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ROOTED NETWORKS, WEBS OF RELATION, AND THE POWER OF SITUATED SCIENCE

BRINGING THE MODELS BACK DOWN TO EARTH
IN ZAMBRANA

We all live in emergent ecologies—complex assemblages of plants, animals, people, physical landscape features, and technologies—created through the habit-forming practices of connection in everyday life. We both inhabit and co-create these ecologies of home, often without being able to “see” them clearly. We live in networks of the sort defined by Bruno Latour (2005) as in the assemblages above, yet we are also rooted in specific territories and geographic locations, often several simultaneously and in series. We are both denizens and artisans of the hybrid geographies described by Sarah Whatmore (2002). Human beings are likewise entangled in several related formulations of contemporary nature/culture (Braun and Castree 1998), described variously as meshworks (Escobar 2001, 2004, 2008), rhizomes (Deleuze and Guattari 1987), the network society (Castells 2000), relational places (Massey 1994), complex ecologies (Botkin 1989; Haila and Dyke 2006), and generic models of networks and complexity (Barabasi 2002; Kauffman 2000).

Using selected tools from political ecology, science and technology studies (STS), human geography, ecological science, and complexity theory, we can learn to recognize and to re-imagine these everyday ecologies of home, as seen from the multiple standpoints of complex actors. We also need a prism that reflects the combined light and patterns of “social” and “biotic” life, in a way that helps us to get beyond the nature/culture binaries that suffuse our thinking.

While we inhabit our own everyday ecologies, sometimes we can see the outlines of structure and function more clearly in “the field,” that is, someone else’s home, workplace, and habitat. The experience and insights of people in the Rural People’s Federation of Zambrana-Chacuey in the Dominican Republic played a major role in my own formulation of network metaphors and models applied to social movements, biodiversity, and landscapes. Along with three research colleagues and several Federation members, I documented and analyzed the process and results of the collaboration between this representative people’s organization and an NGO as they advocated sustainable farm forestry and social justice. By the end of the first study, I was seeing multiple. My own vision was refocused

through the everyday experience, the perspectives, and the data provided by multiple Federation actors, as well as my immersion in the rich, diverse ecologies of their networked lives and landscapes.

In this chapter I make the case for a model of rooted networks, to encompass the complexity of viable, mixed forest and agrarian ecologies. After an overview I summarize several network concepts and models developed in political ecology, STS, geography, and complexity theory and outline an expanded network approach. A return to the field in Zambrana illustrates selected elements of this synthesis and demonstrates the practical origins and applications of rooted networks in political ecology, STS, and conservation ecology.

THE CHALLENGE OF ZAMBRANA

In October 1992 I joined with three colleagues to conduct a four-month study on a farm forestry project in the rolling hills south of Cotuí in the center of the Dominican Republic.¹ The Rural People's Federation of Zambrana-Chacuey (a regional grassroots organization formed during the land struggle of the 1970s and 1980s) and ENDA-Caribe (Environment Development Alternatives Caribbean, a regional branch of an international nongovernmental organization) were collaborating on several joint efforts.² The Forest Enterprise Project promoted planting of *Acacia mangium* trees for timber as a lucrative cash crop on smallholder farms (Geilfus 1995). ENDA had negotiated with the National Forest Service, a division of the army (Dirección General Forestal) to secure permission for legal cutting of this species with special permits from the project. National laws otherwise prohibited the felling of trees, even planted trees on private property. The Federation and ENDA were in the process of constructing a cooperative sawmill with external funding support. The Federation as a whole had embraced the project and supported the formation of a spin-off subsidiary group, the Wood Producers Association, a rising economic and political force within the Federation and the region. Our agenda was to document this case as a model of community-based forestry, and to analyze the interaction of this initiative with gender and class relations in landscapes, livelihoods, and organizations across scales.

We grounded our study in the region, the landscape, the Federation, its members (men and women), their households, and the connections between them. The Federation formed the base for our research on social and ecological dynamics of farm forestry, and was the focus of our systematic, random, and network samples for social and ecological surveys, oral histories, and participant observation in 1992/93,³ 1996, 1997, 2005, and 2007. Throughout the course of these activities, we encountered braided strands of social and ecological history that

linked every feature in this patchwork of farms, forests, gardens, and homesteads to stories of individual lives, families, communities, and social movements.⁴

ZAMBRANA-CHACUEY AS A REGION

Zambrana-Chacuey is a hilly farming region comprising two administrative districts, nestled in the Yamasa Hills near the provincial capital of Cotuí and the Barrick Gold Mine (formerly Rosario Dominicana). In 1992 most of the twelve thousand residents were smallholder subsistence and commercial farmers with one-half to two hectares of land. Land use and cover ranged from pasture and field crops to tree crops, gardens, and forests. Farmers cultivated tobacco, citrus and other fruit trees, shaded cocoa and coffee, *patios* (forest home gardens), and *conucos* (diverse plots of root crops, vegetables, and medicinal crops). Some farmers planted and harvested trees for timber, woodworking, and charcoal. Most households relied on some income from off-farm wage labor (Rocheleau and Ross 1995).

During the 1980s and 1990s Zambrana-Chacuey exemplified simultaneous national trends to strengthen environmental protection and agricultural exports, reconciled under the umbrella of sustainable development. During the Selva Negra (black forest) Anti-Deforestation Campaign, armed troops with helicopters directed enforcement against smallholder farmers, who suffered arrests, fines, and worse for clearing farm plots, making charcoal, and harvesting trees for home use. The state simultaneously encouraged land speculators, ranchers, and agribusiness corporations to acquire and clear more land for agriculture (B. Lynch 1996; Reynolds 1994), an egregious social and ecological contradiction that some authors have overlooked (Diamond 2005). Smallholder farmers increased tobacco and cassava (*yuca*) cash crops in order to survive the decline in coffee and cocoa prices and the suppression of charcoal and woodworking activities.

From 1992 to 2007 farmers relied increasingly on income from off-farm employment, shifting away from tobacco and coffee. Cocoa, coffee, and pineapple prices rose and fell in cycles. A net retreat from coffee was matched by a resurgence of cocoa, based on organic markets and certification. In 2007 pineapple surged in price and in popularity among farmers. During the early 1990s food crops fell in total acreage, production, and diversity, then began to bounce back (upland rice, beans, and root crops) based on higher food prices and market demand. The net result was still a large decrease in food acreage from 1992 to 2007. Timber, in contrast, was a major cash crop by 2007, yet the Association of Agroforestry Producers (APA, formerly Wood Producers Association) grew more timber on fewer farms than in 1993.

THE FEDERATION

Throughout the surveys ran the chronicle of “the Federation” and the undercurrents of resistance, resurgence, and complex relations of power spanning centuries. In 1992 the organization consisted of fifty-nine farmers, housewives, and youth associations from thirty-one communities, with over seven hundred individual members in five hundred households. The Federation directly served over four thousand people and provided broad support to many of the twelve thousand residents in the region. The associations held separate local meetings and sent representatives to the Federation governing assemblies. The organization was rooted in three separate wings of a very broad movement: farm co-operatives; Catholic liberation theology and human rights; and traditional Catholic advocates of “basic needs” (Rocheleau and Ross 1995). Women figured prominently in each, and constituted a fourth, invisible force within the broader peasant movement.

Nurtured in underground grassroots networks and formally founded with the support of the Catholic bishop of La Vega in 1978, the Federation was one of seventeen such regional groups in the larger Confederation Mama Tingo, named for an elder peasant woman leader⁵ assassinated during a land redistribution campaign in 1974 (Ricourt 2000). It was part of a wave of land-struggle movements that grew to international prominence in the 1970s, propelled by the convergence of Catholic liberation theology and poor farmers’ campaigns for land throughout Latin America. The Federation, like the broader movement that spawned it, adopted the empowerment approach of Paulo Freire (1970) as the prevailing method of training and organization, with a strong focus on encouraging voice and action on the part of those who had long been silenced.

The nonviolent land-struggle movements appealed to long histories in place and the rights of rural people to maintain their lands or to regain lands lost to the U.S.-based sugar corporations, the Trujillo and Balaguer regimes, and their clients. The movement also proclaimed the right and the profound need to create space for displaced and landless people who had migrated from other regions to make new homes and new communities based on a shared sense of purpose, respect, and mutual support (Lernoux 1980). People were not so much claiming ownership as making a statement about the proper use of land, the nature of an agrarian landscape, and their own place in it, through the re-creation and performance of a complex, rooted network, shot through with power, anchored in the soil as well as history and a shared vision of the future.

Most Federation farmers had participated in campaigns for land, free speech, and the right to organize, as well as for schools, clinics, roads, and marketing support for farmers. Men and women used nonviolent civil disobedience, ranging from occupation of underutilized largeholder lands to highway blockades.

They faced armed soldiers and police, jail terms, beatings, and campaigns of intimidation and harassment. Over the years the Federation also served as the main vehicle for popular organization as people in Zambrana struggled through drought, floods, hurricanes, absentee landlords, and boom-bust markets for coffee, cocoa, pineapple, and tobacco.

Over time the Federation emerged as a major actor in the daily life and political development of the region, restructuring social relations as well as the landscapes and ecologies of the region. It acted first through the land struggle and later through the agricultural and sustainable development projects with ENDA, which eventually spawned the Forest Enterprise Project, the Wood Producers Association, and the Federation/Wood Producers Cooperative Sawmill. The people of the Federation also acted individually and collectively, through their everyday farming and forestry practices, to continually remake the rich regional agroforest and the social networks that sustained them.

THE ZAMBRANA STORY IN SEARCH OF A BETTER EXPLANATION

Several contradictions and paradoxes surfaced in our studies of the Federation, the changing composition and pattern of the regional agroforest, and the official maps of forests, deforestation, and reforestation. Among the most striking findings was the multiple nature of the Federation, beyond the formal structure of the Farmers' Associations, Housewives' Associations, and Youth Associations. The Federation was not a mere organization, but rather a specific flexible, dynamic, and self-organized manifestation of much deeper and wider webs of relation, both in the social sense and in terms of actor-network assemblages crossing "natural" and "cultural" lines. Relations of power ran throughout the Federation network, within the membership as well as between the group and other entities (forest service, largeholder farmers, the church, ENDA, the mine, and the new commercial foresters' group [Agroforestry Producer's Association]). Networks, roots, and territories were highly entangled and did not fit within the confines of socially or ecologically focused polygons mapped on two-dimensional Cartesian grids. Multimodal conversations and encounters with a large proportion of the Federation membership about the regional agroforest and the social landscape also provided us with the beginnings of a situated-science perspective. We brought the multiple visions of different actors to the table, based on qualitative and quantitative assessments of the same phenomena from distinct positions in complex networks. To make sense of all this required a model we didn't yet have. The rooted network as a tool offers a way to understand the complexity of the Zambrana story, using existing formulations of networks as a point of departure.

NETWORK MODELS, METAPHORS, AND THEORIES

In general, formal models present networks as existing beyond space and place, above the mess of land, water, blood, and soil. Some social scientists treat network structures as inherently recent phenomena (Castells 2000), contrasting high-technology, postmodern, postindustrial conditions with prior organic, pre-modern societies. Networks in STS have arisen from social and cultural studies of information and biotechnologies, while much of political ecology has been in the trenches (literally) of rural life. Yet the actor networks postulated by Latour (2005) can allow us to jump scales and to combine humans, plants, animals, machines, and nonliving elements of the planet, from bedrock and hillslopes, to rivers, rain, and sunlight. Political ecology can bring these models “down to earth,” to reconcile networks with energy flows, nutrient cycles, and movements of people and other beings in territories and ecosystems.

The convergence of political ecology and STS can bring power into network models of assemblages of people, other living beings, technologies, and artifacts. While STS has focused on the power of technologies and the workings of science within societies, political ecology has focused on relations of power between state and corporate structures and local communities whose livelihoods and cultural integrity are threatened by eviction, invasion, resource theft, and environmental degradation (Peet and Watts 2004; Blaikie 1985). Political ecology has also been about popular resistance to this oppression, as well as organized popular movements to protect their home ecologies, reassert their own worldviews, and reconstruct their own integrated arts and sciences of “production” and “conservation” (Rocheleau 2008; Brosius, Tsing, and Zerner 2005; Escobar 1999, 2008; Peet and Watts 2004; Robbins 2004; Zimmerer 1996), as in the forestry, agroforestry, and ethnobotany work of the Federation.

ANT AS ARTIFACT, SUBJECT TO RECRUITMENT AND REINVENTION

The network, as an enabling metaphor, allows us to reconcile our thinking about cooperation, communities, and local knowledge, with structural explanations of power in national and international structures of economies and politics. Actor-network theory (ANT) offers a way to conceptualize the relationships between humans and the disparate elements that we normally classify as part of “nature” or “culture.” It is a conceptual tool to break binaries and explain the power of connections in assemblages of humans and other living beings, technologies, artifacts, and physical features of their surroundings. Actor networks are often represented through a central human actor, augmented and expanded by the number of connections and the weight of the other elements that constitute nodes in the net. The assumption that all connections are positive and can be treated as assets

has been the dominant metaphor. Variations of ANT in social science and policy, including social capital analysis (Putnam 2000) and sustainable-development applications (Bebbington 1997) often present all connections as assets. The framing of actor networks as growth engine and robotic augmentation begs the question “Whose network is bigger?” or “What’s in your network?” (with apologies to a raft of credit card and cell phone commercials on U.S. television).

In contrast, we can transform ANT to fashion complex, polycentric network models that both complicate and clarify our visions of possible futures. We can expand ANT to incorporate the distinct positions and perspectives of multiple groups of people and various species and assemblages of plants and animals, along with artifacts, technologies, and physical elements of their surroundings. It’s not just a matter of getting closer, to get the one true story. It’s about “getting it” through the eyes of a diversity of actors in distinct positions, in complex actor networks, that are best described as rooted networks and relational webs. As part of a search for viable alternatives to “sustainable development,” I propose to re-cruit the network construct and stretch it, building on selective elements relevant to social and biological science: power and polycentricity, situated knowledge(s), roots and territory, self-organization, and complex constructs that mesh nature and culture.

Networks are ecological and material as well as social, and carry power relations in both the patterns and processes of connection. The combined lenses of ecosystems, networks, and cultural studies can help us to see embedded, uneven, and dynamic relations of power. Explicit models of the type, terms, and degree of connection can incorporate multiple dimensions, including positive, neutral, and negative connections (as seen by a particular actor), strong to weak links, continuous to erratic connections, and dense versus dispersed patterns of connectivity. While many network models focus on hierarchies of degree and pattern of connectivity (Barabasi 2002), the terms of connectivity are a major arbiter of power. They can vary from coerced to voluntary, encompassing relations from slavery to partnership and free association (Rocheleau and Roth 2007).

Place and territory are, at best, underdeveloped in STS and political ecology. To address the entanglement of people in the biotic and physical elements of the material world, and the construction of new ecologies, we need to tie networks to land, to locate them, put them in place(s), though not in simple polygons. Relational spaces and theories of place (Massey 1994) as well as meshworks and territories (Escobar 2001, 2008) tie networks to place, yet we need to further engage the material relationships in socioecological networks linked to multiple territories of extraction, production, circulation, consumption, and transformation.

We can think of “network” and “root” as verbs rather than nouns, to visualize

1 the diverse rooting strategies that connect webs of relation to the surface(s) of the
2 planet, as well as technologies of internal connection within complex entities.
3 Several well-known plants illustrate the varieties of rooting and webbing: tap-
4 roots in pine trees; the perching of epiphytes (“air plants”) in tree canopies; the
5 profusion of new plants produced by “spider plants” outside the pots or the main
6 rooting zone of the parent plants; the soil-building habits of coastal mangroves
7 around their woody stilt roots; and algal mats, which create their own floating
8 worlds from microflora and -fauna, making a seafaring macro-being from mi-
9 croconstituents. Deleuze and Guattari (1987) elaborate specifically on the under-
10 ground metaphor of rhizomes⁶ to describe the entangled realities of connectivity
11 and the complex dynamics of social change.

12 Community ecology and systems ecology, respectively, model relations among
13 and between species, and flows of energy and materials between living things
14 and their physical surroundings (Botkin 1989), from ecosystems (Odum 1994;
15 Costanza et al. 2001) to ecological networks (Fath 2007). Horizontal flows as well
16 as vertical “roots” tie individual nodes or whole networks to resources in territo-
17 ries of activity, extraction, residence, identity, and influence. We can model terms
18 and pathways of movement of matter, energy, and living beings between nodes in
19 networks and between whole networks to illuminate processes of mobility and
20 circulation as well as extraction, production, consumption, and the terms and
21 types of rooting, and being, in place.

22 Neural-network models and theories from biological and computational sci-
23 ences contribute explicit models and robust metaphors to study dynamic self-
24 organization from below as well as the role of already existing structures (Kauff-
25 man 2000; Barabasi 2002). Repeated actions create habit-forming practices of
26 connection between neurons in the brain, which create or modify structures,
27 which in turn predispose but do not determine future action. These models also
28 describe dynamic and self-organized phenomena from social movements and or-
29 ganizations to biodiversity in plant and animal communities.

30 Polycentric governance structures (V. Ostrom 1997; E. Ostrom 2001) provide a
31 point of departure to visualize multiple actors as simultaneous centers of power,
32 influence, and action, rather than single structures, central actors, and simple
33 linear hierarchies. Theories of power and knowledge from feminist poststruc-
34 tural scholarship add two powerful concepts to the mix: situated knowledge and
35 positionality (Haraway 1991; Harding 1986). Each actor (individual or group) has
36 a distinct vision of any given network, based on their position, and their experi-
37 ence of shifting terms and configurations of connection over time.

38 The resulting artifact, what we might call a poststructural rooted network, in-
39 corporates the views from individual nodes (as distinct standpoints or subject po-

sitions), to provide a powerful tool for “situated science” in political ecology, STS, and conservation ecology. This networked vision can contribute to critique as well as to the construction of viable “alternative” hybrid sciences that transcend local and global scales, erase nature/culture dichotomies, and join theory and practice. This eclectic tool helps us to “make sense” of complex assemblages of humans, other living beings, and their things, their surroundings, and technologies from distinct subject positions and diverse knowledge perspectives.

As a first step in this process I suggest several specific tasks required to embark on this project: mapping power in networks; mapping rooted networks onto territories; tracing relations of connectivity, autonomy, and sovereignty, as well as mobility, circulation and rootedness; and reconciling complex systems and networks to include assemblages of humans and other beings, their habitats, technologies, and artifacts. Some prerequisites include complicating and expanding our typologies of power; complicating territories beyond fixed polygons; developing a typology of rooting systems and strategies; and integrating hierarchies and self-organization (Rocheleau and Roth 2007). The brief case study below incorporates these various elements through a discussion of women’s changing position in the Federation, and the ongoing construction of a complex regional agroforest by multiple actors.

THE WORKINGS OF NETWORKS IN THE FEDERATION

An organizational diagram of social networks in the region readily demonstrates the role of the Federation as a clearinghouse of information and a center of influence in a crowded field of government, church, and civil-society organizations over three decades (figure 11.1). The Rural People’s Federation of Zambrana-Chacuey and the region it calls home also embody the kind of multidimensional assemblage described by ANT. It includes the relationship of people to each other (from family and neighbors, to trade and church affiliations, political and social organizations) and incorporates a long list of plant and animal species (wild and domesticated) and physical features of the landscape, ranging from mountains, valleys, rivers, and soils, to springs and groundwater. The network also encompasses technologies, artifacts, and infrastructure: technologies of production, processing, resource management, communication, and transport; infrastructure, such as roads, water collection and distribution systems, residential, commercial, and community buildings, and energy and communication grids; and tools, from plows and tractors to sewing machines, cell phones, and motorcycles. Social technologies and practices also form part of this list of actors in the Federation/campesino network, including practices of organization, education, empowerment, resistance, solidarity, and self-governance.

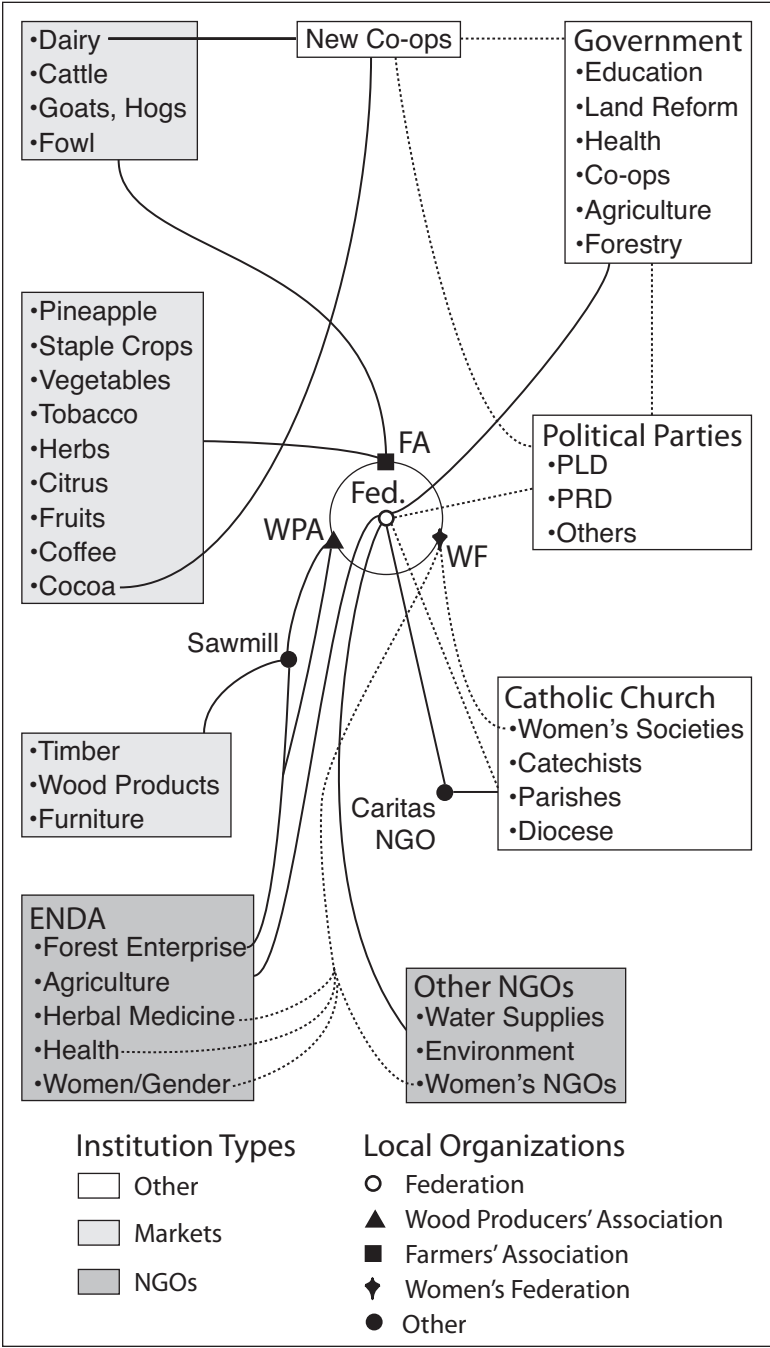


FIGURE 11.1 The Federation embedded in social networks in the region.

The Federation also exemplifies a network-based entity in the more expansive sense of the rhizome metaphors of Deleuze and Guattari (1987), and the characteristics of rooted networks cited above. The organization explicitly addressed the relationships, and the terms of connection, between rural farmers as a group with each other, the land, other living beings, the national political process, and civil society. It tackled the terms of connection to markets for farm products, wood, and agricultural inputs. The Federation sought to shift several relationships toward fair trade, equal exchange, equal rights, and full participation. The members' relationships to each other, national political processes, and markets also hinged on, and impinged upon, the ecologies of their smallholder farms and their connections to land, plants, animals, and the surrounding landscape (figure 11.2).

The politics of the Federation have been explicitly webbed, networked, and rooted, even as they addressed (and sometimes embodied) relations of power. They dealt directly with roots, but included lateral roots in relations of solidarity as well as vertical roots to land, and incorporated roots of different types at multiple scales. The entire Federation was rooted in the twin districts of Zambrana and Chacuey as a regional territory, communities set their roots in local landscapes, and individuals and households drew on roots in small farm properties and specific plots within those. A profusion of tangled roots also crossed each of these scales of social and ecological organization. The plants and animals associated with the households and communities of the membership encompassed both lateral and vertical rooting as they connected to each other, the people of the region, and the soil, water, and landforms. The following examples illustrate selected elements of rooted networks in the experience of the Federation and its members: gender and power in polycentric networks; and reconciling roots, networks, and territories in the regional agroforest.

GENDER AND POWER IN POLYCENTRIC NETWORKS

The Federation consistently used the structure and process of networks (*network* as noun and as verb) to address issues of power and difference. The group had its origins in the politics of resistance against oppressive, unjust, and repressive forces, from a highly militarized national state to hostile agricultural markets and unequal access to land from local to national level. The founding of the formal organization provided a platform from which to speak truth to power, to enforce the members' own demands, and to resist military and police intimidation through mass mobilization (see Lernoux 1980; Ricourt 2000).

The Federation dealt explicitly with relations of power within the organization itself, in terms of both structure and process. During the 1990s women and men

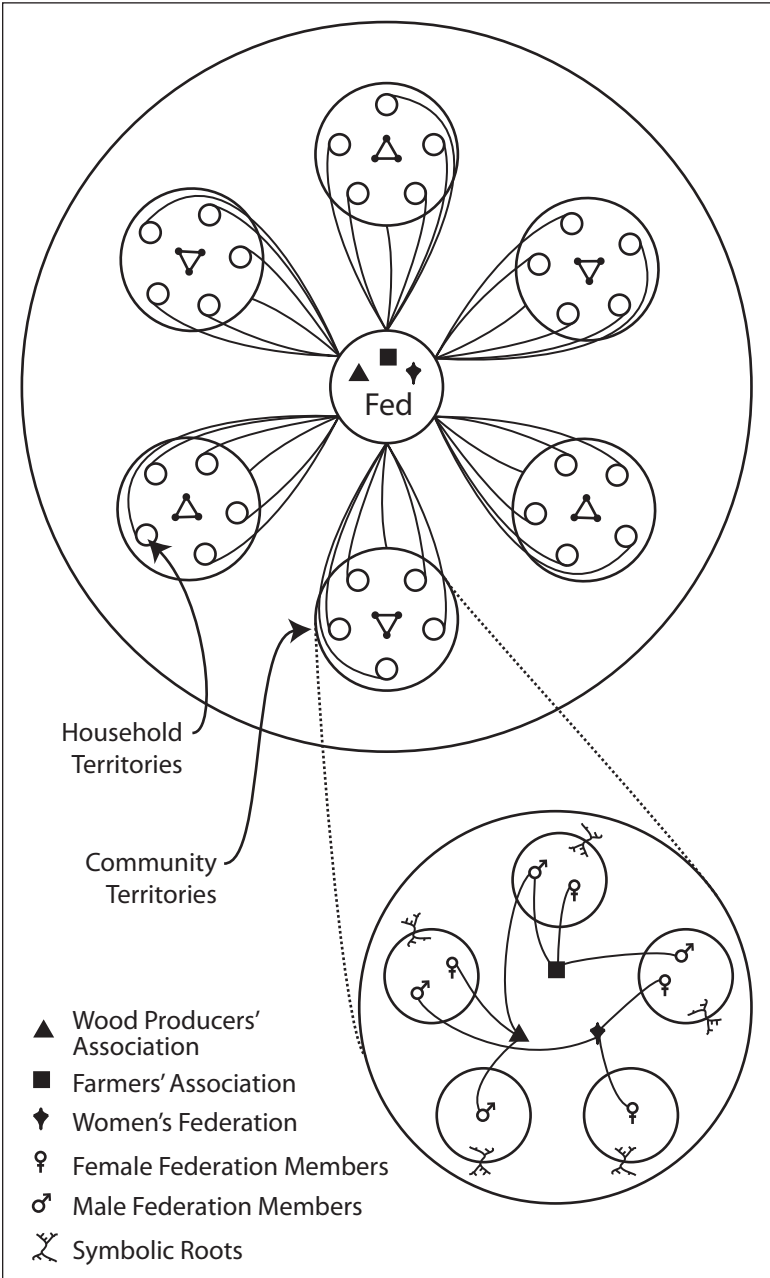


FIGURE 11.2 Rooted networks and territories of the Federation across multiple scales.

participated through the Housewives' Associations (100 percent women), the Farmers' Associations (4 percent women, 96 percent men), and the Wood Producers Association (>95 percent men). Since that time women in the Federation have twice reorganized themselves and renegotiated the terms of their connection and participation, and the Wood Producers have redefined and repositioned themselves as well.

There was a conscious strategy to rely on the diversity of the membership to link with myriad other actors in the organizational landscape (as allies, in solidarity, as clients, or in bargaining mode). An informal division of political labor and social affiliations provided a thick web of connection, communication, and circulation of influence in various church, social movement, government, political-party, and business circles. The membership spanned all three major political parties and more. The hard-won (and ongoing) battle to maintain Federation neutrality with respect to political parties was balanced by individual members with informal connections to ongoing conversations, programs, and government resources linked to party politics. Members likewise bridged various circles within the Catholic church, marketing and commercial networks, and professional and occupational affiliations.

This everyday mobilization of distributed power in polycentric networks had far-reaching consequences. Beyond the land struggle, public services and infrastructure were developed through collective demands (including nonviolent protest and mobilization) to convince state agencies to engage in collaborative efforts with local communities and the regional Federation. Women members of the Federation played a major part within the movement, participating in the active circulation of information and acting to reconstitute places for viable, just, and democratic communities.

The history of women in the regional Federation exemplifies the complexity of the organization, its ideals and contradictions, and its ability to deal with difference and distribute power in networks. From the outset the Federation had a base in women's groups and women's politics of place. Tito Mogollon, one of the founders, noted that the bishop of La Vega commissioned him and three other organizers as human rights promoters in 1974. They approached two women's groups, one in a nearby community threatened with eviction by the Rosario Dominicana (now Barrick) Gold Mine and another in Chacuey. From these efforts emerged the Rural People's Federation of Zambrana-Chacuey as a collective voice and advocacy organization and simultaneously as a center of countervailing power and empowerment.

Women's stories led us beyond the confines of organizations and movements into the realms of sacred space and everyday connections, between humans and

1 other beings, their technologies, artifacts, and physical surroundings. Women's
2 lives in Zambrana-Chacuey led beyond and beneath visible and formal organiza-
3 tions to the web of relationships that predated and gave rise to the Federation.
4 Women did not need permission to join and to govern, or recognition as mem-
5 bers and leaders in the Federation, to wield power. Many already had that, in
6 parallel domains of knowledge and authority illegible to more powerful actors
7 (from men at home to government officials). Yet the recognition of women as
8 Federation members and leaders, and their struggles for more equitable struc-
9 tures (1978–2007), enabled a powerful synergy between women and men, and
10 between economic, political, cultural, spiritual, and ecological domains of au-
11 thority and power.

12 Our surveys in 1992–93 indicated that 20 percent of the households affiliated
13 with the Federation were connected exclusively through a woman in the House-
14 wives' Association, with no corresponding memberships of men in the house-
15 hold. Women in local associations often brought new initiatives (such as the
16 Forest Enterprise Project) to the attention of the men in their communities and
17 encouraged their participation. The women's groups also maintained continuity
18 of activity, while the Farmers' Association membership and activity tended to rise
19 and fall with cash crops and commercial activity (Rocheleau and Ross 1995). By
20 1996 some of the women leaders formed a new, explicitly feminist women's board
21 (*junta*) with a focus on economic and political rights for women. Membership
22 surged, and they formed the Women's Federation, as a parallel entity within the
23 original organization. When they encountered resistance to their new status, the
24 Women's Federation broke away to form an independent organization. In 2006
25 they negotiated with a new slate of Federation officers and re-entered the Fed-
26 eration with greater representation on the board and a stronger role in political
27 and financial decisions. The continuing evolution and revolution of the women's
28 organization within the Federation illustrates the management of power in poly-
29 centric networks, from above and below, including power with, power alongside,
30 and power in spite of, rather than the well-worn confrontational models of power
31 over and power against.

32 The experience of women in the Federation also raises the issue of legibility
33 and the invisible web of relations beneath and beyond the formal organizational
34 structures and recognizable movements. The roots that sustain Federation net-
35 works of solidarity and affinity are made and maintained through the continuing
36 performance, affirmation, and creation of positive alternative cultures expressed
37 in values, landscapes, artifacts, rituals, and daily practice that draw their legiti-
38 macy from a domain beyond the control (and even the gaze) of recognized, domi-
39 nant power. This story of women in the Federation is a tale of rhizomes rather

than taproots, of a subterranean root mat, a relational web of exchange, extraction, and circulation.

This expanded vision of complex, and sometimes creative, entanglements with power has allowed women in the Federation to imagine and create more just, viable, and humane economies and ecologies, and new ways to be at home within them, while still struggling with unequal and unfair distributions of property, political office, and legal authority. The experience of the evolving, self-organizing women's structures in the Federation also suggests neural networks, habit-forming practices of connection, and struggles over the terms of connection, rather than simple stories of open conflict between diametrically opposed or competing groups.

RECONCILING ROOTS, NETWORKS, AND TERRITORIES IN THE REGIONAL AGROFOREST

The relationships of Federation members to national political process, human rights movements, and markets (from local to global scale) also hinged on, and impinged upon, the ecologies of their smallholder farms and their connections to land, plants, animals, and the surrounding landscape as well as production and resource management technologies. The politics of the Federation explicitly addressed relations of power in the ways that people are connected to land, as well as to other people, multiple species, and a variety of technologies and artifacts. They made a strong appeal to "roots" but not a classic "blood and soil" argument for exclusive rights to a fixed territory by a specific group, based on identity and a long history in place. The Federation incorporated lateral roots in relations of solidarity as well as vertical roots to land. They also combined roots of different types at multiple scales (figure 11.2).

The Federation reconciled networks and territories in daily practice and in history. It linked people "horizontally," between people and other living beings, and vertically, between people and other species with their physical surroundings and, literally, the ground beneath them. The people of Zambrana-Chacuey also brought together notions of fixity and long histories in place, with the experiences of displacement, migration, mobility, multiple complex identities, flexibility, and fluidity. The Federation resolved this paradox by jumping scales, joining people to each other based on co-presence in specific geographic locations and in networks of people linked across separate spaces by shared interests (Women's, Farmers', and Wood Producers Associations) and common values (the Federation and the Confederation Mama Tingo).

The politics of place, power, and changing human ecologies in this context were and are about more than gender, class, racial, ethnic, or anti-imperial strug-

1 gles over “environment” as a collection of resources in a specific location. En-
2 vironmental movements as well as rural farmers’ land struggles in this region
3 were about the terms of connection between people, and between groups of peo-
4 ple, land, other species, artifacts (houses, gardens, tools), and the surrounding
5 physical world. They were also about the terms of connection between local and
6 larger places, both earthly and spiritual. Land was not treated as “real estate,” as
7 an exchangeable and interchangeable commodity, but as the ground where body,
8 home, community, and habitat joined in everyday experience as well as in history
9 (Rocheleau 2005). Place was treated not as a container, but as a nexus of relations
10 (Massey 1994), a patterned logic and ethos of contingent connections, rooted in a
11 particular way, anchored in a given space and time.

12 The bedrock of solidarity among the various groupings within the Federation
13 was and is the shared sense of place, with a common commitment to basic po-
14 litical and human rights for all, as well as land, basic infrastructure, and support
15 services. The material space for community was created through regional and lo-
16 cal collective struggles for household plots as private property.

17 In our field-data collection and subsequent statistical analysis of tree and crop
18 biodiversity, we encountered an invisible, species-rich, regional agroforest,⁷ the
19 same patchwork landscape of forest and farms that was being treated by the state
20 as a deforestation crisis zone. A dominant focus on forest as land cover and a
21 selective version of the sciences of conservation and land-use change were be-
22 ing mobilized against the very people who had groomed the biodiverse, culturally
23 rooted agroforest. Their farms, and the surrounding landscapes, including a pro-
24 fusion of forest trees, were almost always mapped into the “deforested” polygons
25 on official maps.

26 The Forest Enterprise Project, with its eventual focus on a single Australian
27 pulp and timber tree that readily invades cropland, gardens, and riparian forests,
28 was heralded as reforestation. It was actually a successful project for producing
29 smallholder commercial timber, linked to a broader effort to promote agrofor-
30 estry, medicinal plants, and sustainable agriculture. The expansion of on-farm
31 timber plantations sometimes replaced tobacco or pasture, but it also encroached
32 on the pre-existing diverse mix of native and naturalized trees in the patchwork
33 landscape, and threatened tree diversity in patio gardens, coffee and cocoa stands,
34 and riparian forests.

35 We made the invisible, species-rich regional agroforest legible to science when
36 we changed the frame of our scientific gaze and the logic of our sampling to see
37 the relational networks of people and plants in place(s). The story of this land-
38 scape was very much the story of the Federation and men’s and women’s politics
39 of place within it, and as such it was embodied in situated knowledge, revealed

by multiple land users. This framework provided a countervailing vision to the powerful images of forest and not-forest in neat polygons on standard maps of land use and cover at scales that erased these finely networked human ecologies.

As we proceeded with the sketch maps and surveys of tree and crop species, it became apparent that the patio (homestead) gardens constituted a polka-dot forest. The mainstay of this species-rich agroforest, the patio garden, was largely a women's domain, and equally impressive, the seeds of forest past and forest future were literally wrapped around peoples' homes. The highest biodiversity was found close to—not removed from—the focal point of human habitation. Our surveys also revealed that seeds crossed land-use categories and property lines with impunity, riding on the wind, livestock, or people, or sometimes through purposeful planting by farmers. Our intensive biodiversity surveys in 1996 and 2007 confirmed the existence of a dynamic regional ecology above, below, and beyond the property lines and land-use/cover categories in the maps of resource management and conservation professionals.

The Federation example and experience stands as a formidable challenge to simplistic advocacy for state, common, or private property models as the exclusive precondition for tenure security and strong roots, to enable biodiversity conservation and sustainable resource management. Network models and specifically the notion of rooted networks help to explain the basis and the success of the Federation's approach to roots and territories, mixing a variety of strategies and treating root as a verb as well as noun. The land struggle was about more than land, and land was about more than private property. Roots mattered, as well as a place to plant them, but both took many forms that coexisted in complex ecologies.

CONCLUSION

The case study in Zambrana-Chacuey demonstrates the need to develop new models and analyses of rooted networks, relational webs, complex assemblages, and emergent ecologies, reconciled with territories. Self-organization from below is newly legible to formal science through network and complexity theories, and can be modeled along with hierarchical structures. The challenge is to mesh social, ecological, and technological domains in theories and models of rooted networks, relational webs, and self-organized assemblages, all shot through with power, and linked to territories and larger systems. Integrative network models and theories can be powerful tools for thinking and acting in place and across places, to identify instances of viability in actually existing human ecologies and to imagine and foster just and humane alternative futures. The ongoing experience in Zambrana demonstrates promising ways of knowing and being in rooted networks, webs of power, and complex landscapes, past, present, and possible.

NOTES

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1. The team consisted of me; Laurie Ross, then a graduate student and now a professor at Clark University; and two Dominican colleagues, Professor Julio Morrobel (then professor of forestry at the Instituto Superior Agrícola in Santiago) and Ricardo Hernandez (then a graduate student and local historian and now a professor in Cotuí). We eventually recruited several additional colleagues from the Federation and ENDA to join us in conducting the study. In 1996 and 2007 Professor Luis Malaret, research associate at Marsh Institute, Clark University, joined me to conduct the ecological surveys with forest technical experts from the Federation.

2. The Federation and ENDA (as of 1992–93) sponsored several other projects, including Ethnobotany and Herbal Medicine, Agroforestry for Soil Conservation and Soil Fertility, Small Livestock Production, and Vegetable Gardens, as well as Woodworking, Rattan Furniture, and Metal-Working Workshops.

3. Over the course of four months in 1992–93, we visited and interviewed thirty-one local associations (farmers, housewives, and youth groups) in sixteen communities (out of a total of fifty-nine Federation-affiliated associations in thirty-one communities, each association comprising roughly twelve to thirty people from a farming community in a specific locality).

4. In 1992–93 we combined ethnographic, standard-survey, and feminist methodological approaches, including participant-observation, group interviews, key-informant interviews, life-history interviews, community and organizational histories, detailed sketch mapping, land-use history, land-use simulation board games, and a formal questionnaire and mapping survey (land use, tree species and crops) with a gender-stratified random sample (45) of the more than 700 Federation members in Farmers' Associations and Housewives' Associations, respectively (Rocheleau 1995; Rocheleau and Ross 1995). In 1996 and 2007 we conducted follow-up biodiversity surveys, using a rigorous ecological sampling framework and survey methods in a subsample of the Federation household lands. In 2007 we conducted oral-history, focus-group, and key-informant interviews with Federation members on the history and trajectory of the regional Federation, livelihoods, and landscapes.

5. Florinda Soriana Munoz led and supported peasants in campaigns for land and social justice in nearby Yamasa.

6. Rhizomes are usually horizontal subterranean plant stems, distinguished from true roots in possessing buds, nodes, and usually scalelike leaves.

7. *Agroforestry* refers to the purposeful combination of trees, crops, and animals in managed ecosystems to enhance production as well as conservation, for economic, cultural, and ecological ends. *Agroforest* refers to the resulting socioecological formation as an entity in the landscape.