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COMMENTARY: SUSTAINABLE AGRICULTURE OUTREACH IN A MARGINALIZED FARMING VILLAGE IN SOUTHERN CHILE: OBSERVATIONS FROM A RURAL SOCIOLOGIST

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A B S T R A C T

I briefly describe the creation of a demonstration garden and several workshops given on ecological gardening techniques in a small, marginalized agrarian community in southern Chile, as part of a larger rural sociological research project. Community response to the garden and workshops suggested a paradox: villagers were eager for lessons on ecological gardening and composting, despite being agriculturalists for many generations. I offer three observations from the point of view of a rural sociologist that speak to this paradox. I close with a commentary on the political and structural roots of the community's impoverishment and the implications for extension agents working with marginalized agricultural communities worldwide.

Keywords: Chile, demonstration garden, foliar sprays, indigenous knowledge, mulch; sustainable agriculture

INTRODUCTION

This commentary arises from an "accidental" extension project. From November 2015 through February 2016 I lived in a community of 45 agrarian smallholder families in a predominantly indigenous (Mapuche) area in the Araucanía region of southern Chile. I was there to conduct sociological research on agricultural sustainability and livelihood diversification, but early in my stay I was given the opportunity to help create a modest community outreach project: a demonstration garden and series of workshops to showcase best practices for ecological gardening. I thus found myself in the curious position of giving gardening advice to a community that had been cultivating the land for generations. The implementation of this small extension project provided unanticipated insights into my sociological research, but it also exposed several puzzling aspects of the community's agricultural development. My purpose here is to briefly describe the extension project and try to make sense of this puzzle through the eyes of a rural sociologist.

Fieldwork Site: The research and outreach took place in the small Mapuche community of LLaguepulli ("yăg-āy-pū-yee") in the hilly area bordering Lake Budi, 100 km west of the regional capital of Temuco, in southern Chile. The Mapuche are the largest indigenous group in Chile and long resisted pacification by the Chilean state – a resistance whose ripple effects continue to impact relations between the community and the state. The ancestors of LLaguepulli's current inhabitants were pushed off their lands by the Chilean military and colonial settlers four to five generations ago and forced west to settle the Lake Budi area. The area was originally heavily forested, but most of the native forest was cleared to allow crops to be grown and livestock (primarily sheep, horses, and oxen) to be grazed (Crow, 2014).

Today the Mapuche population of the Lake Budi region comprises some of the poorest rural communities in Chile (Caniguan, 2012), due to multiple overlapping forces. The turn to input-intensive, monocrop production of potatoes and wheat has led to serious problems with soil erosion, loss of fertility, and declining production levels. While farming incomes are barely subsistence level, other forms of income generation are rare in a countryside with little industry. As a result, huge numbers of Mapuche have migrated from rural

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areas to find work in northern mines or major urban centers (Bengoa, 2012). Most fundamentally, the Mapuche, both urban and rural, have been a politically oppressed people since their first interactions with the Chilean state. Despite a number of subsidy and social assistance programs, they remain a population outside the corridors of political power and economic development (Caniguan, 2012).

All of this has created a dire socioeconomic situation in LLaguepulli and neighbouring villages. Except for a handful of families that benefit from a community-based tourism project, all of the households exist on the margin of poverty or below. Jobs and other supplemental income sources are either scarce, or require travel to cities far away, and access to institutional sources of credit is severely constrained. Most families have home gardens where they grow many of their vegetables, but most arable land is used for growing commodity crops such as wheat and potatoes which demand applications of fertilizers and pesticides and result in soil erosion into the adjacent lake.

Description of Extension Project: My chief partners on the project work for a US-based non-profit that works with local communities to create culturally appropriate micro development projects (MAPLE n.d). They worked with community leaders to gain access to an unused plot of land directly behind the community-run school. There we constructed a series of small garden projects and vegetable beds to display best practices for sustainable garden management relevant to the physical environment and resource needs of the community. I will describe three experimental treatments below.

Composting: The composting of food scraps, biomass, and in particular animal manure in the community posed a perplexing situation. Villagers widely acknowledged that composting was a valuable way to conserve resources and build soil fertility, but simultaneously lamented that the practice had nearly disappeared from the community and been replaced by a general confusion about proper composting technique. Kitchen scraps are mostly fed to hogs, discarded, or burned. Small livestock (e.g., poultry, sheep, hogs) are nearly ubiquitous among households, but very little of their manure is composted. Older adults recalled their parents piling manure in the corner of the animal pen and letting it decompose before applying it to their potato fields, but this technique was now only practiced by a single family I encountered. One woman of 73 years is symbolic: large quantities of sheep manure accumulated under the slatted floors of her sheep pen, but she told me that she did not know how to properly make use of it apart from applying it directly to her garden.

With my partners we constructed a set of three compost bays, each 1 meter by 1 meter, using wood stakes for posts and 1-inch galvanized chicken wire to separate the bays. Then we layered garden weeds, poultry manure, sawdust, sheep manure, kitchen scraps, and straw. Then we held two workshops where we discussed and demonstrated the basics of composting, including the C/N ratio, the practices of layering and aerating, and the time period for ideal decomposition. Attendees of the workshops showed much interest and asked many questions, however it is too early to determine how widespread the adoption of composting will become across the entire community.

Straw Mulch: LLaguepulli's microclimate is hot, dry, and windy throughout the summer, and its soils are thin and sandy, so water availability to crops is a constant challenge. There exist two valuable but underutilized resources for water conservation via mulching: wheat straw, usually burned in the fields after the harvest; and old thatch from the roofs of the traditional wooden structures used for cultural ceremonies. Given these circumstances, we were surprised to find that the use of mulch in home gardens is virtually unknown. From my conversations, the problem of water availability is perceived only as a function of a shortage of rainfall or irrigation, not as a function of evapotranspiration from the soil.

We used the worn-out thatch from one family's ceremonial building and an old pile of wheat straw to experimentally mulch four vegetable beds. Half of each bed received mulch as soon as the seedlings were planted, the other half received none, and all beds were irrigated equally. The results were striking. In the halves without mulch, weeds grew alongside the vegetables and began to outcompete them, while in the mulched halves there were virtually no weeds. By the time of the final workshop the mulched vegetables were visually taller, larger, and greener, a result that caused much commentary among the workshop participants.

Foliar Sprays: Bordering a large lake and only a short distance from the Pacific Ocean, LLaguepulli has access to a potential source of fertility enhancement: seaweed.

In a neighboring community an organic farming couple has been composting seaweed and applying it to their fields to maintain soil fertility. However, this innovation has not spread, and in LLaguepulli seaweed is only consumed occasionally as food.

Our team produced foliar sprays from two kinds of locally available seaweed. We purchased two large sacks of each kind and two 200-liter metal barrels, then immersed each type of seaweed in water, stirring the solutions daily. After two weeks we filtered these infusions and then applied each one as a foliar spray to a respective vegetable bed twice per week, with a control bed receiving only water on the same occasions. As with the mulch, the results were striking. There were not notable differences between the two kinds of seaweed sprays, but the beds that received any spray had larger, greener, and visually less diseased vegetable leaves than the control bed – again causing many excited comments from participants.

Community Response: The project was undertaken as a form of reciprocity in exchange for the community's generosity and as one small way of contributing to their quest for greater sustainability. Though informal and small in scale, it elicited very positive responses, including accolades from the community's president and its spiritual leader (*lonko*). But this merely highlights a paradox: why was there such a strong response to learning about agroecological innovations in a community with deep historical ties to the land and to agriculture? My intention here is not to offer a formal analysis of the project's outcomes, but three observations that attempt to shed light on this paradox. My larger hope is to add to the sociological insights generated by extension practitioners and rural scholars conducting outreach in marginalized rural communities.

The desire for sustainability: One of the reasons that LLaguepulli's leaders agreed to my request to live and conduct research there was the growing sentiment that the system of input-intensive agriculture currently being practiced was unsustainable, both environmentally and economically. They actively desired an alternative way forward, a sentiment repeated over and over and with great specificity during my interviews: respondents spoke of the desire to build soil fertility with local resources; to find alternative crops that will reduce their dependence on commodity seeds; to develop better grazing systems for their livestock; and, most tellingly, to break the cycle of debt that conventional production all but required. This sentiment is not only present in LLaguepulli, but is increasingly recognized throughout the global South. There is a surging hunger within marginalized agricultural communities for a sustainable way forward that retains (or, in a sense, returns to) their agricultural roots while finding alternatives to the high inputs and costs of Green Revolution practices (Broad & Cavanagh, 2012), and it is here that extension has a prominent role to play, helping leverage this dissatisfaction with the conventional agricultural path (Davis, 2008).

Agricultural knowledge old and new: Despite socioeconomic hardship, geographic isolation, and the steady decline of its agrarian population, the farmers and gardeners of LLaguepulli presented an impressive number of agricultural techniques that stemmed from ancestral practices. A man who grows heirloom potatoes showed me an innovative way of storing the tubers in moist beach sand, which he learned from an elder in the community. Another told me of various herbal infusions he produces for natural pest control, passed down by his parents and grandparents. Many women in the community continue the ancient practice of dying sheep wool with leaves, bark and fruits. And several families still cultivate a landrace of quinoa adapted from highland Andean varieties and grown for generations in Mapuche home gardens.

Sadly, many traditional practices that could be part of a sustainable future have fallen out of use – some, such as the cultivation of quinoa, are lately experiencing a resurgence (Sepúlveda et.al., 2004), while others, such as the composting of animal manure, have been nearly abandoned in recent years. This points to a unique role for extension agents: not only advocating the adoption of new practices, but revalorizing traditional ones (Ashby, 2009).

There also exists a set of agroecological techniques that are technically feasible, materially inexpensive, and of great benefit to the sustainability of a small farming community, but are unknown or unpracticed, and here again extension agents have an important role. For example, according to my research the practice of mulching in gardens and the creation of compost or foliar sprays from seaweed are both non-existent in LLaguepulli, despite easy and inexpensive (often free) access to the raw materials. To this list we might add silvopastoral grazing systems; rotational pasturing of poultry; use of green manures; "low tunnels" made of

PVC ribs and plastic sheeting; and solar drying of fruit, among others. What all of these share are low labor and cost barriers, but they may also require a focused effort on the part of practitioners and extension agents to overcome cultural skepticism or inertia.

The structural origins of unsustainability: This brings us back to the central paradox: why was there a desire for education on composting and quinoa cultivation and natural fertilizers in LLaguepulli when these were once widely practiced among the Mapuche? Why is much of the farming and gardening infrastructure in LLaguepulli in such disrepair – tattered greenhouse plastic, crumbling livestock corrals, broken fences – when they are needed to maintain livelihoods? It is tempting to point to individual choices – this person has abandoned composting, that person has let his fence deteriorate. But this is too shallow of an explanation. We must understand the deeper structural forces that created the conditions for this decline, the way that political marginalization and economic stagnation lead to poverty, demographic decline, and diminished motivations.

In LLaguepulli, for example, proceeding back through time one encounters a dense, intertwined causal chain of deprivation. The community received electricity less than twenty years ago, and to this day does not have a reliable supply of clean water, despite living in a country that consistently ranks near the top of development indices for Latin America (e.g., UNDP, 2015). Only now, as I write this essay, is the road that enters LLaguepulli being converted from rough gravel to asphalt. Interviews with community members reveal further fault lines. A lack of legal property documentation leaves many dwellers shut out of formal processes for accessing capital or government grants, and those who do secure loans are charged predatory interest rates if they make a single late payment. Agronomic extension agents visit the community rarely, concentrating their efforts on larger-scale (mostly non-Mapuche) farmers in surrounding areas, and when they do arrive they only offer advice and materials conforming to the input-intensive system of conventional agriculture.

And this whole set of of conditions is in turn rooted in the dispossession of their traditional lands and the forced migration to the marginal, steep hillsides of the Lake Budi area early in the 20th century, at which time communal land access was converted by the state to small private parcels. This deprived the Mapuche of suitable grazing lands to pasture their animals and disrupted generations of norms for shared access to land and communal management of natural resources – all leading to the soil erosion, the dominance of commodity crops, the shortage of animal manure, and the reliance on purchased fertilizer and pesticides that we see today (Bengoa, 2012).

Conclusion and Implications for Extension Agents: The oppressive history of the Mapuche and similar marginalized communities around the world has a direct impact on the role of extension professionals. The debt and poverty and the deterioration of farming infrastructure one witnesses in these communities must be placed in the context of the powerful forces of socioeconomic marginalization and victimization that hinder rural smallholders' access to capital, knowledge, and confidence. These forces were widely evident throughout my time in LLaguepulli, and they help answer the puzzle introduced in the introduction: why does a community that has been living from the land for generations respond so eagerly to a demonstration project about ecological garden management? Because decades of political oppression and socioeconomic impoverishment have deprived the community of an adequate land base for farming and grazing, sending many of its productive members to cities looking for work. This begins a cycle where the transmission of agricultural knowledge from generation to generation is diminished, eventually resulting in the near-disappearance of such critical techniques as saving seeds or composting animal manure.

Based on my time as a researcher in LLaguepulli, I would make a technical recommendation and a broader philosophical recommendation to extension agents working in similar communities. The technical recommendation is to focus on and elevate agricultural practices that conserve existing scarce resources rather than practices that require the purchase of external resources. Examples include saving of local seed varieties as an alternative to a reliance on commercial seeds; thick mulching of vegetable beds as an alternative to a reliance on irrigation and herbicides; and composting of available biomass as an alternative to a reliance on purchased fertilizer. The more philosophical recommendation is to keep a recognition of broader structural forces at the heart of the extension discourse. If it is true that extension "constitutes the most effective means to strengthen and creatively reconstruct the . . .

capacities of people to successfully engage in production and livelihood activities" (Magoro & Hlungwani, 2014: 89), then the marginalizing forces which have historically disrupted and diminished those capacities need to be a part of the conversation among extension agents working towards a more sustainable agriculture.

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