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Contents

From the Editor

1

Articles

The Great Sustainability Challenge
by Isidor Wallimann

3

Traditional Fishing Folk’s Knowledge
on Costa Rica’s Southern Caribbean
Coast: A Critical Component in a
Formula For Lionfish Reduction
by María Suárez Toro

7

Case Study Model in Resilience:
Occupational Safety Health and Disaster
Response to Flood at Universidad de La
Sabana in Chía, Cundinamarca,
Colombia, South America
by Gail Fraser Chanpong
Sherdeana Owens

23

Strategies for Communication: San
Patricio County Pandemic Preparedness
Assessment
by Sherdeana Owens
Aima Jeffresswood

33

Disaster Preparedness: Developing
Sustainable Communities for Older
Adults and Other Vulnerable
Populations by Erika Symonette

41

Commentary

Disability Under Capitalism and
Marxism
by Ray Elling

78

Book Review

Between Preservation and
Exploitation: Transnational
Advocacy Networks and
Conservation in Developing
Countries
by Jaysen Scott

83

News

Killa-Watts – Hydroelectric Test
Stand & Turbine Design by Team
by Xavier Castelazo
Dakota Bowe
Sarah Minette
Garret Inkster
Cody Tilghman

85

Youth Corner

The Lead Free Project
by Sehaj Sandhu
Tarun Kudaka
Kabir Bhakta

86

Origins and development of Afro-
descendants on the south Atlantic
Coast of Nicaragua
by Daylon Moses Downs

96

Intervention to Public Space: Community Gardening in New York and Berlin. by Christa Müller	48	Decenio Internacional De Los Afrodescendientes Reconocimiento, Justicia y Desarrollo by Mallory Brown	101
Fresh supply chains for sustainable destinations: case study in La Fortuna by Mercedes Montero	60	Rachel Carson: An Inspirational Environmentalist by Samara Amin	103

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Sustainable Communities Review



From the Editors



We lead out this issue with Isidor Wallimann's paper on the Great Sustainable Challenge. One major point is that social and environmental policy must be merged. This is akin to Bill McKibben in his recent article in the Nation (<https://www.thenation.com/authors/bill-mckibben/>). Both Isidor and Bill underscore the point that sustainability with climate change are not simple goals. McKibben sees the Paris Agreement as very weak. While we can agree, the social movement aspect of the collective effort (when you think on how hard it has been to create the Paris Agreement).

Our next papers deal with small scale solutions and planning efforts to prepare for disasters. Maria Suarez Toro introduces us to the struggle to reduce Lionfish, an invasive species, on the Southern Caribbean Coast that is reducing fish populations. Gail Chanpong and Sherdeana Owens provides a comprehensive resilience plan to avoid future disaster from flooding of the Universidad de La

About the Editors

Stanley R. Ingman, Professor of Applied Gerontology, University of North Texas, Denton, Texas. Associate Editor: **Iftexhar Amin**, Associate Professor of Gerontology, University of North Texas-Dallas, Texas., USA.

Sabana in Chia, Columbia. As climate change continues to bring sea level rise, all nations will need to adjust potential threats to human well-being and property.

The two following paper deal with planning for disaster at the community level. Erika Symonette reviews existing planning approaches and how response to Katrina did or did not assist one vulnerable population, that is, the elderly. Faith Based communities ended up being the local resource that made the community more responsive. Sherdeana Owens and Alma Jeffresswood so us how communities can better prepare by surveying community residents how prepared to meet a disaster such as a pandemic influenza threat.

Community or urban gardening is currently a rage in many communities across America. Cities like Basel Switzerland have had some 500 urban gardens. Christa Muller compares efforts in New York and Berlin. While we may not feed our growing populations with urban gardens for the foreseeable future, we are amazing how old depopulated cities like Detroit are seeing the growth of urban farmers. Community solidarity may one important impact in high income urban societies.

In order to encourage future researchers, activists and educator in sustainability we have created a Youth Corner, where youths will have opportunity to share their projects. The Youth Corner will empower young people in schools and colleges to join the struggle, battle and movement to make all communities around the world more resilient, more soul enhancing and more sustainable.

Finally, Mercedes Montero provides a detailed analysis of supply train and how they may support more sustainable business practices, under the banner of “local production for local consumption” in La Fortuna in Costa Rica. With global transportation improving and reducing cost rapidly, this will be major challenge for the sustainability movement to address.



ARTICLE

The Great Sustainability Challenge

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The balance between society and nature is askew. The age of industrialization and the subsequent era of consumerism are large culprits for pollution and the degradation of the environment. Human activity on Earth has undeniably affected the planet and has contributed colossal levels of carbon emissions that are pushing global temperatures to keep rising. Significant ecological risks to human survival may result from not taking more pressing action. Governments have a role to play in moving more rapidly and effectively towards more sustainable practices – “how to be more sustainable?” is a question that must be integrated in all decision-making processes.

¹ Originally published in Revolve Magazine.
http://issuu.com/revolve-magazine/docs/re11_digital_issue

While agrarian modes of production also faced sustainability challenges, the magnitude is immensely greater for contemporary industrial models. A society's interaction with nature must be balanced in all modes of production – not to preserve the often romanticized notions of wilderness or conservation, but rather because significant imbalances are bound to result in severe social problems. The reverse is equally true: imbalances in terms of social justice often lead to imbalances in the society-nature exchange that feed back onto society in the form of social problems. As a result, social and environmental policies for managing current problems and addressing future hurdles are intricately intertwined.

All production involves the use of natural resources that are transformed into products that are needed or wanted by humans. Never before in history has this transformation and distribution of products been so vast. Never before has this process been organized in such complexity drawing upon a multitude of sciences. The systemic complexity of production processes and societal consumerism has become a risk to sustainability. Significant social upheavals could result from discontinuities, shocks and bottlenecks within the system – popular revolts are on the rise; environmental disasters are increasing; drastic changes are underway that required a more sustainable approach.

The Society-Nature Nexus

The lack of a sustainable system has created a sense of urgency to bring the society-nature exchange into balance and to make the complex production and social system of industrialized society more resilient. To optimize resilience, populations could – wherever possible – meet their own needs with resources from their region. This would translate into emphasizing the importance of “the local” over “the global”: local self-sufficiency vs. global dependency;

local production and exchange patterns based on tight circularity in exchange; local alternative currencies for reinforcing local economic circularity; local and urban agriculture for food sovereignty; local conservation of resources; and local autarchy in energy and other pertinent resources.

To balance our society-nature exchange, the volume of resources flowing into the production process must be drastically reduced and those resources and products will have to be used more often before they are returned to nature through various modes of recycling. This means consuming fewer resources and consuming them more efficiently. Reducing the volume of emissions back into nature alone will not suffice. Qualitative decisions will also need to be made as to what kind of emissions will be produced. Some emissions (gases, chemical products, nuclear substances, nanotech materials, genetically modified goods) can be better appropriated by nature, thus allowing for more balance in the society-nature exchange and for less negative impacts on society and the environment.

Envisioning a production system that uses fewer resources has caused some new and not so new discourses to emerge. New is the discourse around “decroissance” (or “degrowth”) whereby the production system shrinks at a given rate while also being transformed. Somewhat less new is the discourse around “zero growth” which also assumes that the production system must be adjusted. Since the capitalist money accumulation strategy is built around positive growth it would not be able to “survive” in zero or negative growth environments and would in turn also need a transformation. The call for qualitative measures of “growth” and “well-being” such as the Human Development Index (HDI) is now being revived and implemented by NGOs and policy-makers.

The application of the polluter pays principle could foster more solidarity than the shared burden approach in dealing with environmental and social

problems. The polluter pays principle is anchored in an ethic of responsibility that permits no one to inflict harm or pass costs onto others. Actors are expected to behave in a responsible manner and be held accountable if they do not. The polluter pays principle runs counter to capitalist market economies within which profits and capital accumulation often represent gains made at the expense of others due to socio-environmental negative impacts. At present, social and environmental policy relies too heavily on the shared burden approach in mitigating the burdens imposed by negative externalities. Unfortunately, this outdated “welfare state” notion frees irresponsible, unethical actors of assuming responsibility while depleting public funds.

A Sustainability Policy

A serious transition towards social and ecological sustainability will require much more proactive policies and an overall policy paradigm shift. Social problems are generally dealt within one policy corner and environmental problems in another. The tendency to separate these very significant and large policy fields must be corrected. Environmental policy can (and should) be thought of and practiced as social policy – and vice versa. Tremendous benefits are to be expected if sustainability is the goal.

Conversely, any separation comes at the cost of policy efficiency and positive impact. One policy domain may explicitly or implicitly counteract – or even outright “sabotage” – the other. Under these circumstances, sustainability – an often and highly acclaimed goal – becomes simply rhetoric. For instance, funds to deal with social problems are often derivatives of economic growth. More quantitative economic growth leads to more available funds. But this mechanism may counteract efforts by environmental policy to contain the environmental damage caused by quantitative economic growth.

The need to regulate human interaction with nature through environmental policy is in many

instances directly connected to social risks, human survival, and to social and economic change, all of which are vital to social policy. Many more examples show how social and environmental policies are intricately interwoven in both specific issues and the macro policy frameworks. Yet few efforts are under way to discern the social policy implications of environmental policy and to think and practice the two policies jointly in one integrated field of sustainability policy.

Other policy fields could greatly benefit from interacting in a trans-disciplinary manner. Most academic fields and disciplines should ask how “their” knowledge relates to issues of social and environmental sustainability. Understanding that sustainability cannot be attained without coordinating environmental and social policy will certainly lead to more holistic approaches in politics and policies. This new vision will inevitably lead to new ideas for how the two policy fields can be merged into one. This calls for a paradigm shift.

Reliance on techniques like Environmental or Social Impact Assessments is no longer adequate, since they tend to focus uniquely on local or regional cases without applying social and environmental criteria. The new sustainability policy paradigm suggests that environmental and social policy be synthetically combined and that this trans-disciplinary act be complemented by other academic disciplines asking: “How can we contribute our knowledge to a more sustainable society?” “What knowledge inhibits or obstructs a more sustainable society?”

Cross-Sector Practices

Sustainability is defined as a societal pattern of interaction with nature that assures a very long-term output and distribution mode sufficient for all to live in dignity and in accord with the average longevity of human life. It is evident that many academic disciplines

are strongly intertwined once sustainability becomes their focus. Sustainability can thus only be discussed, researched, planned and implemented under a trans-disciplinary perspective and practice.

All academic disciplines and curricula need to be examined for their relevance in terms of sustainability. Do their research and teaching tend to magnify sustainability problems or help mitigate them? How do they contribute to transitioning society to sustainability? Sustainability would become a cross sectional perspective similar to the notion of gender. There, too, the need to reflect on dimensions of gender in all we think and do has been seen as a necessary component in transforming gender relation patterns.

Science and technology are deeply embedded in our capitalist system and in its pursuits of production and consumption. They serve as the knowledge-base for transforming nature into products and services. Thanks in part to this knowledge-base, the global economic process has been able to attain its complexity and highly out-sourced and intricate division of labor, characterized by horizontal and vertical dependencies based on inequality and exploitation.

Energy consumption would have to be cut to between one fourth and one tenth of the energy consumed today, back to roughly the levels of the 1950s. Most energy reduction efforts would have to come from the core of the industrialized world, about one billion people, as well as another billion in

industrially-emerging countries. The remaining 5 billion of the world's population already consumes energy at sustainable levels, and their per capita energy consumption could even be somewhat increased.

Since the output of the industrial production system is a function of energy, about 5 billion of the world's population is far removed from industrial societies though they may contribute natural resources or agricultural products to others who live in full or emerging industrial societies. The 5 billion live in needs-based production systems – the back-bone for any form of sustainable future given present and projected world population figures.

To implement the energy transition to better practices, we need a scientific knowledge-base that is applied in social and environmental policy and includes sustainability as an overarching cross-sectional policy. Roughly 5 billion people on this planet living mostly in need-based economic systems are moving towards more sustainable ways of living, even after accounting for the negative spill-over burden emanating from wants-based societies of industrialization and consumerism. A paradigm shift is underway and sustainability is at the very epicenter of the emerging model for cleaner economies.



Traditional Fishing Folk's Knowledge on Costa Rica's Southern Caribbean Coast: A Critical Component in a Formula for Lionfish Reduction

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Introduction

The artisanal fishing community on Costa Rica's Southern Caribbean coastline has learned to protect its marine ecosystems while developing an artisanal fishing livelihood based on the traditional knowledge that has characterized the area historically. This has been the case since 1750, when the first non-indigenous fishing folk arrived there from Panama's Caribbean coast, from small Caribbean islands and from the Nicaraguan Atlantic coast.

Initially they would create temporary settlements during the fishing months from March to September, but in 1828 the first permanent settlers established themselves in the region. These settlers were



Afro-Caribbean fishermen who came mostly from Panamá and Jamaica, some with their families, while others partnered with Bribri and Cabécar indigenous women who lived in the Talamanca highlands. Fishing turtle to sell in Bocas del Toro in Panamá was their main livelihood while they also developed subsistence agriculture and fishing for their food ("Fishers of Turtle", n.d.). The coastal marine ecosystems of the Southern Caribbean where they fish include coral reefs, tidal flats, coastal lagoons, mangroves, and sea grass communities that contain a vast diversity of marine life, in an area of some 12,800 km of ocean.

At the end of the 1970s, two Protected Marine Areas were declared in the region by the government as part of its conservation policy: Cahuita and Gandoca Manzanillo (Hoyt, 2005). Artisanal fishing has continued in the region with strong restrictions being imposed in the protected areas and weaker restrictions being imposed in non-protected

¹ Published in the book: Faraclas, N., R. Severing, C. Weijer, E. Echteld, W. Rutgers and R. Dupey. eds. 2016. Celebrating Multiple Identities: Opting out of neocolonialmonolinguisism, monoculturalism and mono-identification in the Greater Caribbean. Willemstad: University of Curaçao and Fundashon pa Planifikashon di Idioma. p 391-407.

areas. The region's fishing communities have been organized under the auspices of the *Association de Pescadores Artesanales Caribe Sur* (ASOpacs - Association of Artisanal fishing folk of the Southern Caribbean Coast – hereafter referred to as the “Association”) since 2011 to “protect local artisanal fisheries, improve local living conditions and livelihoods, and establish collective decision-making in the fishing community.

The Lionfish (*Pterois volitans*, and *Pterois miles*) is a small predatory reef fish, with bold red, white, creamy or black bands, pectoral fins and spiky venomous spines (*Pterois*, n.d.). It was originally restricted in its distribution to Indo-Pacific waters, but was discovered in the Southern Caribbean region in 2009 by fishermen in the area, who immediately reported it to local and national authorities. In the face a potentially devastating invasion of its marine ecosystems by this dangerous predator, the Association has adopted a holistic approach for reducing its numbers.

The effects of Lionfish on the marine ecosystems of the Southern Caribbean are currently being studied by the Association, principally by tapping into the traditional knowledge of local fishing folk with the goals of collecting data on the Lionfish for scientific studies, gathering the stories of the fishing folk, proposing relevant policy changes to deal with the damage inflicted by this invasive species, and mobilizing the fishing folk to take steps to control the predator themselves. After all, they are the population that is on the frontlines of the invasion. Local natural resource agencies have had to rely primarily on local knowledge, thus

reinforcing the importance of local communities and their traditional knowledge in conservation. The fishing folk's organization is showcasing how traditional knowledge is relevant to the protection of marine life, to the maintenance of the livelihood of the community, to the promotion of ethical and sustainable science and to the formulation of renewed policy making about the protection of marine ecosystems.

Traditional knowledge is defined in this study as the knowledge that is constructed by human beings in “interactive observation” with other forms of life in their day to day lived experiences in their quest to live life to its fullest. The phrase coined to describe this in the Southern Caribbean has become a motto: *pura vida* (pure life). *Pura vida*, however, is more than just a motto. It is an active concept, not just the descriptive noun that many newcomers to the area might think it is. In this case study, “traditional knowledge” relates to the knowledge that has emerged historically in a community that has had fishing as one of its main livelihood strategies. Fishing folk's interactive observation with the rest of nature has provided a wealth of knowledge that has been critical historically and is critical today in the interaction between protection of the environment and protection of people's livelihoods, showing that it is possible to achieve an equilibrium among all forms of life.

This case study documents how the Association is tapping into its members' traditional knowledges and practices to reduce the population of lionfish and

simultaneously establish a local lionfish export fishery to complement more traditional revenues generated through lobster and red snapper sales, while protecting native fish stocks and influencing policy making regarding invasive species in protected areas.

New emerging issue faced by the fishing community

Fishing on the Caribbean Coast of Costa Rica has been largely based on “sustainable fishing”, which to the Association means protecting the coastal marine environment that provides their livelihoods, while at the same time creating better social conditions for their communities. These communities traditionally use many fishing methods including, but not restricted to, spears, hooks, loglines, diving, traps and gillnets. This is contrary to what has happened on the Pacific Coast of the country, for example, where industrial commercial boats and methods, such as bottom trawling, have emerged, almost extinguishing artisanal fishing and definitely impacting marine life in destructive ways. Bottom trawling does not discriminate in its catch and it kills marine life at a rate that does not allow for it to reproduce according to its own natural cycles.

Sustainable fishing has not been easy to maintain in the Southern Caribbean. Conflicts regarding policy have emerged. One example is turtle fishing, a main source of income for fishing folk, which has been banned since 1977 when the laws that created National Parks came into effect with provisions for the

protection of endangered species and more recently, Law No.8325 enacted in 2002 for the Protection, Conservation and Recovery of Populations of Marine Turtles. Resistance to those measures did not last long, however, probably because fishing folk had always developed diverse ways of fishing for a diversity of species. During the times of the year when they cannot fish due to weather conditions or the “vedas” (fishing bans) for the protection of the reproduction of lobster, they combine fishing with growing crops, construction and more recently conducting eco-tourism boat trips. Another conflict has arisen because the government has not provided a subsidy to the fishing folk of the Caribbean in the same way that it has for fishing folk on the Pacific coast. This is something that the Association is trying to change by demanding equal treatment.

The most recent challenge, however, comes from the Lionfish which is spreading massively on the Caribbean and Atlantic coasts of Central America because it has no predator in this region. According to marine biologists (Hixon, 2011), there is now a higher larger density of Lionfish in the Atlantic Ocean than there is in its place of origin in the Indo Pacific region. A study by Arrieta (2013) in Puerto Viejo and Punta Mona in 2010 examined the Lionfish as part of the structure of the community of fish in the coral reefs. In the findings, the Lionfish appears as one of the 10 most common species. Another survey conducted by Sandel (2011) of the catch of Lionfish in the Cahuita National Park and the Gandoca Manzanillo Natural Reserve found that there were an average of 92 Lionfish fish per hectare, with

Manzanillo having the highest density of Lionfish at $161,5 \pm 217,6$.

Rafael Hernández, a local fisherman in Punta Uva explained how he was first to report the invasion to national authorities and scientists in June 2009 (Personal interview, 2015).

Although fishing folk did not have Internet access at that time to learn more about the Lionfish, they realized early on that this was a foreign species, because they knew their ecosystems from first-hand lifelong experience. Hernández is in his forties and has fished almost every coral reef in the area since he was a child. The strange animal (Lionfish), which looks like seaweed when its camouflage blends into the coral reef, did not fool him when he saw it.

Another experience was related by his younger brother Andres Hernández who, upon realizing that he was looking at one of the fish his brother had reported seeing, went ahead to catch it with his spear and then used both hands to bring it to shore. The stings from the venomous spikes of the Lionfish were so bad that he had to take an ambulance to the local clinic to treat the resulting respiratory problems and swelling which lasted for days. This story sounded the alert for the entire fishing community who in turn began doing their own research and calling attention to the problems posed by the new invader for their ecosystem, their livelihoods and their health.

An early example of the link between traditional knowledge and “good science”

That same year, a fisherman by the name of Jose Ugalde Sr. asked me to show him a weathercast on the computer. He

wanted to see if computer technology could help him to figure how weather changes might be having an impact on his fishing and his livelihood (J. Ugalde, personal interview, 2012). I showed him and he was in awe at what he saw on the screen. The weather forecast for the day was correct. “How does it (the computer) know?” Don Jose asked. I explained that there were people placing the information on the computer, people like him who learn through their interaction with the rest of nature, but also people who learn about the weather by studying the issue scientifically in laboratories and through mathematical projections.

“Are they fishermen?” Don Jose asked me. He wanted to know how those people behind the computers knew about the weather. I explained to him that there are many ways of knowing about the weather. “Some have learned it through the study of the weather and climate of the planet and others from practical experience as you learned from your parents and grandparents, which is the oldest way of producing knowledge.”

Almost immediately we engaged in a conversation about climate change, concluding that nowadays it is almost impossible to predict the weather, which is one of the reasons why the fishermen wanted access to computers to try to figure out what is going on. With climate change, the weather has changed so much that as a fisherman he felt he could no longer figure out for sure whether to go out in his boat on a given clear day or not. More than once had Don Jose and I gone fishing only to be caught in strong winds and high waves in his small boat.

Local fishing folk rely on “signs” from the sky when looking south to tell them if the day is going to be clear or rainy. They also ‘read’ the winds which, when they shift to come from the Talamanca mountains instead from the ocean as they usually do, indicate that bad winds are soon to come. They interpret shifts in the rocking of their boats as well, so that when they rock sideways instead of front to back and back to front, they know that high waves are soon to come. All of these signs have been passed from one generation to the next through years of interactive observation. But today, a red sky at night is not necessarily a sailor’s delight as the saying goes. The atmosphere is warmer and it can cause a red glow under new conditions that are not necessarily linked to good weather the next day. Changes in climate – whatever their origins - are bringing about weather patterns that are hard to predict, even with traditional interactive knowledge.

The main thing I learned from this interaction is not to underestimate fishing folk’s ways of knowing, because although they might need adjustment in new emerging situations, their traditional science has much to teach academic science in creating a “good science”, that is a more sustainable and equitable science, to confront crises such as climate change and the invasion of Lionfish in the Caribbean (Suárez Toro, 2008). The respect for nature is something deeply ingrained in elder fishing folk in particular, who have historically made their livelihood off fishing. Since that experience, Don Jose and I have become members of ASOpacs – the Association of Artisanal fishing folk of

the Southern Caribbean Coast, which is combining sources of knowledge to face the new challenges.

Another person who understands a deep connection and respect for nature is Doña Grace Jiménez, a member of the board of the Association. Together with her husband Don Jose Ugalde Sr., she has raised six children by combining fishing with agriculture and construction labor. Doña Grace believes that the rest of nature has to be respected, not only biologically but in its “secrets”, something that too often academic scientists overlook, thinking that humankind can control everything. “Nature cannot be fully comprehended, it has its secrets, pretty much like the secrets we keep to protect ourselves and our knowledge from being abused. We can know nature, but with respect”, she said (Grace Jiménez, personal interview, 2013). The way that nature responds to changes through adaption and adjustment is a process that “hard” academic science has not yet figured out. For example, biologists today know that biodiversity helps nature protect itself from the impact of climate change, but they do not know exactly how that happens (Brigitte Baptiste in Viera, 2011). This is one of nature’s secrets that science has not been able to unravel.

Organized fishing folk’s knowledge: a critical component in strategies for coastal conservation

The presence of an organized fishing community on the Southern Caribbean of Costa Rica has been a critical component for success in tackling new challenges that have emerged due to the Lionfish invasion. As

part of a campaign initiated in 2012, the Association has embarked on two projects that have already shown the effectiveness of its strategies based on traditional knowledge in joint initiatives with government, academic bodies, social organizations and other institutions. One project was begun in 2013 under the title “Control of the Lionfish and Conservation of Marine Life in Costa Rica’s Southern Caribbean” sponsored by the Small Donations Fund of the United Nations Development Program (UNDP), and the other project was begun in 2014 under the title “Improving the Quality of Life of fishing folk in the Southern Caribbean” sponsored by the Inter American Foundation (IAF).

These two projects share four objectives: 1) to contribute to the reduction of the invasive population by implementing

diverse methods of catching Lionfish; 2) to promote the creation of an inter-institutional network of collaborators in limiting the threat from the Lionfish; 3) to generate a scientific data base about the Lionfish; and 4) to conduct a campaign in the local communities about the threat of the Lionfish and, since Lionfish is good to eat, the need to become ‘Lionfish predators’ that is, to consume and market Lionfish as a strategy to reduce its numbers.

To date the Association has been the only social organization to mobilize communities on the Southern Caribbean coast of Costa Rica to face this challenge. The context for this mobilization is well described in a recent community initiative (“Why a special law...”, 2014):

The Southern Caribbean is comprised of an historical experience that extends back more than 100 years when the first immigrants to the area arrived from Jamaica and other countries north and south of Costa Rica along the Atlantic Coast. They were fishermen who built their homes along the beach for convenience, as fishing was their main source of livelihood. In the surrounding forests, they cultivated crops of food for their livelihood and to sell, as in the case of cacao and coconut production. They developed a sustainable family-based economy that recognized from the beginning the importance of living in harmony with the environment. This vision, based on a balanced relationship or co-existence with nature, was a primary resource of all social, economic and human development. The people themselves with little government intervention have used this development model for decades in the region, which is still characterized largely by a family-based economy with micro-tourism enterprises combined in many cases with sustainable agriculture and/or fishing or artisanry. The model is designed to protect and balance the rights of the people and the environment, which in the past led to creation of a number of special environmental reserves that today require a policy where co-management can contribute to co-existence between peoples and environment in unprecedented ways.

The necessity to further develop co-management strategies for the protection of the seas has been made even more evident by the fishing folk's proposals to reduce the Lionfish population, which takes into account the fact that the invasive species does not respect borderlines and frontiers between protected areas of ocean and places where fishing folk can catch Lionfish with no restrictions.

The Association claims that in order to be successful in eradicating the Lionfish, they have to be able to seek them out, even in restricted areas where some kinds of fishing are prohibited by law. Contradictory conditions often emerge in the zones between areas under special protection and unprotected areas. Sandoval Hernandez and Castillo Chinchilla (2011) believe that "the presence of large unprotected areas and the distance that surround protected areas and the distance between one protected area to the next can reduce the exchange between species..." (p. 25). For this and other reasons, it has long been recognized that the protection of the seas is generally weak. "The administration of marine coastal area in Costa Rica has been a conflictive area throughout the last decade, particularly the complaints by the environmental sector about overexploitation of fisheries, the lack of environmental policies and policies about the use of marine resources." (State of the Nation Report, 2013)

Created in 1982, Cahuita National Park hosts a 600-acre (242-hectare) that is known to have at least 35 species of coral, 140 species of mollusks, 44 species of crustaceans, and 123 species of fish ("Cahuita National

Park," n.d.). The land areas of the park are home to many types of animals, including the northern tamandua (anteater), pacas, white-nosed coatis, raccoon, sloth, agoutis, mantled howler monkey, and the white-faced monkey. It has a variety of birds as well, including the green ibis, green-and-rufous kingfisher and keel-billed toucan. The Gandoca Manzanillo Wildlife Refuge (REGAMA) includes 10,900 marine acres (4,436 hectares) in which there are five types of coral reefs (The Green Iguana Foundation, n.d.). These formations contain a wide variety of plant and animal species not found elsewhere, including 11 types of sea sponges, 27 species of algae, and 34 species of mollusks, which have been identified so far. The beaches from Monkey Point in Manzanillo south to the mouth of the Sixaola River are sites for four types of sea turtles, all of which are endangered, including the leatherback and green hawksbill.

All protected areas are mainly legislated by the Law of Biodiversity and the Environmental Law and administered by the National System of Conservation Areas or SINAC (*Sistema Nacional de Areas de Conservacion--SINAC*), created in 1994 as part of the Ministry of Environment and Energy (MINAE, n.d.) This Agency administers national parks, conservation areas, and other protected natural areas. Most fishing is banned in the protected areas except for purposes of research, training and ecotourism).

Non-protected areas of ocean are regulated by the Instituto Costarricense de Pesca y Acuicultura (INCOPECA), under Law no. 7384 of 16/1994 which allows for

artisan (small scale coastal), commercial, sports, touristic, scientific and promotional fishing. Its few protective measures cannot be adequately supervised, opening way for over-exploitation by commercial fishing. A large proportion of the fishing in the Southern Caribbean seas, however, is “responsible fishing,” meaning on a small-scale and does not involve the use of large-scale *pesca de arrastre* (trawling) nor the use of *trasmayo* (gillnet) fishing (in contrast to large-scale commercial fishing in the Pacific). (MINAE, n.d.)

The presence of Lionfish and methodologies for its removal require a holistic approach where fishing needs to occur in both protected and non-protected areas of the ocean in the specific case of invasive species. The Association has made put forward this argument precisely because while the protected areas often include special coral reefs, these same coral reefs are also the preferred habitat of the Lionfish. Héctor MacDonald Sr., a fisherman, member of the Association and coordinator of one of the projects for Lionfish removal said that “one of the problems we face in our efforts to reduce the species is the lack of adequate regulation about Lionfish removal in the protected areas in the Southern Caribbean” (H. MacDonald, personal interview, 2013.) A 2013 study by graduate students at the University of Costa Rica, entitled “Analysis of environmental and fishing norms in Costa Rica and recommendations about the control of Lionfish” (Calderón & Morales, 2013) presented evidence to support this argument.

The Association has been devising, advocating and implementing multiple

strategies for the control of the Lionfish. A multi-strategy approach is fundamental to their vision, because their practice as fishing folk has always been based on multiple approaches instead of single interventions. Their results thus far indicate the crucial importance of the active participation of the local population, along with their traditional knowledges and practices.

Drawing from traditional knowledge: multiple methodologies to catch the Lionfish

The Association has put into place a holistic campaign to roll back the Lionfish invasion on the Caribbean coast, demonstrating that a plan with multiple strategies works better as a whole, than does any one single method alone. They are therefore implementing a battery of strategies which range from fishing Lionfish one by one with hooks and spears, to organizing community Lionfish fishing contests involving many fishing folk working together, to the use of “*nasas*” (traps) and more recently, to training youth in scuba diving with tanks in order to spear Lionfish in deeper waters than snorkeling allows.

Furthermore, involving all sectors of the community has enhanced the success of the venture. Traditionally these fishing folk have seen themselves as part of whole communities, therefore, when they design actions to face challenges, they always do so alongside the rest of their communities. Because the Association is comprised of people who are members of the coastal communities themselves, and because the Association’s policy and practice have been

in the hands of these same fishing folk, it has been “natural” for the rest of their communities to get involved. “Organic” community actions have brought together fishing folk, their families, local restaurants, male and female vendors, chefs, traditional cooks, schools and government institutions in concerted efforts to face the new challenge. These efforts have contributed to “build community” around the emerging threat of the Lionfish and have contributed to the development of a new consciousness about the links between environmental protection and livelihoods.

Traditional lobster traps to catch Lionfish: bettering lives, bettering the catch

Among the strategies for catching Lionfish advocated by the Association is the use of a lobster trap. In this way, the Association has successfully revitalized a traditional fishing method, which has proven to be one of the most effective methods to capture the Lionfish. This is due to the fact that the traps can be placed in deeper waters than those reached by diving, the fact that many fish can be caught in one trap, and the fact that traps can be left at the bottom of the sea without the need for human presence as the fish are attracted and captured. Also, the fish remain alive until removed from the trap, either to throw back (those that are not Lionfish) or to take back fresh, be it for eating or selling.

Early in the debates by members of the Association as to the best methods to catch the Lionfish, many proposed the use of their traditional traps. But the rising cost of the

materials needed to make these devices (chicken wire, wood sticks and tying cord) had diminished their use. On the basis of this local knowledge and experience, one of the first tasks that the Association took on was to locate sources of funding to be able to provide fishing folk with the materials to make the traps. The Association was able to garner enough resources to develop a pilot project involving 19 members of the organization, each of whom received the necessary materials to make the traps to catch both Lionfish and lobster. Each participant signed a written agreement which allowed them to keep the lobster and other fish caught in these traps, but to give the Lionfish to the organization. This agreement allowed the Association to accumulate enough Lionfish to develop a marketing campaign for the fish to consumers, which in turn would motivate fishing folk to continue catching the invasive species.

This arrangement is a good example of the potential success of cooperation when livelihood and conservancy go hand in hand, because the methodology is a “win-win” situation for all, as both research and marketing for consumption further enhance the livelihood of the families while contributing to conservation efforts. “Pun”, an elder who has been a fisherman since he was 12 years old, and one of the experts in building the traps said that this traditional form of fishing had become scarce in the area until the Association provided support to build them once again (Pun, personal interview, 2014). “Material for the traps has become really expensive and here in the Caribbean, we do not have the incentives and

support that fishermen get on the Pacific Coast by way of gasoline and a stipend during the times of fishing bans. The support for us to be able to make them again has improved our capacity to catch the Lionfish while improving our livelihoods with whatever else we catch, such as lobster and red snapper, etc.”

Fishing Tournaments: building community through Lionfish hunting

Another successful strategy organized by the Association since 2012 is the annual Lionfish fishing tournament, where community members compete in catching, cooking, learning about and consuming Lionfish. Held for one day every September, fishing folk gather at a particular beach site, organize themselves in teams of three, get in their boats and go out for five hours for an organized Lionfish catch. Meanwhile on shore, government institutions, scientists, women vendors, chefs, families and children develop awareness activities such as showcasing live Lionfish, distributing information, cooking Lionfish to eat and other related activities such as music. At the end of the five-hour saga, the team that catches the largest Lionfish gets an award, as does the team that catches the smallest fish, along with the team that catches the largest amount of Lionfish. All of the catch is counted and examined by students and professors of biology from participating universities to be integrated into a database being developed by the Association for research.

The annual Lionfish event is an opportunity for everyone to get a taste of the

fish and also get information about the need to participate in community actions to eradicate it. Lucia Hernández, a young fisherwoman and a member of the Association, was the certified captain of her boat in the tournament on September 27, 2014. Lucia talked about the experience, saying: “It is very important for us to take part in this because although the day looks like the everyday diving that we do to catch fish and lobster. The feeling of a collective effort where all the boats go out at the same time, filled with teams of fishing folk with the one common aim of contributing to reduce the Lionfish, reminds us that we are a community. That is why I love this place. It has provided me and my family with abundant food throughout my whole life!” (Personal interview, 2014).

As part of the preparations for the Tournament, the Association visits each elementary school in the Southern Caribbean region. Young local marine biologists from the area participate with the Association in providing information to students about the Lionfish. The students, mostly grandchildren and children of fishing folk, are asked to talk about what they have learned from their elders about the species but they are also asked to take what they learned from the Association that day back to their homes. Motivation for the students to undertake scientific experiments while at school also forms part of these community outreach efforts.

One such case is the scientific experiment undertaken by Romi Hernandez, a 6th grader, daughter of Andres Hernández of the Association. With his help she

designed and built protected “houses” at the bottom of the ocean where lobster can lay their eggs away from the Lionfish. In the process she learned that the traditional knowledge that her father brought to her research was just as relevant as other scientific information. After all, her father was the one who showed her how to dive, who knew every corner of the reef and who knew the lobsters’ hiding places (R. Hernández, personal interview, 2014). Because fishing folk often construct equipment and tools for their work, he is the one who taught Romi how to build the cement “houses” for the lobsters.

Combining the scientific method with the traditional knowledge that these children learn from their parents is a good way to keep the young connected to fishing, the ocean, their families and their communities. These youth are also the generation that has been the first to break the 6th grade glass ceiling in education in the Southern Caribbean region. For her scientific experiment, Romi received an award and a scholarship to attend high school. Media, including most every newspaper and radio station in Costa Rica, have covered the tournament, providing a broader audience with information about the campaign to curb the Lionfish population. One headline in Costa Rica’s major mainstream newspaper *La Nación* declared: “fishing folk are a key element in the control of Lionfish” (Soto, 2014). Another newspaper proclaimed:

In Costa Rica, it is local fishermen – not the government – battling on the front lines of the Lionfish war. Spurred by a desire to protect both their

businesses and their coasts, fishermen have convinced restaurants throughout the Southern Caribbean to serve the fish and are now developing a strategy to fill the growing demand with a steady stream of dead invasive lionfish (Fendt, 2014).

International media have also hailed the contributions of the fishing community to the campaign.

Scuba diving for a deeper catch: involving youth on their own terms

In the process of exploring ways to connect to youth, three young Afro-Costa Ricans from the area were invited to participate in the 2nd Lion Fish Tournament organized by the Association in September 2012. They were the only young people who participated in the activity and garnered media attention. In pictures of the event, the three youth stood tall with their fishing spears like warriors and the media named them the “Lionfish Warriors”. They were later asked what it would take to get them committed to working on Lionfish control with the Association, and they said that they had been longing to learn to scuba dive for years. The three youth noted that although they thought that catching Lionfish by snorkeling is very effective and they do it all the time on their own, scuba diving with tanks would allow them to develop new skills in order to go into deeper water and stay longer in places where they had seen many Lionfish in the past but could not reach them.

Therefore, the most recent strategy devised to tackle the Lionfish problem is the

creation of a community-oriented scuba diving community center named, “Ambassadors of the Seas”. It was launched in late 2014 with the aid of professional scuba diving trainers who form part of the membership of the Association. The scuba diving center is designed mainly, but not exclusively, to engage youth in learning both to dive with a snorkel and to scuba dive with oxygen tanks so as to participate actively in the protection of the ocean by catching Lionfish at depths not reached by snorkel divers or with the use of traps as well as by conducting periodic clean-ups where foreign debris is collected from the reefs. Their motto is “Scuba diving with a purpose: Preserving the marine ecosystems in interaction with the culture and livelihood of the fishing communities in Costa Rica’s Southern Caribbean” (*Escuela de buceo Caribe Sur*, n.d.). This project was developed to engage the younger generation in the Association’s endeavors, because the relationship of the youth to fishing is not as intense as it was for their parents.

The youth make a commitment to undertake voluntary work hours at home, in the community and with the Association in consideration of the fact that they are trained free of charge, and recognizing that there is a cost for their families, community and the organization in providing this opportunity. The Association is fostering youth involvement in the protection of their marine ecosystems, especially considering that this generation will face the enormous challenges due to climate change and other factors affecting their coastal ecosystems. On May 1, 2015 during the second Lionfish sweep by the

Association with the Scuba Center, Rocio León, the mother of Romi, and some of the children who came to the activity suggested that children be educated at an early age not to fear the ocean. She suggested they be trained in snorkeling, identification of reef fish and other activities such as cleaning the shore while the older kids and adults cleaned the ocean floor. On the basis of this suggestion, Lucia Hernández, Rocío Aguilar, Blanca Espinoza and Lariza Brenes Bermúdez have organized the first pilot class with a group of 23 children ranging from ages 2 to 13.

Developing a taste and market for Lionfish consumption: everyone can become a predator

The Association also realized that because the Lionfish is a new species in the Caribbean, developing “a taste” for it in the community was to become as important as devising diverse ways to catch it. Building a market for its consumption would further develop an approach that would link conservation with livelihood, a key to success of any conservation strategy that requires participation of all sectors of society. The Association has therefore developed a campaign to eat Lionfish and because it collects the catch of all fishing folk, it has become a reliable distributor to local restaurants. Cooks and chefs at the local, national and international levels have been contacted to compile recipes, and cooks are taught how to clean it and cook it safely.

One Lionfish chef is Doña Elena Spencer, an Afro-Costa Rican who was born and has lived in Puerto Viejo her entire life.

She teaches a Caribbean Gastronomy class to youth every Saturday and on special occasions, she makes *rondon* with Lionfish. *Rondon* is a traditional Caribbean coconut stew with fish. "Lionfish is an easy meat to cook because it is strong and sturdy, therefore hard to 'disappear' in the coconut soup and it absorbs the taste of the spices very well", explained Doña Elena. Chef Rauch from Colombia who now lives in San José, the capital of Costa Rica, has made contact with the Association in order to form an alliance regarding Lionfish consumption. He has a restaurant in this country and a chain of restaurants in Colombia and elsewhere where he has specialized in Lionfish with great success. He told the Association that the fishing folk-chef alliance is critical to expanding the struggle against the presence of the invasive fish in the Caribbean. He pledged to buy the fish from the Association for his restaurant in the city. Leo Guerrero is another Colombian chef living in Costa Rica. He learned about the Lionfish from the Association and took part in one of its Tournaments, preparing a Lionfish dish with his own recipe. He told the Association that Lionfish has particular gastronomical features that are very important because "it eats other fish species that have a high protein value like lobster and shrimp among others. And as if this were not enough, by eating it we are contributing to clean the environment, the reefs and the lives of fishing folk."

A priority of the Association has been contacting restaurants in the area and encouraging tourists and locals to talk about their experience in eating the fish in order to

"get the fish into the culture". One such effort last year was to get the President of Costa Rica to try Lionfish when he came to listen to the community on August 30, 2014. Along with 20 of his cabinet members, he sat in a local restaurant "La Esquina", overlooking the shoreline where local people keep their fishing boats. All of these officials recognized the good taste of the fish and called on the Costa Rican community to support the Association in its campaign. The country's largest mainstream newspaper, *La Nación* reported that the President declared his support for consumption of Lionfish after having tasted it. The headline stated: "Luis Guillermo Solís supports more consumption of Lionfish, a fish that threatens other marine species in Puerto Viejo." (Murillo, 2014)

Sharing recipes and information about how to handle the Lionfish in preparation for cooking has recently been addressed by the Association. Because people know that the fish has a toxin, they are afraid to eat it. "They have to learn that the toxin dies with the fish", says Héctor Mac Donald Jr., President of the Association (Personal interview, 2014). At the end of the day, every effort in this campaign is dependent upon the consistent and reliable supply of Lionfish to the market, which is in turn directly dependent on the way that the Association upgrades its fishing and data collection methods. This is so because as a non-profit organization, the Association is depending on the commercialization of Lionfish as a way to improve its efforts and make them sustainable in the longer term.

Conclusion

The Lionfish is not the only recent problem that threatens destruction of coastal ecosystems, but in Costa Rica it seems to have emerged as an emblematic metaphor for what is happening along the Caribbean coast and elsewhere in the country. Foreign invasive “phenomena” have disturbed traditional integrated approaches to living which in the past guaranteed the health and wellbeing of local communities. Government actions regarding Lionfish removal as well as concerted efforts among all stakeholders is crucial, but understanding and supporting fishing communities and their traditional knowledge and practice is the foundation upon which any effort in this direction must be built, if it is to have any hope for success. This means that policy decisions must be informed by the historical and empirical knowledge of fishing folk.

Through its programming and practice, the Association has opened a space where fishing folk have been able to organize themselves in ways that have enhanced the connection between conservation and the livelihoods of coastal communities. These efforts are providing innovative approaches to conservation of coastal ecosystems, as well as the conservation of the culture and the wellbeing of their inhabitants by tapping into traditional knowledge alongside scientific knowledge. Working to strengthen livelihoods by developing sustainable fishing which has no negative impact on the environment is proving to be a necessary component in viable strategies for the elimination of the Lionfish. The protection of the livelihoods of coastal peoples and the

protection of the environment cannot be separated. One cannot succeed without the other.

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ARTICLE



Case Study Model in Resilience: Occupational Safety Health and Disaster Response to Flood at Universidad de La Sabana in Chía, Cundinamarca, Colombia, South America

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Introduction

Case studies are an invaluable record of field-based global public health best practices. While case studies cannot provide specific guidance for the management of every natural disaster, they are a record of a natural disaster's impact and subsequent community collaboration which help us to frame questions for the future design of effective disaster risk reduction strategies. Case studies also provide valuable teaching material by demonstrating the real-life situations which may confront the practitioner and sharing evidence of the importance of leadership, determination and resilience of both practitioners and volunteers in the recovery and restoration process.

The "Case Study Model in Resilience" article summarizes the natural

disaster that triggered the inundation by flood waters of a Colombian university campus located just north of the Colombia capital of Bogota. The purpose of sharing this timely disaster management case study is to document the immediate corrective steps taken to restore access to the university academic program and the long-term steps taken to ensure that the campus would never again be flooded and that the university would remain "still alive".

The Universidad de La Sabana, located in Chía, Cundinamarca, Colombia, South America, faced one of the biggest challenges in its 30 year university history. As a consequence of an unusually strong winter season, higher than expected water flow in the Bogota River caused the protective dykes to deteriorate and subsequently flood the surrounding area.

The university campus was inundated with muddy, flood water damaging every building on campus as well as the surrounding commercial greenhouses, rose landscape arboretum (*rosa arboreto*) and dairy farms.

The case study reviews and highlights a successful sequence of events

linked to the inundation of the Universidad de La Sabana campus and the strategies developed for management of the disaster. The overall resolution of problems related to the flood, university community response, and establishment of formal disaster risk reduction strategic plans are the focus of this case study.



SOURCE: Diana Sánchez. (2011). El Spectador Photo. "No se cancelará semestre en Universidad de La Sabana." (26 APR - 9:15 PM) retrieved from: <http://www.elspectador.com/noticias/temadeldia/no-se-cancelara-semestre-u-de-sabana-articulo-265480>

Description

Universidad de La Sabana is located four miles north of the capital city of Colombia, Bogotá. On Monday, April 25, 2011, following Easter Sunday, 500, 000 square meters of water from the Bogotá River flooded the university campus. The muddy flood waters reached a height of 1.70 meters in all buildings on campus, including the pristine lecture halls, historic *casa de pueblito original y capilla* and fully equipped computer laboratories with SMART classrooms. The immediate concerns were health risks and potential biological and chemical contamination

impacts on the university campus and surrounding farming communities due to flooding. The next priority related to continuity of Universidad de La Sabana ongoing undergraduate and postgraduate programs.

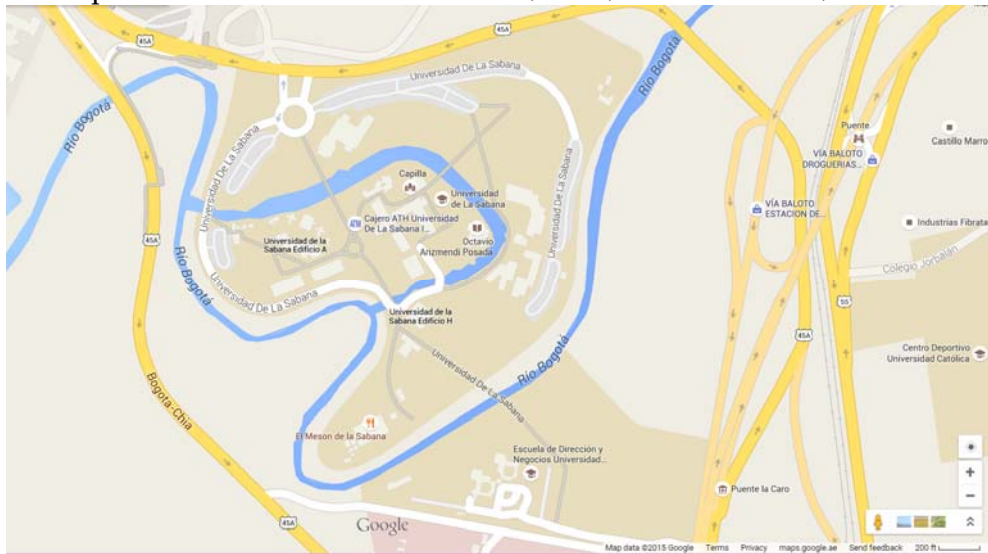
Discussion

The successful restoration of the Universidad de La Sabana programs within an impressively short timeline is strongly attributed to the university leadership's response to the disaster that ensured

continuity of undergraduate and graduate courses. By 21 May 2011, public utilities and service were restored after the rehabilitation of the dykes around the Bogotá River. Three months after the first flood, 25 July 2011, classes returned to the Common Bridge area of the campus that is on higher ground. The Common Bridge is the historic central portion of the campus located

adjacent to the large student parking area on the north side of the campus. In accordance with the wishes of the family who donated their farm land for the Universidad de La Sabana campus, the original buildings and structures, including their family capella chapel, were renovated and actively used as classrooms and offices.

Figure 1. Campus of Universidad de La Sabana, Chía, Cundinamarca, Colombia



SOURCE: <http://www.unisabana.edu.co/unisabana/bienvenidos-estudiantes-clase-2015-1/secciones/mapa-de-ubicacion/>

The overall response was guided by a single principle: “La Sabana Won’t Stop.” Issues of importance addressed immediately by the university leadership related to:

- Reestablishment of Academic Normalcy
- Campus Recovery
- Innovative Renovation
- Continuity of University Reputation

The case study report outlines guidelines and disaster response implications for all stakeholders as the university implemented a multi-phase Disaster Response, Recovery and Reconstruction plan.

Phase 1: The first phase of the university disaster management initiative focused on the reestablishment of academic normalcy. Community support and humanitarian assistance was so swift that the normal academic functioning was quickly restored. Academic course delivery was successfully completed by re-establishing communication channels through Virtual Sabana and facilitated via internet by La Sabana Information, Communications and Technologies (ICT) team. Traditional classroom courses were adapted temporarily to correspondence courses via email with ICT making learning resources accessible using the university website and

online library. Science courses requiring laboratories were temporarily conducted at Universidad Nacional de Colombia, top university in the country for science,

medicine and engineering. However, students were made responsible for accessing assignments and learning



Building a global public-private platform for disaster resilience

In response, PwC has been collaborating with the United Nations, under the auspices of its International Strategy for Disaster Reduction (UNISDR), in an initiative focused on creating a sustainable, private-public disaster risk management platform, with the ultimate goal of creating risk-resilient societies.

This report provides an in-depth look at this critical initiative—along with insights on the disaster risk management approaches and experiences gathered from leading global businesses. It identifies challenges that are constraining efforts to build collaborative resilience, and proven practices that have been used to tackle these challenges.

resources using the university website. University postgraduate courses that were previously delivered online as Self-Directed Learning modules were uninterrupted. The university leadership had the foresight to replicate online resources, student records and all administrative records at an off campus location, known as VISIÓN in Bogotá, at the La Sabana Consultancy

Centre. The Consultancy Centre also houses the university administrative offices and serves as an alternative location for archived university records in electronic format. Time sequence of events:

- Within three days following the flood, Cruz Roja Colombiana (La Sociedad Nacional de la Cruz Roja Colombiana, Colombian

- National Society for Red Cross) teams completed boat rescue missions;
- Within the first ten days following the flood, *university classes resumed off-site at alternate locations;*
 - Within two weeks following the flood, *extensive use was made of Virtual Sabana for online course delivery;*

- Within one month following the flood, the Bogotá River waters receded (21 May 2011);
- Within three months following the flood, classes resumed on campus (25 July 2011).



Phase 2: The second phase disaster management priority was the restructuring of academic schedules in a way that was compatible with university weekly schedules and previously established academic calendars. The Campus Recovery was primarily accomplished by finding alternative locations for the conduct of traditional on campus courses. Through skilled planning and coordination, all university courses were conducted by the original professors with classes convened in sites on higher ground in the surrounding community. There was substantial support offered, including make-shift classrooms in small hotels in northern Bogotá, the adjacent military academy.

There was a tremendous humanitarian outreach and community support resulting in multiple venues for use as alternative classrooms; this was largely due to the university's strong relationships within the surrounding communities. Small hotels adjacent to the campus, secondary-level academies, the Catholic seminary and Universidad Nacional de Colombia offered space free of charge for temporary classrooms within days of the Universidad de La Sabana campus flood. Although Universidad Nacional de Colombia is in central Bogotá, it was fortunate that they opened their doors for temporary use of lecture halls and meeting rooms.

Assignment of alternative locations was based on the central principle: "La

Sabana Won't Stop." Four formal alternative venues were established, including short term use of hotels near Forum Calle 80 and longer term sharing of classrooms Catholic University near La Caro and Universidad Agustiniana as well as La Sabana Hospital (Clinica La Sabana).

Phase 3: The third phase related to the accomplishment of the university renovation and renewal. The university leadership and volunteers suggested innovative solutions and ideas. Academic course delivery required redesign based on traditional pedagogical standards and strategies because most university courses were traditional classroom courses without audiovisual technologies or connection to Virtual Sabana WiFi, Most courses were in traditional classroom lecture format with LCD presentations and SMART boards.

Innovation was needed to meet to the logistical challenge of providing learning materials and library resources to professors and students after assignment of alternative classroom locations. Based on the principle: "La Sabana Won't Stop.", the university re-established permanent ICT network communication between the professors, students and their parents relying on a Social Networking platform.

Additionally, the solidarity of the university community highlighted institutional values and commitment to continuity of public services through the La Sabana Clinic which is located adjacent to the campus on higher ground. An interdisciplinary team took charge of epidemiological vigilance and decision-making to prevent and control biological, chemical, and environmental risk following international guidelines.

Actions taken:

1. Identification of biological and chemical hazards and psychological risks
2. Building disinfection.
3. Disposal of contaminated materials
4. Cleaning and disinfection of equipment and electronic materials
5. Vector Control
6. Waste management
7. Occupational safety focused on adequate personal protective equipment
8. Vaccination campaign
9. Nursing attention point at the University Central Command

Furthermore, the university provided outreach and psychological support to faculty, staff, and students. The flood caused a crisis of confidence that impacted the entire university community. Psychological outreach resources included Crisis Intervention and Group Interventions.

Phase 4: The fourth phase related to the Continuity of Reputation. The speed at which this exceptional university resumed regular course offerings, activities and events was nothing short of remarkable. As a consequence, La Sabana retained the status as one of the leading universities in Colombia. The university restructuring required due to the flood allowed for the development of many more online courses offered through Virtual Sabana. As a consequence, La Sabana gained additional status as one of the best universities for online postgraduate degree programs.

Finally, the university rallied continuous support through extended communication efforts via all types of media and international collaboration. Universidad de La Sabana's recovery and reconstruction focused on building back safer and stronger. The university received

funding for the construction of a new dam encircling the campus through an international consultancy with the Netherlands. This action offered definitive protection for the prevention of future campus floods.

Conclusion

Dr. Obdulio Velásquez Posada, Rector, Universidad de La Sabana, following the successful university recovery, reconstruction and renewal, called 2011 a year that “marked the path to change”. An evaluation of specific emergency response needs and appropriate disaster management was expedited by open, flexible innovation that was guided by the central principle: “La Sabana Won’t Stop” to be successful. The outpouring of humanitarian aid and material support for the university was published in the local, national and international news and journals reporting, “No semester will be canceled in the Universidad de La Sabana. We can guarantee that the semester will not be canceled and that although the campus is flooded, **the university is still alive.**”

The university leadership and the successful decisions by administration improved the visibility, recognition and appreciation of the La Sabana as a leading academic institution in Colombia. A negative experience was turned into an opportunity to “Rethink the University” and promote innovative academic and administrative processes, including new systems for electronic messaging and virtual course delivery (“Comunicación Digital”). The university is stronger than ever due to multidisciplinary team building that encouraged cooperation, collaboration, innovative action planning, and “hands on”

professional development. The adoption of the institutional value, “La Sabana Won’t Stop,” created solidarity and direction with the university community. This sense of solidarity allowed more than 10,000 people to mobilize towards a common purpose and move forward despite adversity.

In conclusion, specific outcomes in the subsequent years dramatically changed the Universidad de La Sabana outlook and commitment to supporting the surrounding farming community. The university learned many lessons following the inundation of the campus, including their stronger commitment of thinking “first” of the surrounding rural communities before considering potential changes at the campus. Currently, the university administrators and faculty have an interdependent sensitivity and stronger bond with pueblitos of Cundinamarca, including the main campus in Chía.

Recommendations

Universidad de La Sabana case study serves as an excellent model for resilience by highlighting successful team building and steadfast innovation in disaster management. As a consequence of the flood disaster, the university learned many lessons about prevention of information loss by reorganizing and updating to Technologies 2.0 for External Data Center offsite. In addition, La Sabana continues to invest in future risk reduction through Virtual Sabana’s commitment to the Sabana Cloud, new emphasis increasing the university capacity to teach with online formats or conduct classroom/laboratory sessions in alternative locations, such as Mobile Classrooms, community venues, and other academic institutions. Many

positive changes occurred as a consequence of mutual support, multidisciplinary resilience through strengthening of existing Social Networks.

The fact that Universidad de La Sabana was tested by the flooding disaster and is still 'alive' demonstrates that the university is a socially responsible institution with heart. Overall, the university has been "built back better" with a new sense of accomplishment as a consequence of strengthening multidisciplinary accomplishments between faculties.

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Data Collection: San Patricio County Pandemic Preparedness Assessment

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Abstract

Background: Assessment of community preparedness for a pandemic event is a crucial part of disaster management planning for any county health department. Data collection is an integral part of such an assessment. Presented in this article are data from the 2011 San Patricio County Pandemic Preparedness Assessment. This contracted research provided data to the San Patricio County Department of Public Health for use in crafting effective community preparedness programming. **Purpose:** The purpose of this research was to obtain information about general and pandemic preparation of residents within San Patricio County, and to identify the most effective means of communicating the risks posed by pandemic influenza (San Patricio County Pandemic Preparedness Assessment, 2011; The Social Sciences Research Center, Texas A&M University-Corpus Christi). The goals of this study were to help with pandemic planning efforts and to build more resilient communities within the county. **Methods:** The research data was collected in the summer of 2011 using telephone and in-person surveys. The initial target audience was a randomly selected sample of San Patricio County residents based on a purchased home telephone listings for 3,000 residents. Subsequent data was collected from residents of family-oriented neighborhoods in Portland, Sinton, Odem, and Ingleside, Texas. **Results:** A total of 437 completed surveys were collected with 222 phone surveys and 215 in-person field surveys. Key findings indicated that some segments of the San Patricio County population were either very well or somewhat prepared for a broad range of disasters. Findings also identified the most effective communications methods in case of a general emergency situation as being cell phones. Information access was identified as television with the most trusted information source being a physician or healthcare professional. **Conclusions:** Findings from this study indicate that a significant portion of the target audience had some preparation for a pandemic event. Findings also identified effective methods for disseminating information to the community at large during a disaster included television and cell phone. Public health data collection methods might require adjustment to align with the characteristics of the specific target audience.

Introduction

This research was primarily intended for community leaders developing a local strategy for building resilience in the event of

a widespread health emergency, specifically influenza. The purpose of this research was to obtain information about general and pandemic preparation of residents within

San Patricio County, and to identify the most effective means of communicating the risks posed by pandemic influenza (DPH 2011). The main emphasis was individual preparedness and the efficacious dissemination of information.

The goals of this study were to help with pandemic planning efforts and to serve as a base for building more resilient communities within the county. The influenza pandemics of 1917, 1957 and 2006, and the global response to the 2009 H1N1 event, affirmed the importance of collaborative assessment and strategic planning by federal, state, and local governments (MacDonald et al., 2013). The H1N1 influenza virus first appeared in Mexico in March 2009, later surfacing in California, Texas and New York, with health hazard strands that emerged also in Canada, Europe, and the Middle East with rapid impact. Statistical data from the Center for Disease Control estimated that the number of cases of H1N1 in the United States between April and November of 2009 as 47 million, while the number of H1N1 related deaths were estimated at 9,820. In December of 2009, there were 210 laboratory confirmed pediatric deaths in the United States due to H1N1 (CDC, 2009). The first reported H1N1 related death reported in San Patricio County was of a Portland man, 48 years of age in November, 2009 (Nueces, San Patricio Counties Report H1N1, 2009).

Most recently, we saw widespread fear in the United States during the Ebola outbreak. Hospitals were required to initiate training and treatment protocols, public health agencies published information for

citizens and grappled with quarantine regulations, while the public sought trustworthy sources of information. This underlines the importance of identifying and utilizing effective methods for communicating risks to the community.

The urgency of this report concerning pandemic preparedness rests on the emphasis on resilience. Moreover, given that resources are limited in the wake of an emergency, it is increasingly recognized that communities will be required to be without support and on their own for a period of time after the onset of an emergency. This suggests that the communities' resilience will be impacted beyond normal day-to-day outcomes.

In relation to infrastructures, GAO, (2009) suggests that while a pandemic will not directly impact the physical infrastructure(s) such as computer systems and power lines; the concern lies in removal of essential personnel needed to operate these essential systems in the workplace. During pandemic outbreaks, absences from the workplace are attributed to illness, and the need to care for family members. Thus, it will diminish the human resources throughout infrastructures.

While resilience is a relatively new public health term, it captures and expands upon many traditional themes in emergency preparedness, and general health promotion. In the context of today's resource-limited environment where efficiency is critical, communities can identify and leverage the activities that are currently in place thereby building resilience.

Methods

The data for the project (DPH 2011) came from the following sources: Telephone survey of residents in San Patricio County (initial sample); and in-person survey collected in San Patricio County through door-to door solicitation in selected communities (expanded sample).

For the purpose of this project, a community survey of residents located throughout San Patricio County was necessary to obtain information about the general and pandemic preparedness efforts of residents within San Patricio County, as well as to identify the most effective means of communicating the risks posed by pandemic influenza.

The initial plan was to conduct a telephone survey only based on a listing of home telephone numbers. Early data collection was skewed towards an older population sample. Close scrutiny determined that an afternoon/early evening telephone survey contacted a disproportionate number of retirees. There was also the tendency for younger persons to forego a landline telephone in favor of a cellular instrument. In an effort to include more young people and families in the sample, a field survey was added. The first plan was to query shoppers at a local department store and a large grocery store in Portland, Texas. The grocery store was not amenable to the plan and the department store required a lengthy approval process. In an effort to collect additional data in a timely manner, family-oriented neighborhoods in Portland, Sinton, Odem, and Ingleside, Texas, were selected for field surveys by the Principal Investigator

and the Manager of the San Patricio County Health Department.

For the telephone and field surveys in San Patricio County, a survey instrument of 45 mostly closed-ended questions was developed. The survey instrument was comprised of six sections (DPH 2011).

Introduction. This section asked the respondents if they were over the age of 18, a resident of San Patricio County, and willing to voluntarily participate in the study.

General Level of Emergency Preparedness. Comprised of 11 questions, this section asked respondents about their overall level of individual preparedness in the event of any type of disaster.

Emergency Preparedness for a Pandemic. The third section consisted of 16 questions that asked respondents about their overall knowledge about pandemics and their current preparedness efforts. It also included questions on the respondents' ability to care for themselves or others in the home during a pandemic

Sources of Information. This section asked respondents about whom they would trust for information in the event of a national health crisis such as a pandemic. It also asked questions about the ways people communicate in a disaster and methods of getting information from authorities.

Demographics. This section asked respondents basic demographic information such as sex, race/ethnicity, education, age, number of children and adults in the household, employment status and annual income.

Future Contacts. The last section asked

respondents for their name, address, phone number and e-mail so they could be contacted in the future.

Results

Of the 3,000 telephone listings, 2,914 were dialed; of these, 222 completed surveys were collected. 215 in-person field surveys were collected for a total of 437 completed surveys. In this sample of San Patricio County residents, 58% of the respondents were white and 38.3% were Hispanic. Respondents to the telephone and field surveys included 67.8% females and 32.2% males. In addition, 72.4% of the sample was 51 years of age or older. Regarding annual income, 21% of the respondents reported incomes between \$10,000 and \$40,000, 13.9% reported incomes between \$41,000 and \$70,000, and 17.7% reported an income of over \$70,000. With respect to education, 28.1% completed high school, 24% had some college (1-3 years), 24% received an undergraduate degree, and 9% had completed graduate degrees.

In the San Patricio County study, three fourths or more of the respondents indicated that they had critical items in the preparedness inventory. For example, 77.9% reported they had a 3-day supply of non-perishable food, 78.5% reported they had a disaster supply kit, 84.9% reported they had a 3-day supply of medication and medical equipment, and 83.7% stated they had secured important documents and records. These results are higher than that reported in other national studies.

To effectively prepare for a pandemic, individuals must be aware of the threat to

public health posed by an influenza pandemic. The first question asked in section 3 was, "Are you familiar with the term pandemic flu?" Sixty percent of the San Patricio County respondents affirmed that they were familiar with the term while 34.3% said they were not. This underlines the need for a more effective method for communicating risk.

In the study, three-fourths or more of the respondents indicated that they had critical items in the pandemic preparedness inventory. For example, 94.4% reported they had medicine for fever, 87.7% reported they had a thermometer, and 63.9% reported getting flu vaccines in the past year. In the national *Pandemic Influenza Survey* completed in 2006 by the Harvard School of Public Health Project, 84% reported they had medicine for fever and 83% reported they had a thermometer. The higher number of resources reported by San Patricio County residents could be due, in part, to the socio-economic status and age distribution of the sample.

In the area of knowledge, 73.4% respondents in San Patricio County reported that they knew at what temperature a child required medical attention if he or she had a fever, 84.7% reported they were aware of the symptoms of a person with the flu, and 91.6% reported that they were aware that hand-washing was the best preventive measure against the flu. About one-fifth of the San Patricio County residents did not know at what temperature a child or an adult needed medical attention in the event of a fever. This information is critical in order for individuals, particularly children,

to be diagnosed early and receive proper medical attention.

Additionally, in San Patricio County, 82.4% of the respondents reported that they were prepared to take care of members of their household for 7-10 if they became sick, and 80.7% reported that if they were sick with pandemic flu and had to remain at home for 7-10 days that they had someone who would care for them. Care taking for sick family members could be a challenge for some residents (43.7%) who reported that they did not have sick days at their place of employment.

In this study, 63.9% of the San Patricio County respondents reported that they had received seasonal flu vaccines. This higher response rate in San Patricio County is probably due in part to the number of older adults that were in this sample.

In San Patricio County, among those respondents with children, 38% reported that their children had received a seasonal flu vaccination in the past year. This low rate of vaccination among children should concern local health officials given the health risks associated with influenza in children.

When asked, "If there were an outbreak of pandemic flu in your community, how much would you trust the following sources to give you useful and correct information about the outbreak?", respondents (83.9%) reported that they trusted their doctor or health care professional a lot; 52.4% reported that they trusted the local or city or county public health department a lot, and only about one

third (32.3%) reported trusting elected leaders in the community a lot. In fact, 15% of the respondents reported that they did not trust elected leaders in the community at all. Regarding the news media as a source of information, 39.4% reported that they trusted this source a lot and 38% reported some trust in the media

Though results for San Patricio County have shown that the sources of information respondents trusted the most are limited (usually only their doctor or local public health department), they reported that their main method of getting information from authorities in a large scale disaster or emergency was from television (68.4%).

Discussion

In many areas, the preparedness level among San Patricio County residents exceeded the national averages. There could be a number of reasons for this high level of household preparedness among respondents. First, a significant number of the respondents in this study were older white men and women. Previous studies have shown well-educated older men and women tend to be better prepared for emergencies than other age groups, such as young mothers. Second, barriers to preparedness include lack of time or money. In preparedness research, individuals with higher incomes are less likely to cite cost as a barrier and are more likely to report that they are very well or somewhat prepared for a disaster, including a public health crisis. In this study, 31% of the respondents reported an

income of over \$41,000 and a significant number reported they were retired. Third, the research was conducted during Hurricane Season in south Texas, thus, people are more aware of the importance of preparedness. In fact, there were on-going educational campaigns utilizing highway signs, television public service announcements, the distribution of brochures, and preparedness conferences to educate the public on the importance of disaster preparedness particularly in the event of a hurricane. Finally, given the age of many of the respondents, it is likely they have experienced a disaster before such as a tropical storm, hurricane, flood, or drought in this region.

Further, with appropriate training, community-based risk communicators would be well positioned to provide information tailored to local cultural norms. Therefore it is important to understand the main methods of communication within the population and to target those when timely communication about health emergencies is needed. As our survey results showed, the main method of communication with friends or relatives is the cell phone (84%) while the main method of obtaining timely information was television, knowing this can improve the chain of communication between authorities and the population.

Additionally other factors to consider when communicating in health emergencies are:

- Be honest, frank, and open.
- Coordinate and collaborate with other credible sources.
- Understand that trust is built as a

process of giving information on a timely manner, even though the circumstances may change.

- Consider community-based approaches for delivery of information, as these are the best methods to give a culturally competent message.

According to the report, Public Health and Disaster Preparedness of Vulnerable Populations in Houston (2009) page 3, residents seek preparedness plans “that are community-specific, delivered through local and trusted sources...and suitable for people of limited means and resources.” There was mention of utilizing neighborhood-based schools and churches as avenues for disseminating information.

Findings from the San Patricio County research also identified levers of community resilience that included some of the following (TDH 2011):

- 1. Wellness**-Promote pre- and post-incident population health including behavioral health.
- 2. Education**-Ensure on-going information to the public about preparedness, risks, and resources before, during and after a disaster.
- 3. Engagement**-Promote participatory decision making in planning, response and recovery activities.

For each of these levers, specific activities can be initiated by state and local entities as a way to build community resilience in the event of a national health emergency. Of particular importance, according to the Houston report, resilience is related to support from families and immediate neighbors. It is imperative that county health officials implement programs

to strengthen all portions of their communities and neighborhoods.

County assessments can provide officials with a sound basis for revising and improving disaster preparedness programs. Honing data collection methods to address specific audience demographics is a key to

effective research in this area. Utilization of telephone surveys, field interviews, and electronic questionnaires are potential methods for evaluating the preparedness of communities thereby providing officials with the data needed to improve current programs and initiate sound plans for the future.

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Disaster Preparedness: Developing Sustainable Communities for Older Adults and Other Vulnerable Populations

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Impact of Natural Disasters in the United States

Since 1980, the average annual number of natural disasters has more than tripled (National Oceanic and Atmospheric Administration [NOAA], 2011). In 2011, an estimated 650 people were killed by devastating hurricanes, floods, tornadoes, wildfires, and winter storms. Wildfires, drought, and extreme heat destroyed livestock, crops, and structures across the southern plains and southwest regions of the United States. In addition, an estimated \$50 billion in property was destroyed by these natural disasters (NOAA, 2011). Yet, hydrological hazards in the United States continue to have an astounding impact on communities. In 2011, Hurricane Irene battered the northeastern seaboard. A reported 55 people died, 9 million people were without electricity, and mandatory

evacuation orders were issued to 2.3 million residents (NOAA, 2011).

Even more, in 2012, Hurricane Sandy pummeled the mid-Atlantic and northeastern United States. In particular, New York City and the surrounding boroughs were inundated with storm surge several feet high, massive flooding, and destructive waves (Blake, Kimberlain, Berg, Cangialosi, & Beven, 2012). In addition, Hurricane Sandy significantly impacted several Caribbean countries, located in the Atlantic basin. In total, across the Atlantic basin, Hurricane Sandy directly related to approximately 147 deaths, with 72 of the casualties occurring in the United States (Blake et al., 2012).

Indirectly Hurricane Sandy contributed to 87 fatalities in the United States. On account of power outages and winter weather, the cause of 50 of these fatalities were hypothermia, elderly residents falling in the dark, and carbon monoxide poisoning from hazardous cooking equipment and generators. Attributed to removing uprooted trees during the cleanup effort and motor vehicle accidents were the remaining fatalities. Further, in New York the storm surge destroyed approximately 305,000 homes. Damaged by extensive flooding were hospitals, schools, the subway system, and commercial buildings. Public and private industries suffered substantial economic ruin resulting in \$19 billion of loss property (Blake et al., 2012).

Undoubtedly, Hurricane Katrina generated astounding attention to natural disasters in the United States. Researchers not only examined the cataclysmic atmospheric conditions that occurred during

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Hurricane Katrina, but also how people were drastically affected by the powerful hurricane (Leong, Airriess, Wei, Chia-Chen, & Keith, 2007; Messias & Lacy, 2007; NOAA, 2005; Zoraster, 2010). An estimated 1,330 people killed were by the brutal weather conditions spawned by Hurricane Katrina (Burton, 2010; Wilson, 2006). Failed levees in New Orleans and record storm surge in the coastal communities of Pass Christian and Biloxi, Mississippi, caused an accumulative \$80 billion in destroyed property across the Gulf Coast displacing over a million residents (Burton, 2010).

Consequently, disproportionately affected by the devastation associated with Hurricane Katrina were older adults. Before Hurricane Katrina, elders 60 and older comprised 15% of the population in New Orleans; however, 74% of the dead were 60 years old or older. Nearly, half were older than 75 years of age (Glass, 2006).

Older Americans and Disaster Preparedness

Current data indicates the United States is rapidly aging. Elderly Americans are living longer due to advancements in medical technology, preventive health care, and a growing emphasis on gerontological health. The Administration on Aging estimates by the year 2020, 55 million people living in the United States will be 65 years of age or older. Parallel to this significant increase among the older adult population, natural disasters are more prevalent. Consequently, adversely affected by these

disasters and exposure to social vulnerabilities during the disaster cycle are the elderly (NOAA, 2005).

Contemporary literature continues to investigate the disaster preparedness levels of older adults residing in the United States. Al-rousan, Rubenstein, and Wallace (2014) examined secondary data provided by the Health and Retirement Study (HRS), a biennial survey designed to track developing trends among adults 50 and older. Primarily, the survey items focus on work force participation, retirement, health behaviors, social attitudes, and socioeconomic status. Updated with targeted modules randomly administered to a subgroup within the sample population, in order to capture current perceptions of adults 50 and older, is the biennial survey.

In 2010, disaster preparedness items were included in the HRS survey. In the HRS Disaster Preparation Module, a total of 1,304 older adults participated in the survey. Disaster preparedness questions focused on survey respondents' having household emergency plans, access to a battery-operated radio, and a three-day supply of water, food, and medication. Respondents answered questions about their awareness of community programs that offered disaster readiness assistance, evacuation plans, knowledge of emergency shelters, and physical impairments that might impede disaster preparedness activities.

Results from the disaster readiness survey items revealed low levels of disaster preparedness behavior in the sample population. Only 23.6% of older adults reported having an emergency plan; while

10.1% reported being in a disaster registry database should they need help, and 43.2% were aware of a local community shelter, in case of evacuation. Reported by 24.8% of the respondents was not having access to a car during an emergency. Nearly two thirds of the sample population reported never attending any disaster readiness programs in their local community and over one third did not have basic disaster readiness supplies in case of an emergency (Al-rousan et al., 2014).

This current literature supports the importance of effective emergency planning in older populations. This information is necessary to develop strategic and sustainable community-based interventions that encourage local collaboration and inclusion of vulnerable populations.

Developing Sustainable Communities

A subtle shift has occurred in disaster preparedness literature. Social scientists are examining the construct of sustainability as it applies to natural disasters and the evolving role of emergency preparedness in this shifting paradigm. What is familiar and anticipated during a major natural disaster such as a winter storm, wildfire, hurricane, or flood is the expected devastation of vulnerable neighborhoods, populations, and the delayed insufficient recovery efforts. Recent disaster preparedness research recognizes the urgency to study disaster preparedness through a different lens, one which sustainability is shaping this new perspective.

Sustainability in disaster preparedness literature may be defined as social capital, social cohesion, or community resilience. Taken together, these concepts accurately describe sustainability: productive use without depletion or destruction. Reininger et al. (2013) interprets social capital as linking people to efficient collaborative human networks and tangible reusable resources (Reininger et al., 2013). Greene, Paranjothy, and Palmer (2015) study on flood exposure and social cohesion explored the mental, emotional, and social aspects of human behavior that extends far beyond the functionality of physical infrastructure, local municipalities and organizations during frequent and reoccurring disasters. Social cohesion is influenced by meso-theories that examine micro, (individual) meso, (small groups) and macro (broader society) systems to further understand the complexities and importance of continued psychosocial health during disasters (Greene, Paranjothy, & Palmer, 2015).

Hurricane Katrina provided a clear example of how a natural disaster impacted marginalized communities and vulnerable people. Temporarily housed at the Reliant Astrodome Complex (RAC) in Houston, Texas, frail older adults were quickly overshadowed by the 23,000 adults and children displaced by Hurricane Katrina and relocated to the RAC. Although medical services, resource and referral information, and social service benefits were readily available to citizens who were evacuated to the RAC; frail elders were unable to access these services due to limited mobility, cognitive and sensory impairment, poor health, and trauma

associated with the relocation. Sixty percent of New Orleans' residents evacuated to the RAC were frail elderly and disabled adults (Baylor College of Medicine and the American Medical Association, 2006). Hurricane Katrina and other large scale environmental hazards revealed the inadequacies in federal, state, and local infrastructures. As a result, disaster preparedness, response, and recovery efforts were compromised (Wells et al., 2013).

The framework for community resilience is the community partner participatory research model. Community resilience exceeds the definition of self-efficacy in the context of individual and family emergency planning and recognizes the ability of communities to mitigate, prepare, and recover from natural disasters. Conceptualized within the framework of a community systems model, community resilience emphasizes strengths and appropriately utilizes resources of disenfranchised populations and marginalized neighborhoods. The goal is social justice, equity, and community empowerment. Vulnerabilities are assessed with the aim of developing strategic, applicable, and culturally aware program interventions (Plough et al., 2013).

Community resilience supports sustainable commerce, viable collaborative networks, transfer of ideas and dialogue, cultural respect, and healthy citizens. Social scientists have determined these characteristics with trusted political leadership and social solidarity sustain community resilience beyond the disaster. Within the community, collaborative

partnerships are an important component of community resilience. Community-based organizations, private sector industry, local government, universities, and faith-based organizations can work together to increase community engagement and empowerment (Plough et al., 2013).

Mentioned earlier, the older adults relocated to the RAC were found to be suffering from dehydration, delirium, and limited mobility. However, health care professionals recognized the depressed condition of the frail older adults who were unintentionally neglected. Gerontological social workers, geriatric nurses, and gerontologist associated with Baylor College of Medicine Geriatric Program at the Harris County Hospital District formed an alliance with the Texas Department of Family and Protective Services to provide medical care and advocacy services for the older residents. A team of Baylor geriatric health professionals and adult protective service workers accurately assessed the immediate needs of the older residents temporarily housed at the RAC. A health assessment and social service tool was developed to provide appropriate interventions. This coordinated response aligns with the goals of community resilience and empowering vulnerable populations (Baylor College of Medicine and the American Medical Association, 2006).

In marginalized neighborhoods, faith-based organizations are significant resources for information dissemination, food and clothing assistance, financial help, and health care services (Plough et al., 2013). According to Graddy (2006), faith-based organizations may be better equipped to deliver a specific

type of assistance to individuals in need compared to other service providers. Numerous studies have identified the church as a significant fixture in many communities. Churches are a readily available community resource providing a building, an existing volunteer network, and established partnerships in the community. Churches with committed community relationships are positioned strategically to acknowledge and address the disparities within vulnerable populations. Likewise, faith-based organizations depend on dedicated volunteers that have the ability to offer more services or allocate additional attention to clients compared to other service providers (Graddy, 2006; Griener, 2000).

Hurricane Katrina increased the involvement of faith-based organizations in gulf coast communities. In New Orleans churches were vital conduits in supporting response and recovery efforts in vulnerable neighborhoods. DeVore (2007) quotes an editorial from the August 2006 edition of the *New Orleans Times-Picayune*: "Faith-based organizations and churches have been a godsend for the metro area . . . showing an ability to organize, mobilize and get things done that has frequently eclipsed the public sector" (p. 762). Historically the African American church has been a primary center of social, spiritual, and political life for African Americans. Hatch and Derthick (1992) emphasize that for over 200 years the Black church has helped African Americans to cope with harsh social conditions (DeVore, 2007; Hatch & Derthick, 1992).

The community resilience framework supports the use of local leadership to

establish emergency planning interventions from within informal social support networks such as churches, community-based organizations, health departments, fire departments, and senior centers. The roles informal social support networks already assume in marginalized communities validate this concept. Community resilience supports what has already been established in most neighborhoods. Informal social support networks readily can be adjusted to initiate and support emergency planning interventions and strategies. Neighbors can form disaster preparedness groups whose targeted focus is to promote critical awareness, resilience, and protective behavior skills. These empowering activities would decrease dependency on federal and state municipalities and strengthen community involvement and responsibility – especially in the elderly and vulnerable populations.

This formula is already in practice when neighbors and friends open their doors to take in a less fortunate member of the community, cook a meal when someone is sick, and provide transportation to the doctor. These established community networks can positively influence emergency planning among older adults and marginalized neighborhoods with the purpose of saving lives during times of disaster. Participating in disaster preparedness interventions and adapting protective behaviors may help minimize feelings of perceived discrimination and empower populations on the fringes of society, especially when affected by a natural disaster. These tools are necessary to

develop strategic and sustainable community-based interventions that encourage local collaboration and inclusion of vulnerable populations.

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Article

Intervention to public space: New Urban gardening in New York and Berlin

Christa Müller¹

Abstract

The paper discusses self-determined, cooperative interventions in public space regarding aspects such as food access, care and social justice. It takes a comparative perspective on community garden activities in Berlin and in New York as well as on traditional and contemporary ways of community gardening. New urban gardening is distinguished from community gardening in the following six ways which will be discussed in more detail below: upcycling of everyday materials, guerilla tactics, reinterpretation of spaces, mobility and sociability of gardens and gardens as hybrid spaces. The paper points out the differentiated landscapes that have developed over urban gardening in the city - and how strongly the social background of the actors as well as the social structural conditions contribute to the diversity of the gardens. Definitely the new community gardens react to other social developments and urban challenges than the community gardens of the 1970s did.



Picture 1: Brooklyn Grange, New York
(Credit: Christa Müller)

New York is widely regarded as “the place of origin” of the urban gardening movement worldwide. For a long time I have wondered whether there is any empirical evidence for this assumption. First, an inventory: I have been doing research on community gardens in Europe since 2000 (Müller 2002, 2011, 2012; Baier et al. 2013). During a study trip in summer 2016 I visited community gardens in Brooklyn,

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Queens, Manhattan and the Bronx - I talked to gardeners and I talked to several representatives of governmental and non-governmental organizations. In New York City community gardens seem to be everywhere, especially gardens of the “traditional type”, which were established in the 1970s. Many of the members have grown old in them. One finds community gardens of the traditional type in all five boroughs. Their number is estimated at 600

(<http://www.greenthumbnyc.org/gardensearch.html>, last download at 03/31/2016).



Picture 2: Smiling Hogshhead Farm, New York (Credit: Christa Müller)

Differentiating Community Gardens and New Urban Gardens

Many observers consider the New York community gardens as the origin of a new type of gardening that has arisen in European, especially in German cities from the early noughties on. I say, however, that American community gardens cannot be seen as prototypes or even as an inspiration for the new urban garden movement neither in Western Europe cities like Berlin, Leipzig, Paris or London, nor in New York itself. And this for some important reasons: One of the most striking is, of course: different lifestyles, age and

social class positions of the actors in the field. Especially members of the young environmental movement believe that it is time for new forms of interaction regarding dichotomies and hierarchies between humans and non-humans, urban and rural lifestyles or consuming and do-it -yourself.

For them the dichotomy „rural life versus the big city” has definitely run out of meaning. Activists do not want to do away with the city, they want to “enrich and develop” it by investing in productive green spaces and in communities built

around common farming and exchange. They take over public spaces – often

neglected or derelict areas – and create something new. They want to



Picture 3: Allmende-Kontor, Berlin (Credit: KD Grote)

determine the conditions of use themselves, whereas the city administration of New York supports and manages the traditional community gardens conditionally: opening times must be respected, a fence is indispensable, smoking and drinking alcohol is not allowed, etc. The city administration views gardens as belonging to the same category as libraries or swimming pools, that is as public spaces or public goods - and therefore subject to municipal control. However, the new urban gardening movement develops its own rules - namely by Commons viewpoints (Müller 2012).

Open source is the central guiding principle in all community gardens; the participation and involvement of the neighborhood are essential principles. The gardens are used and managed as

commons even if the gardeners do not personally own the land. By encouraging people to participate, urban gardens gather and combine a large body of knowledge in productive ways.

More or less at the same time (around 2009) a new type of gardening began emerging in Berlin as well as in New York. It is a type that deliberately avoids given rules, rejects fences, explicitly understands itself as political and experiments with an “independent-do-it-yourself approach” and with upcycling, the process of giving new value to items that are worn out and worthless according to industrial logic. This means that e.g. the Berlin Prinzessinnengarten cannot easily be compared with a community garden in the Bronx, as the media and even scientists have done, but rather with projects such as the Smiling Hogshhead Farm in Queens

which was illegally established on an abandoned railway land of the MTA and was then legalized with the help of the non-profit 596 Acres.

Activists of a new informal urbanism are reclaiming cities all over. In urban gardening, the focus is on self-sufficiency

regarding food issues, on sharing, do-it-together, re-appropriating and re-interpreting manual skills and crafts, opening up designs, breaking up objects and spaces, creating common land and rediscovering the commons (Müller 2011).



Picture 4: Pale Blue Door, Prinzessinnengarten, Berlin (Credit: Marco Clausen)

Initially, these new expressions of informal gardening can constitute a visual irritation. Not infrequently, one finds oneself on a wasteland in the heart of a city, wondering what exactly it is meant to be: a temporary dumping ground for euro pallets, rubber tyres, water containers, seedlings and “upcycled” industrial tarpaulin? An open-air workshop? Or maybe a garden? One thing is clear: spaces such as these, in which fragments of different contexts are mixed with great abandon, are definitely a new sight. A few examples: a DIY-village-square on the tarmac of the former Berlin airport Tempelhof, a group of shopping trolleys filled with plants by the entrance of an underground railway station, an old-fashioned Italian ice-cream cart in the middle of some home-made raised beds in Leipzig, an Outdoor kitchen constructed out of scrap wood in New York, euro pallets planted with vegetables on the grounds of a former brewery in Cologne, which is covered by red tennis court sand because of suspected contaminants in the soil. Yet this bricolage of pallets, crates, bushes, planks, wood, bags, buckets and barrels in fact provides a carefully framed commentary on the end of the industrial age. The urban gardening movement takes up this vital challenge and collectively addresses it in a previously unseen pragmatic fashion.



Picture 5: Moving a garden: Rosa Rose, Berlin (Credit: Susanne Quehenberger)

The urban vegetable gardens are more reminiscent of art installations made out of crates and milk cartons than traditional farms. They are located in unusual places such as inner-city wastelands or on the roofs of car parks. This indicates that we are dealing with a novel approach to the use of open space – an approach which in Germany prominently appeared on a rubbish-strewn wasteland in 2009 in the Prinzessinnengarten in Berlin. Here, people from different generations, cultures and

social environments plant local organic vegetables, eat together, make music, and above all: work together. The founders of the place describe themselves as two amateur gardeners who intentionally “curate” rather than “farm” the land, who do not have a master plan but rather have created an open process in which local people and anyone else who wants to join in can be involved (Müller 2011:38).

Characteristics of New Urban Gardens

We are dealing here with a number of different phenomena unknown in traditional gardening. Firstly there is the idiosyncratic use of old everyday materials from the surrounding urban environment. These materials are given new functions, such as a freight container donated by the Port of Hamburg, now re-purposed as a

garden bar. These re-purposing's are a reflection of the fact that urban farmers have limited funds and have to use what funds they have as creatively as possible. Simultaneously, re-purposings are a comment on consumer society. The consumer role does not correspond to the self-perception of most DIY activists in

urban garden projects. They see themselves not primarily as consumers, but as makers, blenders, finders. The search, they dig, they take away, they continue using objects they have found.

Secondly the use of guerrilla tactics should be mentioned. Wastelands and the areas around tree roots are planted up without the gardeners first asking permission, seed bombs are thrown into barren land, vertical greening is experimented with. Guerrilla gardening brings the viewer up short and challenges habitual perceptions. However, unlike with previous generations, there are only a few protests and slogans demanding this form of co-determination and participation. Current political discourse no longer relies on the power of words or slogans – but rather on the virtue of sending out signs or symbols. Jean-Francois Lyotard (1978) called this “the collapse of the grand narratives”.

A third phenomenon is the hacking, the breaking up and reinterpretation of spaces: wastelands, industrial roofs or rail-wastelands and other neglected areas are transformed into green, liveable environments. Growing vegetables is particularly important here as a way of calling into question, changing and commandeering the industrial production of foodstuffs and the retail chains. Learning how food grows, what conditions and ingredients it needs and what can be done with it, is part of the process of self-empowerment. It also raises fundamental questions such as who the land belongs to, and what ideas about participation and prosperity it should serve in the future.

The fourth phenomenon is the emphasis on mobility. Because of the poor soil quality, many gardens are mobile. The

spatial arrangements, typical of the industrial age, have been altered – boxes and containers can be moved in order to green other spaces. Such moves are not always voluntary. The Berlin neighbourhood garden “Rosa Rose”, situated on formerly occupied land, was removed by force in 2009 to make way for the construction of a residential building. Rather than moving on quietly, however, Rosa Rose paraded through Berlin to their new site, transporting the vegetable plants, bushes and fruit trees on home-made delivery bikes, wearing flowers in their clothes and hair. They thus turned the transportation of the plants into a major public event (Werner 2011, p. 65). This, if nothing else, reveals how different the new urban garden movement is from the traditional gardens: it is profoundly performative.

In the above mentioned Prinzessinnengarten, forgotten varieties of rare crops are grown in reused rice sacks, plastic crates and split-open cartons. Despite the dubious quality of the soil, this farming method underlines and aestheticises the mobile nature of this urban agricultural landscape. Moreover, it is congruent with the playful, artistic approach of urban gardening. A particularly striking example of the play between art, re-purposing and upgrading is provided by the temporary installation constructed in the Prinzessinnengarten by a group of artists from London. The artists call themselves nomads, travelling to different cities around the world and turning the detritus of modern civilisation into temporary places to stay. They create places that come to life thanks to the interaction between many different element - not just people - and then after a time

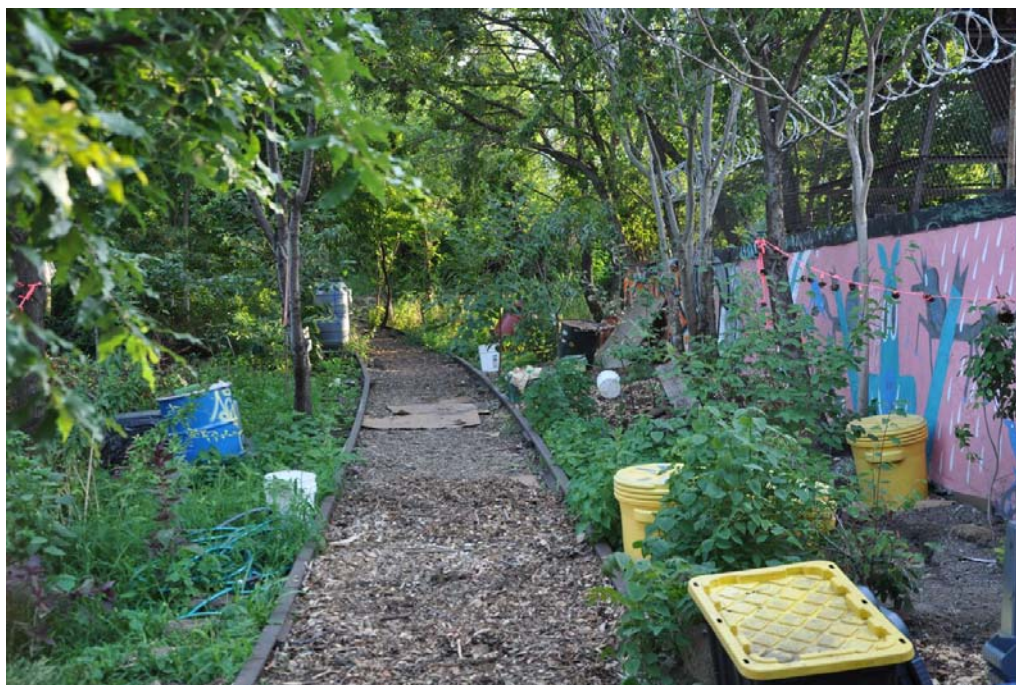
decay. In Berlin the artists built a nomadic restaurant in the form of seven tree-houses made out of old wood and window panes they had collected themselves. The poetry of the tree-houses was a striking interpretation of temporary housing and hospitality. The travelling artists brought nothing with them except what they needed for themselves and their van, and yet they were soon in a position to entertain guests. Guests or hosts? The difference is levelled out. The only other thing they brought with them was a pale blue door for the installation of the same name (Nomadisch Grün 2012:88-89). It is obvious why nomadic is so attractive right now: it promises a situational independence from the multitudinous pulls, impositions and imputations of ubiquitous economism.

A fifth phenomenon is the codification of the social in new urban habitats. Community gardens are radically inclusive. They aim to use the multiple physical settings to appeal to as wide a diversity of people as possible, bringing them together. Many projects are explicitly conceived as learning and educational spaces populated by amateurs, places for working together and learning from each other. Knowledge-sharing forms a precondition and basis for social intercourse which is not so much about speaking to each other, however: those involved want to *do* something jointly – to create, alter, break up or reconstruct a space.

A sixth phenomenon that indicates the innovative nature of urban gardening is that these projects encompass hybrid spaces. The actors do not worry about

mixing the aesthetics of the big city and of smallholdings. Vertical farming structures sit side-by-side with smallholdings. Vertical farming structures made from empty plastic bottles sit side-by-side with seedlings planted in old rice sacks and disused boxes.

Similar to “land art”, where temporary works of art are created and then left to decay in the natural environment, urban gardening sacrifices a certain amount of artistic control over what is created. It does so willingly, however, in order to leave the space open for forms of curatorship in which everyone can be involved. Closely related to urban gardening is the emergence of a type of space that re-unifies not only production and consumption, but also connects the private and the public. It is a type of space which enables interaction and exchange not only between people but also between human beings and urban nature; it therefore creates free space in order to renegotiate the social relationship towards nature. In an urban garden one can see plants and things in space-material arrangements which contain a civilizing promise. They are neither only and primarily aesthetic spaces and therefore art, nor they are primarily and exclusively educational spaces, or mere kitchen gardens: they combine contents from different social systems and connect them in a meaningful way. The atmosphere provides alternative visions of a city. Here plants and animals are no “resources”, but actors who have a right to appropriate environments in urban society (Latour, 2010).



Picture 6: Smiling Hogshead Farm, New York (Credit: Christa Müller)

The “garden generation” curates its own landscapes and architectures, generally without reference to official town planners. Through its rediscovery of manual skills and crafts it makes itself less “governable” in the Foucauldian sense, and less identifiable as far as creatorship is concerned; we do not always know exactly who planned, designed and built the space in these garden projects. The design emerges “in the doing” and in the permanent engagement with the materials. Rather than an individual signature, we see a collective design process that never reaches an end. It represents a new political culture that breaks with the democratic concept of the 20th century and can be seen as a “switch”, to (still “unfinished”) new forms of direct democracy: people take things into their own hands and design their surroundings. This shows a new understanding of politics and democracy, a belief that one's own actions can contribute to processes of social transformation.

Modernity Expanded

Because of the irritation and friction it intentionally causes, the urban garden movement is currently at the forefront of the “attention economy”, which has already caused culture-industrial usurpation. Gardening and subsistence, topics for decades closely associated with the discourse on shortages and dualistic ideas of modernization, have been completely relaunched. The image archive of modernity has been expanded to include subsistence activities that in past decades were encumbered with ideas of poverty, backwardness and a miserable existence far removed from the world of progress.

This is thanks to the Internet generation (Howe/Strauss 2000), a generation that not only wants to garden but to produce images at the same time. It knows how to feed and manipulate the media society's addiction to images. It knows that for the existence of its projects

to receive recognition and affirmation, such projects must first receive visual representation in media. In the words of systems theorist Niklas Luhmann, "What we know about our society, indeed about the world in which we live, we know through the mass media." (Luhmann 1996:9; translated by the author)

Reflection in the media also significantly increases the attractiveness factor of the gardens; this, in its turn, affords an opportunity to bring a real diversity of people together: elderly people from the neighbourhood, urban hipsters, bottle collectors, immigrants, seasonal farm hands and other passers-by. Community gardening creates open spaces in the genuine sense of the word.

For many members of the garden movement, gardening is also an explicitly political act. Many of the actors in community gardens are searching for fulfilling ways of life that may go beyond competitiveness and consumerism. They participate in the debate about the democratic use of public spaces, sustainable urban development, industrial food production and the treatment of non-humans.

Whether the issue is land grabbing, biodiversity or participation, the garden acts as transmitter, accelerator, medium and platform at one and the same time. The community gardeners sow, harvest, cook, propagate, raise hens, and keep bees. In so doing, they make statements. For them, seasonal food might require effort, but it also offers the chance to enter and experience new culinary territory. For them, cheap hybrid seeds can be bought at the garden centre, but using old varieties gives a feeling of autonomy and might create a

connection to the protests by peasant farmers in the global South.

Drawing on collective intelligence and in the process setting communalisation processes in motion is another opportunity offered by urban gardening. Community is created through shared use and collective work. The cultivation of the urban natural environment is accompanied by the cultivation of the social. Urban gardens are open to everyone and, as such, gather and combine a large amount of knowledge in productive ways. A library goes with almost every garden. Since there are usually no agricultural professionals among the activists, everyone depends on whatever knowledge is available – and everyone is open to learning.

In the heart of our cities, which are shaped by the structures of global production and consumption, highly visible parallel structures of subsistence are thus appearing. These structures can partly be explained by growing individualisation processes. But they also stem from a virtualisation of reality. People are looking for tangible experiences and authentic encounters. Community gardens offer them a wide range of opportunities for this, more perhaps than any other place. However, it would be wrong to claim that the gardens are an analogue alternative to virtual spaces. Rather, Web 2.0 is a catalyst in a process in which the analogue and digital worlds increasingly overlap and the line between them becomes more and more blurred.

All six dimensions mentioned for gardens of the new type are applicable both in Berlin and in New York. Gardeners in these projects focus on the localization of the production of unprocessed foods, on experience of urban nature, for a freer and

more and self-determined access to urban land for all and against the privatization of public space.

Comparison with Black Urban Growers

While the young ecological urban movement is playful and has less focus on self-sufficiency than on co-designing the cities, another population group in the US postulates gardening as a survival issue of urban poor: the Black Urban Growers (<http://bugs.nationbuilder.com/>). A crucial difference to the situation in Western Europe is the lack of social policy, which is complemented by extreme inequality. In the last few years, and this is a new phenomenon, too, Justice Activism has focused on community gardens as places for empowerment, especially for the black communities - racism in the US is still a key issue. Also in New York community gardens are often formed, directed and determined by white upper middle class academics. German activists attempt to deal with this misrepresentation, which also exists in Europe, for example through the intercultural gardens approach. In this type

of garden, developed from the late 1990s onwards, many refugees from different countries and backgrounds have tried to “put down roots again”, and through this process are able to negotiate a new understanding of “self” and “other”. Unexpected forms of identity formation beyond border thinking are being created through planting food together. (Müller 2002)

Meanwhile, in the United States, a particular organization of African-American gardeners has established: the “Black Farmers and Urban Gardeners” was founded in 2009. This NGO criticizes the urban sustainability discourse for being pure white as well as for assuming that People of Color are not interested in ecological issues. The “Black Farmers and Urban Gardeners” try to awaken historical consciousness and break up the traditional reservations about agricultural work, which is still negatively archived in the collective memory of Black communities as slave labor on cotton plantations.



Picture 7: Conference 2016 (Credit: www.blackurbangrowers.org/)

In their study “Beyond the Kale” Reynolds and Cohen emphasize that urban gardens are credited with improving well-being in low income communities and communities of color by reducing inequitable food access. However they also say that urban agriculture does not inherently lead to changes in the structures at the root of food system and environmental inequities (Reynolds/Cohen 2016:5-6). Apparently “Black Farmers and Urban Gardeners” do not want to wait for deep change anymore. Currently, they are connecting the debate on police brutality against blacks, known under the slogan “Black lives matter”, with urban ecology and subsistence. Urban gardening serves as a platform for empowerment. Collective self-sufficiency is reframed and thwarts the previous tales of agricultural labor. Such a relinking may well engender a feeling of strength in the current discussions regarding the still rampant racism.

The Black Urban Growers have begun organizing and hosting a series of community events with the purpose of starting a conversation around food: Where does it come from? Who is providing it? Why don't we see more black farmers at the markets? What is the relationship between our individual health and the health of our communities, and why does it matter? (<https://www.linkedin.com/company/black-urban-growers>, last download 10/17/2016)

The call for the 6th Annual Black Farmers and Urban Gardeners Conference 2016 in Harlem can be seen as almost paradigmatic: „Through education and advocacy around food and farm issues, we nurture collective black leadership to ensure we have a seat at the table. (<http://www.blackurbangrowers.org/>, last download 10/02/2016). What amazes at this discourse is the fact that self-sufficiency,

which is commonly associated with powerlessness, is taken as the starting point for self-authorization. The conference calls on the black communities to take responsibility for food issues and thus gain power to act. Karen Washington, co-founder of Black Urban Growers, proclaims: “To grow your own food gives you power and dignity. You know exactly what you're eating because you grew it. It's good, it's nourishing and you did this for yourself, your family and your community.” (<http://womeninislam.org/portfolio/karen-washington/>, last download 10/10/2016)

The comment of a gardener at the Conference Website shows how strong Urban Gardening is charged with reference to ethnic identity politics: “We need to support each other. Be more self-sufficient! When people realize we don't need to go to them for anything they start showing a lot more respect. God bless the child who has his own!! We done heard our mothers and grandmothers say this so many times before!! Be proud of your black life!! So support another black life!! Because black lives matter!!” (<http://www.blackurbangrowers.org/>, last download 10/02/2016)

Both the semantics and the visual design of the Black Urban Growers movement echo the unique power of the discourses of the 1980s. By “post” is no trace to be found. It might be the hopelessness of the social situation in American cities that demands such an unexpected unambiguity – and it shows that access to urban land can be shaped in quite different ways.

Conclusions

In conclusion, comparing the Black Urban Growers and the new urban garden movement, two different forms of self-empowerment through subsistence

production are clear: a concrete material, as is evident in the voices mentioned above, and a more playful, experimental form, which does not focus on urban poverty, but wants to contribute to a degrowth perspective.

The renaissance of subsistence production in the food sector thus has comparable dimensions in European cities and in New York – but also shows significant dissimilarities caused by the different welfare state regimes.

It is not easy to give a forecast on the further development of the new movements in the city. We observe a steadily growing variety of small, agile, event-related movements and actions emerge. They leave a spatial trace by recording places and spaces and thereby changing them. Their addressee is neither the politics nor the market. Their actions address a civil society public, which is no longer waiting for the big solutions to be brought "from above". This applies to the young environmental movement as well as to the black self-sufficiency movement. Only in retrospect will the effects of the new movements on social transformation be perceptible, both as related to the climate change problem and to the struggle for social and racial justice.

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Fresh supply chains for sustainable destinations: case study in La Fortuna

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La Fortuna, Costa Rica, has high potential for becoming a sustainable destination according to international GSTC standards; however, it lacks local sourcing of fresh agricultural goods, even though, some of them there are locally grown. This research describes the agri-food produce supply chain of four selected products in the region and addresses governance mechanisms, price gaps and overall limitations for an effective supply chain.

Results provide an insight on the supply chain mechanism and main limitations of actors to create win-win partnerships resulting in large price gaps among supply chain links and procurement inefficiencies.

1. Introduction

Sustainable supply chain management in agriculture is particularly important since sustainable agricultural products mean better standards of living for rural communities (United Nations 2015) and healthier products for an increasingly conscious tourism population (European Commission 2013, Giovannucci et al. 2012).

Agri-food supply chains are complex and further research can improve competitiveness of host regions, especially when these can be sustainable destinations. Sustainability can also be encouraged by a tourist-driven perspective. In this regard, the Global Sustainable Tourism Council (GSTC) in 2013 introduced a new certification especially designed for sustainable destinations (GSTC 2014) since there is growing consumer demand for sustainable tourism.

Matarrita-Cascante *et al.* (2010) addressed sustainability in La Fortuna and suggested several criteria by which this tourist region may be considered sustainable. Local sourcing and local prosperity are fundamental aspects for sustainable tourism. However, Canedo-Rivas (2012) analyzed how agricultural farmers are not included in the local supply chain and local restaurants do not source from local farmers.

Regional competitiveness is a key aspect of competitive supply chains especially if the agri-food supply chain can provide wider benefits to producers and consumers at the same time. Since sustainability in supply chains is improved by enhanced relationships among partners (Seuring and Müller 2008), this research focused on the

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characterization of the food supply chain in this region and the analysis of governance mechanisms toward the creation of a sustainable destination in La Fortuna.

Integration of supply chains, as well as the adoption of sustainable practices, has proven to increase performance goals in the manufacturing industry (Zhu and Sarkis 2004) and in the food industry (Vasileiou and Morris 2006 Schiefer 2002, Berno 2006). Nonetheless, management faces problems when integrating the first links of the chain (Stoian and Gotret 2011) in an upstream flow, which in this case are agricultural ones.

According to Seuring and Müller's theoretical framework (2008), the supply chain is organized by the focal company and supply chain decisions are based on governance structures. This research addressed these aspects in a descriptive study of selected products grown in the region by small and medium farmers. The main goal of this research was to gain in-depth understanding of agricultural supply chains and their dynamics within a potentially sustainable destination.

Costa Rica has emphasized its tourism attractions in terms of natural amenities, including La Fortuna, whose economy has increasingly shifted towards tourism in the past 30 years and whose economy and population have shown rapid growth (Acuña and Ruiz 2000). La Fortuna's most important sectors in terms of economic shares are agriculture, tourism and trading/services. As for agricultural production in the Huetar Norte region of Costa Rica; 15% is transported to the rest of the country and 21% is targeted for the export market—with

the highest proportion corresponding to fresh agricultural products (Zevallos 2013).

La Fortuna is located in the region of San Carlos (Figure 10), which is the largest canton in Costa Rica with 3347,62 km² and 6.5% of the national territory. San Carlos includes these districts: Ciudad Quesada Florencia, Buena Vista, Aguas Zarcas, Venecia, Pital, Fortuna, La Tigra, Palmera, Venado Cutris, Monterrey and Pocosol (Local Government of San Carlos 2016). La Fortuna is the only one of these districts considered to be a tourist destination—all other are more agriculture-centered.

2. Literature Review

Supply Chain Management

Stoian and Gotret (2011) have characterized the differences between a poor performance in a supply chain and what is considered determinant for high performance. These are usually called value chains or sustainable supply chains. These differences are presented in Table 1.

According to Pagell and Wu (2009), a sustainable supply chain has good standards on traditional measures as well as in the other dimensions included in the definition of sustainable development: social and environmental aspects. Seuring and Müller (2008) define sustainable supply chain management as the material, information and capital flows as well as cooperation among companies while achieving goals in the economic, social and environmental dimensions of sustainable development, considering that these come from client and stakeholder requirements.

Table 1. Characterization of poor and high performance of a supply chain

Criteria	Poor performance/supply chains	High performance/sustainable supply chains, value chains
Purpose	Competitiveness of actors	System competitiveness and long-term vision
Orientation	Guided by the supply	Guided by the demand
Objective	Maximize earnings and minimize costs without considering aspects other than the economic ones	Add value through productivity, quality, traceability and differentiation
Vision	Commercial relationships and supply of products in short or medium term	Commercial relationships and supply of products in medium or long term, with win-win strategies
Organizational structure	Independent actors	Interdependent actors
Type of relationships	Low level of cooperation and trust among actors	Medium to high level of cooperation and trust; clear and transparent definition of norms
Information flows	Low and limited to commercial transactions	Relevant and timely for effective development of actor relationships

Source: Bourgeois and Herrera (1999), Stoian and Gotret (2011)

From these definitions, two predominant issues can be highlighted. The term *sustainability* includes managerial decisions on economic, environmental and social criteria and sustainable supply chains demand collaboration among actors of the supply chain.

Supply chains and governance mechanisms

Traditionally, smallholders are recognized as having partial integration in the market as well as limitations for operating under market principles (Friedmann 1980). The new form of agri-food governance is buyer-driven and has developed sophisticated participation rules (Vorley 2001); therefore, the implications for

smallholder agriculture in the new forms of agri-food governance can be a challenge.

Peculiarities of smallholders sustain that no single model for strengthening their supply chains can apply universally (IFC 2013). The characteristics of actors, products and governance mechanisms (Gereffi *et al.* 2005) partially define the dynamics, possibilities and strategies for successfully coordinating with actors along the supply chain.

Alternative coordination mechanisms need to be created so that small farmers are included; however, these always creates costs—transaction costs. Therefore, the objective of new institutional economics, founded by Coase (1937) and followed by Williamson (1985), is to study conditions

under which firms (or supply chains) are more transaction-cost efficient than markets.

Supply chain partner selection is based on transaction costs between both parties (Hitt 2012). The process of getting to an agreement among actors generates frictions and higher transaction costs that are the result of asymmetries in access to information, bounded rationality and opportunistic behavior among actors (Williamson 1979). Transaction costs define the relationships created among supply chains.

Gereffi *et al.* (2005) suggest a governance typology in global value chains, bounded to the structural transaction-costs theory proposed by Williamson (1991), which divides supply chains into

1. Market structures: This is the lowest level of cooperation between actors in which the buying-selling rules are clear and of common understanding. Transactions are simple and there is no need for a structure to make any kind of transfer: the transactions are made in markets. There are low transaction costs so actors do not tend to deal with any kind of institutional arrangements.
2. Hierarchy: Product and transaction requirements are very specific and because of that, enterprises and supply chains tend to integrate vertically. Generally, there are larger controls over production and commercialization due to asset specificity.
3. Hybrid structures: These are structures that are not located in any of the extremes presented above. Due to differences in asset specificity, products characteristics and transaction complexity, these structures are defined as hybrid (Williamson 1991).

Gereffi *et al.* (2005) then also classified hybrid structures as follows:

1. Modular value chains: The ability of codifying product specification is less complex than the products themselves. Product specifications are codified through a common understanding between buyers and suppliers, so that they only have to work through codified products instead of analyzing the product each time the transaction occurs, reducing transaction costs.
2. Relational value chains: These take place when specifications of a product cannot be codified, transactions are complicated and the capacities of suppliers are high. In these cases, information flows and constant communication among partners is needed and therefore, changes in partners can create high costs.
3. Captive value chains. These occur when the ability to codify and product complexity specifications are high but the capacities from suppliers are low. These face changing prices and the buyer, rather than the seller, is the most significant actor in the decision-making process.

3. Methods

In-depth interviews were carried out with important institutions in the region, including La Fortuna's Development Association (ADIFORT), the regional Ministry of Agriculture (MAG), the National Bank of Costa Rica, the Costa Rican National Chamber for Ecotourism and Sustainable Tourism (CANAECO) and the Costa Rican Chamber of Restaurants (CACORE). These

interviews were intended to address the region's plan for development as well as sustainability's triple bottom line and development perspectives.

Methods for data collection: farmers

The district of La Fortuna was established as the site for analysis because of its sustainable destination framework. Although the borders of the wider supply chain spread to the international market, the focus for analysis and the farmers' sample was estimated according to the geographic limits of the district, since one of the objectives of sustainability is to source locally and the goal of the research is to address this specific topic.

In 2014, INEC conducted the agricultural census, but there is no accurate information about this study's population target since farmers dedicated to agricultural products were not identified on a regional scale (district) but on a wider canton scale. Information about the exact number of farmers dedicated to the selected products was not available.

Meetings with La Fortuna regional MAG were the basis for product selection. Products suggested by the regional director were papaya (*Carica papaya*), yuca/cassava (*Manihot esculenta*) and plantain (*Musa balbisiana*, *Musa acuminata* or a mix of these) (Hernández 2015). However, pineapple (*Ananas comosus*) and taro (*Colocasia esculenta*) production were also included in the questionnaire. Pineapple was included because it can be produced in this region; in fact, 47 percent of Costa Rica's pineapple production is located in the northern region of the country (CANAPEP 2015) and because it is widely consumed on a

national scale. Taro was also included in the analysis because it is produced in La Fortuna and it represents an opportunity for promoting local food in restaurants targeted to tourists. This is one of the objectives of the National Plan for Healthy and Sustainable Food promoted by the Costa Rican Chamber of Restaurants (CACORE 2015).

To get an approximate number of farmers in the region, geographical information on people dedicated to agriculture was obtained from INEC, as well as desegregated demographic, social and economic data. All other information was obtained from field research.

In an exploratory phase, pilot interviews were carried out in training sessions organized by MAG-La Fortuna. Three visits were planned in order to identify the main regions and to validate the information provided by INEC and the selected products before interviewing farmers and restaurants.

A stratified sample was estimated according to the proportion of people dedicated to the agricultural sector of the economy in the district. Six communities within La Fortuna were considered for the sample selection: Agua Azul, Sonafluca, Tres esquinas, La Perla, Los Ángeles, El Tanque and San Jorge. Sample size for farmers was estimated on a 90 percent confidence interval and 108 farmers were interviewed in these communities.

Direct questionnaires were applied from September to December 2015 in several visits to the region. All routes were designed according to INEC's map, previous visits and information about important farmers in the region and others farmers had previously mentioned. All houses in the selected regions

were visited, and those identified as small and medium farmers were interviewed.

Methods for data collection: hotels and restaurants

For selection of the hotels and restaurants, a list of hotel and restaurant licenses was requested from the San Carlos local government. From this list, a total of 325 licenses were active; however, several belonged to the same management. For example, if a hotel had three restaurants, there would be four different licenses, one for the hotel and three for the restaurants although procurement and managerial decisions were taken by the same person. There were several hotels on the list that did not include restaurants and therefore these were not interviewed. In addition, some small restaurants and hotels had closed by the time the research was conducted; therefore, the population was reduced to 53.

All restaurants were contacted; however, the response rate was 50 percent of the population. Interviews were carried out from September 2015 to January 2016 in previously requested meetings with the procurement managers; 30 complete questionnaires were filled out by restaurants in La Fortuna.

4. Results

Supply chain analysis

This section characterizes the main actors of the fresh produce supply chain and addresses their dynamics and governance structures.

Input sources

There are two main agricultural input suppliers in La Fortuna: El Colono and Almacen Agroveterinario Dos Pinos, which are private institutions. Farmers often get their inputs from these as well as either from governmental institutions (especially papaya seeds) or from their buyers, who often provide some inputs if their sellers are committed to a longer-term agreement.

Institutions such as MAG are often committed to supporting farmers to getting their inputs at lower prices; however, 10 farmers mentioned how input prices are high and they believed the government should support them in lowering at least the main agrochemical inputs. There were no farmer organizations in this region to strive for policy reforms that could eventually lead to structural policy changes that could lead to lowering input prices.

Farmers

The population in La Fortuna is 73% rural and 27% urban (INEC 2015) and most farmers live in rural regions, close to their farms. Socioeconomic development (SD) is divided into the five categories, shown in Table 2.

Most of the population (82%) has a low, medium-low or medium SD; however, the largest percentage (68.4%) is considered as medium while only 1 GMU is considered as high and 9 as low. In farmers' households, there were an average of 3.91 people per household (SD = 1.60), the mean, median and mode were all rounded to four people per household, following a normal distribution. The national average of persons per

household for 2014 was 3.30. National averages per quintile go from 3.57 members (fifth) to 3.10 members (first). In La Fortuna, 35.6% of households had more than four members, which is slightly higher than the fifth quintile in national terms

Table 2. Socioeconomic levels of La Fortuna’s population, 2015

Socioeconomic level	Frequency	Percentage (%)	Cumulative percentage (%)
Low	9	5.9	5.9
Medium-low	12	7.9	13.8
Medium	104	68.4	82.2
Medium-high	26	17.1	99.3
High	1	.7	100.0
Total	152	100.0	

Source. INEC, 2015; N = 152 (GMU: geographical minimum units: INEC’s measurement of minimum geographic measurements for analysis)

Most of the population (82%) has a low, medium-low or medium SD; however, the largest percentage (68.4%) is considered as medium while only 1 GMU is considered as high and 9 as low. In farmers’ households, there were an average of 3.91 people per household (SD = 1.60), the mean, median and mode were all rounded to four people per household, following a normal distribution. The national average of persons per household for 2014 was 3.30. National averages per quintile go from 3.57 members (fifth) to 3.10 members (first). In La Fortuna, 35.6% of households had more than four members, which is slightly higher than the fifth quintile in national terms.

The number of household members was usually negatively correlated with per capita income. Therefore, lower national per capita incomes can be expected in La Fortuna; however, income and agricultural incomes are not the focus of this research.

Farmers have a mean of 25.26 years of experience working in the agricultural sector,

with a minimum of two years and a maximum of 62, therefore there is high variation (SD = 13.943). While some have worked as farmers their entire lives, some others changed recently shifted to agriculture, since the construction sector deteriorated in the region a few years ago. Both, agriculture and construction jobs are considered non-skilled labor and workers can switch easily from one activity to the other. Some farmers (eight) that have recently moved to agriculture, mentioned how they were forced to shift from other tourism-infrastructure related jobs to agriculture as a consequence of the recent economic crisis of 2008–2009.

In terms of agricultural dependency for economic performance, 63% of farmer households depend only on agricultural production, while 37% do not. As for their proportional income distribution, 73% mentioned all of their income comes from agriculture and farming.

Table 3. Income from agriculture and education level of farmers, La Fortuna, 2015

Education level	Income from agriculture					Total
	100%	75%	50%	25%	NA	
Less than 6 years	17	1	3	2	1	24
	70.8%	4.2%	12.5%	8.3%	4.2%	100.0%
6 years	45	4	4	5	0	58
	77.6%	6.9%	6.9%	8.6%	0.0%	100.0%
Less than 11 years	12	0	1	0	0	13
	92.3%	0.0%	7.7%	0.0%	0.0%	100.0%
11 years	4	4	1	1	0	10
	40.0%	40.0%	10.0%	10.0%	0.0%	100.0%
Higher education	2	1	0	0	0	3
	66.7%	33.3%	0.0%	0.0%	0.0%	100.0%
Total	80	10	9	8	1	108
	74.1%	9.3%	8.3%	7.4%	0.9%	100.0%

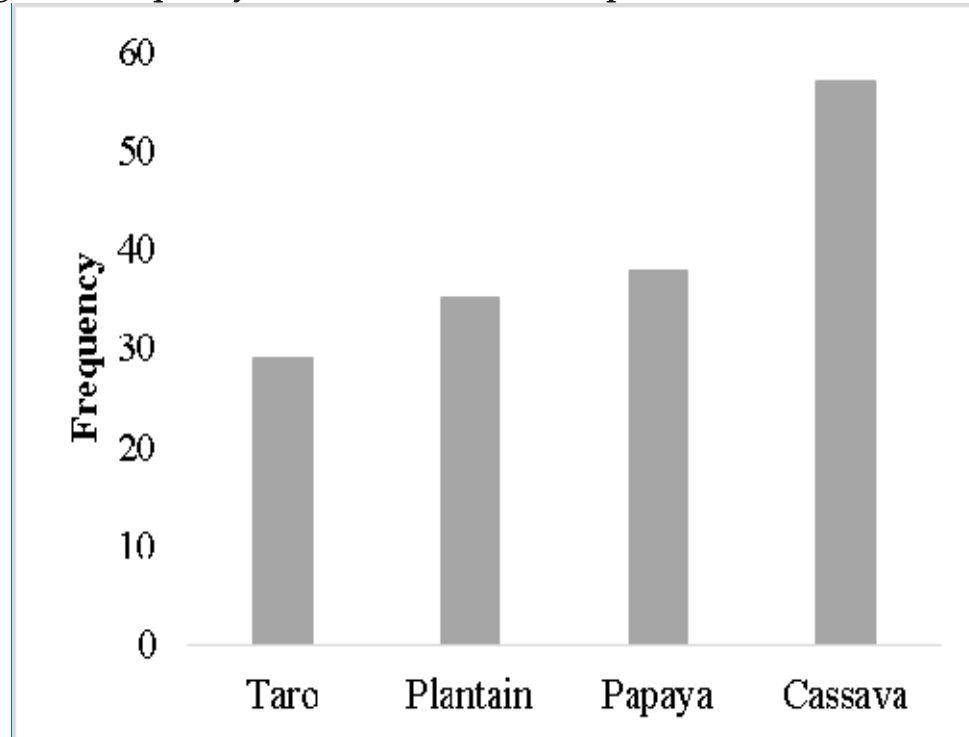
Most farmers received almost all their income from agriculture-related activities whether these were solely crop production or farming; some farmers also combined it with other jobs such as drivers, agriculture machinery rentals, apartment rentals or security guards. These were the jobs mentioned most and their working relatives work mostly in beauty salons or as elementary schoolteachers.

Most of the jobs farmers mentioned are non-skilled labor or low-skilled labor. This situation corresponds with farmers' low academic profile; since 75.9% only have elementary school education, including 22.2%, which who did not complete it. Only three people from the sample (2.8%) had

achieved some kind of higher education. However, even when education increased, farmers still received most of their income from agriculture ($x^1 = 1.29$).

Around half of farmers in this region usually grew more than just one product (44.4%), while 55.6% stuck to one product. Most popular crops were cassava (55%), papaya (38%), plantain (35%) and plantain (30%). Farmers do not rely only on one product—they mentioned prices fluctuate significantly during the year and having more than one product allowed them to increase their financial stability. Some farmers grew a mixture of these products or mixed them with less popular products such as ginger and sweet potato (Figure 1).

Figure 1. Frequency distribution of selected products for La Fortuna, 2015



Although there is much research on the importance of written contracts to enable farmers to increase their development goals, especially for economic stability, in La Fortuna, most farmers worked with their supply chain partners without a contract (69.4%), while 23.1% used a verbal contract and only 7.4% had a written one. According to their responses, this situation occurs because they preferred to choose from the market if there were any buyers who would pay a higher price than the last person/company that bought their product.

Creating trust among supply chain partners is fundamental to sustainable supply chain performance; however, there were no risk-sharing mechanisms for farmers to rely on their buyers, and therefore they were constantly searching for better options;

which farmers understand as buyers who offer better prices.

In terms of association and organizational skills, only 39 farmers (36%) mentioned they belong to some type of farmers' organization; however, these are no local cooperatives or farmers' associations but rather larger countrywide associations.

Most farmers sold their produce to intermediaries and packing companies (Table 4), although they often mentioned they were uncomfortable when asked about why they chose to work with them; however, these actors were the only ones who would buy their entire production and collect it at the farm gate. Restaurants bought mostly from intermediaries (Table 5), reasons being they already know their suppliers or because of ease of the transaction.

Table 4. Frequency of supply chain partner selection for farmers, La Fortuna, 2015

Type of buyer	Frequency	Percentage (%)
Intermediary	53	49
Factory	39	36
Farmers' market	10	9
Supermarket	5	5
Restaurant	1	1
n =	108	100

Table 5. Frequency of supply chain partner selection for restaurants, La Fortuna. 2015

Type of seller	Frequency	Percentage (%)
Intermediary	19	63
Both	7	23
Farmers	4	13
n =	30	100

Local buyers

Restaurant decision makers had a mean of 9.84 years of experience, with some mentioning less than a year of experience and the maximum respondent mentioned 30 years of experience (SD = 7.761).

Educational level of restaurant managers or procurement managers was higher than farmers, which was expected; 43.33% of them had gone on to higher education (college) and 46.66% had between six and 11 years of high school education. These are significantly higher than the educational level of farmers, although farmers have more experience. Also, 60% had received training courses while working in the tourism or sourcing sectors.

Farmers' lack of organization replicated in the restaurant sector: 73.3% did not belong to any type of organization either in the tourist sector or in the sourcing sector. Tourism organization is a common topic in the country, especially when dealing with sustainability issues. CANAECO, the Costa

Rican National Chamber for Ecotourism and Sustainable Tourism, supports business linkages, for example as well as sustainable initiatives and training courses; however, there are only five hotels affiliated with this institution in La Fortuna (Carballo 2015).

In spite of sustainability promotion and the national certification for hotels, restaurants and tour operators, only seven restaurants claimed they are part of the Costa Rican Sustainable Tourism Certification (CST), three other respondents claimed they have strived for it in the past but did not continue to pursue it since it has very high standards and they were not sure if it is worth it.

In terms of contract mechanism, 50% worked with their fresh produce suppliers without a contract, 40% with a verbal contract and 10% with a written contract. This situation had a similar pattern in the previous stage of the supply chain since most farmers did not work with a written contract; however, most restaurants worked directly with intermediaries rather than farmers.

Exports and the Costa Rican market

In farmers' interviews, seven mentioned they own their means of transportation and therefore they sold directly to the local farmers' market, in street sales and in three cases they transported directly to the National Center for Food Supply and Distribution (CENADA), located 125 km away. In cases in which farmers sold to intermediaries, once these products left their farms, most farmers did not know where or to whom products were sold; only five farmers who sold to intermediaries knew where their products were finally consumed.

Production from farmers who sold directly to factories was turned into either frozen products or chips (especially in the case of plantain and cassava). Papaya was also exported either fresh or frozen. There are four factories in La Fortuna, which can absorb the local supply and usually buy all of the farmers' harvest, which is a valuable asset from the farmer's perspective; two of these factories sold their produce exclusively to foreign markets and the other two sold mainly to the local market, at least as first tiers.

According to FAOSTAT (2015), Costa Rica exports fresh plantains to North America and the European Union (EU); however, exports significantly reduced from 2006 to 2009 and have remained low since then. Dry plantains were first exported in 2006 and exports have increased significantly, especially from 2010 on. Fresh papaya is mainly exported to Canada, since papaya from Costa Rican is banned from entering the United States. Taro is exported to North America and to the EU in small quantities however', exports began in 2012,

and so this is a new market. From these selected products, cassava is the most important product in the foreign market. The main market for cassava is the United States since it has been about 70% of total exports for the past 10-year span.

Supporting actors

The University of Costa Rica (UCR), Costa Rica's Technical Institute (TEC) and CATIE (Tropical Agricultural Research and Higher Education Center) are universities that farmers recognize because they have received previous support from them in the form of research and improving their production capacity. The National Institute of Learning (INA) is a teaching center widely recognized by small and medium farmers and hotels and restaurants because they have received training courses from this institution, such as. Food-handling courses and agricultural technical courses.

ADIFORT, La Fortuna's development association has a major influence on a local scale because of its economic capacity and good organizations skills; it works from two main pillars—social projects and economic projects (Román 2015). ADIFORT is involved in the organized farmers' market, which is held every Friday.

The main source of income and social mobility for families in La Fortuna is tourism or tourism-related activities; but the second most important sector is agriculture (Román 2015, Hernández 2015). As for financing, most loans were related to tourism; however, in recent years, these have decreased and people in the region have searched for financing for other types of businesses,

including agriculture and farming projects (Rodriguez 2015).

From the perspectives of tourism and restaurants, the Costa Rica Tourism Institute (ICT) plays an important role in promoting the country as a sustainable, green and authentic destination; however, restaurants and hotels in the region are more acquainted with ICT because of the CST certification program, which is the national certification for sustainable tourism.

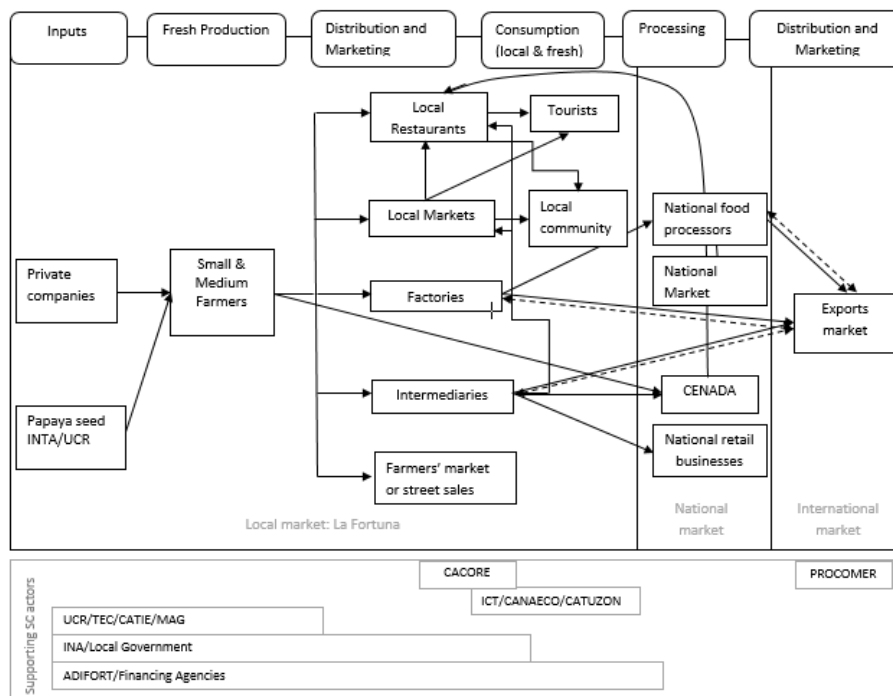
CATUZON is the Northern Region Tourism Chamber, which is a community organization that promotes tourism, especially linked to the northern part of the country; 43 businesses are affiliated with this chamber (ICT 2016), including hotels, restaurants, tour operators and transportation agencies. In terms of tourism promotion and support, only five institutions are currently affiliated with CANAECO, the main advocate of sustainability and tourism

(Carballo 2015). There is not enough information to ascertain why hotels and restaurants do not participate as members of these institutions; however, there are low organization skills and a lack of willingness to associate among both sectors in the region.

Procomer, which is the national institution in charge of promoting exportation of goods and services, assesses all companies interested in exporting; including those who export agricultural goods. It provides guidance to new exporters and those who already export; Procomer also provides international market information; however, this institution works on a national scale.

The graphic representation of the supply chain can be observed in figure 2, where supporting actors are located outside the supply chain structure.

Figure 2. Supply chain of selected fresh agricultural produce, La Fortuna, 2015



Price analysis

Farmers sell their produce to different types of consumers, classified in five different types of buyers, and the mean price paid per buyer is shown in Table 6. Price

ranges according to type of buyer are significantly different for papaya and cassava, but not for plantain or taro.

Table 6. Prices received by farmers per type of buyer of fresh products, La Fortuna, 2015*

Products	Type of buyer					Sig (0.95%)
	Restaurant	Small markets	Factory	Intermediary	Farmers' market /street sales	
Papaya		143	155	155	325	0.009
Cassava		161	156	160	304	0.000
Plantain	120	108	121	123	118	0.923
Taro	217	282.61	262.56	229.97	543.47	0.564

*Prices in Costa Rican colons (price equivalent 544 colons = \$USD 1, 30 May 2016).
Papaya, cassava and taro: prices per kg; plantain price per unit.

Restaurants were also asked about the mean price of these products, results are shown in Table 7. There are no significant

differences in this case; means prices are the same, regardless of the supplier.

Table 7. Prices paid by restaurants per type of seller of fresh produce, La Fortuna, 2015*

Products	Type of seller			Sig (0.95%)
	SM farmer	Intermediary	Both	
Papaya	613.75	671.25	650.83	0.982
Cassava	445	449.58	427.78	0.959
Plantain	165.25	173.73	144.29	0.426

*Prices in Costa Rican colons (price equivalent 544 colons = USD 1, 30 May 2016).
Papaya, cassava and taro: prices per kg; plantain price per unit.

Price sold by farmers to intermediaries and price at which restaurants buy from intermediaries were as follows: papaya 333.065%, cassava 180.988% and plantain 41.243%. Taro was not considered for this analysis since the proportion of restaurants who regularly bought taro was too small.

5. Discussion

Gereffi (1994) defines governance as “authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain.” Governance is based on the complexity of the information between actors in the chain, how the information for

production can be codified and the level of supplier competence (Gereffi *et al.* 2005).

According to Gereffi's hybrid structure classification, the fresh agri-food supply chain of La Fortuna classifies as a captive governance structure since suppliers (farmers) depend on a small numbers of buyers who "wield a great deal of power" (G. Gereffi 1994), while small- and medium-scale farmers (SMFs) are dependent on the conditions established by their buyers.

SMFs do not have any type of farmers' organization; all of them negotiate sale of their produce on their own. This system limits their bargaining power since they are SMFs and cannot exert any type of market power through price and volume control. All farmers have a positive perception of a potential SMF organization; however, no one has launched any initiative yet, perhaps because of lack of organization skills.

Most farmers sold their produce either to intermediaries or to factories, which determined prices. Usually, quality of agricultural products is encoded, but quality standards for agricultural products in this region are not stable; according to interviewed farmers, price and quality are relative terms. When agricultural supply is high, quality standards are very strict; however, when supply is low, buyers do not take into account their quality standards, often buying produce they would not normally buy. Nonetheless, farmers are price takers.

There is a lack of backward information along this supply chain. When farmers were asked if they knew where their produce was sold, most did not. In only five cases farmers knew exactly where their produce was

consumed. Bullwhip effects would certainly affect negatively on farmers' incomes since there is no market-risk information. This is a problem in the sense that farmers would not adapt to changing trends fast enough because of their lack of awareness of market trends.

According to Seuring and Muller (2008), first tiers of the upstream sustainable supply chains would adapt to changing consumer demands either through certification systems or by focal companies. In this case, focal companies are the only source of market information for most farmers and therefore would base their farming decisions on these. Certification systems, however, are not popular in the region; none of those interviewed had enrolled in any type of certification system.

Those who make sourcing decisions in restaurants are aware of the importance of sustainability and local sourcing—they often explained their good relationships with SMFs. They know their target market and are informed of changing trends in clients' needs. Since tourism is gravitating toward sustainability and corporate social responsibility, hotels and restaurants expressed willingness to follow these patterns.

On the other side of the supply chain, farmers were willing to sell their produce to buyers other than intermediaries and factories because most of them felt prices paid for their products were not fair. However, the first problem in linking these two is quantity: if all restaurants in La Fortuna bought all of their products locally, they would purchase only 14.2% of plantains, 0.4% of cassava and 2.5% of papaya grown by SMFs.

Finally, restaurants need at least a weekly supply of fresh produce, while farmers harvest in a six-month period for cassava and taro and do not stagger their harvest in order to offer their produce consistently to local restaurants. Prior coordination is necessary so farmers plan their harvest according to their potential buyers' needs.

6. Conclusion and recommendations

The fresh product supply chain is very complex and since there is no farmers' organization, their decision-making process in selecting partners is scattered among different buyers. In some cases, farmers even sell to intermediaries who transport products all the way to the country's urban area. On the other hand, farmers buy from intermediaries who travel from this urban area to La Fortuna.

Since restaurant owners and managers are aware of the importance of buying locally, especially in the agriculture sector, there is a possibility for these to collaborate. Also, farmers would find prices paid by restaurants significantly higher than those they currently receive from their buyers, therefore there is an incentive for both sides. Nonetheless, this potential trading mechanism would only include a small proportion relative to the number of fresh products harvested in the region.

The education level and socioeconomic conditions of farmers are still a challenge in this region; investment in these aspects could exponentially increase their possibilities for engaging in high-value global chains—to engage in value-added products or promote

innovation in business models of these supply chains.

Although it is a popular characteristic in agricultural supply chains for farmers to depend on buyers, this is still a challenge, since SMFs would sell their produce whatever the price, having no control over any decision-making procedures aside from their harvest; there are no bargaining mechanisms, and conditions are set only by buyers.

Collaboration among SMFs and local restaurants would help the tourism sector not only to comply with sustainable certification standards but also to provide an enhanced experience for tourists by offering local food, which has proven to increase tourist satisfaction in other locations (R. Sims 2009). Governance mechanisms from the tourism sector that push this type of initiative are essential since the agricultural sector of the supply chain lacks organization skills. CACORE's national plan for local food in a possibility for supply chain enhancement; however, incentives for restaurants to participate should be promoted in order to obtain higher policy implications and better standards of living for the rural areas.

Promotion of this type of initiative can promote development in rural areas, creating opportunities for people to prosper and reducing socioeconomic problems that occur with rural to urban migration. Generating possibilities for development in rural areas is key to sustainable development in a region in which most of the population is located in rural areas, often with lower standards of living.

This research provides a characterization of the fresh product supply chain and

emphasizes the main issues of farmers' lack of bargaining power and market knowledge. The asymmetry of information among these two groups of actors was expected because of other empirical results; however, this research provides a full characterization of the supply chain and of its governance mechanism. Further research on how to improve bargaining power of SMFs with low individual quantities as well as improvement in association and organization skills are needed to extend benefits from supply chains and promote rural and local development.

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Commentary

Disability Under Capitalism and Marxism

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Disability is a many-faceted aspect of the human condition, ranging from loss of one or more senses, to mental, physical, speech and other challenges. Mobility issues requiring a wheelchair or walker or other assistive devices keep many people out of common facilities such as post offices or hardware stores. In general, disabilities prevent full social participation. Although exact figures are lacking, estimates range from 15 to 25 percent of the US population experiencing one or more disabilities, some 50 million people (1). The World Health Organization (WHO) estimated, in 2011, "that there are more than 1 billion people in the world living with some form of disability, of whom nearly 200 million have considerable difficulties in functioning" (2. as cited in 3. p. 1278).

An important recent WHO study, using a sophisticated composite measure of all disabilities, studied 49 countries and

found a strong negative association between wealth (household economic status) and age-adjusted prevalence of disability. Across countries, wealthier countries had a lower rate of disability. And of within countries, wealthier people had fewer disabilities than poorer people (3). One can say that disability, like many other human ills, is class related. The question I want to raise and hope to draw comment upon is, "How is disability understood and treated under different political-economic systems?"

There seems to be a dearth of serious scholarly work on this subject, though I have Googled "Marxism and Disability" and found a few fascinating things. One view suggests that through specialization and the division of labor Capitalism "disables" everyone in the sense that their work is usually narrow (for example, a machinist smoothing metal edges of computer parts over and over) thus their full being and potential are never realized (4). Then of course there is the horrendous cost of work-generated illnesses and disabilities (5) many of which get exported to the semi-periphery and periphery of the Capitalist world system (6, 7).

The basis for the Marxist critique of Capitalism and the basis of class and class struggle is THE LABOR THEORY OF

¹ A paper prepared to stimulate discussion at Roundtable #7, Marxist Section, 2013 ASA Meetings, NYC, 2:30-3:30 PM, Sunday August 11, Hotel Sheraton.

VALUE (8, 9) All material objects or substances which have value in society -- be it bread on the family table, iron ore on its way to a smelter, or a book of poetry ready for order from Amazon -- require human labor to produce. But capitalists control the means of production and pay workers only enough for them to get by and sometimes not even that. The surplus is alienated from workers in the form of profits which enrich the capitalists individually and as a class. Workers can increase their share through organization and struggle.

To prevent or weaken such struggles, ethnic groups are played off against one another (racism) the genders are encouraged to put each other down (sexism, patriarchy, and homophobia) and unions are banned or undercut. The power of the State in the form of armed forces and police may be used in these struggles at times of crisis, but the everyday weapons in the hands of the capitalists are the media and other instruments of culture creation, control and transmission – what Gramsci termed “the cultural hegemony”(10). Today, worldwide neoliberal deregulation of work, labor and health issues, unemployment and privatization of public functions create enormous social inequalities.

A long history of struggle has brought working people the right to organize, though this is very weak in the USA and even weaker in poor countries, compared with Sweden and many other nations (11, 12). Women have achieved the right to vote, but still are paid less for equal work (13). Slavery was abolished and civil rights, including access to public places such as a lunch counter and the ballot box have been largely

assured in the US (though if you read *Doonesbury*, you know that Jim Crow is back in Alabama and Texas and voter suppression is going strong again). Recently the U S Supreme Court allowed that gay couples can marry. The struggles go on.

What is the place of disability in this picture? Those who have seen the PBS documentary, “Lives Worth Living” (14) know what a struggle it took to get the ADA Law passed. A crucial event was the assembly of 100 or more people in their wheelchairs at the steps of the U S Capitol. When Congress-people, bystanders and the media saw these courageous people get, or tumble, out of their wheelchairs and start trying to crawl up the Capitol steps, “the jig was up”, so to speak. The ADA Law passed some 23 years ago (15). This law and its history and the general picture of disabilities in the USA are well developed in the *Encyclopedia of Disabilities*, though nothing is said of Marxism and disabilities (16).

The struggle for the disabled to achieve equal, dignified access and inclusion in society’s affairs may be considered the latest in a long line of struggles for human rights. With the Labor Theory of Value in mind, it is easy to see how capitalism in its early stages would cruelly throw the disabled on the human scrap heap. Even at a later stage, under Nazism, the disabled were gassed and burned along with Communists, Jews and Gypsies. Today, the many disability groups often struggle on their own (the blind, the deaf, mentally ill, MS, and others) though some effective Cross-Disability Networks have been formed, such as the Colorado Cross-Disability Network. Few if any disabled persons or groups see themselves as

part of the broader class struggle to overthrow capitalism, though this would be, in unity with others facing discrimination and exploitation, the way to full participation.

What about disability under Marxism? There have been some very sad chapters in the history of “socialist” struggle for working class advancement and eventual control of State Power and the means of production. In Italy, Gramsci himself was frail of body and might have been considered disabled. In any case, he fought some other Italian Socialists writing on “the Southern Question”, notably Lombroso and his followers, who took a social Darwinist view and saw the poverty of the South of Italy as linked to biological inadequacy (17).

Recent correspondence with experts in the disability field indicate that the situation of the disabled – attitudes toward them, employment opportunities, and provision for their access and inclusion are archaic and bad in both wealthy, modern Hong Kong and in economically robust People’s Republic of China – though it was fascinating to learn that when, during the revolutionary struggles, Deng Xiaoping’s son was thrown out of a window and paralyzed for life and needed to use a wheelchair, Party attitudes and actions changed for the better but are still far from adequate (18). Some would question whether China is on the road toward Communism, given its neoliberal direction in recent years.

Correspondence with the Dr. Akwasi Aidoo, CEO of Trust Africa, an important foundation supporting local village, educational, and other developments, suggests that there may be a slightly better

situation in more progressive African countries, such as the “Persons with Disability (PWD) Act” passed in 2006 in Ghana. Its full implementation is lagging, but advocacy for it is growing. In general, in Africa, the situation is poor and “There is much work to be done” (19).

An official WHO study of Latin American and Caribbean countries, paints a positive picture of the health system and health situation overall in Cuba and suggests that the situation for disabled persons is much better than in other comparable countries (20). This squares with a comparison done some years ago of Cuba and the Philippines, considered in World-Systems Perspective. Both countries were under the domination of Spain and the Catholic Church for some 400 years; then came under USA capitalist domination until 1959, when Cuba broke free. The health and health care system developed far better after 1959 in Cuba than in the Philippines (21). But it would be good to learn how things are in a detailed ethnographic sense. For one thing, power doors and other infrastructure needed by disabled persons (and useful for all) are not likely to be found in large part due to the inhuman USA blockade of Cuba carried out, now, for more than 50 years (22).

The Marxist ideal is “From each according to their abilities, to each according to their needs”. Stalin changed this to: “to each according to their work” – hardly an advance over capitalist conceptions. The question of disability in Marxist theory and praxis seems largely undeveloped. Cuba is known to have a number of special schools of high quality to educate children with autism and dyslexia. Is this a “separate but equal”

strategy? In short, some serious thinking and action is called for to fully include all persons in the project of human betterment.

In conclusion, it is suggested that the goodness of human societies can be judged, within resource levels available, according to how well they provide for the access and inclusion of their disabled members.

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BOOK REVIEW



Fuentes-George, Kemi. *Between Preservation and Exploitation: Transnational Advocacy Networks and Conservation in Developing Countries*. Cambridge, MA: MIT, 2016.

Bio adversity is an ever-growing issue in developing countries. As one of the more developed countries in the world, we help set the bar when it comes to economic advocacy. We must set the example as a country when it comes to taking care of our environment. Naturally the eco system plays a factor in how we age in our given countries, and even down to the regions in those countries. The eco system can vary from region to region. Knowing that the eco system can differ in various portions of the world this information should definitely be taken into consideration with the aging process. As we age our bodies' health is determined on the persons ability to cope with their social and physical environment. While reading the book "Between Preservation and exploitation: Transnational Advocacy Networks and Conservation in Developing Countries," I was enlightened on how parts of the world are compromising and how society ages.

The global economic status has been growing as population and technology continue to increase. Despite economic

growth, climate emissions have remained flat in the past several years. This is great on a global scale for the economy to continue to grow while leveling out pollution at the same time. However, on a regional scale developing countries face issues that could compromise their individual eco systems and causing an increase in environmental advocacy. For example, Fuentes-George argues that bauxite mining in Jamaica one of the countries top sources for exporting and creating revenue but leaves the Cockpit country left with waste and hazards that could compromise the countries eco system. There is a fine line in wanting the country to grow economical but harming the same counties eco system because the people of that region are then faced to age there and deal with the land and water. The book also touches on a situation in Egypt where the tourism and structure of the land is causing a higher death rate for birds. Birds are dying from people catching them in nets and from windmills that are used to create energy, and thus decreasing there population. This in the long-term can have an effect on that regions eco system if these birds become extinct as well as other parts of the world that have animals that are facing extinction.

I found economical advocacy to be in issue that should be taken more into

consideration in regards to geriatric care. Yes, these economical issues are frightening as these countries depends on tourism and exports for their economy to thrive but at when does the cost of the people in these countries taken into consideration? Getting the mass public and social activism is a good

way to create policy change that could hold these businesses more accountable for waste and harm that is being created. At the end of the day we need to make sure the society we are developing is one that we can age in a safe manner in.

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News from UNT

Killa-Watts - Hydroelectric Test Stand & Turbine Design

Team Members: Xavier Castelazo, Dakota Bower, Sarah Minette, Garrett Inkster, Cody Tilghman

The goal of the project is to create a hydroelectric turbine test-stand with a mount for interchangeable student designed turbine wheels. The stand would allow students to compare theoretical potential energy of a suspended water column to the actual output of a turbine, and be able to calculate efficiency and theorize ways to improve the system. Using working principles of hydroelectric power plants, Pelton wheels, Francis Turbines, and other common turbines, this project will be created for long term use in the Mechanical and Energy Department. It will be durable, functional, and as a MEEN Lab, or a hands-on demonstration for Alternative Energy Sources. The project will be used to educate the UNT Mechanical and Energy Engineering undergraduates in hydroelectric principles and applications and give any future student the opportunity to create and test their own turbine. Each turbine wheel will be designed/tested in a CAD/Solid Modeling software. Once the wheels have been designed, they will be 3-D printed in ABS plastic can then be tested in the stand. The test stand will run water over the wheels at up to 4 meters/second and generate power from translating the kinetic energy of the water into a shaft which turns an electric motor.

The project idea is modeled after the basic principles hydroelectric power generation, and design multiple turbine wheels that may be suited for different applications. From the research, Pelton wheels were found to be exceedingly effective at catching the kinetic energy of the water thus generating power. The Pelton wheel is essentially composed of 2 cups that split the jet stream in half and shed the water to the side. The cup design allows for the water jet to transfer almost all its kinetic energy into the wheel, which results in high efficiency of energy transfer from the water. This basic principle is the primary inspiration for the project's turbine wheel designs.

The test stand was designed to produce a high velocity jet stream with low volumetric flow rate to optimize our limited pressure head. Calculations began with Torricelli's law of flow out of a vessel. Subsequently, equations for time rates of change for velocity and height of water in the tank were derived. With these equations, sizing specifications for the tank and subsequently the wheels were determined.



Youth Corner

The Lead Free Project

Sehaj Sandhu, Tarun Kudaka &
Kabir Bhakta¹

Abstract: Lead contamination of water is an elusive problem in areas such as Flint, Michigan which can cause numerous health problems. In order to address this situation, this science fair team built an activated carbon filter to remove lead from water. The filter engineered in this project serves as a cheap (when compared commercially), yet effective means of protecting individual households from the dangers of lead water. In order to test the effectiveness of the model filter, the team conducted an experiment measuring significant changes of the lead concentration in a sample of lead contaminated water. The experiment found that the concentration of lead in .5 gallons of water was less than 1 ppm in all the parts per million trials, and under 15 ppb in the parts per billion trials. Overall, this solution to an ever-growing problem in the United States is both intuitive as well as realistic.

The Problem

The Flint Water Crisis started in April of 2014 and the city was declared in a state of emergency in the beginning of 2016 due to the high lead measurements in the water. Whenever water with a low alkalinity runs through lead pipes, the walls are susceptible to corroding, therefore causing lead particles to seep into the water stream. These lead particles when consumed cause health issues. According to the EPA, the effects of lead contamination include "cardiovascular [complications], increased blood pressure and incidence of hypertension" as well as "decreased kidney function and reproductive issues" in adults, for both males and females. Furthermore, drinking lead contaminated water can cause "reduced growth of the fetus and premature birth" in pregnant women. Also children are the most affected by lead contamination which can lead to "behavior and learning problems, lower Intelligence Quotient (IQ) and hyperactivity, slowed [stunted] growth, hearing problems, [and] anemia."

Additionally, in "rare cases, ingestion of lead can cause seizures, coma and even death [in children]." This crisis and a google science fair proposed solution gave inspiration to find a cheap and efficient solution to this real-world problem of lead contamination in water.

¹ Students at the Uplift North Hills Preparatory High School. This project won the 1st Place at the Aga Khan Foundation *Innovative Solutions Challenge 2017*.
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The Purpose & Question

Our purpose will be a cheap and efficient water filter that removes lead from water. This filter can be utilized on a variety of scales ranging from in-home filtration to region-wide implementation in third-world countries. Our question is: How can a cheap and efficient water filtration system for lead be created and how much lead can it filter successfully?

Hypothesis

The water with 27 ppm of lead in .5 gallons of water will have the lowest lead concentration after being filtered for 24 hours through an apparatus containing 1 lb of carbon compared to the other two concentrations.

Expected Outcomes

- Filtering water dissolved with lead(II) nitrate to produce water containing less than 15 ppb (parts per billion) of lead. (15 ppb is the EPA regulation for lead in water)
- Creating an effective apparatus as a prototype for a scalable and cheap lead filter.
- Gaining a thorough understanding of the problem and learning new techniques to obtain a complete knowledge on the topic of lead contamination in water.

Engineering Goals

- Construct a tank that will filter lead from water using the metal absorption properties of carbon.
- Utilize pressure and gravity to transport water into the clean water chamber.
- Use environmentally friendly materials.

Materials

- 1 liter- Lead water (solution 4.90 grams of lead(II) nitrate ($\text{Pb}(\text{NO}_3)_2$) and an excess of water)
- 8 pounds- Hardwood charcoal
- 3 pounds- calcium chloride (CaCl_2)
- 6 gallons- City of Irving municipal tap water (any tap water will suffice)
- 1x- $\frac{3}{4}$ inch thick 12 foot long PVC pipe
- 2x- $\frac{3}{4}$ inch PVC Ball Valve
- 2x- $\frac{3}{4}$ inch Charlotte Pipe PVC Adapter Fitting
- 2x- $\frac{3}{4}$ inch diameter PVC Schedule 40 Adapter
- 1x- PVC cutter
- 1x- J-B WELD ClearWeld Epoxy Syringe
- 6x- Popsicle sticks
- 2x- 3 gallon plastic cylindrical containers
- 1x 1 inch- Straight Shank Drill bit
- 1x- Drill
- 1x- 8 pack Abotex Lead Inspector Lead Test Kit

- 1x- 3 pack Watersafe WS-207 Lead in Home Tap Drinking Water Test Kit
 - 1x- Cotton Cloth
 - 1x- Drawing compass
 - 1x- Bucket
 - 1x- Cot rod (any metal stick will suffice)
 - 1x- Kiln
 - 4x- Stone Kiln plates
 - 1x- Roll of Duct Tape
 - 3x- Great Value plastic spoons (any spoon will suffice)
 - 1x- Measuring cup
 - 1x- 10 milliliters medicine syringe
 - 1x- Hose with running water
 - 8x- Polythene plastic bags
 - 1x- Plastic stick
 - 1x- Petroleum jelly
 - 1x- 12 inch diameter sieve
 - 4x- Empty gallon jugs
 - 1x- 300 milliliters Glass jar
 - 1x- Plastic bowl
 - 1x- Large metal bowl
 - 1x- Scientific calculator
 - 1x- Sharpie
 - 1x- Protractor
3. Drill a hole through the bottom of the first container by placing the middle of the 1 Inch Straight Shank Drill bit on only one of the marks and drilling.
 4. Draw a circle on the center of the lid of the second container with the same diameter as the circle drawn before. Mark three equidistant points along the circumference of the circle once again.
 5. Drill a hole through the lid of the second container by placing the middle of the 1 Inch Straight Shank Drill bit on only one of the marks and drilling.
 6. Cut two 2 1/2 inch segments of PVC using the PVC cutter
 7. Attach the segments to both sides of the 3/4 inch PVC Ball Valve
 8. Attach one 3/4 inch Charlotte Pipe PVC Adapter Fitting to to each of the ends of the PVC pieces that are connected to the PVC Ball Valve.
 9. Cut off the portion of the 3/4 inch PVC Schedule 40 Adapter that does not have threading.
 10. Repeat the previous step for the other 3/4 inch PVC Schedule 40 Adapter.
 11. Use the 3/4 inch PVC Schedule 40 Adapter as a screw. Place it through the inside of the first container and screw it into the Ball Valve PVC segment that was just created.

Procedure

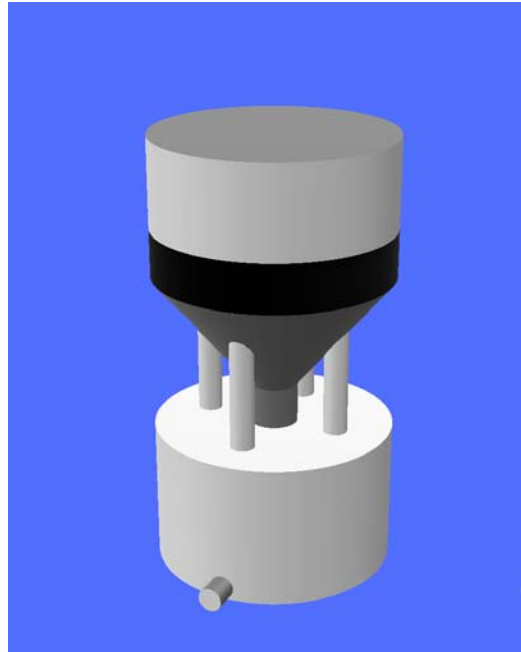
Creating the Filtration Device Pt. 1

1. Draw a circle on the bottom of the first container with a one inch margin from
2. the edge. Mark three equidistant points along the circumference of the drawn circle (each at 120° angle from the other two points).

Prototype Design



3D Design



Creating the Filtration Device Pt. 2

1. Repeat the process using the lid of the second container. This time the “screw” part goes on the underside of the lid and the Ball Valved PVC segment goes on the top. Make sure that the valve part faces outward.
2. Use instructions on J-B WELD ClearWeld Epoxy Syringe and apply epoxy to seal the Ball Valved PVC Segment in place. Use popsicle sticks to apply epoxy. Wait for 30 min for the seal to dry and 24 hours to let it set.
3. Cut out two other PVC pieces that can fit in between the now linked lid of the second container and base of the first container.
4. Place these other two pieces of PVC on the marks that were drawn on the lid of the second container and bottom of the first container.
5. Seal these pieces into place using the epoxy applied with popsicle sticks.
6. Drill a hole on the side, 2 cm from the bottom, in the second container with a 1 inch Straight Shank Bit.
7. Cut 2 inch piece of PVC and attach it to the second ball valve.
8. Push this 2 inch piece of PVC with the ball valve into the hole made on the side of the second container.
9. Seal the piece with the second ball valve in with epoxy and allow it to set. Put the lid of the second container back onto the second container. The

lid of the second container should be attached to the first container already.

10. Cut three pieces of PVC that are the same height as the apparatus.
11. Use duct tape to vertically attach these long pieces to the sides of the apparatus to aid in the structural support of the apparatus. They should be equidistant from one another.
12. Grease the ball valves with petroleum jelly if they are stuck.

Creating Activated Carbon

1. Using a metal rod, grind 8 pounds of hardwood charcoal in a bucket until it becomes a fine powder.
2. Use a sieve to filter out any larger chunks from the powder. Store powder safely in plastic bags.
3. Create a 1:3 ratio of calcium chloride to water in a glass jar.
4. Add the solution to the powdered charcoal in a large steel bowl. Stir well with a plastic spoon.
5. Repeat this process until all the powdered charcoal has been thoroughly mixed with the calcium chloride and water solution.
6. Allow mixture to air dry for 24 hours.
7. Place the mixture spread out in a kiln on stone kiln plates.
8. Within a twelve hour time period, heat charcoal to 1000°C in the kiln, keep at that constant temperature for an hour,

and then allow for it to cool to room temperature.

9. Store the activated carbon safely in a bucket with a plastic bag covering it.

Lead Water Preparation

1. Use dimensional analysis to find the amount of lead(II) nitrate necessary for 3 gallons of lead water at 27 parts per billion (ppb) which is the average amount of lead found in Flint, Michigan. This amount will turn to be 4.9×10^{-4} grams $\text{Pb}(\text{NO}_3)_2$
2. The amount of lead(II) nitrate needed in the 3 gallons is too small to measure without the aid of a micropipet, so it is necessary to create a higher concentration of lead in 1 liter of water. Dissolve 4.9 g $\text{Pb}(\text{NO}_3)_2$ in 1 liter of water and shake thoroughly.
3. The first amount of this solution necessary for the 27 ppb test is 0.1 mL of lead per 3 gallons of water.
4. In order to get this amount, dilute 1 mL of the original 1 liter solution into 10 mL of tap water and take 0.5 mL of this solution.
5. Mix the 0.5 mL into 1.5 gallons of water.
6. The next amount of the original solution necessary for the 27 ppm test is 100 mL for 3 gallons of water.
7. Mix 50 mL of the original solution into 1.5 gallons of water.

8. The next amount of the original solution necessary for the 54 ppm test is 200 mL for 3 gallons of water.
9. Mix 100 mL of the original solution into 1.5 gallons of water
10. The next amount of the original solution necessary for the 81 ppm test is 300 mL for 3 gallons of water.
11. Mix 150 mL of the original solution into 1.5 gallons of water.
12. There are now 4 different 1.5 Gallon solutions with different amounts of lead (27 ppb, 27 ppm, 54 ppm, 81 ppm).
13. Different versions of this dimensional analysis can be used to created to get the same resulting concentrations. (Highly recommended to use a less complicated method)

Testing Pt. 1

1. Roll up the cotton cloth tightly and plug the hole at the bottom of the first container so that the towel pushes tightly against the walls of the tube.
2. Fill the apparatus with 1 pound of the activated carbon.
3. Pour .5 gallons of the 27 ppb solution into the first container of the filter apparatus.
4. Allow the water to filter through the activated carbon into the second container for 24 hours.
5. Measure the volume of the filtered amount and check the lead

- concentration by following the instructions the ppb test.
6. Then remove the remaining lead water from the first container to start a new filtering cycle.
7. Additionally, rotate out the activated carbon with another batch of 1 pound dry activated carbon. Do not dispose of the wet carbon as it solely requires air drying to be reused with immeasurable differences. To replace the carbon simply remove the carbon from the filter into a polythene bag and allow the carbon to dry outside the apparatus.
8. Repeat steps 3-7 for a total of three trials of 27 ppb tests.
9. Afterwards, pour .5 gallons of the 27 ppm solution into the first container of the filter apparatus.
10. Allow the water to filter into the second container for 24 hours.
11. Measure the volume of the filtered amount and check the lead concentration by following the instructions the ppm test.
12. Then remove the remaining lead water from the first container to start a new filtering cycle.
13. Rotate out the activated carbon with another batch of 1 pound dry activated carbon.

Side Note: Lead water will still be clear because lead nitrate is being used instead of corroded lead ion from natural samples of lead water

Testing Pt. 2

1. Repeat steps 9-13 for three trials of the 27 ppm tests.
2. Pour .5 gallons of the 54 ppm solution into the first container of the filter apparatus.
3. Allow the water to filter into the second container for 24 hours.
4. Measure the volume of the filtered amount and check the lead concentration by following the instructions the ppm test.
5. Then remove the remaining lead water from the first container to start a new filtering cycle.
6. Rotate out the activated carbon with another batch of 1 pound dry activated carbon.
7. Repeat steps 15 to 19 for a total of three 54 ppm lead tests.
8. Pour .5 gallons of the 81 ppm solution into the first container of the filter apparatus
9. Allow the water to filter into the second container for 24 hours.
10. Measure the volume of the filtered amount and check the lead concentration by following the instructions the ppm test.
11. Then remove the remaining lead water from the first container to start a new filtering cycle.
12. Rotate out the activated carbon with another batch of 1 pound dry activated carbon.
13. Repeat steps 21 through 25 for a total of three 81 ppm tests.

Acknowledgements

A Google Science Fair project served as one of the major inspirations for this project. We utilized the findings of the Community Impact award winner Alex Howard who was able to create a cheap and efficient filter to remove contaminants such as lead from water. He accomplished this through the use of carbon-coated oyster shells. Although this was a great first step in the right direction to effective lead water filtration, it is unable to filter larger quantities of lead. We used this flaw in Howard's experiment as a major point of exploration in our own investigation and experimentation.

Research

Research Questions

- Which areas utilize lead pipes?
- What are the most abundant sources of easily extractable carbon?
- What is a simple yet accurate method of extracting carbon from the source?
- What is the most effectual way to activate carbon?

		<u>Lead Content</u>	
		Lead Water	Lead Concentration After
Lead Concentration Before	27 PPB	0.5 gal	<15 ppb
		0.5 gal	<15 ppb
		0.5 gal	<15 ppb
	27 PPM	0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)
	54 PPM	0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)
	81 PPM	0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)
		0.5 gal	<1 ppm (undetectable)

Carbon based filters are effective in removing metals such as lead from water. They remove lead through nanotubes that act like pores, trapping foreign particles. Most carbon filters utilize activated carbon which can be produced from any carbon substance when exposed to extreme heat. Activated carbon has a higher surface area and more nanotubes than normal carbon therefore enhancing its ability to trap foreign particles. These nanotubes can easily trap lead particles and this property makes activated carbon a great candidate for creating a lead filtration system. In fact, carbon has become a staple feature in water treatment and many commercial lead filters also incorporate the

method known as carbon block filtering which utilizes granulated and powdered activated carbon. However, these filters are quite expensive, not readily accessible to everyone, and complicated to replicate in a non-industrial setting. Our goal is to construct a non-industrial carbon-based filter that can successfully remove lead in order for it to become accessible for everyone, especially for people living in areas with a contaminated water supply such as Flint, Michigan. In order to to accomplish this, we will utilize charcoal which is an abundant and relatively cheap source of carbon that can be activated by heating a mixture of

charcoal and $\text{CaCl}_2 + \text{H}_2\text{O}$, to further increase its adsorption properties.

Conclusion

This experiment successfully provided a solution to the problem of lead contamination of water by creating an economical carbon filter. The filter functioned by having lead contaminated water flow through a primary chamber containing activated carbon which absorbed the lead, through a tube which separated the carbon from the water, and finally into a secondary chamber where the cleansed water could easily be extracted. This resulted in all nine of our trials in parts per million producing clear water with no detectable amounts of lead. This data contradicts the hypothesis that a 27 ppm of lead concentration in .5 gallons of water will have the lowest lead concentration of the three lead contents as the other two lead concentrations produced the same result as the 27 ppm lead water, no detectable amounts. Therefore, it also shows that an increase in the independent variable has minimal to no effect on the dependent variable when under 87 ppm, mainly due to the activated carbon's capacity for absorbing lead particulates. However, even with a disproved hypothesis, the solution does not become any less viable because it is able to filter out lead to the extent of no detectable amounts in parts per million, making it quite efficient. Although the measurements were precise, they were not as accurate as they

could have been and they can definitely be improved by conducting more parts per billion tests to ensure the product is under EPA standards. Further testing with a research lab will insure having the highest quality filter. All laboratories, researchers, or companies interested in sponsoring this project should contact theleadfreeproject@gmail.com. Overall, the solution was a success because of the inexpensive and proficient lead filtration capabilities of the filter.

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Youth Corner

Origins and Developments of Afro-descendants on the South Atlantic Coast of Nicaragua Bluefields, Nicaragua

Daylon Moses Downs¹

This essay has as an objective, to inform how afro- descendants came to Nicaragua, and became a strong ethnic group in our region. The presentation of Afro-Descendants collective history that follows has many issues. In this essay, I would like to highlights the events, personages, and relationships and how creoles considered themselves, vital to their history. Therefore, it will focus on important, reasonable elements in the construction of their identity during that period of time. According to history the Garifunas also are considered Afro-descendants.

Garifuna origin at the beginning was a mixture of Carib-Arawaks Indians but in 1675 a boat carrying African slaves sunk near St. Vincent. The slaves escaped to the island, they began to intermarry with the natives and because of this combination a new group of people emerged which are known as Garifunas. The largest Garifuna group is

found in Roatan Bay in Honduras others are in Belize. On the Caribbean Coast of Nicaragua we can find them in Orinoco (where the majority of them are located), while others are in, La Fe, Marshal Point and Square Point.

The origin of the African population of the Nicaraguan Caribbean Coast is remote to the arrival of the European settlers in the seventeenth and eighteenth centuries that brought with them African slaves. Africans worked as slaves for those European settlers, who are the forerunners of the modern coastal black society (Creole).

The creoles are descendants of African slaves' origin, brought by force to several islands in the Caribbean and from there, to the Caribbean Coast of Nicaragua. When the slaves were in the islands, they intermarried with Europeans and the American Indians, giving birth to the creoles. Most of them decided to live in what is now the South Atlantic Autonomous Region.

There is also a relatively constant flow of sailors, merchants and freed black people; visiting the coast from Jamaica and other

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Caribbean areas in order to trade. Many of these traders remained in the region, becoming so; residents of the coast, most of them lived as traders, woodcutters, turtle fishermen, etc. However, over the time, a small number, usually with the support of their parents and white masters obtained means of production such as land and slaves, becoming dominant group members of the Coast.

During colonial times, people of European descendant born in Central America were denominated "creoles". In the English Caribbean (which was part of the Nicaraguan Caribbean Coast), the black descendants of European slaves, recognized by their parents inherited, in part, the status of ruling class. As we shall see, the name "Creole" came to identify "all people of African descendant who has lived on the Caribbean Coast of Nicaragua.

In 1787, the British colonialists were forced to evacuate the Caribbean Coast of Nicaragua under the terms of the Versailles, signed between the British and Spanish rulers.

They became the main merchants for indigenous communities and assumed contraband trade with the Spanish colonies in the interior. Also in the political status they became the main councils of the king of the Mosquitia reservation.

According to the language law (Law 226) Creole is the official language in the autonomous regions of the Caribbean coast with other native and natural languages of

the region. The autonomy law, the creation of SEAR (Secretary of autonomy regional education) and bilingual programs MINED, promote the teaching of Creole, the training school for teachers NORMAL prepares teachers for teaching Creole. The University URACCAN offers courses and diplomas for teachers of bilingual programs, and that have as result, the strengthening of reading and writing of Creole in some municipalities of the autonomous regions. 95% of the Creole population is multilingual, as well as they can speak at least a second language (Creole, Standard English and Spanish).

The black community conceived itself as the carrier of English civilization on the coast. They spoke English but with African structure. They kept Anglo-Saxon values and cultural practices, although greatly influenced by their African heritage. In that context the black people (as a social group that lived on the coast) began to be called "creoles" to stand for their position closer to the old English. Ordinary Creoles leaders of the Mosquitia, as a result of being more "civilized", closer to the cultural standard of the British Phenotypic were considered majority of the coast in regards to the rest of the indigenous population. During this same period of time the Moravian Church emerged a powerful influenced in the coastal black community, and also entered to complete by the power of the Mosquitia.

The Moravian mission was established on the coast in 1849, and they started doing

activities in the black communities. They had great success in their missionary and large number of black people became members of the Moravian church. The large numbers of black people that were brought as workers from the Caribbean (mainly from Jamaica, Cayman and San Andres islands); in religious terms they belonged to the Anglican and Baptist. Afro-descendants were racially mixed, mostly members of the Moravian church, which speak the Mosquito Coast Creole, were considered superior to blacks in the social structure during that time.

One of the main characteristic of the Afro-descendants is the language, which is the most important index of the Creole identity. The majority of Creole (as their mother tongue) has what John Holm (1968) has called "Creole of the Mosquito Coast". They were losing their ability to speak Creole because; it was often not enough to be considered by other creoles.

Afro-descendants are religiously Protestant in general. Most of them belong to the Moravian and Anglican churches, while others are Baptists, Adventists, Tabernacles (Pentecostal church) etc. Some Creole was converted to the Catholicism. The Catholicism has become the third most popular religion among the Creole inhabitants of Bluefields. Although, the different churches, always disqualified "pagan" cultures of the creoles. Similarly Creoles have a deep respect for the signals of unknown or "supernatural". A rooster

crowling at noon, a dog howls at midnight or a black butterfly can be signs that must be respected in the Creole society. There is also "specialists" in predicting the future that are highly respected in the Creole society itself as rituals that nobody would dare to question them about planting Guinea pepper in the yard or the famous Mary Gold, plants that help prevent the entry of bad spirits into their homes.

Afro-descendants food is based on the use of coconut oil and wheat flour. As a final point the Caribbean glamorous music and oral African-traditions as well, serve to distinguish this group from other ethnical descendants of the coast. In respect of Creole group they have for years prided themselves of their non-working-class status. In previous time to the enclave they were in their landowner's merchants and fishermen small world. At the time of the enclave they carefully used the educational opportunities made available by the Protestant churches as a means of social advancement.

Afro-descendants still tend to avoid manual labor, especially in agriculture and participate plainly in commercial activities, since these occupations is considered as associated social groups with lower social-economic level on the coast. On the contrary they strive to achieve what they perceive as higher positions such as teachers, lawyers, nurses, doctors, physicians, secretaries, accountant, public employees, private fishermen, small landowners, boat and

furniture builders, or as workers on merchant ships in foreign companies outside of Nicaragua.

In fact, the Creole at least aspires to be middle class. Such as representatives of colonial and neocolonial authority who, at that point occupied the highest positions in the social-economic structure of the coast before the revolution. Nicaraguan Creoles national identity has a great similarity with England, America, and Jamaica. Their growing feelings of Nicaraguan nationality are the result of several important external factors. First, most of the creoles under 40 have received an education which has stressed them out. Nicaraguans had to learn Spanish (in fact most of the creoles are bilingual speaking English and Spanish). Secondly, in the last 30 years the South Caribbean Coast economy has been articulated with the rest of the country more than the other region of the coast.

Afro-descendants feel that by virtue of its historical relationship with the area, the ethnic groups, including the Mestizos of the coast have the right to determine the future of the coast. Afro-descendants believe they have the right to be the dominant population in the areas where they have traditionally been the most: Corn Island, Bluefields, and Pearl Lagoon and to some extent Bilwi. They feel that they have not been able to exercise political control in these areas since the reincorporation; they have been discriminated by the government and the

Mestizos in the Pacific area of Nicaragua. On the other hand the denial of political control is seen by the creoles as a result of a racist attitude. Creoles considered themselves as the most qualified group on the coast. The relationship between people of African descendants and indigenous groups is in respect of the ethnic groups who would live together as one family "hand to hand" which means that they supported each others. One of the happiness they had years ago was unity, they were very united. Parents, grandparents and neighbors used to talk what we call "Nancy stories". Everyone lived together, the indigenous people called it "pana pana" and Creole called it "hand to hand" means that when a family had, everyone had. Over time all this was changing, economic resources, allowed to live this community life where everyone looked the same, there were not many social differences, nor had high, low or average society. All children played together, went to the same churches, almost all the houses were identical houses.

Conclusion

The message for the creoles then, is twofold: First, while on one hand is the right to fight ethnic oppression whatever is their origin they should not lose sight of the identity of the principal operator "ultimately" or the common principles of the struggle of all oppressed people against the exploitation of class, imperialist oppression and racism.

Youth Corner

Decenio Internacional De Los Afrodescendientes Reconocimiento, Justicia y Desarrollo

Mallory Brown¹

La cultura afrodescendiente está presente día tras día y la debemos entender como aquel segmento de la diversidad cultural en el espacio de las américas y el caribe, formada por las distintas expresiones musicales, gastronómicas, bailes, técnicas de trabajo, arquitectura tradicional, conocimientos tecnológicos, espirituales, éticos y lingüísticos, traído por los africanos en condición de esclavizados durante la trata de negros y su implantaciones en los diversos sistemas coloniales de este continente.

Por otra parte, este complejo cultural de origen africano, es un largo proceso que aún no cesa de enriquecerse con la dinámica internacional, pero manteniendo su anclaje ancestral como brújula para no perderse en la globalización cultural, hegemónica y perversa. Sin embargo, la promoción y protección de los derechos humanos, la esencia de este grupo poblacional deba reconocerse, mediante la cultura, la libre participación y la igualdad

de condiciones en la vida política social y económica de las naciones.

Cuando se habla de una cultura negra no significa ocupar un sitio de exclusión en la jerarquía social, de allí es bastante comprensible explicar la tragedia psicológica del negro, por eso, los principales desafíos que enfrenta este grupo poblacional es la inclusión en la toma de decisiones, en el ámbito político, dentro de la educación y el desaparecer ese estereotipo que tienes sobre nosotros que ser negro es negativo y la lucha por la adaptación de los aportes de la población negra en los diferentes países.

Según la ONU, hay alrededor de 200 millones de personas que se identifican así mismo como descendientes de los africanos que viven en América. Estas pueden ser las principales semillas que conlleven a la revaloración cultural, a la conquista de la ciudadanía y por su puesto su lucha frontal contra el racismo y la pobreza.

Por qué se habla de racismo y pobreza si vivimos en un mundo de justicia? Lastimosamente esta no existe en su totalidad

¹ Mallory Brown is an 8th grader. She is from Panama. She got first place last year at the International Speech Contest

ni es igual para todos, puesto que son muchas las vidas humanas que quedan excluidos productos de los desequilibrios injusticias e inseguridades propios de los modelos capitalista promovido por los entes dominantes donde sus víctimas siguen siendo los afrodescendientes. La triste realidad de la población afro es que viven en zonas de mayor pobreza, sin infraestructuras y más propensos a los problemas de riesgo social, pero esto puede combatirse con proyectos de etnodesarrollo sostenible en sus comunidades e impulsar reformas legislativas que permitan la igualdad de oportunidades. Por otro lado, hay que reconocer el avance de políticos, científicos y escritores que son afrodescendientes y hoy por hoy se les reconoce por su gran legado a la humanidad. El Decenio Internacional De Los Afrodescendientes, significa una lluvia de esperanza y lucha por el reconocimiento de sus derechos y aportes que va desde el ámbito cultural hasta el laboral.

Como digna descendiente de los africanos, es hora de redoblar los esfuerzos para preservar crear e innovar nuestra identidad afro diversa.

Por qué, el día que se le reconozca a una persona más por el color de sus ojos que por el color de su piel, estaremos entendiendo a otro en este mundo multiétnico.



Youth Corner

Rachel Carson: An Inspirational Environmentalist

Samara Amin¹



Rachel Carson was a famous writer, scientist, and environmentalist who wrote many books, and started an environmental movement by raising awareness against DDT. Rachel was born on May 27, 1907 in Springdale, Pennsylvania. Her mother Maria inspired her to love nature. Maria used to take young Rachel to the woods, spend hours and taught her how not to harm nature. When she was 11, she wrote a story called *A Battle in the Clouds*. In 1935, she graduated from high school. Her parents sent her to Pennsylvania College, since there was no women's college in Rachel's hometown. To support Rachel's college expenses, her family had to struggle a lot. She decided to take biology classes and wanted to learn especially about the sea.

After she graduated from college she earned a fellowship to study Marine Biology. In 1932, Rachel entered in PhD program. Unfortunately, she had to drop out of John Hopkins because she could not afford the expenses.

In 1935, she got a government job where she had to write scripts for a radio program on marine biology topics. Since she was a good writer they loved her scripts and asked her to write more. In 1936, Rachel was hired by U.S. Bureau of Fisheries as an aquatic biologist. She continued writing many stories and books, such as *Under the Sea*, *A Sea around Us*, *The Edge of Sea* and *Silent Spring*. In *Under the Sea* she described the migratory life cycles of fish and birds. In the *A Sea around Us*, she described the connection of sea life and all life. This was the best seller in 1951, and she became famous worldwide.

Rachel's most famous book was *Silent Spring* which was published in 1962. In this book, she explains how pesticides were doing more harm than good. She was concerned about the wild use of chemical pesticides, such as DDT during and after World War II. DDT was being used in many products such as paint and was being sprayed in the houses to prevent insects. She found out that many beneficial organisms were dying, cancer was increasing, and children were getting sick. She interviewed many researchers, scientists, naturalists, activists, and journalists. In her book *Silent Spring* she showed that air, water

¹ Samara Amin was a 4th grader when she wrote this paper. This paper got the 3rd prize in the History Fair at the Boggess Elementary School, Murphy, TX.

and ground were becoming polluted. DDT was ending up in our food chain.

The chemical industries became furious and started propaganda against Rachel. They claimed that Rachel was an unprofessional, unintelligent, and crazy woman. The chemical industries argued that without chemical pesticides the world would go back to the Dark Ages. The truth is that Rachel was against the over use of DDT and she wanted to promote natural techniques such as crop alteration. The pesticide industries could not stop her. In 1963, she testified in front of Congress.

Rachel died on April 14, 1964 trying to battle cancer. Rachel changed the way humankind should view the natural world. She inspired the new generations to become environmentalists. Before Carson, most people believed that science was always a good force. But Rachel showed that science has to be handled responsibly. Humans have no right to destroy the environment.

I chose to write about Rachel because I love and care about nature just like she did when she was younger. This is connected to me because if DDT was still around me, I would probably have a hard time living healthy. Sadly, DDT is still being used in

other countries around the world to control mosquitos and other insects. My research on Rachel Carson has changed how I feel about nature. I also learned that we should never give up in what we believe in. Rachel was threatened and harassed by the owners of the chemical industries but she never stopped. Her work made me aware that every living organism has the right to live in a healthy environment and that we are responsible for taking care of the environment.

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