be grounded in farmers reality and that they too had been, and could again become, in-situ scientists.

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This work led to the founding of a local NGO – FIPAH (La Fundación para la Investigación Participativa con Agricultores de Honduras), funded in the early years through a grant via Guelph University from Canada’s own ... IDRC. Enter Hurricane Mitch:

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Mitch showed absolutely no mercy on Honduran hillsides. That's when USC Canada, with CIDA support, reached out. We offered to bring our **Seed of Survival program** to Honduras and to help rebuild local production systems beginning with the first link in the food chain—their seeds.

Everyone – the CIAL farmers, FIPAH, local scientists, and USC Canada realized that they needed to bring hardier, more weather resistant local varieties back into the system. They had no choice really. The formal research system had never developed materials for the environmental and cultural conditions of small-holder hillside farmers. There were no hardy local seeds to take out of the gene bank for re-distribution. So in the early years, participatory plant breeding was core to this program. FIPAH and farmer research teams collaborated with national scientists to learn and fine tune skills to help them segregate materials in early generations and to select offspring that could handle local conditions.

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And it worked. The most popular bean landrace was crossed with other beans to improve disease resistance and to raise yields. The crossed seeds were then returned to a collective experimental plot in one of the communities at 1,300 meters. CIALs from different communities came to select the best offspring from the crosses, which they subsequently took back to their own communities for testing.

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In a five-year period, the CIALs succeeded in creating bean varieties that have significantly improved the yields of disadvantaged high altitude, farmers. Revenues from bean sales also increased. A similar experience with maize over a six-year period resulted in two maize varieties that the Honduran government is now considering for national distribution.

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And there was plenty of 'proof in the pudding!' A peer reviewed participatory impact assessment in 2004 demonstrated a decrease in the hungry season – referred as

los Junios – from 5.6 weeks a year to just under 1.4 weeks. These scenes from the meetings the University of Guelph grad student responsible for the study organized to share her findings.

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A decade later our FIPAH colleagues tell us that ‘los Junios’ have disappeared altogether in participating communities.

This end to hunger is not simply the fruit of a clever participatory plant-breeding program of course. It is the result of resilience thinking and several interconnected components. Farmers’ knowledge is at the core for the work and farmers problem-solve together testing long-standing practices and learning new research skills and practices. So tons of innovation!

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And by recognizing the importance of their own varieties, they have a much greater consciousness about the value of conserving the area’s plant genetic resources. They also engage in watershed and natural resource management practices tied closely to their multi-functional, agro-ecology farming systems based on the locally available, natural materials—including forest microbes -- to keep their soils healthy and productive.

The women you didn’t see in that initial slide of the first CIAL are now key and keen actors in the program and have won new freedoms, status and income through their participation – a far cry from their status as “solamente una amba de casa” or “a mere housewives”. **Another peer reviewed Guelph study from 2012** on gender relations confirmed a number of very positive benefits but let me tell you quickly about Doña Luisa in this next slide.

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Participating communities have also developed seed banks to store seeds and produce until prices are right, as well to exchange or loans seeds, conserve germplasm and as insurance for tougher times.

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Biodiversity fairs have blossomed, generating a healthy level of community competition for the greatest number of local varieties, further advancing biodiversity conservation.

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There is intergenerational engagement and reduced youth migration because for the first time youth are starting to see that their could be a future on their hillsides. This attention to young farmers is absolutely critical in a country's whose other dubious distinction is its enormous youth gang violence.

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The growth in political consciousness is impressive, focussed especially on farmers' right to maintain and grow their own varieties, as well as a growing awareness of wider issues associated with the impact of biotech seeds on local seed systems. FIPAH has recently succeeded in engaging the Honduran government in a body to systematically address the country's plant genetic resources.

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Let me repeat: Honduras is one of the planet's most disaster prone country in the world. Climate unpredictability and extremes are breathing down the necks of the women and men farmers today and with increasing frequency. Yet these farm families are showing us that it is possible to stay on those lands, to eat three meals a day, to have enough seed to exchange, sell and save, to keep your children around, and to sell produce in local markets.

According to the USDA, it costs approx. 136 million dollars to develop a single genetically modified crop variety. And even if that engineered seed were to be the most climate resilient, however doubtful at this point, it would represent just one tiny piece of a much broader undertaking in the building of broad-based climate resilience. This Honduras program has received not even 2 million dollars over the last 10 years – 68 times less that the cost of that single GMO techno-fix. Bang for the buck, I'd keep investing the money in the resilience strategy with a more comprehensive view and a sensible dose of humility.

Thank You! Merci!

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Please Note: For a detailed bibliography and references on this subject please look for my book this fall 2014: *Trojan Horse Aid: Resistance and Resilience in the Bolivian Andes and Beyond*. It will be available through McGill Queens University Press. <http://www.mqup.ca>. Further information on USC Canada's Honduras program, including short films, can be found at : www.usc-canada.org.