

THE LANDSCAPE:

THE RIGHT SCALE FOR RAINFED AGRICULTURE
LESSONS LEARNED AND OPPORTUNITIES IN CENTRAL AMERICA



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Study conducted by Fundación PRISMA
for Global Water Initiative (GWI) – Agua Verde / Catholic Relief Services (CRS)

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Abbreviations and Acronyms

ACH: Acción Contra el Hambre

ACHES: Asociación de Cuencas Hidrográficas de El Salvador

ACUGOLFO: Asociación de Cuencas del Golfo de Fonseca

ACURHCASSPEB: Asociación de la Cuenca para la Región Hidrográfica Cara Sucia - San Pedro Belén

AECID: Spanish Agency for International Development Cooperation

AGUA: Proyecto Acceso, Gestión y Uso Racional del Agua

ALN: Asociación de Municipios Los Nonualcos

AMAR: Asociación Amigos del Árbol

AMCRE: Asociación de Municipios de la Cuenca del Río Estelí

AMICUERT: Asociación para el Manejo Integral de la Cuenca del Río Torola

AMUGRAN: Asociación de Municipios de la Cuenca del Gran Lago

AMUNSE: Asociación de Municipios de Nueva Segovia

AMUR: Asociación de Municipios de Rivas

ANA: Autoridad Nacional de Aguas

ANACAFE: Asociación Nacional del Café de Guatemala

ASACMA: Asociación Salvadoreña de Conservación del Medio Ambiente

ASAPMSMA: Asociación Administradora del Sistema de Agua Potable, Saneamiento y Medio Ambiente del Casco Urbano del municipio de Joateca

ASOCLI: Asociación de Organismos de Cuencas del Lago Ilopango

ASOCTISO: Asociación de Organizaciones de Cuenca de los Ríos Grande de Tilapa y Soyate

ASOMAINCUPACO: Asociación para el Manejo Integrado de Cuencas de La Paz y Comayagua

ASPROGUIJA: Asociación para la Conservación de la Cuenca Hidrográfica del Lago de Güija

ASUSCUBAJI: Asociación Usulután Sub-cuenca Bahía de Jiquilisco

ATP: Asistencia Técnica Participativa

ATP1: Asistencia Técnica Cofinanciada

ATP2: Asistencia Técnica Privada
CACH: Comité Ambiental de Chalatenango
CAD: Comisiones Ambientales Departamentales
CADC: Central American Dry Corridor
CAM: Comisiones Ambientales Municipales
CAPS: Comités de Agua Potable y Saneamiento
CATIE: Centro Agronómico Tropical de Investigación y Enseñanza
CCAD: Comisión Centroamericana de Ambiente y Desarrollo
CDC: Centros de Desarrollo Campesino
CEL: Comisión Ejecutiva Hidroeléctrica del Río Lempa
CENGICAÑA: Centro Guatemalteco de Investigación y Capacitación de la Caña de Azúcar
CENTA: Centro Nacional de Tecnología Agropecuaria y Forestal
CIDA: Canadian International Development Agency
CNRH: Consejo Nacional de Recursos Hídricos
COAL: Comités Asesores Locales
COCEPRADII: Comité Central Pro Agua y Desarrollo Integral de Intibucá
COCEPRADIL: Comité Central Pro Agua y Desarrollo Integral de Lempira
CODECO: Comités de Desarrollo Comunal en Honduras
CODENOL: Consejo de Desarrollo Económico Los Nonualcos
COHDEFOR: Corporación Hondureña de Desarrollo Forestal
COMAP: Comanejo de Áreas Protegidas
COMURES: Corporación de Municipalidades de la República de El Salvador
CONACOOOP: Consejo Nacional de las Cooperativas
COSUDE: Swiss Agency for Development and Cooperation
CRS: Catholic Relief Services
DIGESTYC: Dirección General de Estadística y Censos
ECADERT: Estrategia Centroamericana de Desarrollo Rural Territorial
ECAGIRH: Estrategia Centroamericana para la Gestión Integrada del Recurso Hídrico
ECLAC: Economic Commission for Latin America and the Caribbean
EED: European Endowment for Democracy
EPYPSA: Estudios, Proyectos y Planificación, Sociedad Anónima
FANCA: Freshwater Action Network – Central America
FAO: Food and Agriculture Organization of the United Nations
FARENA: Facultad de Recursos Naturales y del Ambiente
FHIA: Fundación Hondureña de Investigación Agrícola
FNA: Fondo Nacional de Agua
FND: Fondo Nórdico de Desarrollo
FUNDACIÓN PROLANCHO: Fundación Para el Desarrollo Integral del Departamento de Olancho
FUNDAMUNI: Fundación de Apoyo a Municipios de El Salvador

FUNDE: Fundación Nacional para el Desarrollo
FUNDESA: Fundación para el Desarrollo
FUNICA: Fundación para el Desarrollo Tecnológico Agropecuario y Forestal de Nicaragua
GEF: Global Environment Fund
GIZ: German Technical Cooperation
GOES: Government of El Salvador
GWI: Global Water Initiative
ICF: Instituto Nacional de Conservación y Desarrollo Forestal, Áreas Protegidas y Vida Silvestre
ICMA: International City/County Management Association
IDB: Inter-American Development Bank
IDR: Instituto de Desarrollo Rural
IFAD: International Fund for Agricultural Development
IHCT: Instituto Hondureño de Ciencias de la Tierra
IICA: Inter-American Institute for Cooperation on Agriculture
INAA: Instituto Nicaragüense de Acueductos y Alcantarillado Sanitario
INAFOR: Instituto Nacional Forestal
INFOCOOP: Instituto Nicaragüense de Fomento y Desarrollo Cooperativo
INIFOM: Instituto Nicaragüense de Fomento Municipal
INTA: Instituto Nicaragüense de Tecnología Agropecuaria
IRENA: Instituto Nicaragüense de Recursos Naturales
ITC: Institutos Técnicos Comunitarios
IUCN: International Union for Conservation of Nature
IWRM: integrated water resources management
LUPE Project: Land Use and Productivity Enhancement Project
MAG: Ministerio de Agricultura y Ganadería
MAGFOR: Ministerio de Agricultura y Forestal
MANCORSARIC: Mancomunidad de los Municipios de Copán Ruinas, Santa Rita, Cabañas y San Jerónimo
MANCOSOL: Mancomunidad de Municipios del Sur de Lempira
MAONIC: Movimiento de Productoras y Productores Agroecológico y Orgánico
MARENA: Programa Multifase de Manejo de Recursos Naturales en Cuencas Prioritarias
MARN: Ministerio de Medio Ambiente y Recursos Naturales
MBC: Mesoamerican Biological Corridor
MESAP: Mesa de Producción y Ambiente
MICUENCA: Manejo Integrado de Cuencas de Centroamérica
MINEC: Ministerio de Economía
NDF: Nordic Development Fund
NGO: non-governmental organization
OAS: Organization of American States

OPPS: Oficina de Políticas y Planificación Sectorial
PACAGIRH: Plan Centroamericano de Gestión Integrada del Recurso Hídrico
PACAP: Protected Areas Consolidation and Administration Project
PADEMA: Plan Departamental de Manejo Ambiental
PAF: Plan de Agricultura Familiar y Emprendedurismo Rural para la Seguridad Alimentaria y Nutricional
PAGRICC: Programa Ambiental de Gestión de Riesgos de Desastres y Cambio Climático
PASOLAC: Programa para la Agricultura Sostenible en Laderas de América Central
PASOLAES: Programa de Agricultura Sostenible en Laderas de El Salvador
PCaC: Programa Campesino a Campesino
PCG: Programa de Creación de Graneros
PESA: Programa Especial para la Seguridad Alimentaria
PIMCHAS: Proyecto Integral de Manejo de Cuencas Hidrográficas, Agua y Saneamiento
PLANDERO: Programa de Desarrollo Rural de la Región de Occidente
PNDR: Programa Nacional de Desarrollo Rural
PNMA: Política Nacional del Medio Ambiente
PNODT: Plan Nacional de Ordenamiento y Desarrollo Territorial
POSAF: Programa Socio ambiental y Desarrollo Forestal
PPTGB: Programa de Producción Tecnificada de Granos Básicos
PREDIBDPA: Programa de Rehabilitación y Desarrollo de la Infraestructura Básica y Diversificación de la Producción Agrícola
PREMODER: Programa de Reconstrucción y Modernización Rural
PREP: Programa Nacional de Restauración de Ecosistemas y Paisajes
PRISA: Proyecto de Reforma e Inversión del Sector Agrícola
PROCAFE: Fundación Salvadoreña para Investigaciones del Café
PROCHALATE: Proyecto de Rehabilitación y Desarrollo para las Áreas Afectadas por el Conflicto en el Departamento de Chalatenango
PROCORREDOR: Proyecto de Gestión Sostenible de Recursos Naturales y Cuencas del Corredor Biológico Mesoamericano en el Atlántico Hondureño
PRODAP: Proyecto de Desarrollo Agrícola para Pequeños Productores
PRODEMORO: Proyecto de Desarrollo y Modernización Rural para la Zona Oriental de El Salvador
PRODERNOR: Proyecto de Desarrollo Rural del Nororiente de El Salvador
PROLESUR: Programa Lempira Sur
PRORURAL: Plan Nacional de Desarrollo Rural Productivo
REDD+: Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
RENOC: Red Nacional de Organizaciones de Cuenca
RIMISP: Centro Latinoamericano para el Desarrollo Rural

RTD: rural territorial development
SACDEL: Sistema de Asesoría y Capacitación para el Desarrollo Local
SERNA: Secretaría de Recursos Naturales y Ambiente
SICA: Sistema de la Integración Centroamericana
SINAPH: Sistema Nacional de Áreas Protegidas de Honduras
SINIA: sistema de investigación e innovación agropecuaria
SNET: Servicio Nacional de Estudios Territoriales
TVA: Tennessee Valley Authority
UAPMS: Unidades Ambientales de Producción y Manejo Sostenible
UNA: Universidad Nacional Agraria
UNAG: Universidad Nacional de Agricultura
UNAH: Universidad Nacional Autónoma de Honduras
UNDP: United Nations Development Program
UNEP: United Nations Environment Program
UNESCO: United Nations Educational, Scientific, and Cultural Organization
UPANIC: Unión de Productores Agropecuarios de Nicaragua
USAID: United States Agency for International Development
WB: World Bank
WFP: World Food Program
WWF: World Wildlife Fund for Nature

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Introduction

In the past few years, Central America has become one of the most vulnerable regions to climate variability and change, both because of its geographical location and because of its severely degraded natural resources, particularly its soils and forests. Extreme climate events—droughts and flooding—have become more frequent and more intense, producing considerable impact on agricultural and livestock production in general, and on food security in particular, especially in what is known as the Central American Dry Corridor. These problems are becoming critical on the Pacific coast, home to the region's main population centers and its most important economic centers.

This context poses complex, tough challenges, which require strategic approaches and frameworks able to deal with them, with development management frameworks at significant scales that simultaneously support agricultural and livestock production and food security, income generation and the strengthening of local livelihoods, water management, and soil conservation and restoration of degraded areas, among others. Furthermore, these approaches must respond to the complexity of the socioeconomic dynamics and institutional frameworks, which influence conditions for the management of natural resources and their governance at different scales.

This study, meant to contribute in this direction, starts with a specific question: How can we promote actions at different scales aimed at producing changes in rainfed farming practices, through the management of green water, to ensure ecosystem services that are crucial to responding to climate change challenges? To this end, the paper begins by putting into context the challenge of rainfed farming in Central America: its sociopolitical context, institutional changes, and the current revival of the agricultural agenda and rural development. The study included a literature review and interviews with key informants (experts and officials from various programs and projects, community organization leaders, authorities and officials from municipal governments and municipal consortia, and scholars and researchers).



This paper describes the development of three main pathways that have steered a large share of initiatives in three Central American countries: Honduras, El Salvador, and Nicaragua. Pathways refer to the development of approaches to rural development, water resources management, and biodiversity conservation, focusing on how they include multiple dimensions and multiple scales. It also presents an analytical framework with three core dimensions—biophysical-ecosystem, socioeconomic, and political-institutional—along with the different scales that influence and condition initiatives concerning rural-territorial development, water resources management, and biodiversity conservation.

The paper includes a concise, chronological review of experiences since the 1970s, informed by the three pathways, along with a synopsis of each country's current institutional framework. Some of the lessons learned about managing the complexity of water and land are discussed in light of these initiatives, for the purpose of drawing useful lessons for initiatives that are innovative, have an impact, and are at significant scales.

Following this, the paper presents an initial set of criteria to guide public and private actions and initiatives. The complexity of rural contexts in Central America includes a growing variety of actors, strategies, and projects, from the renewed importance of family farming to aggressive efforts to change land use—expansion of cattle ranching and agro-industrial crops, along with extractive industries and infrastructure. These efforts are accelerating degradation of natural resources, exacerbating vulnerability to climate variability and change, and unleashing new conflicts over the use and control of resources. Thus, Central America is facing an urgent need for approaches that take up the challenges of management and governance at significant scales in fragile institutional contexts such as those in the region.

The Challenge of Rainfed Agriculture in Central America

CHAPTER ONE

Central America is one of the most vulnerable regions to climate variability and change, which are producing considerable impact¹ that is affecting, in particular, what is known as the Central American Dry Corridor (CADC).²

Although Central America's economies have diversified by developing industry and services, agriculture continues to be an important sector for the region. Family farming has come to play a key role, not only in food provision, but also in job creation and income generation.³ According to FAO estimates, as much as 70% of the food in Central America comes from family farms, and this figure could be as high as 80% when it comes to the two main staple grains in the regional diet: corn and beans (FAO, 2012). Family farming accounts for at least 60% of those employed in the sector and 50% of the agriculture value added (agriculture GDP) in the region as a whole (Baumeister, 2011). Family farming is carried out in a framework of agrarian structures where land ownership is very concentrated, despite agrarian reforms in Honduras, El Salvador, and Nicaragua. Starting in 1990, land ownership was reconcentrated to expand the sugarcane and oil palm crops and ranching, especially in Nicaragua (Baumeister, 2013).

-
1. In addition to evaluating economic losses from specific extreme events such as hurricanes and droughts in Central America, ECLAC has also estimated the economic impact of climate change in coming decades on critical sectors such as agriculture, water, and jobs (CEPAL, 2010; CEPAL, 2012; CEPAL, 2014).
 2. Although descriptions of the geographic area encompassing the CADC differ, they all locate the most critical areas for drought along the Pacific coasts of Guatemala, Nicaragua, El Salvador, and southern Honduras. Descriptions by OXFAM and ECADERT also include the region of Guanacaste in Costa Rica and Panama's so-called Dry Arc (Panamá, Coclé, and Los Santos provinces, and Emberá-Wounaan Comarca). It has been estimated that 30% of Central America's 53 million hectares are in the CADC and that 57% of these are facing severe and high drought conditions (FAO-ACH, 2012).
 3. According to FAO, "Family farming includes all family-based agricultural activities, and it is linked to several areas of rural development. Family farming is a means of organizing agricultural, forestry, fisheries, pastoral, and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's" (FAO, 2014).



Despite the importance and extent of family farming, different manifestations of climate change are jeopardizing the region's food security and agricultural sustainability. Medium and long range climate models predict an increase in average temperatures, lower levels of precipitation, greater evapotranspiration, and a prolonged dry season and mid-year drought. These changes could result in a drop in corn yields of 30% or more in some countries in the region, due to a lack of soil moisture. Likewise, bean yields will decline due to an increase in night-time temperatures (Eitzinger et al., 2012). The predicted impacts on these two crops will undoubtedly compromise the economy of rural families and food availability in Central America.

Climate-change-related problems are accelerating and worsening environmental degradation, inherited from agricultural models based on the green revolution and on exploitation of critical resources such as water. This is also reinforcing historical patterns of exclusion of the rural population, all of which is contributing to further complicating the region's existing vulnerability and historic inequality. This poses an enormous challenge: the urgent and large-scale transformation of agricultural systems to a scale large enough to ensure provision of ecosystem services that are key to the resilience and sustainability of agriculture, the main livelihood of millions of the region's families.

Within this context, the search for approaches and strategies that deal with climate change challenges (adaptation, mitigation), as well as environmental management and development frameworks, is particularly relevant.

Experiences in working at different scales in Central America, presented below, have produced lessons to guide scaling-up based on a green-water approach. These lessons highlight three key elements: i) the definition of new scales of intervention, going beyond traditional approaches focused on individual farms; ii) the inclusion of three dimensions that map out the context (biophysical-ecosystem, socioeconomic, and political-institutional dimensions); and iii) the simultaneous combination of different levels (technical, operational, and strategic). To move forward, it is necessary to understand the “green water” approach, its scope, and main components, as well as the implications of adopting this approach on rainfed agriculture objectives and practices in the region.

Lessons have been drawn from a variety of past actions in Central America. The sociopolitical context has involved several processes that have had a decisive influence on agendas and that largely explain the current institutional configuration, particularly in the agricultural sector. Therefore, we briefly discuss the development of approaches used in the region, including emerging approaches intended to yield multiple benefits.

Social and Political Context

To better understand how Central America is dealing with these major challenges, it is important to know how it has dealt with these problems in the past. This requires understanding sociopolitical and environmental developments over recent decades. The end of the 1980s marked the beginning of a time of change, which would last throughout the following decade. Three distinct processes during this time have had a decisive influence over the conformation of the current institutional framework: i) the stage of post-civil-war peacemaking; ii) development of the environmental agenda in public policies; and iii) neo-liberal and structural adjustment reforms.

In the first half of the 1990s, armed conflicts that had been plaguing several Central American countries since the 1970s and 80s came to an end, making way for new opportunities for social and political participation. Peacemaking processes coincided with decentralization policies, the emergence of new civil society organizing efforts, and a focus on local development efforts. In this context, major development planning processes emerged with new local-level leadership, which have developed to a larger scale, with approaches ranging from micro-watersheds and watersheds to micro-regions and consortia of municipalities, among others.

Regarding development of the environmental agenda in the region, during the 1970s, new insights emerged on the links between development and natural resources management and between poverty and biodiversity conservation. These conceptual frame-

works formed the basis for the “sustainable development agenda.” Even though national governments in Central America were championing natural resources conservation projects—during the 1960s and 1970s—sociopolitical instability had the effect of delaying the advent of sustainable development in the region as part of the peacemaking and reconstruction agenda. Thus, it was not until the mid-1990s when new public institutions were created to be responsible for environmental issues, focusing on contamination and on creation of protected natural areas systems. While the issue of climate change was visible, it was perceived as something off in the future and primarily related to commitments and agreements reached at international negotiations. However, Hurricane Mitch (1998) became a turning point. It facilitated introducing new elements into the approach to the environmental agenda, including risk management, reducing vulnerability, and strengthening local livelihoods.

While new environmental institutions were being created in Central America, the State’s responsibilities and capacities were paradoxically being cut back in sectors related to natural resources management as part of structural adjustment processes that had begun in the late 1980s. During this period, all Central American countries took loans from the Inter-American Development Bank (IDB) and the World Bank (WB) to finance institutional reforms. This had a profound effect on government ministries and other public agencies dealing with the agricultural sector, resulting—for example—in considerable downsizing of extension and credit systems (Rosa and Peña, 1995),⁴ along with a reduction in public spending and privatization of previously State-run businesses and services (Baumeister, 2015).

During this same time, major reforms were being instituted in input, output, and land markets. The main reforms included: i) free trade policies and overall expansion of the market’s role in economies; ii) a reduced role and presence of the State, through privatization of its assets and functions; iii) restructuring of agricultural sector agencies, through budget and staff cuts and by weakening extension and research systems; and iv) targeting of public services to primarily benefit lower income groups (Fuentes, 1993).

Although substantial improvements and new development scenarios were expected from implementation of these reforms, the reality is that Central America is currently facing the challenges of climate change without having solved the problems of poverty and exclusion, particularly critical in rural areas.

4. The backing and funding of these reform processes represented a change in direction in areas supported by credit from multilateral banks. During the 1980s, IDB and WB loans were primarily aimed at irrigation initiatives and agricultural credit programs (Rosa and Peña, 1995).

Institutional Changes in the Agrarian Sector

In the 1990s, Central America began a process of trade liberalization, accompanied by agricultural reform or “sector adjustment” policies and strategies, involving liberalization of agricultural input and output markets and land markets. This entailed institutional reforms in extension services, agricultural credit, property records, and even land tenure systems, including privatization of some service areas. In El Salvador, CENTA (National Center for Agricultural and Forestry Technology) cut a thousand jobs (Fuentes, 1993) and privatized the National Coffee Institute, its research arm, and services to the coffee-growing sector. Honduras outsourced extension services, which gave a boost to private providers (GWI-CRS, 2015).

With the weakening of extension systems, special programs have been created, typically coordinated by high-ranking authorities (e.g., the President’s office), but their implementation appears disconnected from the sector’s public institutions. This became a problem, by producing “their non-institutionalization, a risk of politicization, and weakening of oversight bodies” (PESA, 2011). Another result of the reforms was a reduction in public monies allocated to research, which has resulted in debilitating public agricultural research centers.⁵ Public stockpiling and supply systems were also dismantled and price controls removed, among other things.

Agricultural sector reforms also included privatization of public research entities, and the private sector took over the lead in research of the main agricultural export areas: coffee, bananas, and sugarcane (Stads, et al., 2008). This happened with Guatemala’s National Coffee Association (ANACAFE) and Sugarcane Research and Training Center (CENGICANÑA); the Salvadoran Coffee Research Foundation (PROCAFE); and the Honduran Agricultural Research Foundation (FHIA).

Financial reforms in the region’s countries also affected the agricultural sector. Under schemes to reduce State participation in financial intermediation, countries promoted liberalization and privatization processes that oriented lending to sectors such as trade, services, and consumption. Resources available from development banks were insufficient to meet the needs for agricultural financing. Wattel and Sanders (1997) pointed to dramatic changes in the composition of the credit portfolio: a reduction in public sector lending, increased lending to the private sector, and a major decline in lending to the agricultural sector as a portion of total credit allocations.

5. Por ejemplo, la Dirección de Ciencia y Tecnología Agropecuaria de Honduras emprende actividades de investigación basadas en proyectos, pero no cuenta con un programa integral de investigación (Stads, et al., 2008).



Relaunching the Agricultural and Rural Development Agenda

Throughout the 1990s, the “sustainable development agenda” influenced NGOs and social movements, as well as public initiatives for poverty alleviation and biodiversity conservation. However, a dual, disconnected institutional sector grew up. The environmental area emphasized forest and ecosystem management under protected area schemes, which excluded agriculture, in the process of being redefined institutionally. It was precisely this dichotomy that was the prelude to actions during the first decade of the new millennium.

During the 2000s, especially following the international crisis of 2008, social movements, development agencies, and national governments added concepts such as food security and sovereignty to their agendas and interventions. The agriculture and rural development agenda evolved rapidly, providing a clearer picture of the links between agriculture and climate change. At present, there is a pressing need to transform agricultural systems around resilience, securing food production, as well as ensuring the provision of ecosystem services for climate change adaptation and mitigation. This concept is recognized in the report submitted by the Special Rapporteur on the right to food (during the 25th session of the United Nations Human Rights Council), which raises the need for a new paradigm not based on productivity

but rather on well-being, resilience, and sustainability to support the full realization of this right (De Schutter, 2014).

A range of interests and discourses exists in rural development, where there is a convergence of small and large agricultural landholdings, farmer and land movements, conservation actors, and renewed and voracious accumulation strategies that are disputing control over natural and territorial resources, among others. From different perspectives, people are seeking to address historical dynamics of environmental degradation (such as deforestation and over-exploitation of the land); new dynamics, linked to settlement patterns and consumption-production (contamination from sewage, solid waste, etc.); and the degradation of rural livelihoods (as a result of inappropriate agricultural practices, and, increasingly, due to exploitation and contamination of natural resources). All this, together in a context with migration patterns that are no longer only from rural to urban areas, but involve transnational migration and the ensuing influx of remittances, which have become one of the main livelihood strategies in rural areas in several Central American countries and which are having enormous implications at the local-territorial level.



Links among agriculture, development, and climate change are posing a more urgent need to transform agricultural systems, to make them more resilient, more able to adapt to climate change, and reduce negative downstream impact in watersheds.

The Road Toward Landscape in Central America: Approaches and Pathways

CHAPTER TWO

Following the global crisis in 2008, there was renewed interest in rebuilding institutional capacity for governments to be able to respond to the traditional problems of poverty and exclusion in the rural population. In Central America, this was happening in a new context characterized by high vulnerability to the impact of climate change, but also by persistent migration and rural poverty. The state of knowledge reflects learning processes along three main pathways: rural development, water resources management, and biodiversity conservation.

These pathways show a sort of convergence in their desire to encompass multiple dimensions and scales to reach their goals. Of particular importance are the most recent approaches related to landscape governance and the strategic role that the green water approach is assuming for rainfed agriculture. This section includes an analytical framework that will serve as the basis for a discussion of various achievements and lessons from a variety of initiatives that have been promoted in Central America and have then sought to have an impact on a significant scale.

Rural Development Approaches

Rural development approaches, policies, and programs have developed from a perspective centered on agriculture and on building infrastructure to putting a greater emphasis on local capacity building, strengthening livelihoods, sustainability of initiatives, and the relationship of communities to the environment. Likewise, there has been a shift from an exclusive focus on economic and productive dimensions toward integrating territorial and governance perspectives.

In the Central American region, rural development became the target of public policies in the 1940s and 1950s, when it was decided to modernize the peasantry and rural areas. The region's governments were aided by agencies that included the Organization of American States (OAS) and the Inter-American Institute for Cooperation on Agriculture (IICA) to promote an integrated rural development (IRD) approach, which would include multiple factors involved in rural development: economic, social, education, institutional, and infrastructure factors, among others. As a result of these policies, governmental IRD programs and projects were instituted, geared toward bringing agricultural and non-agricultural services to rural areas: irrigation systems, roads, agricultural technical education, extension services, and credit, among others. Several countries initiated agrarian reforms as part of the modernization of traditional agrarian structures. However, these interventions were characterized by being centrally designed, which, together with the authoritarian nature of the region's political regimes, limited opportunities for rural dwellers to participate (FAO, 2004; IICA, 1978). They also tended to be one-size-fits-all proposals for widely varying social, cultural, and environmental conditions.

Like other development approaches of that time, IRD was aimed at achieving production goals, and therefore did not include the prospects of sustainability in the provision of ecosystem services. Armed conflicts, fiscal constraints, and downsizing of the State apparatus cut short IRD programs and projects by the 1980s and 1990s.

The sustainable rural development approach emerged from thinking about the importance of sustainable livelihoods, and became the new framework for designing projects that reached rural areas during the 1990s (Chambers, 1986; Scoones, 1998). The influence of this approach can primarily be seen in the discourse and actions promoted by NGOs and rural organizations. However, their impact on State agricultural and rural development policies and strategies was limited by the rise of the Washington Consensus, which favored a greater role for market dynamics in determining the direction and guidelines for economic growth.

Recently, a territorial approach to rural development has become more prominent, in a context characterized by political democratization, decentralization and reform of the State, a rise in the rural non-farm economy, and the linkage of rural territories to the dynamics of globalization, among other factors. In this context, emerging actors and institutions are seeking to have an impact on policy decisions and public spending and on the development dynamics in rural areas. In 2003, IICA noted that despite the volume of resources allocated and efforts made in the past few decades with regard to development and rural poverty by governments, donors, and civil society, the results were shaky and indicators showed minimal progress as a reflection of an impact crisis (Sepúlveda et al., 2003). In this context, IICA defined reduction of rural poverty and of food insecurity as

its main objectives,⁶ framed in a territorial rural development proposal with distinctive elements that also proposed to contribute to social and territorial cohesion.⁷ Further developments and their coordination with regional processes in Central America have led to new initiatives, such as the Central American Strategy for Rural Territorial Development (ECADERT), which in 2010, was adopted by the Summit of Heads of State and of Government of the Central American Integration System (SICA). ECADERT seeks to create opportunities and build capacity in the rural population to improve quality of life and build a solid social institutional framework that will promote and facilitate supportive, inclusive, and sustainable development.⁸

From a different perspective, in 2004, the Latin American Center for Rural Development (RIMISP) launched its proposal around the concept of rural territorial development (RTD), contributing to highlighting the role and importance of the territorial realm. Schejtman and Berdegué (2004) define RTD as a process for productive and institutional transformation of a determined rural space, for the purpose of reducing rural poverty. Schejtman and Berdegué posit that RTD rests on two main pillars—productive transformation and institutional development—and they also propose eight criteria for putting RTD programs into operation.⁹ Ten years later, as a result of the Rural Territorial Dynam-

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6. From the Summit of Heads of State and Government in Quebec and from the Ministerial Meeting on Agriculture and Rural Life in the Dominican Republic (both in 2001) mandates emerged for IICA to propose new approaches to work that would seek simultaneously to improve agriculture and rural life, in the context of the new information and knowledge economy, globalization, and integration (Sepúlveda et al., 2003).
 7. The distinctive elements of the territorial approach are: i) reconstruction of the concept of the rural realm; ii) shift from an agricultural economy to a territorial economy; iii) recovery of the territorial and local-rural economy in growth strategies; iv) environmental management and development of environmental services markets; v) shift from private competitiveness to territorial competitiveness; vi) land use planning as a complement to decentralization; vii) cooperation and shared responsibility, as complements to participation; viii) shift from a sector policy to shared public policies in the rural area; and ix) knowledge management for rural development (Sepúlveda et al., 2003).
 8. The Central American and Caribbean Network of Territorial Action Groups and the Regional Platform for Technical Support to Rural Territorial Development (PRAT) were formed in the framework of ECADERT. PRAT is made up of AECID, the secretariat of the Central American Agricultural Council, IICA, RUTA, FAO, and CATIE.
 9. Criterion 1: Productive transformation and institutional development should be addressed simultaneously in RTD programs. Criterion 2: RTD programs should operate with an expanded concept of the rural realm. Criterion 3: For RTD programs, the territory is a space with identity and with a socially agreed development project. Criterion 4: RTD programs should explicitly consider heterogeneity among territories. Criterion 5: RTD programs should convene the diversity of agents in the territory. Criterion 6: RTD programs should consider different ways out of poverty. Criterion 7: RTD programs require complex institutional architecture. Criterion 8: RTD program should be developed and implemented for the medium and long term.

“ The potential of more recent rural development approaches has been constrained by the limited capacities and territorial presence of institutions, reduced investment in services, difficulties in overcoming sectoral fragmentation, and the need for multi-scale mechanisms to successfully plan and manage at the territorial level.

ics Program, implemented from 2007 to 2012, RIMISP presented an emerging conceptual framework focused on the relationships between human agency and institutional change, as well as relationships among factors that condition the territory, including those of an extra-territorial character (Berdegué, Bebbington, and Escobal; 2014). This conceptual framework considers that the territory and territorial dynamics are not the same: that territorial institutions are not perfectly synergistic among themselves and that there are even tensions and contradictions among them. Hence, it is considered that institutional change is territorially differentiated as a result of human agency (individual, collective, and coalitions), which varies throughout the territory, in ways that reflect and conduct the spatially unequal nature of links between specific conditions of territories and extra-territorial economic, social, and political processes (Berdegué, Bebbington, and Escobal; 2014).

Rural development with a territorial approach fosters a greater role for different local-territorial actors in setting development priorities. Ideally, they—in the broadest sense—should coordinate development plans and strategies that integrate strategic projects from a systemic perspective. A key factor for the success of the proposals consists of harnessing the territory’s potential, and based on this, to promote agricultural and non-agricultural economic dynamics. RTD proposals explicitly revive the concept of governance, understood as the set of conditions that facilitate alignment of the different interests involved in a territory. This serves to promote forms and expressions of local organization with a territorial perspective. However, in their expansiveness, proposals with a territorial approach run the risk of ignoring the central role that the sustainable livelihoods approach gives to the rural poor and to the sustainable use of natural resources. In fact, natural resources management and ecosystem services provision are secondary issues in territorial rural development approaches, where environmental aspects tend to be neglected, with primacy given to the economic-productive dimension. The potential of more recent rural development approaches has been constrained by the limited capacities of State institutions and their weak presence in local areas, reduced investments in agricultural and non-agricultural services, as well as the difficulties in overcoming sectoral fragmentation and the need for multi-scale mechanisms and institutional frameworks to successfully plan and manage at the territorial level.

Approaches to Water Resources Management

In Central America, water management as an object of public policy arose out of planning for the first infrastructure projects for irrigation and hydropower generation in the 1950s and 1960s. Since then, approaches have evolved to include participation and governance as central aspects, as in the case of integrated water resources management. For decades, the region has been concerned about appropriate water management, which has shifted from an approach dominated by experts “from above” to a variety of initiatives. The watershed appears as the area of intervention, linking both the territory’s social actors and public sector agencies in its management. Other concerns have also been included, such as natural resources management and changes in production practices that threaten water availability.

Water management in Latin American countries in the early decades of the 20th century tended to be the responsibility of local entities (CEPAL, 1994). Starting in the 1940s, large public investment projects began to foster development of water resources for agriculture and hydropower generation. These types of works promised to link the development of water resources to broader regional or watershed development goals, adopting the concept of the watershed as the planning unit for public investment. The ambitious goals of these projects were inspired by the model of the Tennessee Valley Authority (TVA), created in 1933 in the United States,¹⁰ which was the blueprint for the executive commissions, corporations, or authorities set up in countries such as Mexico, Colombia, Peru, and Brazil (ibid.).

In Central America, this model inspired initiatives aimed at hydroelectric exploitation and crop irrigation, among them the Lempa River Executive Hydroelectric Commission (CEL), created in El Salvador in 1945. However, unlike the TVA, these initiatives did not venture into integrated management of natural watershed resources. During the 1960s, major investments were made in drinking water supply systems and sewerage in the region, including construction of rural water supply systems. These investments were funded by agencies such as the IDB and were the precursor to watershed management projects that started appearing in the 1970s.

The concept of watershed management originated in U.S. forest hydrology science and was initially understood as the administration of “a watershed’s natural resources for the purpose of controlling the discharge of water in quality, quantity, and time of occurrence”

10. The TVA was an initiative to decentralize functions of the United States federal government. It undertook works for flood control, hydroelectric production, and programs aimed at reforestation and increasing yields through an agricultural extension system (Melville, 1997). The TVA had a major influence in Latin America and the rest of the world from the 1940s to the 1960s.

(CATIE, 1986; CEPAL, 1994). Until the 1960s, the most important consideration in watershed management was water (CEPAL, 1994; CATIE, 1986), especially in infrastructure projects such as hydroelectric dams. However, in the 1970s, the emphasis changed. In sync with environmentalist concerns of the time, watershed management came to be understood as the “conservation and/or improvement of a watershed’s environmental quality and ecological systems” (CATIE, 1986). Thus, it was recognized that degradation affected waterways as well as fauna, flora, and soil. El Salvador and Honduras were the first countries in Central America to adopt watershed management programs aimed at the protection and conservation of multiple resources.¹¹

The forestry origin of watershed management can be seen in planning proposals based on studies of land capacity or potential, with the idea that certain areas should be exclusively used for forests, seeking to limit the expansion of agricultural systems, and to foster reforestation in degraded watersheds. During the 1970s, the region began to recognize that watershed management should consider practices used in agricultural systems. A CATIE (1976) publication identified a number of human activities related to degradation of the land: burning, intensive grazing, and farming in inappropriate areas. The report added that these activities are “associated with both land tenure and distribution systems and with ineffective methods of exploitation such as leasing and sharecropping” (Mojica, 1976). However, the agricultural frontier continued to advance in Central American countries and reforestation of large swaths of land proved unworkable. Thus, in the 1990s, the watershed approach in Central America had to take in account hillside farming systems, and conservation options no longer were limited only to reforestation projects. Moreover, proposals aimed at increasing yields began to converge around watershed management, aimed at increasing yields from traditional agriculture. One of the main tools that promised to achieve both objectives—protect watersheds and improve yields—was physical land and water conservation works, together with practices such as stubble management and alternatives to burning.¹² This perspective permeated many public and private programs and projects (through NGOs) throughout the region.

More recently, these initiatives have been influenced by frameworks such as sustainable livelihoods, linking promotion of land and water conservation works to the construction

11. Throughout the 1970s, El Salvador had a Forestry Development and Watershed Management Program, under the Ministry of Agriculture and Livestock. This program had a wide-reaching agenda that included reforestation, physical control and stabilization works, agricultural planning, and demarcation of natural parks (FAO, 1980). Following Hurricane Fifi in 1974, Honduras created a Watershed Planning Department in the Honduran Forestry Development Corporation (CATIE, 1978).

12. These interventions are aimed at regulating surface runoff, most often by building “live” barriers (with plants and trees) and “dead” barriers (stone walls, etc.), drainage ditches, terraces, etc., among other options.

of local drinking water systems and community mobilization to protect these systems. Throughout these changes, from torrent control to the introduction of soil and water conservation practices in agricultural production systems, the watershed as the original scale of work became blurred. At present, although many initiatives adopt a watershed management approach, in practice they tend to be implemented at a smaller scale; in general, they focus on the farm, water systems, or even the municipal and municipal consortia level. Operational or administrative reasons or resource constraints justify concentrating work at these levels. However, in the best of cases, the result is a collection of well-managed parcels, but lacking the prior synergies or societal work necessary to change conditions in the watershed or micro-watershed. Another reason for limited results is that there tends to be a conspicuous lack of participation by key stakeholders in the watershed (or micro-watershed) in these processes, given that incentives and/or opportunities for participation are designed in terms of parcels/farms and of the producer, or in the best of cases, of a very narrow description of possible participants.

Taking into account multisectoral perspectives, the integrated water resources management (IWRM) approach emerged, aimed at harmonization of the different uses of water: agricultural, residential, industrial, etc. One of the characteristics of this approach is precisely the recognition of the multiple uses of water and the interdependence among these, while promoting intersectoral relations and strengthening levels of coordination and decision-making among different public and private user groups (GWP, 2005). In this way, IWRM incorporates social concerns and power dynamics into integrated water management, thus trying to do better than projects designed around a very limited beneficiary profile that leave out other stakeholders who have an impact in the watershed.

IWRM initiatives concentrate on three strategic objectives: efficiency, equity, and environmental sustainability. (SSWM, n.d.). The pursuit of efficiency responds to the limitations inherent in the resource and to the danger that uncoordinated practices and uses could lead to conflicts that compromise its availability (GWP, 2005). In turn, equity means seeking to ensure access by different groups of users, while sustainability is aimed at protecting the resource and its relationship to others within ecosystems. IWRM responds to four basic principles, defined at the International Conference on Water and the Environment (Dublin, 1992),¹³ which acknowledge the vulnerability of the resource, the importance of broad

13. The four Dublin principles: 1. Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment. 2. Water development and management should be based on a participatory approach, involving users, planners, and policymakers at all levels. 3. Women play a central part in the provision, management, and safeguarding of water. 4. Water has an economic value in all its competing uses and should be recognized as an economic good as well as a social good. (GWP, 2005).

participation in decision-making, including the central role of women in water resources management, and its economic value (*idem*).

The watershed represents an intermediate scale between the national level and community, municipality, and municipal consortia levels. In practice, attempts to institutionalize entities such as watershed boards or authorities have not prospered. They can become platforms that challenge conventional decision-making processes at times when water-related problems are increasingly complex, and not amenable only to neutral, rational, or scientific solutions (Molle, 2009). In addition, outside of democratically elected officials, delegation of decision-making authority to non-elected parties entails other political issues related to legitimacy (Cohen and Davidson, 2011). In Central America, watershed authorities have not been encouraged; however, coordination entities have been. Organized as agencies or committees that lack authority or jurisdiction, they seek to link up with duly-elected authorities, such as municipal councils and the municipal associations or consortia to which they belong.

In Central America, the IWRM approach has been a very influential framework, particularly during the past decade, in the bodies belonging to the Central American Integration System (SICA) and in each of the countries. Regionally, policy instruments exist, such as the Central American Strategy for Integrated Water Resources Management (ECAGIRH), in force since 2009, which lays out strategic guidelines for ten years. This is supplemented by the Central American Plan for Integrated Water Resources Management (PACAGIRH)¹⁴ and the respective national plans. IWRM has also been included as one of the main lines in the Regional Environmental Strategy 2015-2020 (CCAD, 2014).

At the country level, IWRM initiatives have sought to have an impact on local, municipal, or national entities that supply drinking water and sanitation services. For example, in the region, there are many drinking water systems run by community organizations, often known as water boards or committees. Entities that have adopted the IWRM approach carry out projects for these organizations to expand their focus and go beyond the provision of water services.¹⁵

14. The first PACAGIRH was adopted during the 20th Summit of Central American Presidents, in 1999 (CCAD, 2010).

15. The following publication is a good resource to learn about experiences with initiatives in Central America that have adopted an IWRM approach: "Gestión Integral del Recurso Hídrico: Experiencias compartidas en Costa Rica, El Salvador, Honduras, Guatemala y Nicaragua," by Alianza por el Agua.

Furthermore, countries such as France and Spain have influenced Central America to create IWRM-oriented watershed agencies (CEPAL, 2003). These agencies work under many constraints because they have emerged at the initiative of civil society and only in recent years have countries such as Honduras and Nicaragua passed laws legalizing their existence. Even when they have legal standing and clearly established powers over water issues, existing watershed agencies do not have sufficient support from water governing bodies at the national level. In this regard, it can be said that watershed agencies, but not watershed authorities, have been created.

Finally, watershed management and IWRM approaches have focused on what is now called blue water; i.e., available ground or surface water. However, there is growing recognition around the world of the importance of green water—water from rain and soil moisture—although in the region this approach is more recent (CRS, 2014). The approach that most closely grasps the importance of green water has been farm-scale watershed management, stressing the importance of soil and water conservation practices and works, which seek to keep moisture in the soil as a critical element in crop production and productivity, but also for improving conditions for infiltration and to prevent runoff.

Approaches to Biodiversity Conservation

Approaches to biodiversity conservation have evolved since the days when they were only concerned with the biophysical dynamics of ecosystems. At present, these approaches take into account social dynamics and power relations among the different actors that influence conservation conditions. The first initiatives to create national parks and protected areas were based on concepts that considered exploitation of plants and animals to be incompatible with conservation. Consequently, they promoted the creation of national parks without people, and in this way gave priority to ecosystem services of interest to city dwellers (e.g., recreation and water) and to the scientific community (e.g., protection of biodiversity, genetic stock, etc.). The State played a leading role, as the only agent with the initiative and capacity to designate large areas as protected areas, which did not contemplate the participation of the population that was living in the vicinity, and sometimes within the limits that had been recognized. Ultimately, early approaches to conservation did not consider inequities in power or the poverty of the people living in areas declared to be protected (Cartagena, 2012; Gómez, 2007; Wells and Brandon, 1992).

In the 1970s and 80s, the conservationist community began to appreciate the idea that conservation efforts are not viable if they do not simultaneously address problems of poverty and development (Phillips, 2003; UICN, 1980). In this context, the sustainable livelihoods approach was employed in the design of integrated conservation and development

“ The approach that most closely grasps the importance of green water stresses the importance of soil and water conservation practices and works, which seek to keep moisture in the soil, improve conditions for infiltration, and prevent runoff, to improve crop productivity in a context of climate variability.

projects, based on the determination of a range of benefits supplied by ecosystems to the local population (Hughes and Flintan, 2001; Chambers, 1986). Thus, it was recognized that protected areas could provide ecosystem services to local people, launching a new narrative in which protected areas were presented as the solution to various problems associated with degradation, such as siltation and water shortages, among others. In addition, new ways emerged to conceive of protected areas; for example, biosphere reserves promoted by UNESCO, where local populations are not excluded from the areas to be preserved. From this perspective, alliances have been promoted with different actors involved in a specific area of interest, including the local population, in this way furthering conservation and local development objectives. The socio-political context favored co-management agreements, in which the State delegated management of protected areas to other actors, although this often ended up favoring urban NGOs over local or community organizations.

Current conservation initiatives tend to value the strengthening and sustainability of livelihoods, promote co-management models for protected areas, and give greater priority to incentives than to coercive measures (IUCN/Ecoagriculture Partners, 2008; Ellis and Biggs 2001; Hughes and Flintan, 2001). In general, initiatives that have sought to integrate conservation and development objectives have been concerned with addressing the dynamics of locally-caused degradation, caring for the protected areas themselves and the neighboring communities. However, dynamics linked to supralocal or supranational trends, such as large investment projects, have become major challenges that often lack effective strategies.

Today, it is recognized that conservation efforts should be approached taking into account complexity at a scale larger than that comprising the protected area and its buffer zone. By the late 1990s, the World Wildlife Fund (WWF) and the International Union for Conservation of Nature (IUCN) began to adopt a landscape approach in their strategies and interventions aimed at promoting conservation. In 2002, the term 'landscape' began to

“ It is recognized that conservation efforts should be approached taking into account complexity at a scale larger than that comprising the protected area and its buffer zone. The landscape scale incorporates governance mechanisms to harmonize the distinct dynamics and interests present in the landscape.

appear in WWF literature, while IUCN was developing an ecosystem-based approach, though it tends to use the terms 'ecosystems' and 'landscape' as synonyms, thus recognizing the diverse and multifunctional nature of landscapes (WWF, 2002; Shepherd, 2008). The conservationist community has produced important thinking around the landscape scale (Harvey and Sáenz, 2008), incorporating governance mechanisms to harmonize the distinct dynamics and interests present in the landscape. In this way, under the landscape approach, wide-scale projects and initiatives have been undertaken, while seeking to harmonize the different dynamics and interests through promotion and strengthening of governance (UICN/Ecoagriculture Partners, 2008). In Latin America, this is a recent approach in conservation projects, although there are examples of its implementation, such as the Conservation Mosaics project in Colombia (Solarte et al., 2014).

“Links among agriculture, development, and climate change are posing a more urgent need to transform agricultural systems, to make them more resilient, more able to adapt to climate change, and reduce negative downstream impact in watersheds.

Emerging Approaches for Dealing with Numerous Challenges and Numerous Actors

In recent years, we have seen proposals appear that reflect a remarkable convergence of approaches coming from rural development, water resources management, and conservation. This is motivated by the need to ensure a broad range of ecosystem services to benefit both rural residents and broader social groups, while at the same time addressing the dynamics of traditional environmental degradation and new threats such as climate change.¹⁶ As a result of a clearer understanding of the links among agriculture, development, and climate change, there is now more recognition of the urgent need to transform agricultural systems to make them more resilient, more able to adapt to climate change, and reduce negative downstream impact in watersheds. In this regard, the importance of agriculture is even more evident. If inappropriate practices and management can be transformed, the potential exists to positively contribute to these objectives at much greater scales than individual plots and farms. Landscape and green-water approaches are some examples of this renewed interest.

16. In 2001, Hughes and Flintan pointed to the almost complete convergence among livelihoods, integrated rural development, and conservation initiatives, known as integrated conservation and development projects, although the latter are located near protected natural areas.

Landscape

In the past decade, different focuses and approaches linked to natural resources management have converged around the concept of landscape, which in this context corresponds to a spatial scale where different kinds of ground cover are recognized that form a mosaic, a matrix of plots or patches (Odum and Sarmiento, 1998). The concept of landscape is useful for capturing and assessing the diversity of land uses, in which preserved and disturbed forests, different kinds of agriculture, pastures, and wetlands coexist together with human settlements and other types of use (Rosa et al., 2003). This mosaic provides many ecosystem services for the actors who shape the landscape, based on different interests (Wade, Gurr, and Wratten, 2008; Perfecto and Vandermeer, 2008). Landscape approaches are based on the recognition that certain ecosystem services do not depend solely on factors associated with a particular ecosystem or site—e.g., an agroecological plot—since ecosystem functions are influenced by a number of social and biological forces that operate at a greater scale (Salazar et al., 2005). Therefore, implementation of a landscape approach or framework means taking into account social and political elements that influence land use in a territory (Scherr and McNeely, 2006).

The term integrated landscape management was coined by Ecoagriculture Partners and is understood as “long-term collaboration among different groups of land managers and stakeholders to achieve the multiple objectives required from the landscape” (Ecoagriculture Partners, 2013). The purpose of integrated landscape management is to simultaneously meet several objectives: poverty reduction, sustainability of rural livelihoods, increases in agricultural production, mitigation of climate change, and biodiversity conservation, among others. At the heart of the approach is the concept of landscape, considered as a socio-ecological system composed of a variety of ecosystems that share common social characteristics and processes (ibid.).

At present, from different perspectives and approaches (rural development, water resources management, biodiversity conservation-restoration), the concept of landscape tends to be increasingly present in different initiatives, since in practice they are facing many challenges, attempting to include a wider variety of actors and also intending to encompass different land uses. The experience gained from various approaches includes the use of concepts such as ecosystem services, sustainable livelihoods, multi-functionality, governance, and collective action (Ostrom, 2010), which add more complexity than traditional challenges inherent in extension methodologies, adoption of practices, incentive systems, and community participation, among others. In general, these more recent concepts are addressed at large spatial scales (landscape, watershed, territory, etc.), based on the conviction that the desired outcomes cannot be obtained at the level of plots, farms,

“ The concept of landscape is useful for capturing and assessing the diversity of land uses, which provide many ecosystem services for the actors who shape the landscape, based on different interests.

or protected areas; but instead, through synergy among many actors that benefit from ecosystem services provided by a determined landscape. Thus, integrated landscape management is not limited to the idea of scaling up interventions; rather the desired objectives require the application of governance principles and methodologies to integrate the diversity of interests in the landscape (Kozar, 2014; Scherr, 2013; FAO, 2013; Tittonell, 2013; UICN/Ecoagriculture Partners, 2008; Buck et al., 2006).

Integrated landscape management requires coordination among the different actors that converge and interact in a given landscape. This coordination should be established with a long time horizon, which means going beyond short- and medium-term interventions such as projects to achieve multiple landscape-scale objectives. It is specifically based on this synergy when actors will be in the best position to ensure the multifunctionality of the landscape (ecosystem services in the broadest sense), while facing challenges and exploiting opportunities (Ecoagriculture Partners, 2013). This approach is particularly valuable in efforts to find alternatives that integrate climate change adaptation and mitigation goals into other development targets. In addition to changes in production practices at the local level, there is also a need for institutional arrangements and the design of public policies—including incentives and funding mechanisms—capable of having landscape-level impact (Harvey et al., 2013).

Green Water

The term green water refers to fresh water and moisture retained in the soil, which is available for use by plants and crops through transpiration and evaporation. Green water can lead to two distinct flows: it can evaporate into the atmosphere before being absorbed by plants, or it can be used by plants for growth, leading to transpiration flow (Falkenmark and Rockström, 2006a and 2006b). It is estimated to account for 90% of water from the hydrological cycle, although it is not fully exploited, because most efforts are concentrated on so-called blue water, which flows through rivers and lakes (CRS, 2014). In this approach, the soil takes on a key role as a water resource, and therefore, interventions aimed at its conservation are especially relevant (Barron, 2012).

The concept of green water was proposed in the late 1980s and was endorsed by FAO in the early 1990s (FAO, 1993). However, it was not until recently that green water flows

“ Green water refers to fresh water and moisture retained in the soil. Flows of green water are critical to rainfed agriculture, which relies exclusively on rainwater.

began to be seen as key elements in rainfed agriculture, which relies solely on rainwater. This type of agriculture, which depends entirely on the moisture retained by the soil, can benefit from management that prevents losses from evaporation (Falkenmark and Rockström, 2004). Advances in hydrological research have favored this type of approach, due to greater knowledge of the potential of green water (currently at less than 50% efficiency). Additionally, growing constraints on the expansion of the irrigated agricultural area in many contexts, as well as the shrinking size and pollution of major waterways, favor the approach (Falkenmark and Rockström, 2006a and 2006b).

Thinking based on the concept of green water goes back to the natural resources management that for decades has been addressed in watershed management, conservation agriculture, and even agroecology (Barron and Noel, 2008; Bossio and Geheb, 2008; FAO, 1993). In addition, the importance of green water to fostering a multifunctional perspective on agriculture has been stressed (FAO, 1999). Furthermore, this concept has implications for the scale at which interventions are designed and planned with regard to resource management in rainfed agriculture. Thus, it is being encouraged that green water management has to be done on a greater scale than a plot or individual farm; but within a scale in which people can still form physical ties to their landscapes and its management. This meso-level (meso-scale) corresponds to a range from 1 to 10,000 km², which coincides with micro-watersheds and sub-watersheds (Barron, 2012).

In Central America, the main cause of land degradation is inappropriate agricultural practices, and rainfed agriculture plays a major role in food production and food security. Approaches such as increasing the productivity of green water represent an opportunity to promote more sustainable production alternatives. As with other approaches – such as integrated landscape management – local participation is considered vital, along with the design of policies to strengthen programs.¹⁷

17. According to the Global Water Initiative (GWI), the pillars of the green water strategy for rainfed agriculture are: i) best agronomic and water harvesting practices; ii) effective extension models; iii) accessible and sustainable financial instruments; iv) expanded incentive framework; and v) landscape scale design and implementation (GWI, n.d.).

“ The landscape approach enables visualizing elements and relationships that other categories – such as territory, watershed, or municipal consortium – do not enable capturing.

An Initial Analytical Framework

With very few exceptions, the term ‘landscape’ still does not form part of the conceptual repertoire used in Central America. However, the approach is not incompatible with the variety of efforts and initiatives being implemented in the region. In fact, its possible use does not imply abandoning approaches focusing on watersheds, regions, territories, or municipal consortia. The landscape approach is not being proposed here as an alternative to replace other management perspectives. What we do suggest is to exploit the landscape approach as a lens that enables appreciating elements and relationships that other categories – such as territory, watershed, or municipal consortium—do not enable capturing.

With this perspective, this initial analytical framework uses elements of the landscape approach to guide the review and analysis of actions that have been implemented in Honduras, El Salvador, and Nicaragua, for the purpose of gleaning lessons that can contribute to responding to the initial question (How can changes in rainfed agriculture be scaled up, through green water management, to attain significant impact in a context of climate change?). To attempt to answer this question, we must clarify what is understood by scale up, landscape, and governance.

In its most basic sense, the term ‘scale up’ refers to how to increase the number of persons involved through projects and programs.¹⁸ For analytical purposes, scaling up is broken down into three different types: horizontal scaling up, associated with seeking expansion and the mass use of promoted practices, to reach more people and communities in the same sector or interest group; vertical scaling up, which seeks to influence public policy and institutional frameworks to foster the changes and transformations being sought, involving a variety of actors; and temporal scaling up, taking into account that the changes and transformations being promoted, such as soil remediation or adaptation to climate change, need to be sustained over time.

18. Interest in scaling up comes from concerns about the limited impact of projects in terms of farmers reached, poverty reduction, or influence on public policy (Gonsalves, 2001).

“Scaling up refers to how to reach a greater number of people. It is broken down into three different types: horizontal scaling up (expansion and mass use of practices); vertical scaling up (influencing policies and institutions); and temporal scaling up (sustained over time).

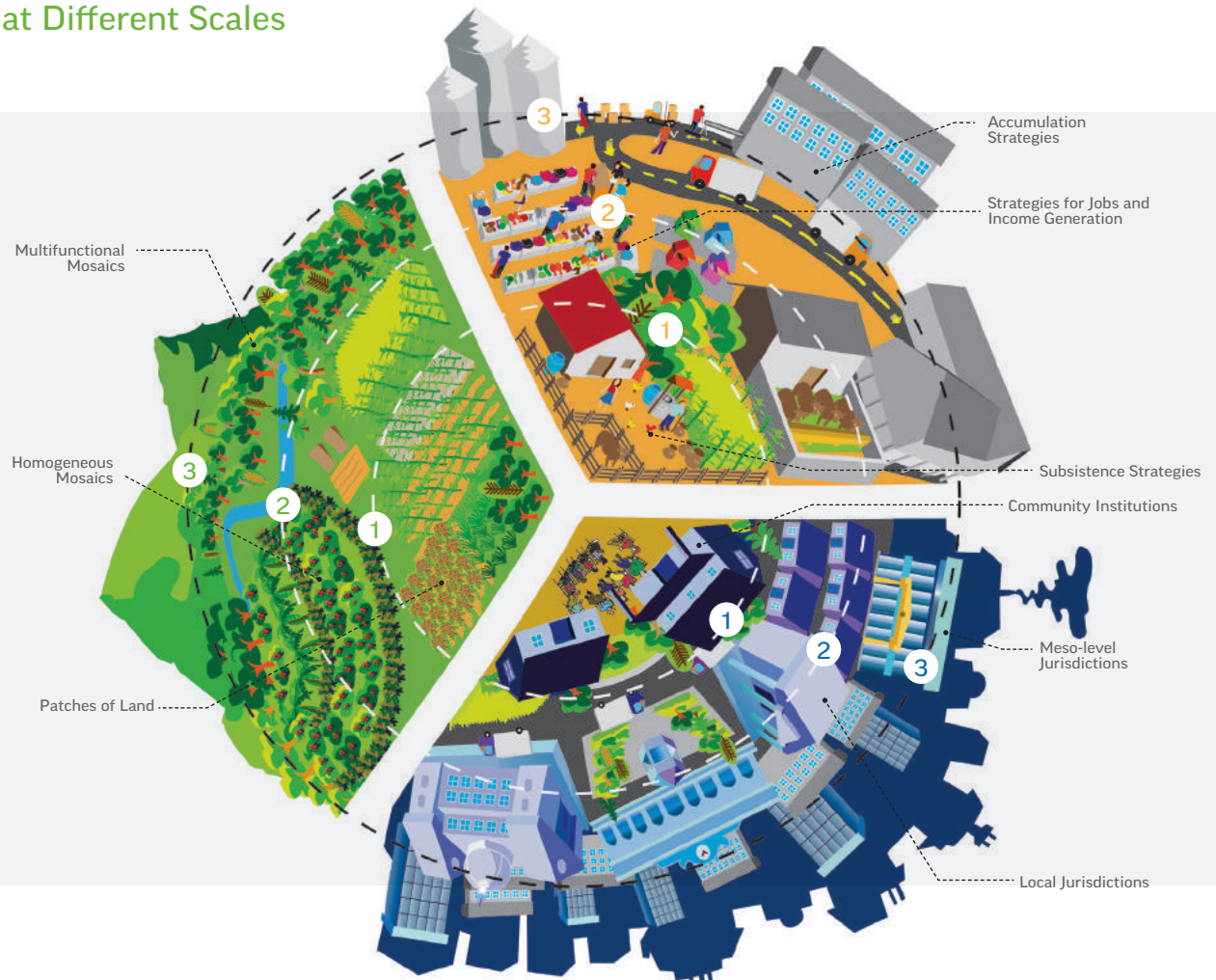
Landscape refers to a space whose geographical scope encompasses multifunctionality and heterogeneity (Torquebiau, 2015). Multifunctionality means that there are different land uses and different ecosystems in the landscape. Therefore, it has the potential to provide multiple ecosystem services (water supply, food, biodiversity, carbon sequestration, etc.). Heterogeneity refers to the variety of actors with different levels of power over and interests in the use and control of natural resources and ecosystem services.¹⁹ A landscape, by definition, is multifunctional and heterogeneous. Thus, use of a landscape approach requires paying attention to different elements and interconnections (ibid.) to ensure not only appropriate management, but also to promote the construction of governance systems that ensure sustainability.

Landscape governance refers to institutional arrangements, decision-making processes, policy instruments, and the underlying values that encompass landscape management (Kozar, 2014). Through the governance system, it is determined who is entitled to and who benefits from resources and when, and the means to enforce these rules (ibid.). Good governance is a critical factor in managing and reconciling different interests regarding use of and control over resources in multifunctional and heterogeneous landscapes. Attributes commonly associated with good governance include participation, representation, deliberation, accountability, autonomy, social justice, and multilayered or polycentric forms of organization (Lebel, et al., 2014).

In addition to the concepts of scaling up, landscape, and governance, there are at least three dimensions that are more or less involved in projects and initiatives, regardless of the approach used: biophysical-ecosystem, socioeconomic, and political-institutional (Figure 1). To the extent that initiatives attempt to encompass more and greater elements in the biophysical-ecosystem, socioeconomic, and political-institutional dimensions, the levels of complexity are also greater.

19. Torquebiau (2015) uses the term heterogeneity to refer to the structural diversity in landscape units instead of heterogeneity of actors.

Dimensions for Management at Different Scales



Biophysical-Ecosystem Dimension

1/ Patches of Land

Irrigation district
Farm-plot
Community forest

2/ Homogeneous Mosaics

Aquifer recharge zones
Biological corridors
Agricultural development zones

3/ Multifunctional Mosaics

Biosphere reserves
Eco-regions
Sub-watersheds and watersheds
Production development zone

Political-Institutional Dimension

1/ Community Institutions

Water Board
ADESCO (Community Development Association)

2/ Local Jurisdictions

Micro-watershed council
Municipal government
Inter-community coordinating groups

3/ Meso-level Jurisdictions

Municipal consortia-associations
Sub-watershed and watershed agencies
Territorial development councils

Socioeconomic Dimension

1/ Subsistence Strategies

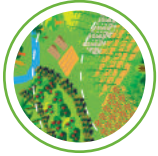
Small producers
Family farming

2/ Strategies for Jobs and Income Generation

Agricultural small and medium enterprises
Agricultural cooperatives

3/ Accumulation Strategies

Logistical platform
Agroindustries
Territorial competitiveness



BIOPHYSICAL-ECOSYSTEM DIMENSION

Rural or territorial development, watershed management, and biodiversity conservation initiatives have, from the outset, understood and emphasized different biophysical and ecosystem conditions, as well as processes that affect them. However, in general, they all define particular biophysical spaces (scales) for intervention. The spatial scales of initiatives can be located in a wide array ranging from plots, farms, individual patches of land, and micro-watersheds, to irrigation districts, biological corridors, production development zones, sub-watersheds and watersheds, eco-regions, and biosphere reserves. To the extent that initiatives cover larger biophysical spaces and ecosystem functions in a more comprehensive and all-encompassing way, they more closely approach attempts to manage multifunctional mosaics, understood as the various land uses that express efforts toward different goals (production, protection, conservation, and restoration).



SOCIOECONOMIC DIMENSION

There are two key considerations in this dimension: i) all the actors that implement their own strategies, reflecting thus their interests and levels of power; and ii) the economic dynamics that influence the viability of sustainable production systems, the transformation of natural resources management practices, and the development of inclusive production chains, among others. The socioeconomic dimension has three identifiable scales: one relative to subsistence strategies, such as small farm production and/or family farming; initiatives to promote social and productive activities for jobs and income generation (agricultural small and medium enterprises, agricultural production and services cooperatives, rural community tourism ventures, etc.); and more ambitious strategies motivated by the introduction of accumulation strategies, including those promoted by external and/or transnational actors (large expanses cultivated with sugarcane, extensive African palm plantations, coffee-growing areas, mining, infrastructure corridors, and logistical services, etc.).



POLITICAL-INSTITUTIONAL DIMENSION

The political-institutional context is critical to ensuring that arrangements are developed that support the promotion of intersectoral actions, with multiple actors and at multiple scales. These include, at one end, local/community organizations and institutions (water boards and community development associations), taking into account local authorities such as municipal government and different kinds of organizations for coordination, such as micro-watershed councils and inter-community coordinating groups. They also include meso-scale institutions, such as municipal consortia, municipal and/or micro-region associations, watershed committees, and territorial development councils, among others. The chances of having a significant impact involve building a State institutional framework that is informed and supports local efforts.

In Central America, the combination of these three dimensions has shown—as expected—different emphases. Thus, for example, proposals for the socioeconomic and political-institutional dimensions are strongly in evidence in the most recent school of thought on rural development that emphasizes a territorial focus. However, despite emphasizing the territory, integration of the biophysical-ecosystem dimension remains weak. Conservation approaches, including integrated conservation and development projects, are based on a strong emphasis on the biophysical-ecosystem dimension. These approaches even include relevant concerns about the socioeconomic dimension; but, in general, they do not sufficiently address the political-institutional dimension. They often infringe on and/or limit the rights of communities and producer groups.

Approaches aimed at water management are based on a strong emphasis on the biophysical-ecosystem dimension. They even include considerable concern for the political-institutional dimension. However, in general, they tend to elude critical aspects of the socioeconomic dimension, as occurs with conflicts and disputes over control of natural resources for deployment of accumulation strategies by actors with levels of power that end up stifling local-community-territorial actors.

In their latest versions, approaches such as green water and landscape propose addressing these three dimensions in a much more integrated manner. They much more clearly mark the need to advance from handling and management to governance and to the pursuit of multiple objectives in much more complex contexts and scales.

Finally, based on a review of the three schools of practices in the region, three levels of intervention have been identified, which are involved in initiatives, projects, and programs to a greater or lesser extent: a technical level, an operational level, and a strategic level.

The technical level is related to the promotion of management practices, technologies, or crops, mainly based on an understanding focused on the biophysical-ecosystem dimension. At this level, the technical options are often known; however, they are insufficient and require the development of actions at the following levels (operational and/or strategic).

The operational level comprises the design and implementation of a set of services to support rural livelihoods, whether through research, extension, incentive systems, infrastructure, marketing, etc. Therefore, the success of interventions is closely linked to the relevance of those services. At this level, particular attention tends to be paid to the socio-economic dimension.

The strategic level refers to governance; that is, to building a shared vision of the problems, the solutions, and of development. It entails processes based on collective action for the negotiation of agreements and institutions that enable managing the complexity of interests that are concretely in evidence in the landscape, the watershed, or the territory. At this level, the political-institutional dimension stands out.

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The most important achievements in sustainable land and water management have been facilitated by legal reforms that have enabled different local actors to develop their own institutional arrangements, including the possibility of designing their own regulations.

Learning to Manage the Complexity of Central America's Land and Water Issues²⁰

CHAPTER THREE

In Central America, initiatives have been implemented that, although responding to different objectives, have faced the challenge of replication or mass implementation, i.e., horizontal scaling up, either in natural resources management practices or innovations in production systems. These issues have also raised challenges involving environmental governance, which has been attempted by coordinating among agendas and institutions at different management and administration scales (vertical scaling up). These initiatives demonstrate many ways of addressing scale, beyond the plot or the community. On the one hand, there has been a long tradition of designing projects and programs where the intervention area is defined on the scale of subnational regions or other territories defined using some blend of biophysical, socio-productive, and jurisdictional criteria. This is the case of initiatives spanning a group of departments or municipalities, at times under the name of micro-regions, municipal consortia, or regions. Another very common way to define the scale of programs and projects is based on the concept of watersheds, almost always operationalized on the scale of recharge areas, micro-watersheds, and watersheds, because larger watersheds have proven to be too large to be covered by limited projects. Finally, conservation initiatives have used another way to approach scale, by the demarcation of areas of different land use, such as core areas and buffer areas, which usually overlap with jurisdictional boundaries or watershed limits.

This chapter broadly systematizes key aspects in Central American experiences that have sought to scale up land and water management, lessons that are manifested in changes in approaches and methodologies used in projects, programs, or processes, whether for agricultural or rural development, water resources management, or biodiversity protection. The first highlight of these changes is a trend toward integrating

20. This chapter describes the lessons learned in all the regional experiences that were analyzed. Therefore, many of the references herein on the different experiences in different countries are explained in greater depth in the final chapter, which describes these studies.

biophysical-ecosystem and socio-productive dimensions, as well as the political-institutional dimension. Moreover, as will be seen below, there is a lesson here on how to promote scaling up using watershed and territory approaches, based on the opportunities offered by changes in local, territorial, and national institutional frameworks.

Multidimensional Approaches to Dealing with Interdependent Problems

In Central America, initiatives that have included scaling up of good land and water management practices among their objectives offer a wide variety of entry points. That is, they have been designed with very diverse objectives, such as rural development, poverty reduction, sustainability of hillside agriculture, natural resources protection, food security, and adaptation to climate change, among many others.

For decades, most programs and project that have dealt with these issues have sought to influence different factors that affect decisions about the use and management of natural resources by productive, family, or associative units. However, many of these experiences saw their objectives to scale up over extensive geographic areas frustrated, because only a very limited proportion of producers adopted the proposed innovations.

It has been gradually recognized that one of the reasons that expected scaling up has not happened has been design and implementation of interventions based on an inadequate understanding of the many dimensions involved in processes to adopt productive practices and systems, which are supposed to achieve the broader objectives of the programs and projects. In this regard, a shift has been seen in recent decades toward focuses and approaches that seek to integrate different elements of the biophysical-ecosystem, socioeconomic, and political-institutional dimensions. Thus, while projects and programs are driven by sectoral objectives, the different actors involved in the design and implementation of these processes are more aware of the interdependence among the different problems encountered in localities and territories.

This multidimensional perspective is becoming more relevant with the growing connection of Central American territories to globalization and the new context of climate change. These trends are increasing the complexity of landscapes along the Central American Pacific slope, historically more populated and also more tied to global economic dynamics. The same trend toward increasing complexity is also being seen in the historically homogeneous landscapes of the Atlantic slope, increasing the multifunctionality of these territories. This supposes an increase in the heterogeneity of interests among the actors involved in land use, a process leading to different economic and socio-environmental

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conflicts around resources and functionality of Central American territories. To the extent that these trends strengthen, the need will grow for approaches that enable addressing the interdependence among economic and environmental change processes. The integration of dimensions also enables identifying common interests among the different actors affected by these dynamics, a necessary condition for the sustainability of governance processes in territories or landscapes.

Integrating the Socioeconomic Dimension into Land and Water Management Initiatives

A first step in the adoption of multidimensional approaches in land and water management initiatives has been to integrate the socioeconomic dimension into approaches that in the past had leaned toward the biophysical-ecosystem dimension. This can be seen in projects and programs that have pursued synergies between conservation objectives, or recovery of natural resources, and production or rural development goals. This happens for example in initiatives on watershed management, sustainable agriculture, access to drinking water, and community forest management.

Until the late 1980s and even in the 1990s, watershed conservation projects had a penchant for forestry-based solutions. For example, reforestation projects that were done with timber species or for fire control were of little interest to farming families. However, since the 1990s, there has been a better understanding of the social and economic dynamics underlying watershed degradation in Central America, which led to the search for restoration and management options that are adaptable to hillside agriculture. Thus, since the 1990s, sustainable agriculture projects have included practices and works for land and water conservation, and stubble management without burning. There have also been tests of new production systems such as agroforestry and silvopastoral systems, options that provide tree cover—thereby, land and water conservation—as an alternative to traditional reforestation, which enable improving economic conditions for producers.

Moreover, integration of the socioeconomic dimension into forest conservation and biodiversity conservation projects is also being seen. In the different territories where these types of initiatives have been promoted, social dynamics forced rethinking approaches

“ People prioritize problems such as deforestation, forest fires, and even soil degradation when the connection to their livelihoods is obvious, such as in the current context of climate change, with erratic rainfall that is endangering food security.

that did not take into account the importance of natural ecosystems for local livelihoods. Community forest management initiatives have been carried out in Nicaragua and Honduras. This is a lesson in process, as indicated by the PACAP case in El Salvador, which in 2009 changed its approach during implementation to ensure integration of the livelihoods of the population. Meanwhile, initiatives in Nicaragua and Honduras were strengthened.

One of these lessons is that collective action around problems with the degradation of natural resources arises from what is valuable to the producers themselves and others who live in rural areas. Problems such as deforestation, forest fires, or even soil conservation are rarely seen as priorities by the population because the connection to their livelihoods or food security is not obvious, except where extreme crises make this relationship palpable, such as the case in Lempira Sur²¹ or the current context of climate change. One issue that gives a sense of urgency to environmental protection is water. Different experiences in the past two decades have shown that the issue most likely to generate and sustain collective action is water for use in households and in small and medium agricultural production. This does not mean that there are no other valuable “tickets” to governance. In forest communities, the forest can be a ticket to governance. Honduras even has the concept of community forest committees, enshrined in the Forestry Law, in addition to significant experiences with community forest management.²² In the current context of erratic rainfall, food security for rural families can be an important catalyst for collective action, as evidenced by past experience.

As part of the different initiatives, it has been found that water is often a catalyst for collective action to confront problems such as agricultural burning, forest fires, and socio-environmental conflicts in protected areas. Thus, projects for access to drinking water in rural communities have sought to establish connections with actions to protect water sources and micro-watersheds, sometimes as part of the management of protected natural areas. For this purpose, different schemes for incentives and compensation for ecosystem services are being tested, among them, payment for environmental services systems.

21. This point is analyzed in the section on Honduras in the last chapter of the book.

22. Cases such as Gualaco and Villa de San Antonio, among others.

Integration and understanding of linkages among the different dimensions has enabled designing better incentives to gain participation by rural residents in actions to protect and manage natural resources. For example, the process of changing practices in Lempira Sur showed the usefulness of credit schemes that helped producers and their organizations capitalize. The case also showed that collective incentives can promote land and water management actions at the community scale. Moreover, understanding the linkages between ecosystem services and livelihoods promises to provide greater flexibility to traditional payment-for-environmental-services schemes, because compensation options are expanded to non-monetary options such as technical assistance services or information on markets.

There is also a lesson about the importance of including access to markets in the design of projects that promote practices that protect water and land, because to the extent that productivity improves, buyers for the surplus need to be ensured. However, the range of options for sustainable resources management is still limited for producers who do not have their own land.



“ Linkages between ecosystem services and livelihoods promise greater flexibility to traditional payment-for-environmental-services schemes, in which non-monetary compensation options are expanded to technical assistance services, to strengthening rights, or to better marketing capacity.

Progress with Integration of the Political-Institutional Dimension

In addition to the integration of the biophysical-ecosystem and socioeconomic dimensions, it is clear that the design of natural resources management programs and projects has advanced in the integration of the political-institutional dimension. Two valuable lessons in this regard concern, on the one hand, the key role played by social organizations to legitimate, endorse, promote, or encourage changes in practices, and, on the other hand, the importance of sustaining horizontal scaling up processes using institutional designs in the corresponding scale.

Grassroots Organizations to Promote Scaling-Up Processes

Scaling up requires social actors that lend sustainability to processes to change land use practices. In the past, it was common for projects to propose forming producer groups (called “interest groups” or “solidarity groups”), since this type of organization favors the adoption of productive practices and systems. To the extent that different types of community organization have grown stronger, water and land management initiatives have ceased the practice of forming new groups, seeking to rely on organizations already established in the territories. For projects, this has the advantage of having a locally legitimated ally, which in many cases enables providing continuity to actions after the project’s actions have ended. It is now recognized that it is important to strengthen community organizations already provided for by law, such as community development associations, drinking water and sanitation committees, and watershed councils.

Informants in both Honduras and Nicaragua agreed that water boards (CAPS in Nicaragua) can be a significant social force for driving land and water governance processes at the community and municipal level. Generally, these are the actors most interested in protecting water sources and in some cases they are already having an effect at the micro-watershed and sub-watershed level, thanks to the establishment of second-tier organizations, alliances with municipal governments, and NGOs. Honduras and Nicaragua also have new legal instruments to protect micro-watersheds as part of their water laws, something that El Salvador has not yet managed.

“ Social organizations play a key role in legitimating, endorsing, promoting, or encouraging changes in practices, and therefore, it is important to sustain horizontal scaling up processes using appropriate institutional designs.

Water boards also exert social control to induce changes in practices by other actors, or even conduct organized protests against projects that affect water resources. In El Salvador, where the number of community-run water systems is limited, land and water management initiatives have relied on ADESCOs (community development associations), cooperatives, and types of organizations particular to certain territories. However, unlike water boards and watershed agencies, these organizations have a broader agenda, in which water and land issues are diluted among other priorities (infrastructure, production, etc.). Along these lines, in El Salvador, no social agent has yet been identified that has community roots and can enhance land and water governance as in Honduras and Nicaragua. However, there are some producer organizations that could fill this role since they have demonstrated greater concern for sustainable agriculture options, such as agroecology and organic production. This has been seen in the case of the National Union of Farmers and Ranchers of Nicaragua (UNAG), working through the Campesino a Campesino Program (PCaC) in Nicaragua, where horizontal scaling up of sustainable agriculture arose from a process with farmer- and community-based roots and support from trade organizations.

From Water Boards to Watershed Agencies

Water boards in Central America usually consist of local farmers, which promotes the integration of interests around the protection of micro-watersheds and water recharge areas. However, they have obvious limitations, in the sense that individually their capacity to have a territorial impact does not extend beyond the community level, and most still have difficulty managing water systems, which is why they are not even proposing sustainable recharge area management yet. In this regard, it is important to highlight the cases of COCEPRADIL, COCEPRADII, and ASOMAINCUPACO in Honduras, second-tier organizations made up of water boards that have had a territorial impact and that are currently promoting protection measures for large tracts of forest. These organizations do not only represent local interests around drinking water services, but rather they have broadened their mandate, contemplating territorial development objectives, achieving more comprehensive social and economic management of the territory. CRS has played a key role in these three efforts, supporting local capacity-building processes over the long-term, which is being expressed in the technical and proactive capacity of

community leaders who assume leadership positions in the same organizations and in the local institutional framework.

Water boards have also proven to be the actors most committed to the operation of different watershed associations and committees designed using the IWRM approach as opportunities for participatory and multisectoral management. Different projects have encouraged the formation of these groups, inviting water boards, local governments, and NGOs. At present, watershed agencies are only considered in the laws of Honduras and Nicaragua. Because this is recent legislation, most experiences with the creation of watershed agencies have relied on other types of organizational structures. For example, in El Salvador these groups organize as not-for-profit associations, and like other NGOs, have come to depend on cooperation projects. In some cases, watershed management agencies have managed to fund themselves through water charges, or, unusually, through more formalized payment for environmental services (PES) schemes. The latter example has occurred more frequently in places where local government has shown interest in maintaining these groups, either with PES systems or through direct municipal contributions. It is noteworthy that local governments are showing greater commitment to these groups when they involve ensuring sustainability of water systems for urban areas or municipal seats. In practice, watershed associations and committees have functioned more as civil society alliances.

While it is true that some watershed agencies have successfully brought in different sectors among actors involved in water use, they have still not developed solutions that appeal to the full range of stakeholders. For example, if a committee decides to prioritize coffee issues, then the livestock sector may lose interest and drop out of the group. This also has implications for the financial sustainability of these initiatives. At present, most watershed agencies are financially supported by water boards, which, as users of the service, are the sector most interested in seeing changes in production practices and systems that affect water resources. As several informants pointed out, talking self-critically about these processes, “we are a bit lazy about wanting to do participatory planning, where all these interests reach a common goal” (Focus group, Honduras, 2015). It is also important to point out that most watershed agencies have managed to scale up to the micro-watershed level and that there are very few cases at the sub-watershed and watershed levels.

Local Government in Land and Water Management

The development of water boards and other community development organizations is a trend that gained strength in the 1990s, as part of an agenda for institutional reforms that also benefitted the transfer of authority and resources to local governments. In this context, there was a sharp rise in the inclusion of local institutional frameworks in the design of rural development projects and in incentives for natural resources protections

and management, a need that had already been observed in the first integrated rural development projects.

In the case of rural development programs, agencies such as the World Bank promoted initiatives in which municipalities became co-executors of social investment funds. Local governments could also facilitate the work of identifying beneficiaries, through their territorial political operatives and structures such as the ADESCOs and CODECOs, which had ties to municipal governments.²³ Agricultural development projects also relied on local governments with the goal of reaching their beneficiaries and, to the extent that they began to integrate elements of sustainable natural resources management, they found in them an ally that could legalize and institutionalize a number of norms aimed at environmental protection. In the case of Honduras, it was also observed that there was a municipal government incursion into agricultural technical assistance services following cuts in central government budgets for this line of work.

In the literature on management of the commons there are many examples of the importance of local authority in natural resources management, such as the example of certain localities in Guatemala. However, in areas of Central America that do not have this type of community authority (practically all mestizo areas in the dry corridor), it has been demonstrated that municipal governments can lend legitimacy and an institutional framework to incentives and norms that can benefit green water management.

Of the three countries studied, Honduras is where the most interest from local governments is seen. This can be attributed to the rise of new leadership emerging from a context in which community-based organizations such as water boards have built up their technical capabilities, in addition to training targeted to local and municipal leadership. Another factor in the Honduras case is the favorable legal environment that is conducive to participation by local governments in land and water governance processes, by declaring micro-watersheds as water protection areas.²⁴ It should be noted that in all cases of micro-watershed declarations, the water boards have also played a leading role; i.e., these initiatives are driven by a grassroots actor with considerable social power. The case of several areas in southern Honduras, in the departments of Lempira and Intibucá, stands out, where micro-watershed protection processes have been implemented with the determined participation of local governments and municipal consortia. In this region, several

23. CODECOs were Community Development Committees in Honduras.

24. There have been cases in which community organizing around water boards has led to the rise of leaders who then join the local government. There have also been cases in which elected authorities had conflicts with water boards, but who changed their position when they realized they were dealing with a sector with political weight (local operators focus group, 2015).

“ The most important achievements in sustainable land and water management have been facilitated by legal reforms that have enabled different local actors to develop their own institutional arrangements, including the possibility of designing their own regulations.

notable municipalities have efforts to eradicate agricultural burning and forest fires. These processes have advanced more in municipalities where the mayor and town council have made land and water management a priority.

The small size of Central American municipalities, particularly in El Salvador, leaves few options for incentives that are geared toward intervention scales greater than micro-watersheds. Although the administrative division of the State groups municipalities into departments, in the three countries studied, the departmental scale does not have much of a functional role in State administration. Therefore, platforms that aspire to water resources management at a larger scale, such as certain sub-watersheds and watersheds, lack a territorial authority figure endowed with adequate political authority to intervene at this scale. This makes it necessary to continue addressing vertical scaling up from below (water boards, etc.) and from above (national public policies).

Legal Progress

Traditionally, any talk of rules and regulations regarding natural resources management has been synonymous with prohibitions. Although rules and regulations continue to be instruments of governance, it is important to underscore that the most important success stories regarding sustainable land and water management have been facilitated by legal reforms that have enabled different local actors to develop their own institutional arrangements, including the opportunity to design their own regulations. Such is the case of municipal ordinances banning burning in numerous municipalities in the countries studied.

This is part of a shift seen over the past two or three decades in the way in which programs and projects understand the institutional component. Apart from involving local governments and organizing multi-actor groups, such as watershed agencies, interest has also developed in influencing legal and policy frameworks, no longer just for establishing regulations, but also for expanding the range of management incentives and instruments. For example, in the Honduras case, it appears that the law encourages participation by social organizations and local governments. Thus, the political will of City Hall is fundamental to processes to declare micro-watersheds as “water supply areas.” In some cases, the declarations involve cooperation among several local governments and reconciliation of interests among a variety of actors.



Many projects and programs have better technical designs and better implementation, but their outcomes have been limited because they did not include the importance of promoting processes to develop a shared vision of landscape, or support for the development of governance systems.

Governance as a Challenge for Strategic Land and Water Management at Different Scales

Programs and projects for sustainable resources management in recent decades have demonstrated greater integration of biophysical-ecosystem and socioeconomic factors that influence the spread of land and water management practices in production systems. This has led to improvement in the technical and operational management of these incentives. However, scaling up experiences have also showed that those attempting to scale up horizontally no longer only face difficulties with resources management but also governance problems that require the institutionalization of incentives, norms, or regulations to achieve effectiveness and resolve conflicts. Many projects and programs have better technical design and better implementation. However, their outcomes have been limited, since they have not carried out strategic management processes aimed at governance; that is, the collective development of a shared vision of landscape or the territory.

Learning to Manage Interdependent Problems at Broad Scales

Most relatively successful experiences with scaling up in land and water management beyond the farm have occurred around limited geographical areas, such as municipalities, water recharge areas, or micro-watersheds. Although to a lesser extent, there have also been some experiences at the level of groups of municipalities, forming micro-regions or municipal consortia.

As seen in previous chapters, the municipal scale has been adequate for implementing a number of actions that have contributed to land and water management and governance. This has been especially true since the 1990s, when local governments in Central America began to receive a degree of political, administrative, and financial autonomy.

Nevertheless, it has been seen in practice that municipalities may be jurisdictions with considerable limitations—whether in terms of land area, population, or resources – on addressing issues within their mandate. This has led to the formation of municipal associations, municipal consortia, and micro-regions. The creation of municipal associations in Central America gained momentum in the 1990s and 2000s. This trend toward municipal

associativity has been fostered by local development perspectives and, more recently, by territorial development proposals in which the planning unit is the territory, understood as a social construct. This last point means that the territory is the result of social, cultural, and economic relationships experienced on a daily basis.

Municipal associativism has been the basis of significant local and territorial economic development processes, and in some cases the initial reason for organizing these municipal consortia has been the need to address problems with natural resources management and governance. However, although the formation of municipal consortia may obey a territorial approach, it should be underscored that all experiences with land and water management in which local governments and municipal associations participate have been guided by the divides between watersheds or micro-watersheds to define the geographical scope of the different interventions. Indeed, one of the findings of this study is that for decades, watersheds, sub-watersheds, and micro-watersheds have been the preferred choice for geographically defining natural resources management projects and programs, specifically those geared to water resources management, but also those geared to soil and forest resources conservation, hillside agriculture, etc.

The watershed approach not only provides a spatial unit of work, defined by biophysical criteria, it also involves attention to water flows and to the relationships among upstream and downstream actors. However, in many cases, working with a watershed approach has been understood as the introduction of soil and water protection works. Furthermore, most experiences propose working under an approach in which biophysical criteria (sub-watersheds or micro-watersheds) take precedence. In practice, the spatial scale of the work and the type of actions have already been defined, whether by social factors such as social capital in the territory or by political-institutional factors such as the role of local governments and central government institutions in scaling up efforts. For example, guidelines aimed at prioritizing poor producers have led to key actors in the dynamics of watershed degradation not being considered as “beneficiaries” of technical services aimed at soil and water protection.

In the past, some efforts promised to have an impact on sub-watersheds or whole watersheds, but resource constraints required prioritizing micro-watersheds within them. Furthermore, the methodology used at larger scales and also at the smallest scales, has been based on assumptions about horizontal scaling up, not always accompanied by vertical scaling up actions. Thus, there have been attempts to transform large watersheds and territories in the same ways that have been used to transform recharge areas and micro-watersheds: promoting protection practices in a larger number of plots or farms. It is important to realize that, notwithstanding their name, micro-watersheds may be quite large. For example, in Honduras, a micro-watershed might include thousands of hectares, covering dozens of com-

munities. This justifies the need to include other actors, such as second-tier organizations, municipal governments, or municipal consortia.

To the extent that protection of water supply sources has been included on water boards' agendas, these boards have managed to coordinate actions with other actors for scaling up land and water management actions. In many cases, protection actions are limited to the standpipe itself; for example, fencing off the source to keep cattle out. In recent years, projects such as MICUENCA have implemented actions to protect water recharge areas at a minimum, on occasions scaling up to the micro-watershed.

Just as the experiences by water boards in the protection of water sources, most efforts at scaling up to the micro-watershed level have focused on water sources. A recurring issue in these cases has been the need to address conflicts between water system users and certain producers. A frequent type of conflict in these local contexts comes from the need to regulate or eradicate practices that affect water systems (deforestation, agrochemical contamination, contamination from livestock manure). Moreover, there are also frequent conflicts over ownership of the land where water sources are located.



In Honduras, there has been some success in dealing with contamination by approaching small and medium coffee producers (owners of 2.8 to 3.5 hectares) and working with them to change production methods. For example, the CRS Cosecha Azul ('Blue Harvest') initiative seeks to decrease the use of agrochemicals and production of wastewater (known as 'honey water') in coffee growing in areas where CRS has been helping communities with their water systems. In some cases, local governments have intervened as mediators to facilitate conflict management, which has sometimes led to resolution with the water board or committee purchasing the land to protect standpipes or micro-watersheds. In El Salvador, where land prices make it harder for water boards or municipal governments to buy land where water sources are located, many of these conflicts remain unresolved.

Initiatives promoted by water boards, watershed or micro-watershed committees, and local governments have a sectoral perspective, since their interest is centered on water resources management (blue water). The experience of these groups shows that expanding the spatial scale of processes not only increases the number of actors that must be involved, but also that it is necessary to consider different sectors. It is to be hoped that the range of sectors that will engage in these groups will increase if they want to add green water management to their agenda, an issue that requires consideration of the full range of interests involved in land use. This is no longer only about water users and activities that have the potential to pollute bodies of water; rather, actors and interests will have to get involved around the expansion of urban uses (residential, tourism, transport, etc.), mining activities, and conservation of protected natural areas.

In this regard, it will be important to take into account the experience from territorial development planning processes, which generally involve sectors other than those usually interested in water resources management. One of the institutional innovations in these processes has been the formation of groups that bring together people from different sectors (Ballón and Zeballos, 2009), which often have names such as roundtables, regional councils, committees, etc.²⁵ These multisectoral groups recognize problems and conflicts, identify and coordinate interests, and propose and negotiate solutions. In this regard, they fulfill functions similar to those of watershed agencies, but their perspective is no longer centered on blue water, rather on a broader agenda. Moreover, these groups enable the development of a common vision for the territory. The number of experiences of this type is limited, because this is a relatively recent trend, although in the past, multisectoral platforms for territorial environmental management have been tried. Several cases can be found in El Salvador, such

25. Development of multisectoral platforms stems from the analysis that "much of the losses in energy and in public and private resources is due to sectoral modes of action that fail to take an integrated look at complex problems" (Ballón and Zeballos, 2009).



When the scale is expanded, the variety of interests, economic thinking, and power differences make it hard to build consensus or shared visions. It may be necessary to first make progress with resolving conflicts over land and water use, or even conflicts about the vision of development that should be a shared commitment in the territory.

as CACH, CODENOL, and the Jiquilisco Bay Territorial Action Group. Honduras has the Production and Environment Roundtable (MESAP) of MANCORSARIC, the food and nutrition security roundtables in the Gulf of Fonseca region, and the natural resources management roundtable in the Lenca region, both affiliated with regional development councils.

Political and Institutional Challenges for Scaling Up Land and Water Governance

It is important to remember that participation in these groups is voluntary and they have difficulty engaging more powerful actors. For example, the Jiquilisco Bay Territorial Action Group includes a variety of actors from civil society, local governments, and small cooperatives, but the sugar mills and sugarcane growers are not there, even though this is one of the most influential activities in the landscape. Furthermore, CODENOL is a platform that is broadly representative of economic interests in the Nonualco region; however, this group does not get involved with natural resources management issues. The food and nutrition security roundtable in the Gulf of Fonseca region in Honduras is a different case. There, the participation of large producers, through private development foundations, has brought dynamism to this territorial mechanism.

One difficulty in expanding the agenda and representativeness of governance platforms comes from the differences in interests and in power among local actors. In this regard, it must be recognized that some territories are more heterogeneous than others in terms of interests, economic thinking, and the levels of power of those who shape the landscape. In some cases, interests in the land continue to be agricultural in nature, with limited linkages to urban markets. That is, these are contexts that, comparatively, show limited social and economic heterogeneity. The extent that the variety of endogenous and exogenous actors increases, influencing the dynamics of land use, is expressed in landscapes with growing complexity and multifunctionality.

Furthermore, differences in property rights, particularly land and natural resources management rights, influence the development of agreements and the adoption of land and water management practices. By definition, management rights define the decisions each class of user can make with regard to the land and other resources. When a majority of

farmers work leased land and do not have full management rights, they have little incentive to adopt practices that would appreciate the value of land that is not theirs. In this regard, it should be recognized that some processes to scale up land and water management have happened in relatively small areas (municipalities, micro-watersheds) where social and economic conditions are not very heterogeneous. This has enabled water boards and governments to arrange a number of factors supportive of a vision of environmental sustainability, successfully influencing actors who had initially resisted changes in their production systems. As several informants noted, it is relatively “easy” to reach agreement in watershed agencies when they are made up of water boards, but it is a challenge to bring into these groups productive sectors whose actions have an impact on water resources, which involve a greater diversity of interests and therefore conflicts. When the spatial scale is expanded or work done in more heterogeneous territories, the variety of interests, economic thinking, and power differences make it hard to build consensus or shared visions that would enable overcoming conflicts and thus facilitate governance.

This has important implications for strategies to scale up green water management practices. Where it has been possible to build a common vision of the territory and develop social capital, people can probably move on to horizontal scaling up of technical options without much work. In other contexts it may be necessary to first make progress with resolving conflicts over land and water use, or even conflicts about the vision of development that should dominate in the territory.

While in less heterogeneous contexts, local institutions and actors have fewer difficulties in designing land and water management schemes; in other contexts, local institutions have limited capability to influence certain actors. However, a case in the Lower Lempa region of El Salvador showed that the involvement of institutions with greater authority has enabled influencing economically powerful actors to begin to solve problems related to land and water management.²⁶

This suggests that the scaling up of land and water management options will be facilitated by the presence of local and national State agencies with different competencies and authority. In the literature, these types of arrangements, in which different entities with a variety of competencies and differing degrees of authority are involved, appear under different names, such as multi-level collective action, nested institutions, and polycen-

26. In this case, MARN has been able to get actors in the sugarcane chain to begin to eliminate burning of fields during the cane harvest. Thus, under a “green harvest” banner, the area harvested green (without burning) grew from 1,780 ha in the 2011/2012 harvest, to 4,900 ha during the 2012/2013 harvest, and 8,400 ha was projected for the 2013/2014 harvest (MARN, 2013b).



A key factor in territorial management is development of a shared vision of future development in the territory or landscape. This requires building capacities that go beyond technical aspects.

tric governance systems.²⁷ An institutional system of this type is the one provided for in the water laws of Honduras and Nicaragua, where watershed committees or councils are formed at different scales (micro-watershed, sub-watershed, and watershed). However, this design, which expects the participation of a wide range of civil society actors and State institutions, requires an intersectoral cooperation line of thinking that is not fully accepted either in the competencies or the culture of the sectorized State structure. In this context, cooperation will greatly depend on political will, which is not always practical. For example, it is not surprising that in Nicaragua, local governments conflict with CAPS.

Cognitive-Cultural Processes: A little-studied factor

The few experiences there have been with territorial management or development, and with wide-scale changes in practices, suggest that a key factor in these processes has been the development of a forward-looking vision about the territory or landscape that is to be transformed. Processes to develop this type of territorial vision or identity can be seen in the three countries, apart from the success of each case. Additionally, it continues to call attention that this cognitive and cultural factor has been part of some farm- or plot-level experiences, where one of the objectives of technical support to farmers is the development of a long-range view of their farm or plot. For example, the ability to project a vision for the future is the starting point in the methodology of Honduran educator Elías Sánchez and of different initiatives that have implemented the “farm plans” methodology.

The use of methodologies to help local producers and actors develop a shared view of the territory or landscape faces some challenges with knowledge management at that scale. One lesson that should be underscored is that this ability to visualize the future farm, territory, or landscape requires building capacities that are not developed in trainings focused on technical or administrative issues. Moreover, different informants in this study drew attention to the type of achievement indicators used to evaluate program and project performance. There is still a bias toward indicators for fulfillment of technical and operational objectives, but not strategic objectives. Such biases often come to determine the outcomes of projects and programs, since the emphasis on achieving goals fails to capture qualitative changes in capacity building for governance.

27. For purposes of this document, these concepts can be considered interchangeable; however, it is important to note that an academic debate exists that does not consider them synonymous.



Degradation of natural resources, exacerbating vulnerability to climate variability and change can trigger new conflicts over the use and control of resources, compounding the challenges inherent in management and governance at different scales in a context of fragile institutions.

Criteria for Promoting a Landscape Approach in Central America

CHAPTER FOUR

Although this study does not delve into specific projects and programs, it does survey different approaches and criteria that constitute the foundation for current land and water management practices at different scales in Central America. Recurrent themes appear along these pathways—efforts that did not bear fruit, along with several success stories. This has happened in a changing, increasingly complex context, which poses a challenge to initiatives that pursue socioeconomic and environmental impact at significant scales in rural areas. In Central America, this complexity includes a growing variety of socioeconomic actors, strategies, and projects, which range from renewed interest in family farming to aggressive processes to change land use, caused by expansion of livestock ranching and agro-industrial crops, the mining industry, and infrastructure for developing logistical platforms and services, among others. This raises the possibility of new degradation of natural resources, exacerbating vulnerability to climate variability and change. It can also trigger new conflicts over the use and control of resources, increasing the challenges inherent in management and governance at different scales in a context of fragile institutions.

The opening chapter proposed examining the pathways of land and water management at different scales based on the definition of three dimensions that are essential to making progress with this objective in a context of increasing complexity (Figure 1). Here we discuss a number of criteria that this analysis enables recognizing, to contribute to orienting initiatives that seek to have an impact at different scales. These are initial criteria that need to be substantiated, refined, or discarded in future studies.

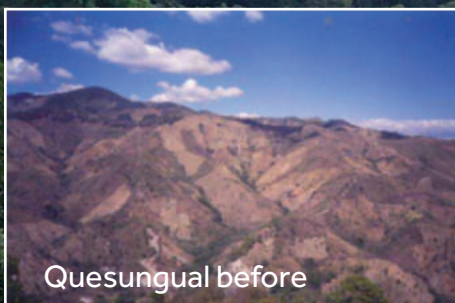
Working at Different Scales from the Beginning: The importance of taking an initial reading

Projects that have sought mass use or multiplication of good farm-level practices have generally failed in their attempts at scaling up. These interventions have focused almost exclusively on homogeneous plots and farms, communities, and organizations,

as well as on small geographical areas such as recharge sources in the upper reaches of micro-watersheds. Those experiences that have successfully transformed larger spaces, whether at the micro-watershed level or with small groups of municipalities, did so by setting out objectives, actions, and indicators on those scales.

It appears that if significant impact is intended, it is essential to work at different scales from the beginning, which involves not only pursuing horizontal impact to reach a greater number of people and communities, but also vertical impact to influence institutional policies and frameworks that foster the changes being promoted. From this perspective, the work involves much broader time scales, since it also seeks to ensure sustainability in much more complex contexts.

Farm- and plot-level processes influence green water management, and in turn, are impacted by landscape-scale processes. We should be constantly shifting our gaze from the plot or farm to the territory or landscape and back again. The landscape approach is useful because, more than a single scale, it is an approach that works at multiple scales, which requires going “down” to smaller units, such as plots or farms, encompassed by the landscape. The landscape approach involves taking into account large and small farms,



Quesungual before



Quesungual now



It is essential to work at different scales from the beginning, which involves not only pursuing horizontal impact, but also vertical impact to influence institutional policies and frameworks. From this perspective, the work involves much broader time scales.

The landscape approach is useful because it demonstrates the importance of working at multiple scales.

as well as various land uses. In the past, emphasis was on producers who cultivate small plots because they are poor families. However, large farms often have a considerable influence on the landscape, as they tend to base their strategies on highly-degrading production models with clear social and environmental impacts on the landscape.

Initiatives aimed at having a significant impact should begin their interventions at different scales. This requires taking an initial reading of the main interactions among socioeconomic, biophysical, and institutional factors that determine the dynamics at community, local-municipal, and territorial scales. It is important to recognize how hard it can be to read the situation because sectoral approaches dominate programs and projects. Promoting interdisciplinary teams, tools, and methodologies would contribute much further to more comprehensive assessments of interdependent problems in the different dimensions and their scales. Taking an initial reading should be seen as a participatory, inclusive, and empowering starting point for the different actors, in particular, those who are the most vulnerable. Likewise, it should be understood as an instrument that contributes to defining a programmatic agenda for management, for social construction of the scale, and for governance.

Make the Most of Possibilities Offered by Different Scales

Working with the landscape approach involves overcoming the constraints presented by the different scales. The wide dissemination of the watershed approach easily leads to thinking that governance only refers to demarcation of watersheds. However, since this demarcation is based on exclusively biophysical criteria, watersheds do not geographically match jurisdictional divisions, nor necessarily all the actors relationships and interests. In this regard, taking into account jurisdictional scales is unavoidable to be able to establish the framework for policy decisions that affect land and water management. Furthermore, the perspective gained from the set of local/territorial scales enables grasping a number of social and economic dynamics that the watershed approach fails to capture in all its complexity. The interdependence among the different scales must be

“ The landscape approach requires taking an initial reading of the main interactions among socioeconomic, biophysical, and institutional factors that determine the dynamics at different scales.

recognized, though it is not always easy to analyze when working with local/territorial and jurisdictional scales.²⁸

Contexts, dynamics, and the heterogeneity of actors and land uses are factors that influence the development of a shared vision at broader scales. This can make it necessary for governance issues to be addressed based on much more restricted areas—e.g., recharge areas in the upper reaches of watersheds—because these scenarios may be less heterogeneous, where community, local, or municipal governance agreements, replicated in nearby communities or municipalities, could achieve major changes in the landscape. More heterogeneous scenarios can be expected at broader scales, which means governance schemes with other time horizons, anticipating different rhythms within the same landscape/territory. At times, broad governance agreements may not be viable, while agreements to address specific dynamics or practices might be, which is why a sectoral approach also makes sense.

Working Simultaneously on all Three Dimensions

To the extent that the landscape approach emphasizes the relevance of multifunctionality and heterogeneity, it is evident that there is a need to work simultaneously with different scales, defined using biophysical (micro-watersheds, sub-watersheds, watersheds), socioeconomic (place and territory), and political-institutional (local governments, municipal consortia, national government) criteria.

It is obvious that natural resources management initiatives are increasingly facing situations in which socioeconomic, biophysical, and institutional processes are involved. Natural resources management projects and programs do not always work toward synergies among these dimensions. Therefore, it is necessary to deliberately integrate these dimensions, because they are essential to getting the transformation of land and water management practices to have an impact at significant scales, but also to be economically viable and garner support from various institutional frameworks.

28. Furthermore, it should be noted that there are a lot of technical professionals with training in watersheds and in popularizing the concept among population sectors including producers and decision-makers, especially in Honduras and Nicaragua, where watershed-related scales have been incorporated into water laws.

“Working with the landscape approach involves recognizing the interdependence among different scales, as well as the role played by biophysical-ecosystem, socioeconomic, and political-institutional dynamics.”

Assessments that bolster interventions, the design of explicit objectives, and evaluations in projects and programs must deliberately address synergies of interventions in the biophysical-ecosystem, socioeconomic, and political-institutional dimensions.

Finding Common Interests that Serve as a “Gateway”

Working with a “gateway” topic or issue that resonates with the interests and concerns of the actors legitimizes initiatives, projects, and programs, while at the same time motivating them to engage and participate. One of the most important lessons for green water management is that collective action around issues concerning degradation of natural resources grows from things that are valuable to producers and rural inhabitants. As mentioned, water is often a gateway with great potential for mobilizing that engagement. Water can almost naturally link different scales together, because farm- and plot-scale processes influence, and in turn are impacted by, micro-watershed and sub-watershed processes.

This does not mean that there are no other valuable “gateways.” However, these gateways will depend on specific contexts, considering the three dimensions. Thus, it is not advisable to predefine them before understanding the specific contexts. In communities dependent on forest resources, the forest is the main gateway for management and governance. In the current context of erratic rainfall, food security of rural families is a growing source of collective action, as a variety of experiences have demonstrated. The importance of choosing a “gateway” reinforces the need to have a multidimensional approach, because in practice the gateway confirms its multiple interactions with and types of dependency on the different dimensions.

Supporting Development of a Shared Landscape Vision

Working with actors to contribute to developing shared visions of the territory or of the landscape is critical to the promotion of green water management at different scales. The development of a shared vision must be deliberately undertaken, relying on participatory methods and on work agendas that reflect the interests of different actors, including farmers (small, medium, and large), local authorities, and the different civil society groups in the territory.

“ Collective action grows from things that are valuable to the people in rural areas. Water is often a gateway with great potential for activating and/or promoting collective action. Water almost naturally links different scales together.

It is not often that farms have a perspective on biophysical dynamics, beyond the vicinity of their farm or plot. However, it is important for farmers to be aware of the influence of these dynamics on the landscape and of the influence of the landscape on their farm or plot for their involvement in processes that promote green water management at different scales. Certain crops, such as cacao and shade-grown coffee, have the potential to restore ecosystem services, among them water resources, particularly in areas where most of the land is used for agriculture. The involvement of private producers in green water management should be part of a broader organizing effort, facilitated by the promotion and provision of multi-actor platforms, in which the diversity of interests is made explicit, as well as the impacts and potential of the different strategies and production systems.

Promote an Institutional Framework and Governance Systems for Management at Different Scales

Consensus and shared visions are crucial to building institutional frameworks and governance systems that are consistent with landscape-scale management. If green water management requires simultaneous interventions at different scales, then an institutional framework is needed that takes into account the territory and landscape, from the farm and plot up to larger areas such as the watershed.²⁹ To the extent that green water management at different scales requires resolving governance problems at the level of watersheds, territories, or landscapes, and not only technical problems at the farm or plot level, there is a need for the participation of organizations and institutions that enable legitimizing particular agreements or measures.

An organized community, local producers' organizations, or water boards can be the first rung in the institutional framework for land and water governance. Their engagement is important insofar as they usually represent the main users of the land and water. In turn, municipal authorities can play different roles in land and water management. For example, they can provide different governance mechanisms between community actors themselves, among

29. The literature talks about a nested or multilevel institutional framework to refer to schemes or “institutional arrangements” with the capacity to coordinate and agree to objectives at different spatial, social, or jurisdictional scales. The term polycentric institutional framework is also used, to emphasize that certain issues cannot be resolved by a single authority or center, but rather by several institutions with intersecting authority, justifying their coordination.

communities, and among groups of communities and their organizations. In addition, local governments have jurisdictional powers and authority to institutionalize management schemes that can seamlessly cover spatial scales such as micro-watersheds or protected areas.

However, territories may be home to negative dynamics that exceed the governance capacity of local actors, municipal governments, and their associations. To cope with these dynamics, the entities and institutions at a higher hierarchical level need to participate. For example, a government entity has more resources to change the structure of incentives for an agroindustry whose decisions may be determining land use across hundreds and thousands of square kilometers.

Green water initiatives will benefit from the participation of an entity with political authority in the spatial scale targeted for impact. Although agencies and committees for micro-watershed, sub-watershed, and watershed management have been promoted in Central America, these are platforms for participation, and even for coordination, but they are not



“watershed authorities,” since they lack jurisdiction delegated by the State. Although micro-watershed committees are often energized by the participation of local governments, the committees lack jurisdiction over large micro-watersheds and sub-watersheds, and therefore, sub-watershed and watershed agencies do not have political decision-making capacity. Since Central America does not have intermediate level authorities between the national scale and the municipal government, it is important to take into account the role played by different institutional arrangements at the community level (water boards, micro-watershed committees, municipal governments, municipal consortia), but also at the national scale.

Advocate for Public Policies that Support Landscape-Scale Management and Governance

La The national scale in general and public policies in particular are crucial to advancing toward landscape-scale management and governance. Municipalities and municipal consortia, understood as institutional and jurisdictional scales, have limitations compared to processes that are impelled and promoted from the national and even international level. Shared visions for the landscape or territory among actors result in investment. This investment requires transforming the overall incentive structure to make it possible for changes in practices in agriculture and green water management. This issue may be more difficult where heterogeneity among actors is benefited by certain public policies.

For example, structures, such as multisectoral platforms and watershed agencies, are often paralyzed by conflicts of interest or a lack of cooperation among actors who seek to take advantage of opportunities offered by policies to promote investment and economic growth in strategic sectors such as sugarcane, oil palm, etc.

Accordingly, management initiatives should increasingly include national government bodies, especially at the largest scales, which are usually the most heterogeneous and multifunctional. Major changes in public policies and in the overall incentives structure require local-territorial actors to deliberately advocate at national bodies, such as ministries of environment, agriculture, public works, economy, etc.

Promote and Develop New Leadership Consistent with a Landscape-Scale Approach

One difficulty for the integration of the different dimensions (biophysical-ecosystem, socioeconomic, political-institutional) is partly due to the fact that technical teams and decision-makers for State programs, projects, and institutions continue to operate

“ The key to changing farming practices is not limited to economic incentive schemes or technical training; it requires new interdisciplinary knowledge. The landscape approach provides a set of criteria and methods with the potential to integrate more advanced proposals for water and land management at different scales.

from a sectoral mindset that does not allow for the development of a culture of interdisciplinary work. The design and implementation of interventions based on interdisciplinary groups will facilitate the integration of the different dimensions and give attention to interdependent problems. This study has shown the pathways toward such integration; however, in the territories, people still recognize initiatives focused on the dissemination of technological solutions that do not sufficiently consider the complexity of socioeconomic dynamics or of the complexities of institutional structures.

For example, certain circles continue to think that the key to changes in farming practices is limited to economic incentive schemes or technical training. No attention has been given to producers recognizing themselves in the landscape (in the territory or in the watershed); i.e., to them developing a broader view based on an understanding of the territory where they farm, of ecosystem services, of multifunctionality, and of landscape heterogeneity. It is also important to consider that the processes of social construction of a territorial or landscape vision are, by definition, cognitive and cultural processes that involve collective and territorial identities.

Considering these challenges, knowledge management and the development of shared visions of the territory and landscape should be taken as basic elements of broader social and political processes involved in the design and implementation of programs and projects. This requires fostering and developing leaders equipped with technical tools, methods, and policies that influence, motivate, and contribute solutions.

This study offers an initial approach to scaling up that may be more robust if it delves into initiatives that leave lessons of what to do and what not to do in this area. In any case, the experience gained by the three pathways that have been addressed in this study—rural and territorial development, water resources management, and biodiversity conservation—enable recognizing the landscape approach as a set of criteria and methods with the potential to integrate more advanced proposals for water and land management at different scales.

Beyond the Farm: Efforts to Scale Up Land and Water Management in Central America

CHAPTER FIVE

Concerns about making an impact at major scales are not new in Central America. For several decades now, actions, programs, projects, and interventions have been implemented and promoted to address the challenges of rural poverty, food security, natural resources management, and most recently, adaptation to climate change. For purposes of this study, it is important to learn how these problems have been addressed in the past, which involves a review of the framework, approaches, strategies, and actions that have been implemented in practice in Honduras, El Salvador, and Nicaragua. To this end, this chapter reviews the changes that have occurred in each country in concerns about making an impact at major scales. It is organized chronologically according to the pathways addressed in this report. Also included is a brief overview of the current institutional frameworks in each of the countries studied. In general, we have chosen to present efforts that are useful for their contributions, regardless of the extent of their funding, duration, or geographic scope.

Honduras

According to the most recent data on land use, Honduras has over 3.62 million hectares of crop and pasture land. Rainfed agriculture accounts for 97% of this land area, given that in 2009, irrigation systems were in place in no more than 90,000 ha, according to data from the Secretariat of Agriculture and Livestock, reported by FAO (AQUASTAT/FAO, n.d.).

Compared to other Central American countries, in some areas of Honduras rainfed agriculture has the benefit of favorable weather conditions. However, weather and rainfall patterns differ considerably across the country. There are marked differences among the Caribbean coast, the intermontane region, and the south. Atlantic watersheds have milder changes between seasons; March and April have the least precipitation—about 50 mm (IHCIT, 2014). These conditions are suitable for growing very valuable crops, such as African palm and sugarcane, in rainfed conditions in the country's northern plains and valleys. Conversely, rainfed agriculture in the Honduran dry corridor—i.e., the southern plains and central and western highlands—has to tolerate a pronounced dry season from November to April, with rainfall of less than 10 mm in January and February (IHCIT, 2014).

Most of the Honduran Dry Corridor (61%) is sloped land steeper than 20%, and has been traditionally home to subsistence agriculture (FAO-ACH, 2012). Because of these conditions, basic grain yields in the Dry Corridor are lower than national averages: 14.8 cwt/mz³⁰ (compared with 26.6 cwt/mz nationally) and 6.7 cwt/mz for beans (compared to the national average of 10.9 cwt/mz) (Gobierno de Honduras, 2013). All this affects living conditions of the population: according to official data, 92% of people living in the Dry Corridor live below the poverty line (Gobierno de Honduras, 2013).

Despite these conditions, the Dry Corridor is also one of the largest coffee growing areas, given that 58% of the land in this area is more than 700 meters above sea level (FAO-ACH, 202). According to figures from the Forest and Land Cover Map, coffee currently covers over 240,400 ha, primarily in central-western Honduras (ICF, 2014). Compared with a land area of 150,000 hectares reported by the National Agricultural Census of 1993, coffee has expanded by 60% in 20 years (Del Gatto, 2014). Most of this growth is due to small farmers, farming less than five hectares, who have started to grow coffee; these

30. cwt: hundredweight. mz: manzana. 1 manzana = 0.7 hectare.

farmers account for over 90% of the country's 130,000 coffee growers. On these small coffee plantations, 95% of the crop is shade grown, which means these fields constitute agroforestry systems (Del Gatto, 2014).

The growth of the coffee industry has brought better income to a sector of the rural population. However, it also has negative effects on water supply systems for domestic and farm use, whose sustainability is tied to conservation of forest cover in the upper reaches of watersheds, precisely where coffee growing is expanding. This is also causing widespread pollution from wastewater that coffee processing plants release into waterways.

Although forests are being replaced with coffee growing, it is important to note that recent data suggest that secondary vegetation is expanding throughout the country, though more concentrated in the south and west, precisely in landscapes dominated by farming families. This trend is attributed to several factors, such as increased crop yields for basic grains, which has permitted increasing fallow land, as well as diversifying livelihoods (Del Gatto, 2014; Zelaya, interview 2015).

Approaches and Pathways to Land and Water Management at Different Scales in Honduras

Rural and territorial development

Honduras began to integrate land and water protection into rural development projects during the 1980s, when it undertook several integrated rural development (IRD) projects, funded by the International Fund for Agricultural Development (IFAD). Throughout the eighties, other similar projects were also implemented, with funding from different cooperation agencies.³¹ All these projects used direct incentives to farmers, in cash or in kind, to undertake on-farm practices (e.g., physical land and water conservation works, such as stone barriers, live fences, ditches, and infiltration pits). However, the IRD projects were primarily successful with adoption of improved seeds and agrochemicals in areas that were still free from the influence of the green revolution.

31. A prime example is the Marcala/Goascorán Rural Development Project (MARGOAS), funded by COSUDE, which was implemented from 1980-1991 in the Department of La Paz (Hellin and Shrader, 2003).

The experience with these projects, at least during the 1980s, was not evaluated positively. Soil and water protection practices came predetermined and were introduced without an understanding of manpower and resource limitations in the production systems.³² Farmers simply followed the instructions of extension agents, who frequently had to meet goals determined when the project was designed. In addition, as later studies showed, works were erected only as long as direct incentives were being received. Only a minority of farmers permanently adopted the techniques and the majority of works deteriorate from lack of upkeep (Hellin and Schrader, 2003). According to some informants, the IRD experiences “gave us guidelines of what not to do”; e.g., do not try to persuade farmers to change production systems without considering what they want (CRS staff, focus group, 2015; Zelaya, interview, 2015).

These lessons were woven into rural development projects of the 1990s, which no longer were limited to working at the plot or farm level; rather, they started to integrate the political-institutional dimension on a broader scale. Along these lines, the first efforts at coordination with local governments began, which benefited from a new institutional context, particularly the 1990 Municipalities Law. The 1992 Law for the Modernization and Development of the Agricultural Sector was also influential. It practically eliminated the national agricultural extension system, forcing projects to seek out local allies.

One of the most consequential processes implemented in the 1990s was FAO’s Lempira Sur Program (PROLESUR), which ran from 1988 to 2004. PROLESUR started in 1988 to respond to the emergency situation caused by a severe drought in several municipalities in southern Lempira department. After responding to the emergency, the project focused on reversing soil deterioration in the area. PROLESUR provides important lessons related to extension methodologies, use of incentives, and community organizing to promote productive and practical systems to enable restoring and maintaining soil moisture. The PROLESUR experience has subsequently been echoed by other FAO projects in Central America, particularly the Special Food Security Program (PESA), which has been underway since 2000 in Guatemala, El Salvador, Honduras, and Nicaragua.³³ In Honduras, PESA systematized PROLESUR’s experience with scaling up agroforestry systems and credit unions.

PROLESUR also supported an overhaul of the secondary school curriculum, which resulted in the creation of five Community Technical Institutes (ITC). The ITCs have provided

32. Honduras has received funding from the Spanish Agency for International Development Cooperation (AECID) and the Canadian International Development Agency (CIDA).

33. Furthermore, there was a lack of understanding that the conservation practices being introduced contributed little to stop soil degradation (Hellin and Schrader, 2003; Hughes-Hallet, 1985).

continuity to the scaling up of soil and water management practices in Lempira and have enabled implementation of innovations to address new challenges appearing in the territory (Bonilla, interview, 2013; López, interview, 2013; Otero, interview, 2013). Furthermore, PROLESUR took advantage of the changes introduced by the 1990 Municipalities Law to stimulate local government participation in environmental governance of the territory. This process would lead local actors to create the municipal consortia called MANCOSOL, CAFEG, and MOCALEMPA in the early 2000s (Flores, interview, 2013; PROLESUR, 2004; Ismail et al., 2005).

The lessons that emerged from PROLESUR go beyond the technical level, since the project synergized with other initiatives being implemented in the department of Lempira and that examined today, demonstrate a valuable case of territorial development. That is, PROLESUR's actions were part of a process of broader collective action led by communities and local governments, with support from NGOs and churches. With regard to soil and water management, one of the most important outcomes from this process was the elimination of agricultural burning in eight southern Lempira municipalities (Interviews; PROLESUR, 2004). Local governments supported this transformation in farming and livestock practices, through ordinances to fine the use of fire, decisions that were endorsed by a social movement that made its voice heard through town hall meetings, and even a municipal referendum.

Another key player in building consensus around eradication of burning was Catholic Relief Services (CRS), which began supporting construction of drinking water systems in Intibucá and Lempira in the early 1980s, using a community engagement approach to manage and operate the system. With the drought of 1987, these initiatives proliferated throughout Lempira Sur. CRS provided skills training in environmental and financial sustainability. Dozens of community water boards or committees were formed, clustered into municipal coordination groups, and these into departmental bodies. This gave rise to the Lempira Water and Integrated Development Projects Central Council (COCEPRADIL) (Ramos, interview, 2013). Intibucá Department had a similar experience, which led to the creation of the Intibucá Water and Integrated Development Projects Central Council (COCEPRADII).

In their respective regions, the impact of COCEPRADIL and COCEPRADII has gone beyond the management of water resources to form part of a broader territorial development dynamic over the past two decades. CRS's approach to empower and build capacity in community organizations has played a key role in this. As will be seen below, all this work to develop institutions and build people's capacity has resulted in the departments of Lempira, Intibucá, and La Paz having the most advanced intersectoral coordination initiatives for micro-watershed and watershed management. Several changes seen in far-

ming practices and in the landscape may be attributable to these processes. For example, both institutional records and satellite data show that in the 2000-2011 period, agricultural and forest fires and other hot spots are less frequent and less severe in this region of the country. There are even several municipalities where these incidents have not been seen, including those in southern Lempira (IHCIT, 2012). Furthermore, this is one of the regions where an increase in secondary growth has been confirmed, as explained above (Del Gatto, 2014; ICF, 2014).

Watershed and natural resources management

Experiences with watershed protection and management in Honduras date back to the 1970s, when the ravages of Hurricane Fifi (1974) prompted the Integrated Land Management of Sierra de Omoa Watersheds Project. Later, in the 1980s, at least a dozen land and water protection programs and projects were conducted. Some were designed as watershed management initiatives and others with a general resources management profile, strongly emphasizing reforestation (Dulin, 1985). These initiatives were carried out by government institutions, primarily the Ministry of Natural Resources or the former Honduran Forestry Development Corporation (COHDEF0), with technical or financial support from donors including FAO, USAID, COSUDE, CARE, etc.

Among the watershed management projects used to build national capacity in watershed management were USAID-sponsored initiatives from 1982 to 1989. The Natural Resources Management Project worked in the Choluteca River basin from 1982 to 1989. This project already included extension activities to introduce conservation of soil and water on slopes used for crops and livestock (CATIE, 1988, Hughes-Hallett, 1985; Ledesma and Gackel, 1985). Upon completion of this project, a second phase was implemented, known as Land Use and Productivity Enhancement (LUPE Project). This project, which lasted from 1989 to 1996, gave continuity to interventions in a portion of the Choluteca River basin and also expanded to other areas outside of the watershed (CATIE, 1988).

Furthermore, the Zamorano Pan-American Agricultural School also contributed to knowledge generation for scaling up from different watershed management and natural resources projects. These initiatives include the three PROCUENCAS projects (I, II, and III), implemented from 1996 to 2001, the UNIR Project (1996-1999), and the Choluteca River Upper Watershed Restoration and Management Project (2000-2001). This series of projects shows a progression in learning about engaging local actors. Thus, PROCUENCAS I (1996) was designed to solve problems with deforestation and forest fires in the Yeguaré River basin. This experience showed that community willingness to adopt practices and take action to protect the forest was enhanced if the interventions used water management as a starting point, and this was integrated into PROCUENCAS II and III. It was also recognized

that it was important to build capacity in local organizations and governments with regard to natural resources governance; UNIR did this, which led to the Yeguare Region Municipalities Association (Caballero, 2011; Pilz, interview, 2015; Flores, interview, 2015).

In general, by the 2000s, watershed management projects in Honduras were beginning to consider governance aspects, such as participatory management and institutional strengthening of local actors. Among the government-sponsored initiatives that adopted this methodology is the Multiphase Natural Resources Management in Priority Watersheds Program, known as MARENA, financed by a US\$25 million IDB loan. This program, which was part of the responses to the Hurricane Mitch disasters, was designed to build capacities and develop management instruments in local governments and central government institutions. It was also supposed to make investments aimed at sustainable natural resources management and rural development (BID, n.d.).

MARENA worked in 14 sub-watersheds located in the upper reaches of the watersheds of the Ulúa, Nacaome, and Chamelecón rivers. The chosen sub-watersheds covered over 17,600 km², with a population of close to 1.2 million people. The project organized regional sub-watershed councils in those territories, open to community-based organizations



such as water boards, trustee boards, producer associations, as well as municipal governments and municipal consortia. It also made progress with assessments of the territorial context, management plans, and sub-watershed investment plans. The last of these were to have been implemented in a second phase, but project resources were redirected in 2006 (Cruz, interview, 2015).³⁴

MARENA displays a combination of rural development and watershed management elements. According to the initial proposal, the Program considered lessons identified in a study of a half dozen rural development projects previously implemented in the country.³⁵ Although the watershed concept provided the Program's frame of reference, it was recognized that the institutional, operational, and financial capacity and conditions and legislation were not yet in place in Honduras to tackle integrated watershed management (BID, n.d.).

CATIE implemented the FOCUENCAS I and II projects from 2000 to 2009, returning to the intention to base territorial development strategies in watershed management. The FOCUENCAS projects were carried out in the Copán River sub-watershed and in La Soledad micro-watershed. These small, but innovative projects extensively systematized their lessons. The Production and Environment Roundtable (MESAP), implemented in the framework of the Consortium of the Municipalities of Copán Ruinas, Santa Rita, Cabañas, and San Jerónimo (MANCORSARIC), was particularly salient. MESAP was formed as an intersectoral space, to define territorial priorities for economic development, focusing on sustainability of water resources (Lara et al., 2007).

In addition to these initiatives aimed at "comprehensive" sub-watershed and micro-watershed management, in recent decades projects have emerged that are aimed at the protection of water sources, led by local or territorial actors. Here, a community, water board, or municipal government assumes management of drinking water. Most of these projects are solely concerned with the infrastructure for water collection and distribution; however, some of them have gradually assumed more comprehensive management of recharge areas and even entire micro-watersheds.

Experiences in the departments of Lempira, Intibucá, and La Paz, aided by CRS, stand out among those that have successfully reached these scales. Starting in the 1990s, water

34. This was initially designed as a project with a three-year first phase and a second phase that would cover an additional five years. The IDB loan, approved in 2001, corresponded to the first phase, but lasted until 2009. The second phase was not implemented.

35. These were the El Cajón Watershed Natural Resources Management Program, financed by IDB; PAAR, financed by the World Bank; and four others with bilateral support: PLANDERO, PROLANCHO, GUAYAPE, and PROLESUR (BID, n.d.).

boards began to promote actions to protect recharge areas, at times through land purchases or changes in farming practices (Ramos, interview, 2013; Flores, interview, 2013). Over time, CRS, together with communities and local government, has refined a water resources management model associated with sustainability of rural drinking water distribution systems run by community or municipal organizations and by water boards. This model is based on empowerment of communities and local government to institute planning of production activities in water recharge areas that supply water systems (Ca-sares, interview 2015). Currently, water boards and their organizations are carrying out governance processes in some 12 municipalities of the departments of Intibucá, Lempira, and La Paz, in coordination with local governments and municipal consortia, actively engaged in watershed management through watershed committees or councils.

This methodology has been integrated into recent CRS projects, such as the Integrated Management of Central American Watersheds Project (MICUENCA) and the Cosecha Azul (Blue Harvest) project. The MICUENCA project (2008-2012) took place in 20 recharge areas in 20 micro-watersheds in Honduras, Nicaragua, El Salvador, and Guatemala (CRS/GWI, 2013). In turn, Cosecha Azul is working with small coffee growers in the departments of Lempira, Intibucá, and La Paz, in southwestern Honduras, along the border with El Salvador. Both initiatives offer experiences in water resources governance in small micro-watersheds, through platforms in which water boards, community organizations, and local governments participate.

This model is not only being used in the areas where CRS has worked. In every department in the country, examples can be found of communities that, in partnership with local governments, have begun taking steps to protect watersheds supplying water, based on the 2007 Forest Act. Thus, by 2013, a total of 372 micro-watersheds had obtained an official declaration of this type, covering 3.7% of Honduras' land area (ICF/GIZ, 2014). The Forest Act prohibits any type of activity that endangers water resources, including farming and livestock activities, in micro-watersheds declared as water-supply areas. However, agricultural uses in place prior to passage of the Act were grandfathered in and are permitted, while at the same time it says that agroforestry projects should be encouraged.³⁶ Importantly, there are almost 5,000 drinking water systems administered by community organizations or water boards in Honduras (FANCA, 2006), which offer substantial potential for land and water management initiatives at the community and micro-watershed level.

36. The history of protecting watersheds that supply water dates to the 1970s, when legislation was passed to declare several watersheds as "forest reserves," but with the explicit objective of protecting the sources of the water for the cities of Tegucigalpa and San Pedro Sula (Sánchez, 2011).

Biodiversity conservation

At present, forests cover 5.4 million hectares of Honduran territory, or 48% of the country, while crops, pasturelands, and agroforestry systems such as coffee cover 32% (ICF, 2014). The extent of forest cover has facilitated scaling up a model to protect water resources based on forest conservation. Thus, the official declaration of “water producing areas” is frequently applied to forests identified as such by communities and local government. Hence, 62% of “water producing area” land is covered with forest (ICF/GIZ, 2014). Moreover, many of the 91 areas that make up the National Protected Areas System of Honduras were created with the explicit objective of protecting water sources. This can be found, for example, in the legislative decree founding La Tigra National Park in 1980 and in the Cloud Forests Act of 1987, which protected the peaks of 36 mountains and hills above 1,800 m.

Management of protected areas for biodiversity conservation in Honduras faces challenges that go beyond technical solutions. These involve governance challenges, in the face of potential threats such as unsustainable tourism and mining. They also involve “structural administrative errors,” such as the lack of a legal declaration, zoning errors such as inclusion of the buffer zone inside the protected area, and a lack of management plans (ICF/SERNA, 2009). Governance challenges are more diverse in certain large areas inhabited by indigenous or Afro-descendent peoples, such as the case of the Río Plátano Biosphere Reserve, the Tawahka Biosphere Reserve, and the Bay Islands National Marine Park. In many cases, governance challenges have been dealt with through co-management agreements between the government authority and NGOs, with poor results, either from a lack of supervision by government authorities (ICF/SERNA, 2009) or, in other cases, because NGO co-managers have lacked roots and legitimacy among the local population (Torres, interview, 2015).

However, in recent years an increase has been seen in the number of water boards, municipalities, and municipal consortia participating in agreements to co-manage protected areas.³⁷ The involvement of these types of bodies with local roots is conducive to management of these areas using a more comprehensive approach to governance. Initiatives that can provide lessons to that effect have extended their gaze beyond actual protected areas, to support projects for productive development and institutional development. This applies, for example, to the Sustainable Management of Natural Resources and Waters-

37. By 2005, municipalities or municipal consortia were participating in 18 out of 44 co-management agreements (COHDEFOR/UICN, 2005).

heds of the Mesoamerican Biological Corridor in the Honduran Atlantic Project (PROCO-RREDOR), carried out from 2007 to 2012. This project, funded by the European Union, supported actions aimed at protect area and watershed management, land registry, land use planning, and institutional strengthening.

Another project conducive to integrating local actors into co-management of protected areas with a territorial and landscape perspective is ProParque (2012-2015), funded by USAID. This project has three major lines of work: boosting rural MSMEs in the areas of tourism and cocoa; biodiversity conservations, which works with SINAPH; and climate change, which addresses the issue of disaster risk reduction as an adaptation agenda, and renewable energy projects and REDD+ as part of the mitigation agenda. ProParque has been notable for its interest in integrated watershed and landscape approaches into strategies for protected area conservation, in addition to implementation of economic options. This has led to management plans becoming more complex, something for which the co-management NGOs are not prepared. In contrast, governance problems have been more effectively addressed where the co-management entity is the local government, because this closes the gap in the authority necessary for land use planning (Sealley, interview, 2015).

Furthermore, it is important to point out that some local and territorial actors tied to water projects are moving into protected area management. Such is the case of COCEPRADIL, which has been managing Congolón National Monument for several years. Moreover, since 2012, COCEPRADII has been one of the co-management institutions for the Cordillera de Opalaca Biological Reserve. In December 2014, the Association for Integrated Watershed Management of La Paz and Comayagua (ASOMAINCUPACO) signed an agreement with ICF for co-management of El Jilguero Reserve in the department of La Paz (Coll, focus group, 2015).

Legislation, Policy, and the Institutional Framework

The legal environment in Honduras is favorable to the participation of community organizations in blue water management. In this regard, possibilities for scaling up soil and water management appear to depend on the capacity of local actors to use water laws, approached from a broader perspective that considers soil moisture.

It is worth noting that interest by communities, water boards, and local governments in water governance often comes out of their direct involvement in public water supply and sanitation services. This role in the provision and self-management of these services is covered by the 1990 Municipalities Act and the 2003 Framework Law for the Water and Sanitation Sector. The latter came to regulate and strengthen community management of water sys-

tems, and made protection of water sources and micro-watersheds the obligation of service providers. In turn, the 1990 Municipalities Act guaranteed political autonomy for municipalities, granting them powers to draw up their own development plans, to promote or regulate economic activities, and to undertake environmental protection initiatives.

The legal concept of “water supply areas” first appeared in the 2007 Forest Act, as an instrument for forest protection in relation to water for domestic, productive, and energy use. Although the National Institute for Conservation and Development of Forests, Protected Areas, and Wildlife (ICF) is responsible for officially declaring water supply micro-watersheds, the requests usually come from communities and local governments. In fact, the same law indicates that communities, municipal governments, and community or municipal forest councils must participate in the demarcation of these areas. Forest councils are bodies for participation in forest governance created by the same law and are formed at the department, municipal, and community level.

Scaling up these initiatives could be facilitated by the 2010 General Water Law, because it creates opportunities for governance at different scales (micro-watersheds, sub-watersheds, and watersheds). The law has a chapter on “Watershed Agencies and Citizen Engagement” that defines the functions of sub-watershed and micro-watershed councils. These councils are defined as bodies for coordination and harmonization of actions by public and private stakeholders involved in sectoral management in the geographical area of the watershed. However, the formation of these bodies has been progressing slowly and although dozens of mechanisms can be counted that function as micro-watershed councils, as of January 2013, only three watershed councils, four sub-watershed councils, and two micro-watershed councils had been officially recognized (GWP Honduras, 2014).³⁸

Recent legislation offers the possibility of other types of opportunities being formed. For example, even though the Law for the Establishment of a Country Vision and the Adoption of a National Plan for Honduras (Country Vision Act) establishes watershed-based regionalization, it had to adjust to a multisectoral perspective. Therefore, regional development councils have been established, along with roundtables, to address issues of food security, natural resources, and risk management, in addition to health, safe water, and sanitation (Zelaya, interview 2015).

The legal instruments covering water resources reflect the interest of civil society in water, confirming the idea that this resource can best provide a “gateway” to management of soil

38. However, in different locations in the departments of Intibucá, Lempira, La Paz, Valle, and Choluteca different mechanisms can be found that function in practice as micro-watershed councils without having been established as such under the new law (Zelaya, interview 2015).

moisture. However, the possibility of encouraging soil and water management using concerns about food security should not be ruled out, especially in the dry corridor. In this regard, it is important to note that in 2010, the Food and Nutritional Security Strategy and the Food and Nutritional Security Act were adopted. This has had an impact on programs such as PESA as well as on initiatives the Honduran government has been managing in the framework of the Alliance for the Dry Corridor. The issue of food security is clearly linked to the issue of rainfed agriculture, and in this way, can lead to green water management.

El Salvador

With a population of 5.7 million and a land area of 21,040 km², El Salvador is the smallest and most densely populated country of Central America (273 inhabitants per km²) (DIGESTYC, 2008). Three quarters of the country is covered by different agro-ecosystems on which not only agricultural production relies, but also ecosystem services essential to the country's development (MARN, 2013a).

According to the last agricultural census (in 2007), 95.2% of all land used for farming and livestock is solely rain fed and less than 5% is irrigated. However, although only an extremely small portion of land is irrigated, this consumes 66% of the water used in El Salvador (MARN, 2013b).³⁹

Of almost 400,000 producers, over 80% are subsistence farmers and over half are landless and must lease land each growing season. Sixty-eight percent of all producers work on plots of less than one hectare and over 90% work on less than four hectares (MINEC-MAG, 2009).⁴⁰

Most basic grains are grown on rainfed fields, primarily by small farmers. For this reason, the country's food production depends on precipitation and on retained soil moisture. According to MARN (2013b), it rains 1,848 mm per year (1981-2010 average), with 93% of rain falling from May to October. There tend to be dry periods in July that have become a high-risk factor for farmers. In 2014, this mid-year drought lasted for 30 days

38. Farming, pastures, and agroforestry systems cover 74% of the country; forest and shrub vegetation, 14%; mangroves and riparian forests, 2.4%; urban areas, 4.3%; rivers and lakes, 2.2%; and other uses, 3.1% (MARN, 2013a).

40. Human consumption accounts for 22% of water use; water used to generate thermal energy, 9%; and for other uses 3%. Ninety percent of irrigation systems are based on gravity and flood technologies (MARN, 2013b).

in eastern El Salvador, causing a loss of over 20% of the expected corn harvest (Trujillo, 2014; MAG, 2014).

In addition to variability in rainfall, climate change has brought higher temperatures, which have an impact on soil moisture. The average annual temperature in El Salvador has risen over 1.3 °C over the past 60 years. Currently, the average annual temperature is 24.8 °C; the hottest month is April, with an average of 26.4 °C (SNET, 2006), at the end of the dry season.

Most crops in the country are grown on slopes, including basic grains. Soil degradation is severe; an estimated 59 million metric tons are lost each year due to inappropriate use and management (MARN-PNUMA, 2007). Clean culture and livestock farming are the activities that exert the most pressure on the soil, especially for hillside and rainfed farming. Despite the severity of land degradation and the many efforts made to manage and preserve it, only 37,482 out of a total of 395,588 producers were using soil and water conservation techniques, according to the 2007-2008 agricultural census (MINEC-MAG, 2009).

El Salvador's protected natural areas cover a limited area. If all proposed areas were formalized, they would cover 1,610 km² or 7% of the country's area (MARN, 2010). Additionally, many forested areas are facing pressures that limit basic ecological functions and threaten natural regeneration processes that had reached some significance in earlier decade, but that may now be backsliding. One of the main pressures is fires set on purpose or accidentally, most of which started with burning of pastureland and crop fields. In the case of livestock, fire is used to renew seasonal pastures, primarily jaragua grass (*Hyparrhenia rufa*). There is a belief that pastures will be lost if fire is not used. As a result of this and other pressures, considerable expanses of gallery forest along river banks are disappearing.

Approaches and Pathways to Reverse Natural Resource Degradation in El Salvador

Since the 1970s, El Salvador has implemented various initiatives aimed at reversing degradation, along with transforming the use and management of basic natural resources such as the forest, soil, and water. These initiatives sought to have a large-scale impact, using various strategies: rural and regional development proposals; reforestation strategies; promotion of technological options associated with conservation agriculture; watershed management schemes; and encouraging conservation through declaration and management of protected areas. Here we illustrate some of the most relevant initiatives, their approaches, and their strategies for scaling up.

Agricultural development, rural development, and territorial development

As part of the efforts to strengthen the agroexport model, in 1970, the Government of El Salvador requested technical assistance from the Organization of American States to conduct a study to identify areas with the greatest potential for agricultural development, for the purpose of focusing the country's technical and financial efforts on these areas (OEA, 1974). As a result, it was agreed that the technical assistance would be provided for implementation of three inter-related phases: (1) a countrywide zoning study; (2) a detailed study of a pilot area representative of conditions prevailing in most of the country's agricultural areas; and (3) identification and design of development projects for the different agricultural areas, particularly the pilot area.

In 1974, the findings of the study's first phase were presented, which proposed 19 agricultural zones, divided as follows: i) intensive cropping areas (12); ii) permanent cropping areas (4); forestry areas (2); and marginal areas (1). The studies included a broad array of economic, social, and biophysical factors, emphasizing the importance of soil and water resources to foster regional development schemes (OEA, 1974). The second phase, 1973 to 1976, selected the Lower Lempa River⁴¹ as the pilot region. An information system was developed to provide the groundwork for inclusion of the spatial and regional dimension in development policies, such as estimates of the structural problems in each region, determination of development potential, and an evaluation of the impact of development programs. It was thought that the results from the pilot region would provide the basis for their subsequent application in the country's other regions as part of the 1973-1978 Five-year Agricultural Development Plan (OEA, 1977). In late 1977, the government of El Salvador allocated general budget resources as counterpart funding for implementation of the third phase of the agricultural zoning project (Diario Oficial, 1977). However, the Lower Lempa River region that was proposed as part of the second phase was not formalized, nor were the project's criteria used to define other regions.

While the proposals were being finalized with OAS technical assistance, the Ministry of Agriculture and Livestock (MAG) was working on designing a Strategic Program for Comprehensive Development of the Northern Region, with support from IICA; but the agricultural zoning proposals and criteria would be missing. This program sought to include the northern region into the country's development process by increasing income and

41. The pilot region included 24 municipalities in the departments of La Paz, San Vicente, Cabañas, and Usulután, a representative region for agriculture in that decade, and large enough for the implementation of a regional planning scheme: 3,255 km², or 15% of the country's total area (OEA, 1977).

improving living conditions for the rural and urban population (MAG, 1978). This program was structured around three components, implemented from 1978 to 1982: i) production, ranging from promoting cultivation of coffee, fruit orchards, vegetables, and agroindustry, to installing research and extension centers, among other things; ii) infrastructure, including construction of secondary roads and telephone exchanges; and iii) expansion of social services, spanning construction of health centers, schools, rural water supply systems and sewerage services; among other things (ibid.). The production component established a goal of soil conservation and torrent control on 14,000 hectares and reforestation of 13,000 hectares. In 1978, some 10 projects had already been designed, which included agroforestry development in the La Palma and Tamulasco river basins, irrigation development in Atiocoyo, small irrigation and reservoir building projects, and agrometeorological studies and determination of potential soil use. This program provided continuity to the third phase of the project begun with OAS support, but with approaches and methodology different from the original proposals.

The OAS-supported agricultural zoning project and the IICA-sponsored northern region comprehensive development program used different approaches, but shared certain features. Degradation of resources including soil and water was designated as a significant problem. Both sought to establish institutional foundations so that government agencies – particularly MAG—would lead development processes in key areas and regions of the country. As a result, capacities were created and/or strengthened in different ways: education and technical training for officials from various agencies, by creating new research and extension agencies, or by promoting coordination mechanisms for actions aimed at production, infrastructure, and improvement of basic social services.

At the same time these projects and programs were underway, in the early 1970s, another began that would continue for at least 15 years in the municipalities of Metalío (Sonsonate) and Guaymango (Ahuachapán). It would become an important reference point because of its achievements in transforming soil management practices by small basic grains producers. In 1970, an extension agency was opened in Guaymango (a municipality covering slightly more than 60 km²), which started work with the extension agents conducting an assessment, which wrapped up in 1973. The results revealed a high level of poverty and dietary deficiencies associated with health problems as the most important challenges (Calderón et al., 1991). The low productivity of farming systems, tied to the level of soil erosion, stubble burning, farm size, land tenure status, and illiteracy were considered important factors having a bearing on poverty. From 1974 to 1981, the extension agency took action in the framework of three programs: Modern Basic Grain Farming Practices Program (PPTGB); Rehabilitation and Development of Basic Infrastructure and Crop Diversification Program (PREDIBDPA); and the Granary Building Program (PCG). From 1974 to 1978, activities were limited to Guaymango, but from 1979 to 1981 they were expan-

ded to Metalío, a hamlet in the municipality of Acajutla.⁴² By 1983, 398 mutual assistance groups had been successfully formed, with 1,678 farmers and 2,356 hectares. The system was based on conservation tillage: no stubble burning, maintaining ground cover, use of improved corn varieties, and moderate fertilizer use. This resulted in considerable increases in productivity, which rose from an average of 0.97 tons of corn per hectare in 1974 to 2.1 in 1989 (*ibid.*).⁴³ The agrarian reform of 1980 also had an impact in Metalío and Guaymango by overcoming the precarious conditions of farmers, who were much more interested in adopting conservation practices once they became landowners.⁴⁴

The uncertainty resulting from the war in the 1980s limited attempts to implement development programs and projects with the regional approach that had been sought since the previous decade. Although activities continued, it was not until the 1990s, as part of the post-war period, when there was a return to attempts to promote rural development using regional and territorial approaches. However, this time they were not only focused on central government capacity, but also on different local actors, such as municipal governments and local-territorial organizations, which came to play much more predominant roles in development efforts.

In this context, for example, several projects were implemented that were supported by donors such as IFAD and the European Union. In the case of IFAD, the projects started with financial support for credit programs for production and productive diversification, and for construction of basic infrastructure, homes, and markets to expand trade opportunities for producers, and shifted to programs that sought to promote opportunities for territorial coordination and consensus building.⁴⁵ Of particular relevance was the Project

42. PPTGB was based on the organization and promotion of mutual assistance groups with a minimum of three farmers each, as the basic institutional arrangement for access to credit and technical assistance. In turn, although PREDIBDPA was geared to basic infrastructure, it fostered soil conservation and agroforestry. PCG was implemented only in 1977 and 1978 to take advantage of the increase in production and reduce post-harvest loss from storage problems (Calderón et al., 1991).

43. In 1974, only 12 mutual assistance groups had formed, made up of 82 farmers on just 18 hectares (*ibid.*).

44. A study in the 1990s on market conditions for marketing stubble concluded that in Guaymango, the amount of biomass generated was enough to enable its dual-purpose use, as mulch and fodder, and that that was a basic condition for the adoption of conservation tillage in other areas. The mere fact of not burning stubble did not necessarily mean that conservation tillage practices were adopted, as was noticed around Opico, where practices similar to those in Metalío and Guaymango were being promoted (Choto and Saín, 1993).

45. From 1984 to 1987, the Global Agricultural Credit Program was carried out as part of the economic recovery strategy aimed at small producers of basic grains on plots smaller than two hectares for obtaining production inputs. Through support to this Program, IFAD began a series of operations to support rural development efforts in El Salvador: PRODAP (1990-1998), PROCHALATE (1992-2000), PRODERNOR (1997-2004), PRODAP II (1999-2006), PREMODER (2001-2010), PRODEMORO (2005-2013).

for Rehabilitation and Development of Areas Affected by the Conflict in the Department of Chalatenango (PROCHALATE), implemented from 1994 to 2000 as part of post-war reconstruction, following the 1992 Peace Accords. PROCHALATE was funded by nine cooperation agencies, with IFAD and the European Union as the main funders. It is noteworthy that this effort attempted to ground coordination in a sort of emerging local government during the post-war period, which at the same time responded to the confusion of multiple funding sources and the failure of the central government to properly coordinate them. Following several years marked by gaps, uncertainties, and tensions around implementation, in 1997, project implementation was reorganized, to emphasize addressing the department's environmental problems and the option of consensus building as a way of working. One of the main outcomes of this was the Departmental Environmental Management Plan (PADEMA), led by the Environmental Committee of Chalatenango (CACH) (Gómez and García, 2002).⁴⁶ To boost PADEMA, CACH created a Facilitating Technical Unit and fostered creation of 26 Environmental Units for Production and Sustainable Management (UAPMS), which were designed as geographic regions defined by common problems and interests (CACH, 2003). In practice, only a few UAPMSs were sustained and an evaluation done when PROCHALATE was about to close down warned that funding to create them was limited. It also mentioned obstacles to implementation of PADEMA, including these: the program's failure to incorporate plans by co-implementers and institutions; lack of a sense of ownership among the population; absence of a legal framework to legitimize civic engagement in the UAPMSs and CACH; limited decision-making power of representatives from central government public institutions; and a lack of willingness by mayors to work with the UAPMSs, due to their perception that public participation in PADEMA detracted from their authority (MAG-PROCHALATE, 2000). PROCHALATE ended in 2000 and CACH operated until 2005. In 2009, it was reactivated as a venue for coordination among different organizations (Municipal Environmental Units, government institution representatives, and NGOs), which provided resources and time to issues of strategic importance to the territory, including updating PADEMA in 2012.

46. PADEMA grew out of an extensive consultation process led by CACH. The basic purpose of PADEMA was to create and consolidate a participatory environmental management system around four strategic lines: i) territorial reorganization; ii) economic restructuring (including giving up practices that degrade natural resources), the fight against poverty, and changes in consumption patterns; iii) institutional reform for a different relationship among the State, municipal government, and territory; and iv) cultural reclamation and changes in values, beliefs, and attitudes (CACH, 1999).

47. PRISA was part of a group of broader operations sponsored by the World Bank, the Inter-American Development Bank, and the United States Agency for International Development to institutionalize structural adjustment reforms, economic liberalization, and a redefinition of the role of the State (Rosa, 1993; Fuentes, 1993; Barry, 1994). PRISA was implemented around three components: i) reform and institutional development of MAG and CENTA; ii) agricultural research and extension; and iii) improvement of land registry and cadastre service. A fourth component was also included, aimed at emergency works in response to the impact of Hurricane Mitch and the 2001 earthquakes (The World Bank, 2003).

While specific projects were being implemented and territorial initiatives and actors such as CACH in Chalatenango were emerging, institutional reform processes were also being implemented nationally. These would have direct implications on the direction of rural development, as happened with the reform in the agricultural sector. The Agricultural Sector Reform and Investment Project (PRISA) implemented from 1994 to 2003, was advised and funded by the World Bank. PRISA sought to strengthen institutional capacity in the agricultural sector, focusing on MAG and CENTA; accelerate the generation of productive and environmentally sustainable agricultural technology; and contribute to productivity improvements of small and medium farmers (The World Bank, 2003). The main results of implementation of PRISA transformed the nature of MAG, reducing its scope and weight. It was limited to a role of regulator and facilitator whose sectoral development policies would be market-driven. CENTA became an autonomous institution whose research focused on small and medium farmers. It developed and tested seed varieties, along with technologies to promote diversification to higher-value crops, such as fruits, vegetables, agroindustrial crops, animal production, and even technologies for natural resources management (small-scale forest plantations and soil conservation). However, the latter represented only 6% of PRISA's research projects over its lifetime (The World Bank, *op. cit.*). The main change with regard to extension work was a reorientation of the extension methodology, which shifted from a training and visiting approach to goal-oriented extension. This would be used to foster a transformation in monocrop-based production systems, integrating a business perspective that would support decision-making to switch to production lines with more commercial potential, consistent with the reorientation of agricultural policy.

At the same time, but from a different perspective, based in the socioeconomic and environmental reality of small rural hillside-farmers, a number of much more specific projects were implemented. They would share a common denominator in concern for rural development, but this time seeking to have an influence over the promotion of slope-farming management models. This happened with the Sustainable Slope Agriculture Project (CENTA-FAO-Laderas); the Institutional Development for Sustainable Slope-Farming Production in Central America Project (IICA-Holanda/LADERAS); and the Sustainable Slope-Agriculture in Central America Program (PASOLAC).⁴⁹ Using different approaches, these projects sought to develop methodologies, tools, and models for slope management with an impact at significant scales.

48. IICA-Holanda/LADERAS was implemented in Honduras and El Salvador, and PASOLAC was implemented in Honduras, El Salvador, and Nicaragua.

The CENTA-FAO-Laderas Project, implemented from 1994 to 2002, was based on the watershed as the basic planning unit. It carried out a number of actions including a participatory planning methodology for soil and water use and management, agricultural diversification, and strengthening the organization of production with a gender perspective in communities located in micro-watersheds in Cabañas, Morazán, and Usulután (Van Ginneken et al., 2001). Despite good results, and that this project was institutionally based in CENTA, the evaluation mission pointed out that the institutional changes in CENTA's model for technology generation and transfer through PRISA, in particular the goal-oriented extension methodology, conflicted with participatory planning in micro-watersheds. The coexistence of both methodologies meant a delay in the internalization of the methodology developed for the CENTA-FAO-Laderas project, despite the micro-watershed-based approach and that land management and agricultural diversification promoted by the project was widely accepted by CENTA staff members working on the project. According to the evaluation mission, based on its results and because of the difficulties in attaining results with goal-oriented extension, CENTA chose the micro-watershed model (*ibid*).

The IICA-Holanda/LADERAS project was based on the belief that overcoming poverty and the degradation of natural resources on slopes would require a wide variety of institutional actors to come together, which meant that it was necessary to promote coordination mechanisms at local, national, and regional levels (Baumeister and Hurwitch, 1997). This project, which ran from 1995 to 2002,⁵⁰ worked to improve livelihood security for farmers and their families, while ensuring sustainability in natural resources management and meeting the needs of those who use water that originated from hillside sources (Miranda, 2003). The innovative approach of this project was repeatedly highlighted by different actors, as well as by different evaluation missions. However, in 1997, the project was advised that it needed to put farmers more at the center as stakeholders. Even though the promotion phase garnered strong interest and participation by stakeholders—e.g., mayors, teachers, health workers, and other public officials—it was observed that stakeholders who were farmers had less influence compared to the empowerment of other actors, located primarily in municipalities' urban seats (Baumeister and Hurwitch).⁵¹ At the end of the project, integration of the territorial approach was identified as one of

50. The first stage (1995-1998) emphasized an outreach role for the project, with collaborative actions aimed at sustainable development. The second stage (1998-2002) was categorized by its role as facilitator and promoter of co-management, transferring competencies and authority exercised by the project to local and national organizations. Finally, the third stage (after 2002) corresponded to the project's exit and to the self-management process by organizations. The project presumed that each of its interventions would be designed thinking about its exit and on the need to build institutional capacities that would enable the continuity of actions and benefits produced during the project's lifetime. (Miranda, 2003).

51. In El Salvador, the municipalities were Nueva Concepción (Chalatenango) and Jocoro (Morazán).

its main limitations, even though interinstitutional consensus building and coordination made significant headway and had an impact in local settings, because at the national level, public policies still used a primarily sectoral approach (Miranda, 2003).

In turn, PASOLAC,⁵² which also focused on hillside farming, worked toward transforming traditional agriculture, using effective demand-driven services and strengthening competitiveness in harmony with the environment, to improve people's quality of life. PASOLAC had four components: research; technology validation and transfer; capacity building for professionals, technologists, and farmers; and institutional coordination. In the case of El Salvador, from 2006 to 2008, the Program was implemented with the idea of becoming a nationwide program, paving the way for the Sustainable Slope Agriculture in El Salvador Program (PASOLAES), which was housed in MAG's Policy and Strategy Office. This was part of the exit, advocacy, and scaling up strategy, under the premise that sustainable farming actions on slopes nationwide could be promoted through policies. PASOLAC and PASOLAES developed a number of technical guides, systematizations of experiences, and trainings in different areas: soil and water management; local economic development; integrated watershed management; rural enterprise development, based on a value-chain approach; advocacy around agricultural and environmental policies; and payment for environmental services mechanisms implemented through municipal governments (this happened with municipal-level payment for environmental services pilot actions). These actions were aimed at promoting institutionalization of arrangements that would link slope management actions with water collection and production for different uses. Through this approach, the program sought to carry out efforts to put the supply and demand of environmental services to work, emphasizing local-level water services. However, it did not accomplish much and, following its finalization, the main actions did not have the expected follow up.

In the case of municipal governments, a variety of experiences were aimed at responding to the challenges of rural poverty and environmental degradation using different approaches that had also shifted toward a territorial orientation based on joint municipal jurisdictions. This happened with municipal consortia or associations, with considerable aid from international cooperation agencies, such as the experiences of the Honduras-El Salvador Binational Border Development Program, funded by the European Union and implemented from 2002 to 2009.⁵³ The Binational Program arose as part of an in-

52. PASOLAC was implemented from 1995 to 2008 in El Salvador, Honduras, and Nicaragua.

53. The intervention area was located along the 300 km of land border between the two countries, including the departments of Ocotepeque, Lempira, Intibucá, La Paz, and Valle in Honduras, and Chalatenango, Cabañas, San Miguel, Morazán, and La Unión in El Salvador (GOPA, 2007).

vestment-promotion strategy for development of the border region, as an instrument to strengthen regional integration and to monitor reconstruction and transformation actions that the European Union was supporting following the ravages of Hurricane Mitch (European Commission, 2000). Its main objective was oriented to improving capacity for local development planning and management by the population living near the border, through fostering organization, coordination among local governments, and the implementation of financing mechanisms that will make it possible to implement projects to improve quality of life (GOPA, 2007). To do this, the Binational Program adopted a facilitator approach supporting implementation of proposals for collaboration, consensus building, coordination, and consolidation of municipal associative processes, strengthening institutional and citizen engagement (*ibid.*). The Program defined four operative regions in which work with municipal consortia and micro-regions was promoted through nine core local development areas, focusing on specific issues.⁵⁴ These core areas constituted the main opportunity for interaction among various actors to encourage local governance-based development processes, which was understood as collaboration, coordination, and consensus building among local governments (at the municipal consortia level) and civil society organizations in the different territories (*ibid.*).

From another perspective, in southern El Salvador, the Nonualco Municipalities Association (ALN) was created in 2002 in the wake of the 2001 earthquakes, based on an initiative of four municipal governments that sought to address the effects of the earthquakes together. It was formally constituted that year by seven municipal governments, and later expanded to sixteen. The ALN fostered the Local Economic Development Strategy for the Nonualcos Region,⁵⁵ which reflected the region's shared development vision. Its overall objective is to improve people's living conditions, by revitalizing local economic development, strengthening local capacity, and building consensus among public and private actors in the territory. This strategy is a tool for resource management, alliances, and political advocacy (Interview with Enrique Merlos, 2015). A territorial institutional framework has developed as part of

54. The core areas were: 1) support for the territorial planning process in La Montañona Consortium (Chalatenango); 2) comprehensive water resource management and decentralization (Lempira); 3) Marcala-Perquín binational economic corridor (La Paz, Morazán); 4) binational expansion of the livestock socio-productive chain in the southeast (La Paz, Morazán, La Unión); 5) production chains linked to binational economic development (Ocotepeque, Chalatenango); 6) binational integration for greater access to basic services (Lempira, Cabañas, Chalatenango, San Miguel); 7) decentralized natural resources management in the binational setting (Intibucá, San Miguel); 8) strengthening social capital for productive recovery along the southeastern border (La Paz, Valle, La Unión); and 9) strategic investments in the binational Goascorán River basin (La Paz, Valle, La Unión) (GOPA, 2007).

55. These strategies were developed with support from the FORTALECE/GTZ Program, FUNDE, and the IDB Social Entrepreneurship Program. "Public-Private Partnerships for Local Economic Development in El Salvador" Project (FUNDE/AMN/GTZ/BID).

this strategy, including the Nonualcos Economic Development Council (CODENOL), made up of private actors, organized productive sectors, and the public sector in the territory. Likewise, different regional public-private consensus-building venues exist.⁵⁶

In 2013, the mayors recognized that the seriousness of environmental problems was holding back territorial development (Interview with Enrique Merlos, 2015). In response, they developed territorial governance plans in two priority watersheds: the Jaltepeque Estuary and Jiboa River watersheds. These plans were based on three components: i) environmental management; 2) economic development; and iii) institution building (Interview with Enrique Merlos, 2015).⁵⁷

With regard to economic development, plans included development of the cocoa chain and promotion of more environmentally-friendly agriculture. They also sought to reverse soil degradation due to poor farming practices, deforestation, and degradation of the upper watersheds, by regulating the extraction of gravel, decreasing the impact from flooding during the rainy season, and reducing water pollution from dumping. This led to the development of a watershed management plan and funds are being raised to build a water treatment plant and risk protection and mitigation works, in coordination with the Ministry of Environment, Ministry of Economy, and Ministry of Agriculture (ibid).

Watersheds and water resources

The 1970s marked the beginning of systematic efforts to address the severe degradation of natural resources that had been noticed in El Salvador since the 1940s.⁵⁸ In addition to recurrent problems from flooding, such as that from the San José River in Metapán, there were also needs to ensure water supply, reduce sedimentation behind the recently-built Cinco de Noviembre hydroelectric dams, plus widespread problems from soil erosion. In the 1970s, this led to a strong but short-lived interest in large-scale reforestation as a way to restore soil and water resources in watersheds, which shifted to the need to transform productive practices of small subsistence farmers.

56. Tourism Roundtable, Fisheries Roundtable, Coalition of Women for Local Economic Development, Youth Roundtable, Los Nonualcos Youth Network, Rural Youth Cooperative, Employment Roundtable, Network of Business and Financial Development Services Providers, Federation of La Paz Fishery Cooperatives, and the Agricultural Cooperative Federation.

57. Plans were developed with support from the Local Government Strengthening Project, implemented through a World Bank loan.

58. En 1945 el gobierno salvadoreño solicitó apoyo al Institute of Interamerican Affairs, para elaborar un plan de implementación de prácticas tendientes a la conservación de la tierra y a la conservación y aumento del abastecimiento de aguas en El Salvador (Michaelsen, 1976).

Reforestation efforts were carried out in the upper watershed of the Lempa River, through two FAO-sponsored projects: Watershed Protection and Forest Development in the Northern Region (1971-1973) and Forest Development and Watershed Land Use Planning (1973-1977).⁵⁹ As part of these efforts, the 1973 Forest Act was passed, which was designed around a vision of fostering protective reforestation, considering the forest as indispensable to conservation and to improvement of other renewable natural resources.

Despite these attempts, it was not long before the limits of the reforestation-based strategy to protect other natural resources became visible. Michaelsen (1976) noted that it would be impossible to achieve rapid reforestation due to the lack of government control over lands suitable for forestry; the presence of a large number of smallholders and tenants on lands appropriate for forest use; the lack of attractive subsidies to encourage private parties to establish protection forests; and the degraded condition of the soil. In 1980, FAO warned that under-performance of reforestation goals was due to lack of a strong forestry policy from the government with regard to land use, forestry credit, and lack of orderly planning (FAO, 1980).

In the 1980s, new reforestation proposals were developed in the context of the agrarian reform. To the extent that land reform consolidated smallholdings—the predominant pattern on land for forestry—these proposals returned to thinking about what could be achieved on these lands (Barry et al., 1996). Thus, from 1980 to 1992 a significant shift resulted in the implementation of three projects sponsored by UNDP-FAO, this time oriented toward small farmers. The main objective of these projects was dissemination of a conservation agriculture and agroforestry model: the Project for Conservation and Utilization of Renewable Natural Resources in the Northern Basin of the Cerrón Grande Dam was implemented from 1980 to 1984; the Development of Rural Communities and Watershed Land Use Planning Project from 1985 to 1986; and the Agroforestry Support to Rural Poor Communities Project from 1987 to 1992 (Cuéllar et al., 2004).

Together, these projects contributed substantively to finding more appropriate technological options for small farm production, which then became key to the implementation

59. During the first project, a demonstration area of approximately 2,000 hectares was established on property acquired by the government (Metapán Pilot Project), which operated as a research and training center for national technologists. It also sought to adapt and demonstrate modern resource management and conservation, watershed protection, reforestation, and integrated land use, including establishment of a model agroforestry community in the Metapán pilot watershed. The priority of the second project was watershed land-use planning, which intended to have national coverage. From 1973 to 1977, 27 forestry agencies and 6 forestry sub-agencies were established in MAG's administrative regions. The goal was to reforest 20,000 hectares, which was scaled back to a less ambitious figure following the experience of the first year (Cuéllar et al., 2004).

of more wide-reaching actions. This was the case with the Environmental Program of El Salvador (PAES), one of the most ambitious efforts after the Peace Accords, which ran from 1998 to 2004. Funded by an IDB loan, PAES was aimed at stopping erosion and sedimentation in the upper Lempa River basin as a strategy to reduce siltation of the Cerrón Grande dam and prolong its life. Three components were designed to accomplish this: one relating to soil conservation and agroforestry; one for monitoring water resources; and one for management of protected natural areas.⁶⁰ PAES was designed to include a watershed approach: the main sub-watersheds for intervention were identified and micro-watersheds were prioritized. However, the main criteria for choosing specific farms and beneficiaries focused on productivity, profitability, and return on investment, while leaving out the most degraded, poorest areas. Nevertheless, the soil conservation and agroforestry component sought to go beyond targeting individual farms, by promoting forms of social organization and a number of incentives to promote community-scale collective actions (Herrador, et al., 2005).⁶¹ Performance indicators for soil conservation and agroforestry targets, measured in works and practices carried out, influenced the dilution of the watershed approach, concentrating efforts at the farm scale.⁶² Despite this, it has been recognized that PAES promoted ‘concentrated farm areas’ where soil conservation and agroforestry works and practices were adopted. What still remains today are farms with agroforestry systems (fruit trees), soil and water conservation works, and dead barriers on farms located in the intervention areas (Chavarría, interview 2015). Efficiency in meeting physical targets meant that when PAES ended in 2004, funds were left over (\$3.13 million), which were allocated to funding the natural resources management component under the Trinational Program for the Upper Lempa River Basin, in the Trifinio area in El Salvador (Tobar, 2007), instead of expanding or strengthening the achievements of the initial sites.⁶³ PAES did not promote micro-watershed or sub-watershed organizations, but rather other organizational types, for both project implementation and

60. Although these components were designed as part of an integrating framework, in practice they were implemented separately. Soil conservation and agroforestry actions targeted two municipalities in Santa Ana (Texistepeque and Coatepeque) and two in San Salvador (Tenancingo and Guazapa).

61. According to former project technicians, in the end the community banks interested the farmers the most, among the different types of incentives used. Several still operate in Santa Ana (interview with Hernán Chavarría of MARN, 2015).

62. Several project technicians felt that the micro-watershed approach could have been better addressed without the strong pressure of the established physical goals, reflecting the lack of a strategy to link the farm as a production unit to territorial units and broader management strategies (Herrador, et al., 2005).

63. The Trinational Upper Lempa River Basin Program was to be implemented using three loans that the countries of Guatemala, Honduras, and El Salvador were to obtain from the IDB. However, El Salvador did not have enough votes in the legislature to ratify its loan, which led to it using left-over PAES resources to implement actions in the Trifinio area, as part of the Trinational Program.

to facilitate monitoring of actions once it had ended (committees for communal inputs administration, producer associations, communal banks, marketing committees, municipal environment committees, etc.)

Interest in watershed management also grew during reconstruction following the signing of the Peace Accords in 1992, as an outcome of expansion of community and municipal drinking water systems. Although most drinking water access projects focused on construction of infrastructure, concern about ensuring sustainability of water resources was gradually introduced, primarily related to protection of water sources.⁶⁴ Different projects have been implemented with this dual focus. However, there has been a more recent trend to further develop institutional arrangements that would ensure micro-watershed and sub-watershed management, as well as the inclusion of agendas and actors from a broader water governance perspective (e.g., this occurred with the Access, Management, and Rational Use of Water Project—AGUA—which ran from 1999 to 2002 in 18 municipalities in the departments of Ahuachapán, Usulután, and Morazán).⁶⁵ The goal of the AGUA Project was to increase access to clean water in rural areas, in harmony with the environment, to ensure sustainability of water resources. To this end, the project worked on four components: i) watershed management and agroforestry; ii) water delivery and environmental sanitation systems; iii) environmental education; and iv) local development. This project fostered the participation of municipal governments and community organizations such as ADESCOs in water resources management, contributing to building capacities for planning, watershed management, and soil and water conservation. It led to the adoption of municipal ordinances for water resource management, sanitation, and watershed management. It also worked on developing integrated water management plans and watershed committees in four pilot sub-watersheds (San Simón and El Borbollón in Usulután; Corinto in Morazán; and Cara Sucia in Ahuachapán) (Berganza, 2004). This project also included public policy advocacy, promoting approaches such as integrated water management and multiactor platforms for water governance in the context of impassioned debate over the orientation of the proposed water sector reform being pushed by the government. The proposal was to implement concession schemes and markets for water-use rights; opening administration of urban water delivery systems to private

64. For example, the Association for Drinking Water System, Sanitation, and Environmental Management of Joateca Municipality Urban Seat (ASAPMSA), founded in 1994, purchased a piece of land in the San Antonio River (a Torola River tributary) micro-basin using monetary contributions from community residents, who also contributed labor to build soil and water conservation works to protect and conserve springs (FAO Facility, 2009).

65. The AGUA Project was funded by USAID and implemented by NGOs such as World Vision and a consortium made up of CARE-EI Salvador, SalvaNATURA, FUNDAMUNI, and SACDEL.



sector participation; and the creation of new bodies for water stewardship and for regulation of the drinking water sub-sector (Cuéllar et al., 2001). The proposals did not prosper because different social actors rejected them and mobilized against them.

From 2007 to 2012, the Integrated Management of Watersheds in Central America Project (MICUENCA) was implemented in El Salvador, Honduras, and Nicaragua by CRS as part of the Global Water Initiative (GWI), with funding from the Howard G. Buffett Foundation. The goal of MICUENCA was to reduce the vulnerability of poor rural communities to water-related impacts. In El Salvador, the project covered 31 communities in the departments of San Vicente, Morazán, and La Unión.⁶⁶ MICUENCA underwrote construction of water systems for human and production use. Through administrative organizations for water delivery systems (water boards and ADESCOs), it promoted water resources management, including construction of soil and water conservation works, to make water delivery services sustainable, and training of farmers in water harvesting technologies and the management and maintenance of drip irrigation systems. MICUENCA identified issues that communities could not resolve on their own or in isolation. It was concluded that there was a need to act from a multi-level perspective and watershed scale: lack of water sources near agricultural fields, water sources on land outside the community, etc. MICUENCA also promoted public policy advocacy at the municipal level. To this end, it supported training and strengthening of environmental units in municipal governments.

66. Each department was served by a co-implementer (CARE, ACUGOLFO, FUNDESA, and Cáritas San Vicente), under CRS leadership.

Along these lines, some municipal governments allocated municipal funds to manage water recharge areas. It also facilitated collaboration among water boards, local governments, and landowners in at least 15 cases where there was also participation from municipal consortia and micro-regions, given that two or more municipalities often share the boundaries of micro-watersheds and sub-watersheds (Casares, interview 2015).

Along a different line, from 2004 to 2009, MARN implemented several AECID-funded projects aimed at creating and strengthening a number of watershed associations.⁶⁷ By 2010, there were 11 watershed associations made up of community representatives (mainly ADESCOs and water boards), productive sectors, NGO representatives, and government agencies. Their objective was to build local capacity for the rational use of natural resources and watershed management.⁶⁸ Since their formation, the associations have promoted participatory natural resources protection efforts associated with watersheds. This meant that they fostered construction of soil and water conservation works (cross-slope channels, infiltration pits, live and dead barriers, etc.), reforestation, and protection of water sources based on water recharge area management plans. In northern La Unión Department, ACUGOLFO has implemented environmental and watershed management projects, such as the Natural Resources and Environmental Restoration and Management Project through Integrated Water Resources Management, co-funded by PRODEMORO (IFAD) and MICUENCA. This is aimed at community organizing, strengthening of local structures, coordination with local governments and institutions, appropriate technology transfer, strengthening Municipal Environmental Units, strengthening water system administration boards, and water and sanitation advocacy work. ACUGOLFO is a founding member of the Goascorán River Binational Management Group (Honduras and El Salvador) and participated in development of the Goascorán River Binational Watershed Management Plan. However, despite the role played by watershed associations, these groups have not become institutionalized, because the General Water Law bill, introduced in the Legislative Assembly by the executive branch has still not passed.⁶⁹ In February 2011,

67. Article 48 of the Environment Act mandates MARN to create a national interinstitutional committee on watershed planning, management, and sustainable use, which is to include local authorities.

68. The main agencies are: Association of Lake Ilopango Watershed Agencies (ASOCLI); Jiquilisco Bay, Usulután, Sub-Watershed Association (ASUSCUBAJI); Gulf of Fonseca Watershed Association (ACUGOLFO); Watershed Association for the Cara Sucia - San Pedro Belén Water Region (ACURHCASSPEB); Lake Güija Watershed Conservation Association (ASPROGUIJA); Torola River Integrated Watershed Management Association (AMICUERT); and the Association of Grande de Tilapa and Soyate Rivers Watershed Organizations (ASOCTISO).

69. Article 24 of the bill mandates creation of watershed committees. Article 28 mandates establishment of regional watershed agencies as MARN technical-administrative bodies, which will implement actions to monitor, facilitate, and oversee integrated water resources management in each water region, including use, development, protection, conservation, and recovery (MARN, Anteproyecto de Ley General de Aguas, 2012).

MARN organized the creation of a national watershed association network (Watershed Association of El Salvador- ACHES), a third-tier organization. Its goal is to protect and conserve water through integrated watershed management with the inclusion of different societal actors. However, it lacks follow-up, leaving watershed associations to subsist by implementing small projects.

National parks, protected areas and biodiversity conservation

The establishment of national parks and protected areas in El Salvador is strongly linked to concerns about soil and water degradation. However, in recent decades, interest in biodiversity has become more important, along with greater concern about the complexity of conservation in facing the challenges of governance for the viability of protected and conservation areas.

Based on the 1973 Forestry Act, two land protection areas were established: the first, to protect water resources threatened by urban growth in the areas of the San Salvador volcano and its surroundings, Mount San Jacinto, and the Lake Ilopango sub-watershed; and the second in Chalatenango, to control erosion that was affecting the Cerrón Grande reservoir. Using the same law, the Montecristo (1987) and El Imposible (1989) national parks were also established. El Jocotal (1996) and San Lorenzo (2000) were declared protected areas, along with forestry bans, and criteria for establishment of salt works and fish farms in mangrove areas (Cuéllar et al., 2004). In 1974, the Forestry and Fauna Service and the National Parks and Wildlife Unit were created in the Ministry of Agriculture and Livestock, initiating the process to identify and assess protected natural areas and conservation areas in El Salvador. By 1976, 47 natural areas had already been recognized under different land tenure systems (MARN-UICN, 2005).

With implementation of the agrarian reform in the early 1980s, a number of areas with forest cover that had been awarded to cooperatives were declared as reserve areas. The idea was that these areas would be declared protected areas. Based on the Basic Agrarian Reform Law of 1980, over 22,000 ha were declared reserve areas, covering the country's main natural areas and affecting haciendas that contained close to 92 natural areas (CBM-MARN, 2003).⁷⁰ The reserve areas were put under the jurisdiction of the Salvadoran Institute for Agrarian Transformation (ISTA).

70. Reserve areas had the potential to be earmarked for conservation because they contained representative ecosystems, which should be transferred from the reformed sector to the government (Quintana and Sermeño, 2010).

In the early 1990s, a new phase developed, in which new interests took shape in biodiversity conservation, protected areas, and overall environmental management. Progress moved in two directions from 1990 on. On the one hand, a new governmental environmental institutional structure and regulatory body were being created through which the government developed a new framework for environmental management that included the creation of MARN in 1997. On the other hand, it limited the actions of existing entities, as happened with the National Parks and Wildlife Service.⁷¹ The new institutional structure was strongly linked to regional and international commitments made by the government, including ratification of agreements related to global environmental change such as desertification, biodiversity conservation, and climate change (Gómez et al., 2003). In this context, strategies were aimed at natural resources conservation and ecosystem conservation as part of the regional Mesoamerican Biological Corridor strategy, supporting projects for strategic sectors in conservation and agricultural production, such as the Coffee and Biodiversity Program.

International agreements have had a significant impact on the reorganization of the environmental institutional structure; expansion of approaches; redefinition of competencies; and regulation, implementation, and coordination of activities. Plans, programs, policies, and regulations needed to be reviewed and updated (Quezada, 2003), and therefore the organizational restructuring of MARN was adjusted to respond to following international agreements by forming different departments and management areas.

The 2001 earthquakes sparked heated debates that led to the development of a proposal for a National Land Use and Development Plan (PNODT), which takes up conservation initiatives and proposals and links them to a Special Plan for Protection of Natural Spaces (EPYPSA-IBERINSA, 2003). This plan relaunched strategies for conservation of natural spaces through a land management system based on development of management categories, the declaration of protected natural areas, and organization of 15 conservation units (Gómez et al., 2003). The natural areas identified in the 1970s, the reserve areas declared as part of the agrarian reform of the 1980s, and new areas and ecosystems iden-

66. As part of the reform of the agricultural sector, the staff and other resources of the National Parks and Wildlife Service decreased significantly. This led to the formation of alliances with NGOs to continue working on conservation goals in a context of lack of funds, insufficient technical staff and logistical support, the accelerating deterioration of the areas, and the poor consolidation of institutional efforts (Gallo, 2006). Societal participation in the management of protected natural areas began in 1992, with the signing of the first co-administration agreement for El Imposible National Park by SalvaNATURA. In 1994, four more similar agreements were signed for the protected areas of San Marcelino (ASACMA), Barra de Santiago (AMAR), San Diego-La Barra (Asociación Pro-Humedales de El Salvador), and El Amatal (La Laguna Botanical Garden) (ibid.).

tified in the 1990s added up to some 118 natural areas proposed to make up the National Protected Areas System, mandated in the 2005 Protected Natural Areas Act.⁷²

In order to consolidate the National Protected Areas System, regularize land tenure, and institutionalize management models for protected areas, MARN implemented the PACAP Project (Protected Areas Consolidation and Administration Project) from 2005 to 2012 with support from the GEF and the World Bank. The aim of PACAP was to conserve biodiversity of global interest through strengthening the protected areas system and consolidating two priority sites (The World Bank, 2012). PACAP was designed to link up with other national and regional initiatives. From the GEF's perspective, successful implementation of PACAP in two pilot sites would be key to solidifying the National Protected Areas System. It would provide the basis for expanding the national segment corresponding to the Mesoamerican Biological Corridor and would complement another project funded by the GEF and World Bank to institutionalize a system of charges and payments for environmental services.⁷³ PACAP supported a draft of the protected areas strategy. It also proposed a national land-use plan through which 15 conservation areas would be created to integrate fragmented areas into the national protected areas system using a broader landscape approach (*ibid.*). Despite these outputs, PACAP went through several problems during its implementation. Finally, it largely failed to show expected results at the national level, although at the local level, it supported significant efforts at landscape-scale governance, in both Jiquilisco Bay (Usulután) and in the San Diego La Barra (Metapán) area.

In 2010, of 189 identified natural areas (181,725 hectares), 59 had been legally declared as protected areas (35,045 hectares). Of these 59 areas, 42 were reserve areas under the agrarian reform, of which, in turn, only 28 had been demarcated (Quintana and Sermeño,

72. As part of its global and regional biological diversity commitments, El Salvador will also develop a proposal for the creation of the biological corridor, which will form part of the Mesoamerican Biological Corridor.

73. In 2005, an Environmental Services Project was drafted, which was to be implemented with a grant from the GEF (\$5 million) and a loan from the World Bank (\$5 million). The loan lacked the votes to be ratified, which also kept the GEF grant from being awarded. The Environmental Services Project sought to create payment for environmental services mechanisms to provide incentives for the sustainable use of the land in hillside areas in at least two pilot areas, which would provide the basis for creating a framework for implementation in different watersheds around the country. The GEF's interest was to ensure that the project would contribute to biodiversity conservation, expansion of the Salvadoran section of the Mesoamerican Biological Corridor, pilot payment for environmental services mechanisms as long-term conservation instruments that could be replicated and scaled up in El Salvador and other countries, research of links between changes in land use and environmental services, and increased carbon sequestration (The World Bank, 2007).

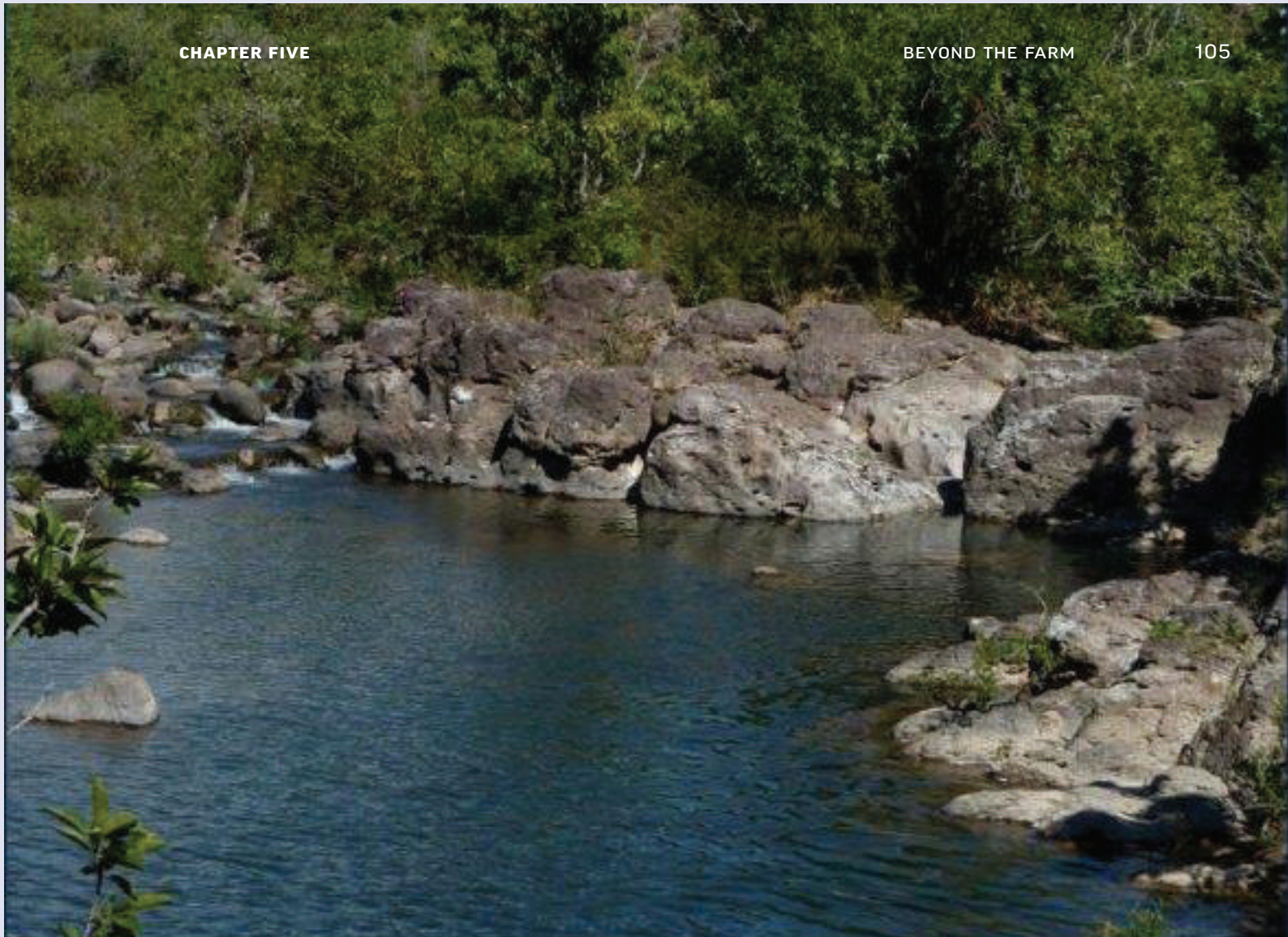
2010). By 2013, the Protected natural areas System was made up of 15 Conservation Areas, which contained 84 protected natural areas declared as such by MARN (72 government areas and 12 private areas). At the same time, there were 30 co-management organizations, most of which only have agreements or endorsements for project implementation (from one to three years duration) and very few have obtained agreements delegating management (MARN-UICN, 2005).

With support from the Spanish cooperation agency, Local Advisory Committees (COALs) were created in the Jiquilisco Bay area in 2004, shortly before adoption of the Protected Natural Areas Act of 2005. However, they were not organized around protected natural areas, but were instead based on the municipalities whose political and administrative jurisdictions coincided with Jiquilisco Bay (Jiquilisco, Puerto El Triunfo, San Dionisio, Usulután, Concepción Batres, and Jucuarán). These COALs went through a process of orientation and training, which then led to development of project profiles and annual operating plans (Quintana and Sermeño, 2010). With the adoption of the Protected Natural Areas Act, the COALs gained legal recognition as platforms for participation and coordination between protected natural areas and their adjacent social areas.⁷⁴ COALs were formed in the protected natural areas of the San Marcelino Complex and El Imposible National Park. The one for San Marcelino has a board of directors, while the one for El Imposible National Park failed to organize (*ibid.*). The PACAP Project recommended creating COALs in the pilot sites. This led to organizing a COAL for San Diego–La Barra National Park, which was incorporated by an executive resolution, and has a record of induction. According to AECID, in 2013, ten COALs were created as mechanisms for local governance and social engagement, made up of representatives from communities near protected natural areas, municipal councils, and MARN (AECID, 2013).

In the framework of the Ramsar Convention on Wetlands and UNESCO's Man and the Biosphere Program, El Salvador declared seven Ramsar sites⁷⁵ and three Biosphere Reserves (Apaneca-Illamatepec, Xirihualtique-Jiquilisco, and Trifinio Fraternidad) from 1999 to 2014. As part of efforts to manage wetlands and the biosphere reserves, MARN has

74. Article 8 of the Protected Natural Areas Act establishes the Local Advisory Committees as the main instrument for engagement and coordination between the protected natural area and its adjacent social area. The committees should be made up of one representative from the Protected Natural Areas Administration, one representative from the communities near the area, one representative from the respective municipal councils, one representative from the legally established non-governmental organizations working on natural areas, and one representative of the community development associations that have legal status. Central government and municipal representatives shall be appointed by an executive resolution in the corresponding area or from the municipal government, as appropriate. Procedures for the election of NGO and ADESCO representatives shall be established in the Act's regulations (Oregano Legislative, 2005).

75. Lake El Jocotal, Jiquilisco Bay Complex, Cerrón Grande Reservoir, Lake Olomega, Güija Complex, Jaltepeque Complex, and Barra de Santiago Complex.



promoted opportunities and platforms that are more expansive than the experiences with management of protected natural areas. To illustrate, the Xirihualtique-Jiquilisco Biosphere Reserve (declared in 2007) is primarily a mosaic of ecosystems and agro-ecosystems, ranging from conservation and use of mangroves along the coast, to production of sugarcane, salt, shrimp, coconuts, small-scale livestock operations, basic grains, and vegetables. Based on the 2005 Protected Natural Areas Act, MARN promoted creation of the Xirihualtique-Jiquilisco Biosphere Reserve Management Committee, through formation of Local Advisory Committees (MARN, 2007). In 2009, MARN developed an interinstitutional coordination platform covering the entire Biosphere Reserve,⁷⁶ including municipal governments and reactivation of nine COALs. After completion of the PACAP project, the MARN Department of Environmental Governance and Natural Heritage (now the Department of Ecosystems and Wildlife) promoted reactivation of the Xirihualtique-Jiquilisco Biosphere Reserve Management Committee (MARN, 2013c).

76. The Reserve covers 101,607 hectares, of which 36,144 correspond to the core zone, 48,257 to the buffer zone, and 17,206 to transition zones.

Institutional and Policy Framework

The severe and frequent impact of climate change has sparked new efforts to develop policy frameworks to address emergencies, reduce risk, and enhance capacity for adaptation to climate variability and change. In 2012, the Salvadoran government's Council of Ministers adopted the National Environment Policy (PNMA), whose main objectives are to reverse environmental degradation and reduce vulnerability to climate change (GOES, 2012). In 2013, the National Environmental Strategy became official. It is based on four thematic strategies, of which at least three are highly relevant to rainfed agriculture and promotion of green water management: the National Water Resources Strategy, the National Biodiversity Strategy, and the National Climate Change Strategy.

The National Water Resources Strategy affirms the importance of water to food security. It notes the urgent need to promote transformation of agriculture on hillsides, adapted to deficits and excesses of rain, along with the adaptation of agriculture on flatlands, affected by flooding, and the need to manage water from a territorial perspective including watersheds and aquifers (MARN, 2013b). The National Biodiversity Strategy underscores, as a necessary condition, the development of governance models. It also aims to contribute actions to strategically integrate biodiversity into the economy, through key areas (coffee, cocoa, fruit, basic grains, livestock, fisheries, aquaculture, and tourism). Additionally, it seeks to promote a massive process of restoration and conservation of critical ecosystems (mangroves and beach ecosystems, rivers and wetlands, gallery forests and other forest systems), as well as preserving traditional practices to conserve genetic resources, linking them to the promotion of local economic options (MARN, 2013a). In turn, the National Climate Change Strategy raises the need for sectoral adaptation strategies, including agriculture, promotion of the restoration of critical ecosystems and rural landscapes, and a program on national mitigation priorities that promotes low-carbon pathways to economic growth. This strategy also highlights the need for local governance systems, which should be linked to land management schemes, with engagement and cooperation mechanisms (with the participation of municipal consortia), with sustainable watershed management, as well as with local organization and management models to monitor risk and the distribution of benefits, among others (MARN, 2013d).

The cornerstone of adaptation is the National Program for the Restoration of Ecosystems and Landscapes (PREP), which has four components: i) advocating for a shift to sustainable agriculture at the landscape and territory level, based on existing human and social capital (seed capital); ii) restoration and conservation of critical ecosystems (mangroves, gallery forests, wetlands); iii) massive use of natural infrastructure together with grey infrastructure; and iv) a new way of working, through joint implementation by ministries and local actors (Barry, 2012). PREP recognizes that restoration must begin with ecosystem services

that are basic to the livelihoods of rural communities. By that logic, PREP is not limited to protected areas or land with forestry potential, but rather it involves agriculture and livestock production areas. It seeks to work with producers (small, medium, and large), through promotion of change toward sustainable agriculture at the landscape and territory level (Barry, 2012). The National Biodiversity Strategy is particularly relevant to rainfed agriculture and green water, because of the importance it gives to soil restoration. This strategy emphasizes the importance of transforming agricultural practices to protect organic matter and soil moisture. To that end, it promotes the need to move away from harmful practices in coffee growing, sugarcane and basic-grain crops, and livestock farming.

While the above are important strategic advances and represent new institutional frameworks, with enormous potential for promoting broader and more inclusive management schemes, in general, they are faced with limited financial resources and with inflexibility in operating procedures and in interinstitutional coordination that limit their implementation. For example, after going through a process of sectoral institutional restructuring, MAG had no choice but to assume the enormous challenges of food and nutritional security resulting from the 2008 crisis. Implementation by MAG of the Plan for Family Agriculture and Rural Entrepreneurship for Food and Nutritional Security (PAF) started in 2011, through CENTA and with technical support from FAO and WFP. PAF consumes most of the MAG and CENTA budget, so that most interventions are done under the PAF scheme, through the productive chains it promotes (basic grains, fruits, vegetables, aquaculture, honey, coffee, cocoa, handicrafts, and rural tourism) (MAG, 2011).

PAF is a response to the immediate problems of food and nutrition security. Thus, it is understandable that at the beginning it did not strategically include its linkages to the challenges of adaptation to climate variability and change. However, the enormous shock to expected basic grain harvests in 2011 and 2012 forced MAG to include climate change adaptation and mitigation criteria through the Strategy for Climate Change Adaptation and Mitigation for the Agricultural, Forestry, and Aquaculture Sectors, through the MAG Office for Sector Policy and Planning (OPPS) and the Sector Environmental Unit of MAG (MAG, 2012). This strategy recognizes the need to change agricultural practices to achieve environmental sustainability and tackle climate change (*ibid.*), although PAF continues being implemented without substantive changes. It should be noted that MAG does not have a mechanism for evaluating the progress made by this strategy, because it is not tied to work plans (Interview with Lucía Gómez and Julio Olano, 2015).

In 2014 and 2015, MAG held a number of consultations with producers and various stakeholders as part of the process to update the 2012 Strategy. As a result, in June 2015, MAG presented the Environmental Strategy for Climate Change Adaptation and Mitigation of the Agriculture, Forestry, Fisheries, and Aquaculture Sectors. Unlike the 2012 strategy,

it would not be coordinated by OPPS, but instead by the Department of Forest Management, Watersheds, and Irrigation, which explains the heavy emphasis this strategy gives to the watershed approach, to such an extent that its overall objective is to contribute to adaptation to the impact of climate change and variability in the agriculture, forestry, fisheries, and aquaculture sectors, based on a sustainable watershed management approach (MAG, 2015). The instruments for implementation of this strategy and the mechanisms for coordination with other institutional efforts such as PAF and PREP are still not clear. This reflects the lack of progress with interinstitutional and intersectoral coordination that could better guide what government agencies promote at the level of its territories and their actors.

Nicaragua

Nicaragua has a land area of over 130,000 km², of which 8% are lakes, ponds, or rivers. Although Nicaragua's inland waters hold great irrigation potential, only 1.5% of agricultural land is irrigated (FUNICA, 2012); thus, rainfed farming accounts for virtually all agriculture.

Nicaragua has three major topographic regions: the Pacific, the Central Mountains, and the Atlantic. The dry corridor extends over the Pacific region and part of the Central region, covering almost 34,000 km² (24% of the country). However, in contrast to other Central American countries, less than one third (30%) of the land area in Nicaragua's dry corridor is on hillsides with slopes steeper than 20%, which has facilitated its use as a major farming area (FAO-ACH, 2012). Furthermore, Nicaragua has a smaller percentage of land in the dry corridor than Central America's other countries (FAO-ACH, 2012). These conditions suggest that, compared to other countries, Nicaragua could be more resilient to the rainfall deficit typical of the dry corridor. In fact, Nicaragua is a supplier of food to the entire Central American region. This situation, however, should be looked at from a broader perspective: the country is losing its forests at a high rate, as a result of expansion of the agricultural frontier into the less-degraded but more fragile lands of the Caribbean region, outside the dry corridor. This dynamic has led to a doubling of land growing basic grains (corn, beans, rice, and sorghum) in Nicaragua from 1987 to 2006, increasing 105%, more than any other Central American country (FAO-ACH, 2012).

Moreover, Nicaragua has made great strides toward eradication of agricultural burning for basic grain crops. This process has not been studied, but different witnesses have spoken about this reduction. For example, leaders of the Campesino a Campesino movement

believe that “at least eighty out of every hundred who used to burn no longer do so in Nicaragua” (Morales, interview, 2015). However, upsurges in burning can be seen in certain areas and there has been criticism of mixed signals from the government, which in 2011 adopted a ministerial resolution on prevention and control of agricultural and forest fires that authorized each farmer to burn up to two manzanas of land per productive cycle.⁷⁷

As in other Central American countries, the protection of water sources is the responsibility of community committees that are often powerless to negotiate with landowners who persist with inappropriate practices, such as burning and deforestation. Even local governments are reluctant to confront these interests due to the political influence that landowners usually have.⁷⁸

Coffee production faces two major problems: contamination from wastewater and from pesticides. Several interviewees warned about this, when posing the challenge of “how to produce so many hundredweights instead of applying chemicals in these areas; there’s no approach. So, they don’t come to negotiate because then what are you going to put forward? Close the recharge area? That is not an approach for a private producer. He wants solutions that allow him to produce the same. Tell me how to produce and I will stop contaminating the water because he is in favor of the economic good, and they have economic and political power” (Interview with CRS-Estelí technical team).

Approaches and Pathways to Land and Water Management at Different Scales in Nicaragua

Rural and territorial development

Rural development in Nicaragua has had two major experiences with scaling up (in the sense of multiplication) of innovations in agricultural production systems. First was the formation of cooperatives, which began in the 1980s. Second was the Campesino a Campesino movement, which began in the late 1980s, but did not gain traction until the 1990s.

In the 1980s, the Sandinista government (1979-1990) conducted broad agrarian reform, whose priorities included creating numerous cooperatives and mixed-economy enterprises (government-cooperative). One of the objectives of this process, apart from transforming

77. Ministerial Resolution No. 004-2011, published in Official Gazette No. 211 on 8 November 2011.

78. Interviewees have referred to the case in San Ramón, where CRS is implementing the Cosecha Azul project.

the agrarian structure, was to increase the volume of agricultural production. When the revolution triumphed in 1979, agricultural productivity in Nicaragua was considered to be quite low, and use of technologies such as hybrid seed, synthetic fertilizers, and other agrochemicals was not widespread among peasant farmers. Thus, the agrarian reform used a Green Revolution technological approach, promoting agricultural mechanization: “subsidized inputs and chemical fertilizers were distributed in unparalleled quantities in the history of agriculture in the country” (UNAG-PCaC-GIZ-EED, 2010).

All this effort aimed at adoption of Green Revolution technologies was supported by an extensive network of governmental and non-governmental organizations. These included the Nicaraguan Institute of Agricultural Technology (INTA), which was in charge of a network of Small Farmer Development Centers (CDCs). Producers got involved in agricultural modernization through agricultural reform cooperatives and UNAG, a trade association for small and medium farmers that was the Sandinistas’ social base in the countryside (UNAG-PCaC-GIZ-EED, 2010; PASOLAC, 2005).

Following the Sandinistas’ electoral defeat in 1990, an institutional overhaul gutted public services for agricultural technology transfer (UNAG-PCaC-GIZ-EED, 2010). In this new context, associations like UNAG and dozens of new NGOs came to play a leading role in providing technical support to small producers (PASOLAC, 2005).⁷⁹

It is in this context that the expansion of the Campesino a Campesino (Farmer to Farmer) movement occurs. This is a grassroots movement that revolves around a learning methodology and collaboration among farmers and seeks to solve specific problems in agricultural production using sustainable agriculture or agroecological approaches, a combination of traditional knowledge, and the generation of innovations validated by farmers themselves. The approach originated in indigenous communities in Guatemala and later spread to Mexico in the 1980s. Campesino a Campesino was introduced in Nicaragua through UNAG’s Campesino a Campesino Program (PCaC), which in 1987 organized the initial exchanges and trainings between Mexican and Nicaraguan farmers (UNAG-PCaC-GIZ-EED, 2010; Cuéllar and Kandel, 2007).

With PCaC, UNAG was responding to a time of transition and political reflection in Nicaragua’s farmers’ movement. The agrarian reform had emphasized cooperative businesses, neglecting and even clashing with family farmers. This situation favored the counterrevo-

79. In 1996, reforms were introduced into the agricultural transfer system, seeking greater participation by users in funding the costs of the services. Different forms of the Participatory Technical Assistance (ATP) model were implemented: Basic ATP, for farmers with little ability to pay; Co-financed Technical Assistance (ATP1), in which producers gradually assume the costs of services; and Private Technical Assistance (ATP2), through private technical assistance service companies (PASOLAC, 2005).



lutionary movement that was fueled by these farmers dissatisfied with the Nicaraguan revolution. PCaC was introduced as a pilot experience to respond to the farming sector (Cuéllar and Kandel, 2007). PCaC began in Nicaragua as a technical approach to soil and water conservation on hillsides in the dry tropics, a sharply focused issue both thematically and geographically (UNAG-PCaC-GIZ-EED, 2010).

With the end of the armed conflict in 1990 and the reintegration of thousands of former combatants into the rural economy,⁸⁰ PCaC had the ability to create opportunities for supporters of both sides to come together and exchange farming experience, promoting reconciliation and reconstruction of the social fabric in communities hard hit by the war

80. In the early 1990s, some 701,500 manzanas were distributed to demobilized combatants as part of the peace agreements between the Contras and Sandinistas (66% of these lands were allocated to ex-Contras) (Cuéllar and Kandel, 2007).

(UNAG-PCaC-GIZ-EED, 2010; Cuéllar and Kandel, 2007). In the 1990s, PCaC broadened the range of technical options and expanded to more areas. Throughout the 1990s, the number of farmers participating in PCaC grew; by 2000, it had 680 outreach workers in 78 of the country's municipalities. The number of exchange gatherings increased from 5 in 1988 to 290 in 1997 (Hocdé and Miranda, 2000). In 2009, the movement had a presence in 986 communities in 85 municipalities, reaching 20,000 families through over 2,000 outreach workers. In this period, PCaC had begun to expand its range of topics, addressing issues such as gender equity and environmental protection (UNAG-PCaC-GIZ-EED, 2010).

At present, PCaC is promoting the Nicaraguan Agroecological and Organic Producers Movement (MAONIC). This movement is made up of over 100 grassroots organizations that represent 12,000 farmers. MAONIC was organized in 2013, as a result of policy advocacy that led to passage of a law to promote organic farming and national standards for organic certification (Valverde, interview, 2015).

Until the late 1990s, all rural development initiatives in Nicaragua focused on the agricultural sector. For example, the National Rural Development Program (PNDR), which began in 1995 and was renamed IDR in 1998, focused on construction and reconstruction of productive infrastructure and on distribution of support in machinery, equipment, and inputs (Vélez, 2003). In the 2000s, discussion began of an approach to rural development that incorporated the idea of the many functions of rural territories, beyond agricultural production. Since the late 1990s, Spanish cooperation agencies facilitated a reflection and cooperation process around the so-called "Tepeyac Group," formed in June 1999, which at one point managed to bring together universities, farmer organizations such as UNAG and UPANIC, as well as government institutions such as MAGFOR and representatives from international cooperation agencies. The objective of this initiative was to build consensus on a national rural development policy that would be set forth in a National Plan in a subsequent Rural Development Act. The process managed to finalize an assessment and a comprehensive rural development proposal with a territorial focus, entitled "Groundwork for Rural Development in Nicaragua" (Iniciativa por el Desarrollo Rural de Nicaragua, 2001; Romero et al., 2006).

Starting in 2002, the Nicaraguan government integrated elements of this proposal into the rural development policy framework, and into the National Development Strategy of 2003 (Romero et al., 2005; Romero and Ferrero, 2004). Thus, the National Rural Production Development Plan (called PRORURAL) outlines territorialization of rural development policies around regions and watersheds (MAGFOR, 2005a, 2005b). Reportedly, by the mid-2000s, the territorial approach was "substantially considered" in the most important programs funded by the international cooperation community (Romero et al., 2006).

It is not clear what implications this had in the implementation of rural development policies, but apparently the main rural development initiatives using a territorial approach have been put into practice by territorial actors themselves, prime among these, the municipal associations (consortia). Informants mentioned advanced territorial management processes by the Association of Nueva Segovia Municipalities (AMUNSE) and the Association of Rivas Municipalities (AMUR).⁸¹ At the municipal level, often the links between the agricultural agenda and the development agenda are the result of participation by leaders of trade associations, such as UNAG and PCaC in the various opportunities for civic engagement, or even in municipal councils. In some, PCaC leaders succeeded in passing municipal ordinances for environmental protection and have even been elected mayor (UNAG-PCaC-GIZ-EED, 2010).

With the change of government in 2007, the “territorial” discourse shifts toward a rural development policy with a sectoral emphasis. In this framework, horizontally scaling up government programs to the national scale has become a priority. An example of this is the Zero Hunger Program, which set out to reach 300,000 farmers, providing them with production inputs and capital. In addition, the current government has given a fresh boost to cooperativism. Thus, in 2007, two agencies were created that had already been provided for in the Cooperatives Act, in force since 2005: CONACCOOP (National Council on Cooperatives) and INFOCOOP (Nicaraguan Institute for Cooperative Development and Operation). INFOCOOP brought the total number of registered cooperatives from 1,772 in 2007 to close to 4,100 by late 2011 (Tortilla con sal, 2012). In 2015, government officials reported having reached 5,100 cooperatives (ATC, 2015). This made Nicaragua the Central American country with the greatest number of cooperatives, of which about 70% are engaged in agricultural production (Cooperativismo en movimiento, 2011).

According to some sources, an increasingly prominent role by central government agencies is being seen in these initiatives, at the expense of the initiative by territorial actors, particularly from municipalities and municipal consortia (Interviews).

Watershed and natural resources management

Various public organizations, NGOs, research institutes, and trade associations have carried out programs and projects that include watershed management. Since the 1990s, MARENA has taken up watershed management on its work agenda, based on projects and programs such as POSAF (I and II), PASOLAC, FOCUENCAS, PIMCHAS, and recently PAGRICC, which enabled government institutions to develop management plans in different micro-watersheds and sub-watersheds.

81. AMUR has a Territorial Development Plan for Rivas Department.

Thus, the selection of intervention areas has not obeyed clear prioritization criteria, much less a national strategy, but rather opportunities from the international cooperation community or attention to specific crises (Aburto, interview, 2015; Gómez, Ravnborg, and Rivas, 2007). However, there have been several ambitious experiences in terms of geographic coverage. One of POSAF's objectives was to improve institutional capacity for watershed management. The program's work covered 11 sub-watersheds in six departments and one autonomous region. POSAF is mentioned as a project that was successful in getting new farm-level practices adopted (Gómez, Ravnborg, and Rivas, 2007).

Another program that left important experiences in watershed management was the Program for Sustainable Hillside Agriculture in Central America (PASOLAC), by the Swiss cooperation agency. In Nicaragua, the program covered the departments of Estelí, Nueva Segovia, León, Chinandega, and the southern region, and lasted for 15 years (1992-2007). According to an evaluation, 30% of people living on hillsides have been positively affected by the program in various dimensions of their lives. The program involved approximately 50 public and private institutions with field actions, building capacity on issues such as technology validation and transfer, sustainable watershed management, payment for environmental services in micro-watersheds, climate change, and hillside risk management. Throughout the time it was in operation, PASOLAC evolved from a technological approach to a territorial one. Thus, the unit of work scaled up from the parcel to the farm, then to the micro-watershed, and finally to the territory (COSUDE, 2009).

Since 2011, MARENA has been implementing the Environmental Program on Disaster Risk Management and Climate Change (PAGRICC), which ends in 2016. Its objective is to support resilience to climate change and climate variability in several municipalities of the Rio Viejo and Lago de Apanás watersheds. This has been one of the best-funded efforts of recent years and one of the first to be explicitly aimed at adaptation to climate change.⁸²

Also important are the cases of CATIE's FOCUENCAS I and especially FOCUENCAS II, implemented in the municipalities of Matagalpa and Somoto (where work was begun in the Jucuapa and Aguas Calientes sub-watersheds). FOCUENCAS I was designed in response to the situation exposed by Hurricane Mitch and was supported by the Swedish cooperation agency.⁸³ FOCUENCAS I carried out farm- and community-level production

82. The program has \$16.75 million for implementation, from a loan agreement with the Inter-American Development Bank (IDB), support from the Nicaraguan government, and grants from the Nordic Development Fund (NDF) and the Swiss cooperation agency.

83. The complete name of FOCUENCAS I was the Regional Program for Local Capacity Building for Watershed Management and Disaster Prevention.

projects around seed funds, diversification, reforestation, renovation of coffee plantations, and soil and water conservation. In turn, FOCUENCAS II was designed as a way to horizontally and vertically scale up actions implemented in the first phase.⁸⁴ To do this, it would be necessary to implement systematization and communications actions; replicate processes and methods in adjacent sub-watersheds; and advocate for the development of an institutional watershed management structure at community (facilitating arrangements), municipal (facilitating ordinances), and national (influencing legislation) levels (Castellón and Prins, 2009; Villamagua, 2011). For example, the municipality of Matagalpa adopted a master plan for production and conservation in the Jucuapa River sub-basin, through a municipal ordinance in 2004. Article 5 of the ordinance says: “The sub-watershed committee that will assist with implementation of the Master Plan shall be recognized and supported” (Castellón and Prins, 2009). It was expected that the results attained in the Jucuapa and Aguas Calientes sub-watersheds would be replicated in other sub-watersheds and would be incorporated into local and national government policies and school policies (Castellón and Prins, 2009).

Use of this method to address watershed management through projects leads to the conclusion that the watershed approach has not been officially implemented in an organized way within public institutions. An exception is the case of INTA, which in 2004 decided to incorporate a watershed approach into its extension activities (Castellón and Prins, 2009). Thus, public technical assistance shifted to being oriented by a watershed approach for restoring water resources in terms of production. This meant reorienting the efforts of its extension agents, of which there were some 150 at the time, to work with 45,000 farmers in 21 micro-watersheds. The approach involved three levels of planning: the farm, the community, and the micro-watershed. It did not scale up to the sub-watershed level, “because they were too big and this complicated the entire operational side.” Thus, the agents prepared baselines and intervention plans for each micro-watershed. They also organized municipal micro-watershed platforms, in coordination with other initiatives that were underway, such as FOCUENCAS II.

However, with the change of government in 2007, it was decided that INTA had lost coverage because it had concentrated on those 21 micro-watersheds. The new government also gave priority to food security and MAGFOR reallocated INTA’s resources to the new Zero Hunger Program (Espinoza, interview, 2015).

84. The second phase was named Innovation, Learning, and Communication for Adaptive Watershed Co-management.

By the 2000s, all watershed management initiatives were looking to organize governance structures with names such as watershed committees or local watershed committees, managing to strengthen these types of participatory management or governance instruments in relatively small territorial units (sub- or micro-watersheds). This process led to the accumulation of considerable experience in collaborative watershed management. For example, the municipality of Somoto put forward an ordinance against burning and deforestation. Jucuapa created a sub-watershed committee, spurred by INTA, CATIE (FOCUENCAS II), and Matagalpa's municipal government (Castellón and Prins, 2009). In addition, local watershed committees were organized at the community level, which were grassroots operational structures of Jucuapa's sub-watershed committees. Other examples can be seen in Jinotega and Carazo. Furthermore, a lot of experience sharing activity was seen in different organizations.⁸⁵

Seemingly, the 2007 Water Act had the effect of facilitating the formation of these structures; MARENA counted 52 sub-watershed and micro-watershed committees in early 2011 (MARENA, 2011).⁸⁶ As explained below, approval of the General Water Law brought about a change of course that was favorable to the official adoption of the watershed approach in water resources management (Gómez, Ravnborg, and Rivas, 2007). These initiatives are aware that solutions are not limited to technical fixes, especially in the case of small farmers, where factors such as poverty and deterioration of the environment and of water resources requires a political approach, as well as scaling up at the institutional level (CRS, interview, 2015).

Whether these structures are effectively improving watershed governance or whether they are scaling up beyond micro-watersheds has not been studied. However, MARENA reported that from 2010 to 2013, it had developed 14 plans or assessments for different watersheds (MARENA, 2014). Some of these plans cover areas as small as 25 km², while the largest cover over 2,000 km².

Protected areas and biodiversity conservation

Nicaragua's National Protected Areas System (SINAP) includes 74 areas (66 terrestrial and 8 marine-coastal) covering more than 22,000 km² (2,340,617 hectares), equivalent

85. In 2008, the first meeting of watershed organizations was held, where the National Network of Watershed Organizations (RENOC) was created. The First National Meeting of Watershed Committees was held at the same time. In March 2015, these meetings were held for a second time.

86. According to 2008 reports, 18 committees participated in the First National Meeting of Watershed Committees (Villamagua, 2011).

to 17% of the country. One area alone, the BOSAWAS Biosphere Reserve, covers some 8,000 km², or 14% of Nicaragua, in a region bordering Honduras (MARENA, 2006a)⁸⁷.

Almost all protected areas in Nicaragua were established during or after 1983. With the triumph of the Sandinista revolution, the Nicaraguan Natural Resources Institute (IRENA) and the National Parks Service were created, in 1979 and 1980. These institutions began studies in dozens of areas with conservation potential. By 1983, 17 areas had been created, including the summits of volcanoes on the Pacific coast⁸⁸. Following the Sandinistas' electoral defeat in 1990 and the demobilization of ex-combatants, major amounts of land were transferred and conservationist circles began to worry about a "reactivation" of the advance of the agricultural frontier. Thus, "with great urgency," dozens of new areas were given official status in the center and Caribbean coast of the country in 1990 and 1991 (Faurby, 2007, MARENA 2006a), including the large BOSAWAS reserves and all the protected areas in southeastern Nicaragua⁸⁹.

It soon became apparent that the government could not administer such a vast protected territory, so in the second half of the 1990s, it began to experiment with co-management. These experiences were technically oriented and funded by USAID, through The Nature Conservancy, an environmental NGO, as part of the Co-management of Protected Areas Project (COMAP). However, the co-management scheme only applied to a small number of protected areas. By 2007, all co-management arrangements in Nicaragua were being run by NGOs and were dependent on COMAP Project (USAID) funds. Participation by municipal government in these co-management initiatives was "timid and indirect through coordination with NGOs" (Barahona, 2007).

In the 2000s, the conservationist agenda revolved around creation of the Central American Biological Corridor. During this time, a Caribbean Biological Corridor was also proposed. However, budget constraints continued to vex MARENA, leading to development of new ways to involve other actors. Thus, MARENA began to promote the establishment of

87. In 2001, a law was passed that set, *inter alia*, the definitive boundaries of the Reserve (Law No. 407). However, BOSAWAS had already been established in 1991 by presidential decree, as a National Natural Resources Reserve (Executive Decree No. 44-91). In 1997, BOSAWAS was declared a Biosphere Reserve as part of UNESCO's Man and the Biosphere Program.

88. Before this date, three protected areas had been established; the first in 1958, under the category of wildlife refuge (Cosigüina, in the municipality of El Viejo, department of Chinandega). In the 1970s, two areas were added under the category of national parks.

89. In 1990, the protected areas of southeastern Nicaragua were created, including the Indio Maíz Reserve (Decree 527). In 1999, the boundaries of these areas were updated (Presidential Decree No. 66 – 99), known since 2003 as the San Juan Nicaragua River Biosphere Reserve, based on its recognition by UNESCO's Man and the Biosphere (MAB) Program.

private wildlife reserves, which have now added 63 additional areas to the 74 in the government system (MARENA, 2014). Moreover, the Legislative Assembly opened the door to municipal governments establishing “municipal ecological parks” through municipal ordinances, although the final declaration remains in the discretion of MARENA (Regulations for Protected Areas, Decree 14-99). Thus, not all the proposed municipal ecological parks have been recognized by MARENA (Barahona, 2007). In any case, in 2004 and 2005, the first eight municipal ecological parks were created (MARENA, 2006a). By 2014, there were 23 of these parks (MARENA, 2014).

Following international trends, in the 1990s and 2000s, there was an official move to integrate the conservation agenda into development planning processes. Concern about the advancing agricultural frontier was at the heart of the debate (Ruiz et al, 2007). One of the flagship programs in this integration was the Socio-environmental and Forest Development Program (POSAF), designed to build institutional capacity for watershed management, sustainable farm-level natural resources management, and construction of community works for natural disaster prevention and mitigation. MARENA and INAFOR carried out the program, which was implemented in two phases: the first from 1994 to 2001, and the second from 2002 to 2006 (Gómez, Ravnborg and Rivas, 2007). This perspective was reflected in later initiatives, such as the PROAMBIENTAL Program and even managed to penetrate agricultural policy instruments, such as the Rural Development Program (PRORURAL), which was presented as part of conservation area protection efforts (Barahona, 2007; MARENA, 2006a).

However, these efforts failed to address the most difficult problem facing the conservation agenda, namely, the expansion of the agricultural frontier into buffer zones and core areas of protected natural areas. In the 2000s, it became clear that a better understanding was needed of farm-forest dynamics in agricultural frontier regions. This interest first arose from MARENA and social actors involved in management of the BOSAWAS Biosphere Reserve and the San Juan River Reserve (Faurby, 2007). Since their inception, the BOSAWAS and San Juan River reserves have posed tremendous challenges for governance due to their size and the hundreds of thousands of people living in their buffer zones and core areas. The BOSAWAS Reserve declaration covered an indigenous territory with a population of around 25,000 people in its core area and 200,000 in the buffer zone, primarily mestizo settlers (Cuéllar and Kandel, 2007).

Even though in Nicaragua the “landscape approach” was not part of the vocabulary of those involved in conservation, the need for governance in territories where protected areas are located did lead to the creation of opportunities and work methods that provide elements for developing a landscape approach based on the reality of the country. Both the BOSAWAS and San Juan River biosphere reserves have participatory structures that

should facilitate attention to the complex socio-environmental dynamics in the territory. Commissions “at the highest level” have also been created to decide which issues are of greatest concern for biosphere reserve management (MARENA, 2006a). However, migration of settlers to protected zones as well as to indigenous peoples’ forests continues unabated today (Fundación del Río, interview, 2015).

Since 2012, the government has been experimenting with types of inclusive management of protected areas, involving communities and other territorial actors. In this direction, it has set up “Committees for Protection, Care, Conservation, and Collaboration” (known as Collaborative Committees). By 2015, these committees had been established in 17 protected areas. Each one develops a protection and management plan in consultation with the population. This method complements other types of management such as joint management with indigenous territorial governments and co-management (La Voz del Humedal, 2015; MARENA, 2014). As in other experiences, the support of NGOs and international cooperation agencies is crucial to these initiatives.⁹⁰

Moreover, the creation of protected areas now follows new protection criteria, beyond the traditional focus on biodiversity conservation. Thus, in 2013, MARENA declared five “Water Reserve Areas,” in three different watersheds, covering a total of 6,835 hectares (MARENA, 2014). This might encourage the involvement of local people in certain protected areas.

Legislation, Policy, and the Institutional Framework

In the past few years, changes in legislation and policies have had significant implications for soil and water governance in rainfed agriculture. In the first place, changes in the legal framework of the water sector should be mentioned, especially the National Water Act (Law 620), which was passed in 2007. The law provides the groundwork for organizing different uses and prioritizing human use, using an IWRM approach based on watersheds, sub-watersheds, and micro-watersheds. Stewardship of the sector is the responsibility of the National Water Resources Council (CNRH), as the highest level for management, and creation of the National Water Authority (ANA) was also mandated, as

90. For example, in Los Guatuzos Wildlife Refuge, a Ramsar site located in the Department of Río San Juan, a Collaborative Committee has been functioning since 2013, which reviews the existing management plan. The initiative is being implemented with support from Fundación entre Volcanes and Amigos de la Tierra España, in the framework of the “Project for Building Local Capacities to Promote Participatory Environmental Management in Two Protected Areas in the Cocibolca, Nicaragua watershed” (La Voz del Humedal, 2015; Euronotas Digital, 2013).

a decentralized body of the executive branch. Furthermore, it provides tools for watershed management; for example, a National Water Fund (FNA) to fund the National Water Resources Plan and watershed-specific plans.⁹¹

In terms of resource management at the plot or farm level, the Water Act “stipulated that those persons who have properties in water recharge areas must by law set aside 25% of this recharge land for protection and conservation” (FARENA-UNA, interview, 2015). With regard to governance instruments, Art. 4 states that “. . . the watershed is the territorial management unit for implementation of integrated water resources management.” To put the approach into practice, Regional Watershed Agencies are created, which are government agencies formed in response to a proposal from ANA and approved by CNRH. These agencies’ members must include the mayors from all the municipalities that make up the watershed. In turn, Regional Agencies are made up of Watershed, Sub-watershed, and Micro-watershed Committees, the latter becoming forums for consultation, coordination, and cooperation among watershed agencies, central government agencies, municipalities, autonomous regions, NGOs, and users (Gómez, Ravnborg, and Rivas, 2007). In this way, the law offers a framework of legitimacy to the different watershed committees that organized earlier in different ways, under other legislative bodies (Villamagua, 2011).

The General Water Act also includes a number of provisions for drinking water and sanitation systems run by Water and Sanitation Committees (CAPS), in anticipation of the filing of a special bill, passed in 2010 (Law 722 or Special Law for Water and Sanitation Committees). This legislation enabled the over 5,000 water and sanitation committees to gain official status as community organizations, have their own property, and manage finances to provide ongoing services.⁹² The CAPS Law established guidelines concerning committee organization, constitution, and legalization, which is handled through registration with the Nicaraguan Institute for Aqueducts and Sewerage (INAA). The process includes submitting documentation of a number of requirements, including a municipal registration certificate, to the municipal technical unit created to serve the CAPS. The law also states that CAPS can be represented on local development and civic engagement bodies, particularly, watershed agencies and watershed committees, in accordance with Law 620 (Villamagua, 2011).

Passage of the CAPS law grew out of a social mobilization process that won passage of the Water Law in 2007 in which community members play an important part. Following

91. The fund will be financed through other sources, by payment of a fee for water use. The fee has not yet been adopted because it requires a special law.

92. In the rural sector, an estimated 5,400 Water and Sanitation Committees (CAPS) supply more than 1.2 million people with drinking water.

that victory, the movement pressed for the CAPS Law. The first experiences with implementation of this law highlighted the difficulties in obtaining its benefits, including special power rates and tax exemptions. However, the CAPS have formed a National CAPS Network to advocate around these issues, particularly to ease their legalization. The network has enormous social mobilization potential, considering that each committee could have up to seven members (Zamora, interview, 2015). Yet, they still have to solve very specific problems, including financial sustainability and maintenance of drinking water systems. There are also several incipient cases of CAPS getting involved in protection of recharge areas. Moreover, it is not surprising that these organizations are perceived as a threat by mayors who are wary of their social power (Zamora, interview, 2015; Medrano, interview, 2015; Suárez, interview, 2015; Ruiz, interview, 2015).

Apart from these institutional changes, in recent years, vertical scaling up has been seen on issues related to resilience to climate change. For example, in 2010, Nicaragua drafted its national climate change plan, in a process facilitated by MARENA. However, its impact on the public agricultural sector has been limited because of the reorganization of institutions such as MAGFOR, IDR, and INTA, with the creation of the Ministry of Family, Community, Cooperative, and Associative Economy (MEFCCA) in 2012, which absorbed the Rural Development Institute and the extension services provided by INTA, leaving it only responsible for research. These changes seem to have limited resources for climate change adaptation measures.

However, development in 2012 of a policy on organic agriculture and of a technical standard to provide the basis for public (government) organic certification has been important in promoting sustainability practices. Currently, PCaC and MAONIC belong to the commissions of the System for Agricultural Research and Innovation (SINIA), led by INTA. They have set up a collaboration between MAONIC and INTA to put research studies on agroecology on the INTA research agenda on this issue. Another organization participating in SINIA is CRS, which has signed an agreement with INTA to carry out studies on some 45 farmers' fields.

Experiences such as these suggest a favorable context for scaling up green water management. The question is whether such vertical scaling up can translate into horizontal scaling up. In this regard, it is important to point out that both the literature on scaling up and the experiences discussed in this study suggest the importance of assuming this as a governance issue, for which it necessary to develop the corresponding institutional framework. For example, in Nicaragua, it has been suggested that municipal governments can play a mediation role in conflicts over water, such as those that occur when community members want to protect water sources against more powerful actors (FARENA-UNA, interview, 2015).

Along these lines, Nicaraguan legislation recognizes Municipal Environmental Commissions (CAMs)⁹³, defined as bodies for coordination and civic engagement. In general, the CAMs are deliberative commissions, although at times they implement projects or programs. They are made up of representatives of local government, of local offices of the central government (e.g., MARENA, INAFOR, the police, and ministries of health and education), and of civil society (NGOs, trade organizations, producer associations, businesses, and communities). They should be chaired by the mayor or a council-member, and formally created by a council decree; however, it is common for the mayor to not participate regularly in the meetings (Larson, 2006; Larson, 2002).

Creation of the CAMs was prompted by cooperation projects and by MARENA, for which they serve as the main mechanism for promoting civic engagement in environmental management. By 2006, CAMs had been formed in some 100 municipalities, although not all work well. The most successful have strong support from local government and/or from several activist members. The most common problems in CAMs active in 2004 were, in this order: lack of objectives or a clear, agreed working agenda, conflicts between town hall and INAFOR, lack of interest from town hall or from the mayor in particular, and burnout associated with previous experiences or with the same lack of clarity about their mission (Larson et al., 2006).⁹⁴

In this regard, it should be noted that historically, and even today, few local governments have shown the capacity or interest for participating in natural resources management. In the late 1990s, a series of studies done in 21 of the country's municipalities came to the conclusion that town halls have few incentives to become involved in natural resources management (Larson, 2002). Currently, it is not uncommon to hear complaints from community organizations such as CAPS and Collaborative Committees that town halls are not interested in joining efforts to protect natural resources (Fundación del Río, interview, 2005; La Voz del Humedal, 2015). In turn, PCaC and MAONIC representatives agree that some town halls do offer specific support for sustainable production initiatives, and some have projects to provide assets to producers—e.g., permanent nurseries—but none has taken the lead in proposals to transform agricultural production toward more sustainable practices (Morales, interview, 2015; Valverde, interview, 2015).

Furthermore, it is important to point out that traditionally the Nicaraguan government has been centralized. Several observers have noted that it was not until the 1995 consti-

93. Considered in the General Environment and Natural Resources Act (Law 217) and the Municipalities Law and its Amendments (Laws 40-261).

94. MARENA also promoted Departmental Environmental Commissions (CADs), but these rapidly fell apart (Larson et al., 2006).



tutional reforms that the autonomy of municipal government was “formally established” and its powers defined (Roque, 2007). The 1997 reforms to the Municipalities Act adapted the law to new constitutional provisions, entrusting municipal governments with new powers, including the authority to manage natural resources, but without providing the necessary financial resources. Before 2004, municipal governments had to fund all their activities with the limited revenues obtained from local taxes or by turning to project management. Not until passage of the Law for Budgetary Transfers to the Municipal Governments of Nicaragua (Law No. 466) in 2003 did the central government guarantee transfers of funds from the national budget to municipalities (Roque, 2007).⁹³

Lack of autonomy and local revenues have resulted in a policy by central government institutions of taking charge of local government initiatives. For example, the first Municipal Environmental Plans (PAMs), in 2000, were developed by MARENA with little involvement by local governments. Three years later, the Ministry found that of a total of 150 PAMs, town halls had only formalized 58 of them and that, in general, there was

93. In late 2002, Nicaragua was the only Central American country that did not allocate budget transfers to its municipalities. The 2003 law set an initial percentage of 4% of the national budget, with annual increases. In 2007, transfers were 7% of the budget (Roque, 2007).

a “weak institutional structure and integration of PAMs in municipal planning,” due to “ignorance, poor understanding, and little appreciation for the process of developing and implementing the PAMs” (MARENA, 2006b).

Although these mistakes have been overcome, the law still contains provisions that restrict municipal autonomy, affecting territorial governance processes that are important to scaling up. For example, the establishment of associations among municipalities must be authorized by INIFOM and then by the National Assembly, unlike the laws in El Salvador and Honduras, where they have the right to associate freely without needing authorization from either the executive or legislative branches (Odonne et al., 2012).⁹⁶ Occasionally, because of difficulties in legalization, *de facto* municipal associations or those under the guise of NGOs have worked.⁹⁷

All this suggests that until recently, conditions have not been favorable for local governments to implement environmental governance processes, and therefore initiatives along these lines that might have been undertaken may not have matured or they stagnated. Moreover, comments have been made in this vein that the municipal autonomy process has stagnated or even regressed in recent years, because the executive branch exerts more influence on local governments through INIFOM and “political secretaries at the municipal level.” This makes it necessary to have the support of these bodies to be able to coordinate with local governments (Interviews).⁹⁸ Furthermore, a centralized style of governance persists. For example, at the departmental level, delegates from public institutions need authorization from the central office in Managua just to attend meetings. Cases such as MAONIC and CRS joining the SINIA commissions are due in part to the contacts that these organizations can find among high-level government officials, since these are the people who authorize regional-office technical personnel to get involved in territorial environmental governance.

95. In late 2002, Nicaragua was the only Central American country that did not allocate budget transfers to its municipalities. The 2003 law set an initial percentage of 4% of the national budget, with annual increases. In 2007, transfers were 7% of the budget (Roque, 2007).

96. In El Salvador, municipal associations or consortia gain legal status granted by their own charter, and therefore do not require any proceedings before the executive branch; registration is done by the Corporation of Municipalities of the Republic of El Salvador (COMURES), an agency run by municipal governments themselves. In Honduras, they also have the right to associate freely without needing to receive authorization or to register. The only exception is when cross-border associations are formed with municipalities in neighboring countries (Odonne et al., 2012).

97. By 2004, 19 municipal associations with legal status could be identified, organized around departmental boundaries (10), regional boundaries (1), or for special purposes. Among the latter are the Association of Estelí River Basin Municipalities (AMCRE) and the Association of Municipalities of Gran Lago Watershed (AMUGRAN) (ICMA, 2004).

98. Observers argue that municipalities “worked with much more independence” before the 2012 elections and that municipal associations have been weakening in recent years.

This tendency to take charge of local governments and officials, and limit their initiative contrasts with the policy of investing in the agricultural sector and of expanding the cooperative sector. This is evidence that the government's rural development policy maintains a sectoral rather than territorial approach, since the lack of municipal autonomy weakens territorial governance initiatives. This will make it difficult to territorialize sustainable-production public policies that have come out in recent years. Another weakness of environmental management is that public policy continues to be implemented through short-term projects funded by cooperation agencies.

99. It could be said that the present government is banking on territorial governability, not on governance, a process that involves a more participatory style in setting agendas and making decisions that affect the territory.

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