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Resilient Environmental Governance: Protecting Changing Ecosystems Through Multilevel Governance

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RESILIENT ENVIRONMENTAL GOVERNANCE: PROTECTING CHANGING ECOSYSTEMS THROUGH MULTILEVEL GOVERNANCE

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DEDICATION

To my grandparents, who always encouraged learning.

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ABSTRACT

RESILIENT ENVIRONMENTAL GOVERNANCE: PROTECTING CHANGING ECOSYSTEMS THROUGH MULTILEVEL GOVERNANCE

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International governance is increasingly defined by multilevel governance; with short-term projects, transnational cooperation between different groups, and unclear institutional space. In this situation, a key issue is the *resilience* of governance arrangements or the ability of governance arrangements to respond to political and ecological shocks to the system. Using international biodiversity governance, this study explores the question: *What social and political processes produce resilient governance?*

This study argues that the key to understanding resilient governance is the network structure within and outside of the governance arrangement. Modular network structures are able to generate ideas from multiple sources, able to solve political problems on small scales, and able to insulate institutions from political contagion. Centralized network structures, in contrast, often result in top-down learning, politicization of the entire governance arrangement, and inability to adapt in response to problems. Those governance arrangements with limited network structures are unlikely to learn at all. The network structure theory argues that network dynamics

are shaped by the structure and result in different learning and different adaptive outcomes.

This argument is made in the context of international biodiversity governance which presents has a number of cases of resilience in difficult to explain cases. Chapter 2 and Chapter 3 look at the network impacts in 10 different international biodiversity governance arrangements. Chapter 4, Chapter 5, and Chapter 6 explore these dynamics in the context of the Mesoamerican Biological Corridor (MBC) and the Caribbean Challenge. These empirical cases present a complex and robust analysis showing that network structures, more than the governance institutions or national context, shape the resulting impact of governance arrangements.

The implication of this finding is that effective institutions also need resilient modular networks in order to have lasting environmental impacts. Strong institutions can be constrained by centralized networks which limit learning opportunities following shocks. This study thus complements studies of effectiveness in international relations by providing a crucial dynamic piece of the overall situation. Response to shocks is shown to be shaped by network structure and importantly by early learning and network connections. Without these, effectiveness can be disrupted by political or environmental shocks.

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ABECAFE	Asociación Salvadoreña de Beneficiadores y Exportadores de Café	An organization of industrial exporters of Coffee in El Salvador.
ACS	Association of Caribbean States	
ACTO	Amazon Cooperative Treaty Organization	
ADESCO	Asociaciones de Desarrollo Comunal	Legally recognized local development cooperatives in El Salvador capable of organizing projects.
ARDM	Association for the Reconstruction and Municipal Development of Cinquera	Local ADESCO in the city of Cinquera, El Salvador
ARENA	Alianza Republicana Nacionalista	Main political party of the government in El Salvador during the Civil War. Held the Presidency from 1989 - 2009.
CARICOM	Caribbean Community	
CARIFORUM	Caribbean Forum	Formal relationship between CARICOM and the Dominican Republic
CBD	Convention on Biological Diversity	
CCAD	Central American Commission on Environment and Development	Regional environmental organization in Central America 1989-present.
CEP	Caribbean Environment Programme	Governing organization of SPAW and other regional environmental agreements.
CITES	Convention on International Trade in Endangered Species	

DGRN	Direccíon General de Recuersos Naturales	El Salvadorian Environmental Ministry 1972-1991
DR-CAFTA	Dominican Republic-Central American Free Trade Agreement	
FIAES	Fondo de la Iniciativa para las Americas de El Salvador	Result of agreement between USAID and the Government of El Salvador to create a fund to contribute to biodiversity and child health in El Salvador
FMLN	Frente Farabundo Martí para la Liberación Nacional	Main faction of communist revolutionaries during the civil war 1980-1992. The main opposition party in government of El Salvador after 1992.
GEF	Global Environment Facility	
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit	German international aid organization
ITTO	International Tropical Timber Organization	
JICA	Japan International Cooperation Agency	
MAB	UNESCO's Man and Biosphere Programme	
MBC or CBM	Corredor Biológico Mesoamericano	Regional biodiversity connectivity program in Central America from 1997-present.
NPAS	National Protected Area System	The formal name for the protected areas system in the Dominican Republic
PLD	Partido de la Liberación Dominicana	Party of Leonel Fernandez (President 1996-2000, 2004-current)
PRD	Partido Revolucionario Dominicano	Party of Juan Bosch during his Presidency and later the governing party for 8 years

		between Balaguer administrations (1978-1986).
PRSC	Partido Reformista Social Cristiano	Party of Joaquin Balaguer
SEMARENA	Environmental Ministry-Dominican Republic	
SICA	Sistema Integracion de Centroamerica	Regional integration system of Central America
SPAW	Protocol Concerning Specially Protected Areas and Wildlife	Caribbean wildlife and protected areas law.
TCC	The Caribbean Challenge	
TNC	The Nature Conservancy	
UNEP	United Nations Environment Programme	

CHAPTER 1

NETWORK STRUCTURE MATTERS

Shocks impact biodiversity governance institutions in a number of different ways. The early history of the Convention on International Trade of Endangered Species (CITES) and the Convention on Biological Diversity (CBD) look similar in many respects. Both saw significant political struggles in one arena cause intractable conflict throughout as nongovernmental organizations and blocks of activist states became key veto players throughout the organizations. However, the two organizations largely went on different trajectories as CITES was able to routinize and compartmentalize political debate but the CBD was able only to get weak progress on issues with even lower levels of political agreement. In some ways, the results could be expected to be different: the CBD is a stronger organization with wider agreement (although it is missing an important member with the United States not involved) than CITES, the networks involved in the CBD are wider than they relatively narrow ones involved in CITEs, CITES has better enforcement capability but lower autonomy from other organizations. These puzzles come out across the field of international biodiversity governance with unlikely institutions adapting to be robust governance arrangements and strong institutions failing to adapt at all. The social and political processes which animate these outcomes are the focus of this study.

Why some multilevel governance institutions prove resilient to shocks while others instead reinvest in the status quo and still others collapse entirely is a puzzle for a number of different fields of study. By focusing on resilience of international

governance arrangements, the study contributes to studies of common property resource management at local levels (Anderies, Janssen, and Ostrom 2003, Ostrom 1990, 2005, Poteete and Ostrom 2008), questions of how to design effective international environmental institutions (Miles 2002, Young 1999b, 2010), and questions of the power of networks of substate and nonstate actors in international politics (Haas and Adler 1992, Betsill and Bulkeley 2004, Keck and Sikkink 1999, Lipschutz 1996, Wapner 1995) and the ability of these actors to make knowledge claims in a complex governance context (Martello and Jasanoff 2004, Drori 2003, European Environment Agency 2013, Gulbrandsen 2008, Lidskog and Sundqvist 2002, 2011, Litfin 1994a, Siebenhuner 2002). Resilient biodiversity governance is a puzzle for these various perspectives because it highlights non-linear emergent mechanisms which can cause the surprising variation of outcomes in biodiversity governance.

This study argues that the crucial feature that produces resilient governance is not regime design (the strength of the institutions and their enforcement provisions) nor in the social capital of any one particular network (whether in a national constituency, an international coalition, or an advocacy network). Rather, the crucial animating feature which facilitates resilience or alternative outcomes is the network structure, particularly the connections and mediating points between different networks. This argument challenges much of the conventional arguments which are given for resilient governance and highlight some potentially important aspects for a fuller understanding of effectiveness in international environmental politics. The rest of

this chapter will highlight the basics for this argument and the empirical basis for its claim that will be expanded in the rest of this study.

Resilience and Effectiveness

The road to effective environmental governance is rarely a direct path and this is certainly true when looking at the history of biodiversity governance. While both historical institutionalist studies (Peters 2005, Fioretos 2011) and rational choice institutional focus on transition costs (Tullock 1975) emphasize the self-replicating aspects of institutional structures, this does not necessarily mean that the ability for institutions to effectively manage problems will self-replicate. The issue becomes even more important if the focus shifts away from these institutional views to a view that sees institutions as embedded in political contestation (Mahoney and Thelen 2009). Biodiversity politics around the world emphasize that effectiveness is not self-replicating with a multitude of cases from around the world. For example, the country of Madagascar had constructed a significant and increasingly robust system for biodiversity protection through the country over the past year. However, following a 2009 coup, the system went into complete disorder and much of the progress was quickly undone (Yu, Levi, and Shepard 2010). In addition to the risk of external political shocks disrupting biodiversity governance, the internal dynamics of the governance arrangement can disrupt efforts. In the Tongass National Forest in Alaska, a lease regime created a fairly effective management of the forests but became increasingly brittle with changing economic and environmental conditions (Baier, Lovecraft, and Chapin III 2009).

Effectiveness alone then is not sufficient, but biodiversity governance institutions must also be resilient in order to have lasting impact.[1]

The study and practice of international environmental institutions has focused significant attention on the factors which contribute to effective governance institutions. Effectiveness studies have largely explored the factors that contribute to building institution. These studies have broadly identified the bargaining process, strong institutions, and the role of epistemic communities or scientists as playing key roles in achieving effective governance (Breitmeier, Underdal, and Young 2011, Mitchell 2006, Miles et al. 2002, Young 1999a, Haas, Keohane, and Levy 1993). These findings have shown wide applicability, have been supported by multiple different methodologies and approaches, and explored a number of different political and environmental contexts. However, one limitation of these studies is that they did not directly deal with temporal effects and the factors which may be related to maintaining effective institutions. Although some studies have attempted to remedy this neglect (Grundig 2012, Young 2010), this section will argue that adding temporality into effectiveness primarily needs to account for the way institutions respond to shocks and disruptions.

[1] Resilience itself has become a problematic buzzword in international relations recently and is used increasingly in reference to the war on terrorism, global response to financial crisis, and other governance issues. Most notably, resilience was the major theme of the 2013 World Economic Forum meeting. The popular conception of resilience is often implicitly defined in a very narrow manner often denoting the vision for some "return to normalcy." Resilience, as used in this study differs fundamentally from this conception in that it is a dynamic process that involves adaptation and learning rather than any return to a supposed stable point of governance.

Effectiveness has been defined in a variety of different ways. Effectiveness for this study is broadly defined as a change in the behavior of actors as a result of human institutions which generates a positive and expected environmental output. This definition fits closely with the broader definitions of effectiveness shared in the field but emphasizes the political and environmental outputs (Young 1999a). Other definitions of effectiveness focus on other aspects; for example effectiveness has been defined as simply whether international institutions help avoid resource wars (Dinar 2011, Helm and Sprinz 2000), whether they lead to transformation of policies in member states (Haas, Keohane, and Levy 1993), or whether they foster general multilateralism (Downs, Rocke, and Barsoom 1998, Perkins and Neumayer 2007). These political aspects have been increasingly coupled with improved environmental conditions as a key aspect of effectiveness (Underdal and Young 2004, Young 1999a). The definition used here of effectiveness includes political outputs, requiring change in the policies by institutions, and improved environmental conditions in a basic definition of effectiveness.[2]

Effectiveness studies have focused significantly on the conditions preceding effectiveness: from institutional bargaining, scientific inputs, and institutional design. However, by focusing on the inputs into effective arrangements, the studies may miss crucial factors that develop after a governance arrangement is formed. Oran Young notes in a recent assessment article that "environmental regimes are dynamic in the sense that they change continually after their initial formation. After established,

[2] Some studies appear to equate effectiveness with resilience as the same outcome. This is true both in local level studies of resilience and in international studies. Although in practice they do overlap significantly, as will be explored in Chapter 3, conceptually we can best identify the processes and mechanisms of resilience by treating them as distinct outcomes.

institutional arrangements do not remain static over time. Environmental regimes wax and wane in terms of their capacity to solve problems" (Young 2011, 3). The problem then is in how to capture this dynamic change in governance arrangements (Duit and Galaz 2008).

Taking account of dynamic governance must include studying the adaptation of governance arrangements in responding to different shocks. Shocks can be broadly defined as events which cause a significant number of actors in the governance arrangement to question the rules used by the institutions. Understanding response to these events means being aware of surprise, cascade effects, tipping points, idea generation, etc. (Duit and Galaz 2008).[3]

Adding a focus on resilience offers one productive route to begin to understand the dynamic features of governance arrangements. Resilience can be broadly defined as the ability of a system to respond and reorganize to a variety of shocks to the organization of the system. Lance Gunderson defines this concept of resilience as "measured by the magnitude of disturbance that can be absorbed before the system redefines its structure by changing the variables and processes that control behavior" (Gunderson 2000, 426) It can be contrasted with robustness, or what Holling termed engineering resilience (Holling 1973), which is the ability of a system to remain in a state

[3] The approach to dealing with dynamic aspects of institutions goes beyond attempts to add temporal features into effectiveness studies. Using the collective optimum criteria to evaluate effectiveness (Underdal and Young 2004), Grundig integrates temporal aspects in evaluating the effectiveness of institutions in terms of difference in gains from faster or slower moving institutional processes (Grundig 2012). This approach does improve the effectiveness studies; however, it does not focus on nonlinear aspects like surprise and cascade which are crucial in understanding the adaptation of governance arrangements.

of equilibrium before being tipped over.[4] Resilience then is largely about the adaptive capacity of a system and its ability to reorganize without collapsing permanently (Walker and Abel 2002, Holling, Gunderson, and Ludwig 2002).[5]

The integration of resilience into governance studies should not take the metaphor from biological systems too far. As will be argued below, the general findings emphasizing diversity, modularity, and tightness of feedback loops is of limited use in understanding transformations of governance arrangements (Walker and Salt 2006, and see also Levin 2002). However, focusing on the resilience of governance arrangements adds two components into studies of effectiveness.

First, stability may not demonstrate resilience of governance arrangements. The ecological studies of resilience have emphasized this by arguing that stable ecological states are often very brittle and their stability is based upon a narrow and vulnerable resource base (Gunderson 2000). This is exemplified with the adaptive cycle depiction developed by Gunderston and Holling (Gunderson and Holling 2002). The adaptive cycle illustrates some key stages that systems develop through and a way to understand

[4] A helpful metaphor to understand this distinction is to imagine a ball in a cup versus a ball on the top of a very narrow peak. In the ball in the cup approach, the ball can roll around the sides going up different directions before leaving the cup itself. The resilience here is in finding a variety of response situation to move around under general system organizing features (Gunderson and Holling 2002). The ball on the peak, in contrast, has a stable state and even the slightest shock will topple the ball toward the sides. This view, what I term robustness, contrasts with resilience in that it simply measures the ability of the ball to remain in one place rather than move around a broad area of stability. The distinction is not always clear in the literature, but a clear distinction helps make the idea of resilience in this study clear (Jen 2005).

[5] Resilience is an eclectic set of studies with some cross-citations, but limited coherence as a field of study. In addition, it is quickly sprawling into a range of different approaches. An introductory set of literature is: (Anderies, Walker, and Kinzig 2006, Carpenter, Brock, and Ludwig 2002, Carpenter et al. 2001, Folke 2006, Gunderson 2000, Lebel et al. 2006, Lundberg and Frodin 1998, Peterson, Allen, and Holling 1998, Resilience Alliance 2007a, b, Walker, Anderies, et al. 2006).

resilience emphasizing the point that resilience is primarily about reorganization after a shock.[6] When applied to governance, the result is that strong institutions may be fairly vulnerable to shocks and weaker institutions may have significant ability to respond to shocks. Even robust governance arrangements, those resistant to change, may be quite brittle when focusing on their ability to adapt. The Network Structure argument pursued here, if true, offers significant reason to bring into question arguments about robust institutions being sufficient to result in resilience.

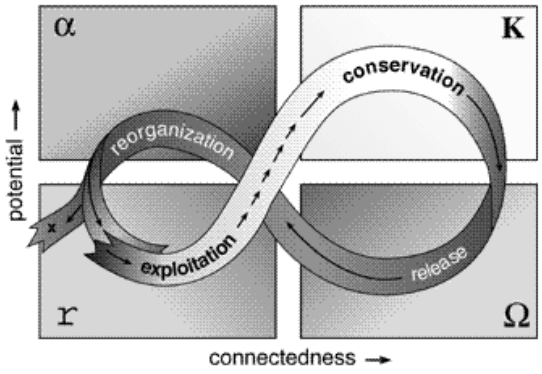


Figure 1.1-Gunderson and Holling's visual representation of the adaptive cycle (Gunderson and Holling 2002).

Second, systems are never insulated from the adaptive cycles of other systems connected with them. The world is not designed by clear hierarchies, but rather panarchies where systems have dramatic and sizable impacts on the adaptive cycle of

[6] Holling provides an illustrative walkthrough the adaptive cycle writing: "For an ecosystem such as a forest, think of the century- or centuries-long cycle of succession and growth from pioneer species (r) to climax species (K) followed by major disturbances such as fire, storm, or pest (Ω). Such disturbances occur as wealth accumulates and the system becomes gradually less resilient, i.e., more vulnerable. As a consequence, a disturbance is created to release accumulated nutrients and biomass and reorganize them into the start of a new cycle (α). That reorganization can then exploit the novelty that accumulates but is resisted or lies latent during the forward loop" (Holling 2005, 14)

other systems. In the words of resilience scholarship, this would mean that systems are always nested in other systems (Abel, Cumming, and Anderies 2006, Gunderson and Holling 2002, Carpenter and Turner 2001). The second addition that resilience adds to studies of effectiveness is identification of these systems which may not appear to be directly linked but which can have disruptive or resilient effects on governance arrangements. This proves to be crucial in understanding the dynamic relationships of surprise, adaptation, and creativity that is essential in governance arrangements.

The question of effectiveness thus becomes much richer with the addition of focusing on the ability of governance arrangements to respond to shocks. This allows a more dynamic view of effectiveness of environmental institutions and also allows identification of institutions which may respond to shocks in a productive manner and develop increasing effectiveness.

International Biodiversity Governance

International biodiversity governance is a very valuable arena for studying the issue of resilience in international environmental governance. Biodiversity governance has become an important global force over the past few decades and is a significant terrain of environmental governance generally. Over 10% of the world's land area and significant amounts of the marine areas have been declared protected areas (World Database on Protected Areas 2010). Global spending on biodiversity projects from all sources has been estimated at between $36 and $38 billion for 2010 (Convention on

Biological Diversity 2010).[7] These projects have grown increasingly complex since the 1980s with a host of diverse governance arrangements: parks with people, ecological corridors, payment for ecological services, certification of commodities, public-private partnerships, regional integrated plans, and a host of other programs. Biodiversity governance projects have been developed in local communities, individual states, entire regions, and globally in order to attempt and conserve the remaining diversity of species.

With a diversity of forms of governance projects, there has also been a significant divergence in the outcomes of these projects (Rodrigues and et. al. 2004, Smith et al. 2003). In terms of the development of the governance arrangements, some have persisted and adapted to changing environmental conditions, scientific theories and approaches to managing those environmental conditions, and shifts in political constituencies. Other governance arrangements have been folded into newer governance arrangements, have been locked in a single approach and failed to adapt, or have collapsed entirely. The issue of resilience is thus highly relevant in this field of environmental governance.

This question is not unique to biodiversity and is of increasing importance in a number of problems in international environmental politics. Although there are some transboundary and global problems that have seen the development of comprehensive

[7] This puts global spending on biodiversity above the National GDP of about half of the world's countries, including Costa Rica, El Salvador, Panama, Serbia, Kenya, etc. In terms of environmental spending, the $36 billion spent on biodiversity issues globally is more than spent on solar power (about $30 billion) and double wind power (about $14 billion). It still is far behind the global pesticides market (about $50 billion) and many other industries, but is nonetheless significant.

treaties, the coverage is not extensive and even those with developed treaty systems often have punctuated progress in the development and implementation processes (Biermann and Pattberg 2008, 283-284). The formal promotion and integration of Type-II partnerships around the Johannesburg Conference and through Global Environment Facility (GEF) funding has led to a proliferation of various governance arrangements including certification and market-based regimes, collaborative networks, and local-local coordination (Najam, Christopoulou, and Moomaw 2004, Andonova and Levy 2003/2004, Andonova and Mitchell 2010). In addition, as the political roadblocks to significant treaties in many fields has restrained the creation of multilateral environmental agreements, a complex and multilevel governance systems has become of primary importance in realms like climate change (Dimitrov 2010), forests (Humphreys 2003), and excess nitrogen (Erisman 2004), among others. Global environmental politics, in general, is seeing a significant rescaling in efforts over the past two decades and the development of a polycentric system of projects (Andonova and Mitchell 2010, Ostrom 2010b). The question of resilient governance is thus valuable to a large and growing set of problems in international environmental politics.

Although the question of resilience is a common one, international biodiversity governance offers some very unique aspects that make it a particularly valuable terrain for study. First, biodiversity loss is one of many different problem types that is *locally problematic but globally aggregate*. These types of problems are impacted to a large extent by behavior at the local levels and often have their largest impact on local provision of ecosystem services, but which aggregate to give the problem a global

dimension (Conca 2006, 12-20, Hale and Manzerall 2004). This type of problem presents new challenges to the study of international environmental politics in that it is of a different nature than transboundary pollution problems (such as acid rain) or problems that may largely have a global impact (such as climate change or ozone layer depletion). Conca (2006, 13) writes "Most of the problems that have attracted serious, sustained regime-building efforts involved environmental harm that flows directly across borders…Formation of a regime has also been a common remedy for problems associated with an international commons that exists outside the territory of states." In contrast, locally problematic, globally aggregate problems such as deforestation, soil erosion, solid waste management, and freshwater management often deploy alternative governance forms than formal, treaty-based regimes. Investigating governance resilience in biodiversity can add unique insights into the various political areas beyond regimes.

Biodiversity projects also provide important hard cases for resilient governance because they often do not have the institutional supports or stable constituencies that are seen as normally crucial to producing effective regimes.[8] This is not simply a result of the unique problem-type of biodiversity governance, but is also a result of the particular development of international efforts to deal with the problem. The major

[8] For ease of discussion, "international biodiversity governance" relates to those international efforts that are largely focused on the improvement or maintenance of the overall diversity of species in ecosystems. It is thus distinct from some species-specific governance efforts that focus their attention on management of a single species. This division is not simply an analytic decision but reflects the geography of governance efforts. Biodiversity related treaties are often separate from efforts in the fishing regimes, whaling regime, or other species-focused regimes. There are, of course, key interactions and linkages, but they are separated in terms of most of their interaction.

biodiversity agreement, the Convention on Biological Diversity (CBD), operates more as a bazaar of various different coordinating spaces than a formal agreement or regime (Faizi 2004, Le Preste 2002). The result being that international biodiversity governance occurs without clear international guidelines setting the context. National constituencies are crucial in articulating policies, developing strategies, and in implementation of any international efforts at biodiversity management (Fee et al. 2009, Zimmermann 2009). However, effective biodiversity governance still requires coordination and action across multiple jurisdictions. The result is a host of regional actors and transnational networks providing a complex array of different biodiversity strategies and projects. The insight to the question of resilient governance from looking at biodiversity governance is understanding how resilience can happen in a difficult environmental and institutional context.

Defining Resilient Governance: Adaptive Capacity and Authoritative Capability

Resilient governance is defined as a governance arrangement which can adapt and respond to both shocks to the political context and shocks in the environmental condition. As a broad concept, resilience is defined as the ability of systems to respond to shocks in a way which does not permanently change the functioning of the system (Holling 1973). The opposites of resilience would be governance arrangements which either do not adapt following shocks or those which collapse entirely (Gunderson 2000). Operationalization of the concept is difficult to the extent that resilience is often a latent variable and cannot be identified precisely without regular shocks and disturbances to the system and adequate evaluative tools to analyze resilience. However, the definition

above would find that resilient governance is those arrangements that are high in both *authoritative capability* and *adaptive capacity*.

Two examples of resilient and non-resilient governance in biodiversity governance at the local level can help ground the discussion of the concept. The positive case is that of the Ecomuseum Kristianstads Vattenrike (EKV) in Sweden which has seen a significant updating of procedures and behavior over the past decade and a half. Originally, the Kristianstads wetlands had been declared a Ramsar conservation site in the 1970s and received some significant conservation support from the Swedish government. Despite these efforts, the wetlands continued to see significant decline through the 1970s and 1980s. One individual in the 1980s, Sven-Erik Magnusson who was an assistant curator of the Kristianstad County Museum, began organizing a network in order to highlight the natural condition of the wetlands. This effort resulted in collection of the environmental knowledge about the wetlands, brought in various groups that were noticing similar declining trends but were not largely connected, and raised the public profile of the declining wetland condition. The result was the creation of EKV, headed by Magnusson, as a loose organizational space which developed a series of interlinkages with various different actors, eventually being integrated into the municipal government, and supporting constant adaptation and fine-tuning of procedures. The result is that EKV has developed a highly-adaptive management strategy and a diverse base of support allowing it to weather both natural and political disturbances (Gunderson et al. 2006, Lebel et al. 2006).

An example of a non-resilient institution is that of the Everglades in Florida. Much of the Everglades have been transformed over the past 75 years with large parts of the northern part being turned into agricultural land and much of the Eastern part transformed to serve the urban areas. A group of individuals (centered in a 6-person expert panel including C.S. Holling) began developing an active, integrated, and adaptive management plan for the Everglades in the 1980s. In addition, a series of severe environmental shocks (fire, flood, and drought) and actions by environmental policymakers and activists raised the prominence in the public of protecting the Everglades. In 2000, the area received an authorization for over $7.8 billion from Congress to encourage the restoration of the area. Despite a designed adaptive strategy for the Everglades and significant support from the national government though, any implementation of experimental management has been disrupted by political struggles. Gunderson and Light explain that "The Everglades process of experimentation has been hindered by (1) long standing feuds among special interest groups (agricultural and environmental) who seek certitude in policy, rather than understanding through experimentation; and (2) outmoded policies and practices that hamstring experimentation efforts and (3) resistance from agency scientists" (Gunderson and Light 2006, 327). The result has been that this system has seen declining ecosystem health indicators and even preliminary adaptive management ideas have been short-circuited.

Resilient governance then needs both the adaptive capacity and the ability to continue to discuss and implement decisions (the authoritative capability). Political or environmental disruptions or shocks can both derail governance efforts at the local and

at the international level. Oran Young organizes the various possible shocks into those internal to the governance arrangement and those external to the governance arrangement (Young 2010); although Young's organization is instructive, when defining the necessary components of resilient governance it is more useful to divide them between whether the shocks disrupt the adaptive capacity or the authoritative capability of the organization. Political disruptions involve the defection of major actors, the loss of leaders, network breakdown, the development of intractable and opposing coalitions, and wider geopolitical issues, among others. Environmental disruptions can include natural disasters, disruptions to ecosystem services, scientific or popular reports on the severe situation, and internal assessments about the environmental conditions. Resilient governance is governance that can adjust and adapt to these different types of disruptions.

Dealing with political shocks requires **authoritative capability** within the organization which revolves around the ability of the governance arrangement to make rules and keep actors committed to those rules (Bernstein 2004). In some instances this relates to the trust that actors have in one another and in other times the "delegated authority" of the institutions they create to achieve the ends they were designed to address (Barnett and Finnemore 2004). Governance arrangements which are unable to keep important members involved or which are unable to make and update rules will not be resilient but will instead be in either states of arrested development or in some instances outright collapse. International environmental politics has seen cases which exemplify these lessons. Agreements like the United Nations' Framework Convention

on Climate Change and the Cartagena Biosafety Protocol have both been beset by lacks of authoritative capability and have been unable to develop significant additional agreements (for the general discussion of arrested development, see:Young 2010 chapter 4, which also explores the particular case of climate change, for more on climate see: Dimitrov 2010, Thompson 2010, for the Biosafety protocol, see: Andree 2007, Oberthur and Gehring 2006).

Coupled with this, **adaptive capacity** relates to the ability of the governance arrangement to develop and integrate scientific information into their rules and procedures. The studies of resilience and adaptive capacity at the local level have emphasized the importance of trial and error, policy experimentation, learning based upon new understandings of the problem, and the ability to communicate these results across levels as key to sustaining resilience (Ostrom 2005, Folke 2006, Gupta et al. 2010, Pahl-Wostl 2009b). Studies of international environmental politics has likewise emphasized the importance of learning and integrating in new understandings into procedures as crucial to their maintenance (Haas and Haas 1995, The Social Learning Group 2001). The lack of adaptive capacity has held back a number of international agreements; highlighted most significantly in the collapse of North Pacific Fur Seal efforts, where natural disease and the failure to take this into account caused the collapse of the institution (Young 2010).

To help understand the wide range of possible outcomes, it is useful heuristically to see resilient governance as one of four different governance outcomes based upon different levels of authoritative capability and adaptive capacity. Governance

arrangements with low authoritative capability and low adaptive capacity will be seen as collapsed arrangements. They are largely unable to develop rules or to integrate new information and will be particularly vulnerable to shocks. Some arrangements have a large ability to generate and integrate new information, but lack the political will to do so. Using Young's term "arrested development" (Young 2010), these arrangements have high adaptive capacity but without the authority to implement them. Conversely, some arrangements have generally high political engagement and authority but which are largely unable to generate usable knowledge to the organizations. These organizations are here termed equilibrium in that they generally bargain to specific equilibrium points and under certain stresses they may experience punctuated progress; however, the adaptation is not a constant or engrained process. Finally, resilient governance arrangements will be those which are both high on authoritative capability and adaptive capacity. Figure 1.2 collects this information with some key examples of specific international regimes.

		Adaptive Capacity	
		Low	High
Authoritative Capability	Low	**Collapse** Regional Seas Program in the Persian Gulf Fur Seals	**Arrested Development** UNFCCC International Convention on Whaling
	High	**Equilibrium** Antarctic Treaty System	**Resilience** Ozone North Sea

Table 1.1- Different possible governance outcomes based upon their authoritative capability and their adaptive capacity. Cases are drawn from: (Miles et al. 2002, Young 2010)

Network Structure Theory of Resilience

This study argues that the crucial feature which enables some governance arrangements to maintain adaptive capacity and authoritative capability is the network structure. In particular, network structures which evolve to have distinct clusters of like-minded actors and institutionalized linking agents bringing these distinct networks together. The key aspects then involves both tightly coupled modules within the network and agents able to diffuse ideas and policy options between the different modules of the network. If there is not a modular network structure or if the modular network structure is not held together with linking agents then the governance arrangement will result in an alternative outcome. Within this broad articulation, the theory makes some specific hypotheses and expectations about relevant causal mechanisms that will be crucial in contributing to resilience.

Theoretical and Empirical Basis for Modular Network Theory

The theoretical and empirical basis for the modular network theory of resilience develops from a number of different streams of governance research. The mixed theoretical lens which develops emphasizes the important role of bottom-up, emergent processes and the important role of adaptive management created through focused learning by small groups. However, there are a lot of other conditions identified as relevant to resilient governance which the modular network argument finds to be of secondary relevance to resilience on the international level.

Before proceeding, it is important to point out that although the primary studies of resilient governance study local level institutional interactions this study is primarily concerned with resilience at an international and multi-level setting. The dynamics that operate in the local level may be irrelevant or difficult to apply to international settings. The modular network theory builds from findings and theoretical arguments about resilient governance at the local level and sifts these disparate studies to generate a generalizable argument for resilience at the international level.

Rather than a unified field of analysis, the insights relevant to the question of resilient governance derive from a number of different streams of research on resilience of social-ecological systems and governance studies. The most significant analysis has happened in studies of the resilience of linked socio-ecological systems, work often affiliated with the Resilience Alliance, studies of common-pool resource management and polycentric governance, and studies of coordination in multilevel governance environments.

Before exploring governance studies to develop insights about a theory of resilience, it is necessarily to deal with the limits of the resilient theories of ecological systems. As argued above, the resilience findings can assist in developing a dynamic approach to governance that focuses on the adaptive processes within governance arrangements. The approach helps understand that robustness and resilience are not confused and that the full array of nested, interacting systems are accounted for. However, the metaphor from ecological systems should not be widely applied to governance systems.

To apply the findings across systems often leads to broad arguments that try to apply ecosystem dynamics to those of governance institutions. For example, Walker and Salt identify three key system dynamics that are applicable across resilient systems: diversity, modularity, and the tightness of feedbacks (Walker and Salt 2006, and see also Levin 2002). Walker and Salt explain the components of the three factors explaining that: "Diversity refers to variety in the number of species, people, and institutions that exist…both functional and response diversity…Modularity relates to the manner in which the components that make up a system are linked…[And] Tightness of feedbacks refers to how quickly and strongly the consequences of a change in one part of the system are felt and responded to in other parts" (Walker and Salt 2006, 121). While possibly important broad aspects of resilient governance, the problem with these answers is that they explain little about the actual adaptive processes of governance arrangements.

The metaphor becomes most strained when studies using resilience as a general approach began discussing leadership. Studies use the concept of leadership to explain the preparation and shepherding of governance arrangements through various states (Olsson et al. 2006). While work has shown keystone species play key roles in organizing and reorganizing ecological systems (Mills, Soulé, and Doak 1993, Walker 1992), it seems strained to understand leadership in similar ways. Leadership often becomes *ex post* explanations which point to individuals as key leaders to explain certain governance changes (Skodvin and Andresen 2006). The null condition or absence of leadership proves analytically difficult. While not denying the possible importance of leaders and leadership in the processes of adaptation and resilience, the argument here is simply cautious in suggesting that ecological studies provide some important suggestions, but the development of theory is best done by looking at governance studies.[9]

Governance literatures and resilience

Three different, but related, streams of governance studies provide some useful insights for understanding resilient international governance. None of them directly apply to wider international governance arrangements, so each will provide some key facets that together will contribute to the network structure theory of resilient

[9] Even the broad insights of modularity, diversity and tight feedback may become stretched when applied to multilevel and international governance. Diversity, for example, may mean different things at different levels of governance. The challenge for a theory of resilience in multilevel and international setting is to provide an understanding of how these factors may play out in different levels and across levels.

governance. These three streams can be most usefully classified as socio-ecological system governance, polycentric governance, and multi-level governance.

Socio-ecological system governance work has increased dramatically over the past decade and focused on a number of different cases but primarily on governance at the local or subnational level. The research has used ideas of shock, adaptive capacity, and regime shifts (concepts largely drawn from the resilience in ecological systems studies) to explore changes in resource use and ecosystem use by people (Garmestani and Benson 2013, Anderies and Janssen 2011, Norberg et al. 2008, Walker, Gunderson, et al. 2006, Anderies, Walker, and Kinzig 2006, Folke et al. 2005). These studies have explored a number of different dimensions involved in resilient governance but in general have emphasized learning, cross-system impacts, and network connections as crucial processes in understanding resilience. The limitation of these studies for understanding international governance is that they do not account for large differences of interest between actors. In situations of diverse interests and coordination problems made more difficult in multiple jurisdictions, it is unclear whether the same findings would be relevant.

However, two ways these studies inform the network structure theory is that they emphasize the importance of wider connections beyond a single institution and that learning systems mediate network form. In regards to the first, with the idea of panarchy and nested systems (Gunderson, Holling, and Peterson 2002, Carpenter and Turner 2001), these studies have observed in a number of instances the importance of wider systems in shaping the processes within a governance arrangement. For example,

in a study of Uzbek drought response, Herrfahrdt-Pähle and Pahl-Wostl find that the larger Soviet management system persisted after the fall of the Soviet Union shaping the adaptability of the water regime (Herrfahrdt-Pähle and Pahl-Wostl 2012). The result is that other systems with connections to a governance arrangement can cause shocks and also prevent adaptation. The second conception is an emphasis on learning as a key mediating factor. While network structure may have an impact, it is learning that largely mediates that impact in practice. In the EKV case earlier, the network structure in the EKV was important but only became active because of the ability to generate and spread new ideas across the network (Olsson et al. 2006). This provides a core insight for theory development in that it means that learning dynamics are a crucial mediating variable which shapes resilient outcomes.

Polycentric governance studies contribute to this conception by emphasizing coordination rules and the risks and rewards of modular and centralized network structures. The literature initially developed in studies of urban politics in the United States which emphasized that coordinated action amongst different municipalities was not only possible, but could contribute to inventive policy learning (Ostrom, Tiebout et al. 1961). This led to empirical work in municipal governance in the United States and the United Kingdom (Rhodes 1996, Stoker 1998) and to work in management of common pool resources such as shared irrigation systems, forests, or fisheries (Dietz, Ostrom, and Stern 2003, Ostrom 1990, 2005). The literature developed a sustained evaluation of common management regimes that worked without reliance on hierarchical control mechanisms or competitive market forces (for theoretical work this

literature is generally responding to, see: Demsetz 1967, Hardin 1968). Governance from this approach is the development and following of collective rules between functionally equivalent participants. Such a system develops from unit-level mechanisms of trust and reciprocity which gradually build into rules and rule-based behavior (Ostrom 2005, see also Axelrod 1986). The mechanisms that then cause such rules and institutions to persist are supported by rule following behavior, the use of specific type of rules such as monitoring, conflict resolution procedures, and increasing returns (Ostrom 1990). Coordination then in context of the polycentric governance stream then entails development of norms, rules for collective action, and design principles for maintaining those rules.

The major insight for international and multilevel settings from this work, which similarly to socio-ecological governance studies is largely at a single level even if it includes multiple actors, is that it highlights the importance of network structures on shaping learning behavior. One of the major observed advantages of polycentric governance arrangements has been that they allow trial and error experimentation and local adjudication of rules which can generate better post-disruption lessons for the governance arrangement (Ostrom 2010b, a, 2005). However, while these systems can work, the large risk with them is that they will not be connected enough together to matter or that power or economic dynamics (such as free riding or rent seeking behavior) will disrupt the dynamic learning potential in these agreements (Andersson and Laerhoven 2007, Gibson et al. 2005).

Finally, multilevel governance studies focus primarily on the ways in which coordination and collaboration can occur across jurisdictional scales. Developing primarily in studies of the European Union (EU), this stream emphasizes the development of transnational linkages by subnational units in ways which make and shape policies. Hooghe and Marks' study of the European Union emphasizes that "subnational actors operate in both national and supranational arenas, creating transnational associations in the process" (Hooghe and Marks 2001). Further explorations have specifically found that pressures on both the European Commission and local governments have resulted in each jurisdiction depending on one another to achieve certain goals (Ward and Williams 1997). The theoretical foil for multilevel governance has largely been the state-centric perspective of EU integration which has emphasized the integration process as constrained by state actors and keeping the formal policymaking impact firmly in the hands of centralized states. The empirical contribution of multilevel governance studies then is on emphasizing the policy networks that exist between bureaucrats, subnational units, and nongovernmental organization networks (Börzel 1998, Kriesi, Adam, and Jochum 2006, Bugdahn 2008).

Each stream of governance research adds some aspect which together contribute to the network structure theory of resilience below. In addition, each adds some unique causal mechanisms which would be relevant for fully understanding the causal process. Using cross-governance studies to construct a theory of resilient governance has some risks involved. However, these risks can be dealt with effectively through an eclectic approach studying the mechanisms of governance (Sil and

Katzenstein 2010). A crucial part of the theory will thus not simply be the broad insights from the three different streams, but some of the mechanisms used in the different theories.

Network Structure Theory of Resilient International Governance

Simply stated, the network structure theory of resilient governance argues that different network structures shape the learning that occurs within governance arrangements following shocks and this shapes the adaptive response to the shocks. The crucial independent variable is the network structure (broadly defined as being of various ideal types, modular, centralized, or limited). When a shock happens to a governance arrangement, the network structure shapes precisely the potential learning dynamics which can occur and be implemented by the different aspects of the governance arrangements. Modular networks will enable broad, bottom-up learning driven by ideas from multiple clusters of the governance arrangement while centralized structures will tend to foster top-down learning driven by one particular part of the network. These learning approaches will then shape precisely how the governance arrangements adapt and respond to the shock. Bottom-up learning will facilitate the resilience of the governance arrangement, while centralized networks will facilitate limited adaptation and often support of current streams of political resources from the institutions, and limited networks will see little learning. The result is that even if they appear complex and disorganized, broad and modular networks are the most likely to facilitate resilience. Robust institutions are not sufficient, and may even be detrimental

at some points, and social capital in some aspect of the network is unlikely to be enough to spur resilience across the network.

Network Structure

The network structure argument contends that the crucial shaping condition for resilience is the governance network structure which exists before a shock occurs. The articulation of different network structures and how precisely to describe these abound throughout a number of different literatures and no standard articulation has been developed (Börzel 1998, Rhodes 1997). The articulation developed here is an original depiction of the different possible network types and remains an ideal type articulation rather than a definite measure for study across fields. The articulation develops from separate understandings of political networks focusing on the coalitional composition of networks (Steinberg 2009, Thelen and Mahoney 2009) and the importance of linking and bridging actors (Granovetter 1973). Coalitional politics as the basis for institutional dynamics alerts us to the broad networks which are connected to any governance arrangement while the linking actors show the pivotal role played by actors who can perform functions in multiple networks at the same time, whether this is bilateral activists operating in domestic and international spheres (Steinberg 2001) or whether these are norm entrepreneurs or scientists serving policy roles who operate between different functional spheres (Haas 1990a, Cortell and Davis 2005). The ideal types then vary on the organization of the coalitions that make up the network and on the role of linking agents.

Modular networks are defined as those with multiple, separate coalitional groups of actors that are joined by key and persistent linking agents. A module is described as a group of actors in a network with significantly more connections to one another than they have to other members of the network (Newman 2006). Centralized networks are those with few separate groups of actors and with linking agents serving brief roles linking coalitions which quickly dissipate in future rounds of institutional conflict. Finally, limited networks are those without extensive and repetitive network connections outside of the arrangement. As will be shown in the cases, these networks develop for a variety of reasons and are linked together through largely historically dependent reasons. The specific causal pathways and likely mechanisms are captured in the heuristic Figure 1.1.

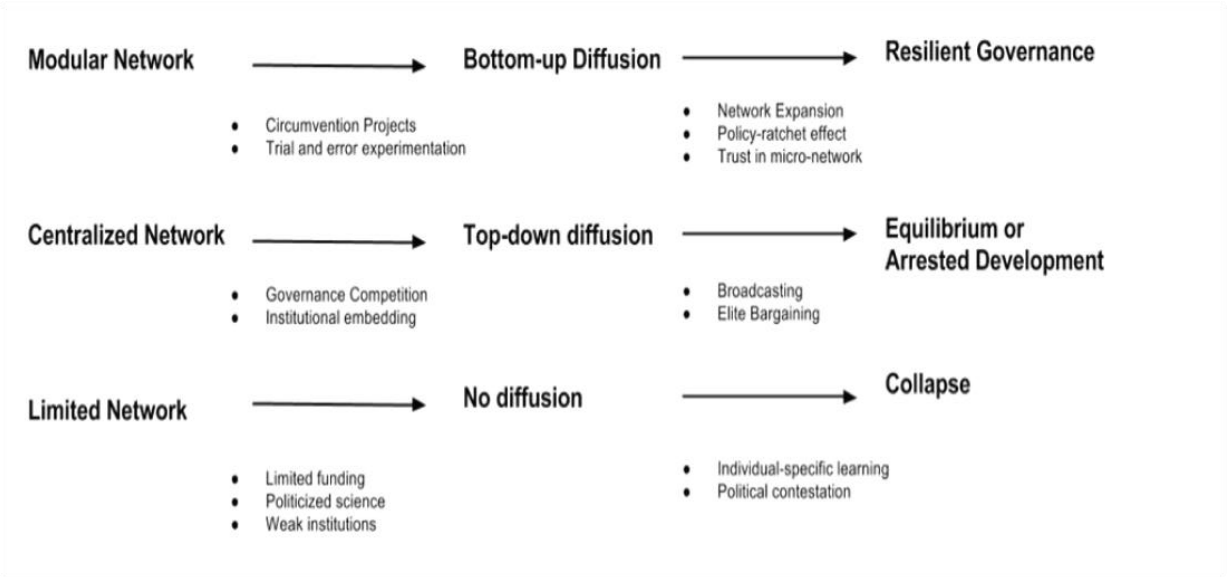


Figure 1.2– Visual depiction of the causal processes expected as a result of network structures.

The first set of hypotheses in the modular theory argument relate to the argument that the network structure will shape the processes of idea diffusion during

and after shocks. Hypothesis 1 expects that if there is a modular network structure then there will be bottom-up diffusion of information. Hypothesis 2 expects, in contrast, that if there is a centralized network then there will be top-down diffusion of information. The theoretical basis for these distinct pathways is found in all three literatures explored above but have distinct mechanisms. Hypothesis 3 expects that when there is no network organized, then there will be no diffusion of information.

Relevant mechanisms for Hypothesis 1, linking modular networks to bottom-up diffusion of information are *circumvention projects* and *trial and error experimentation*. Circumvention projects would be those projects organized around the governance organization which link different actors than are linked in the governance arrangement projects. This feature is described in a number of different empirical descriptions in polycentric and multilevel governance studies. Pahl-Wostl terms these connections "shadow networks" (Pahl-Wostl 2009a), Hooghe and Marks broadly discuss them as local-regional linkages (Hooghe and Marks 2001), and other descriptions do not usually provide a clear conceptual name. This mechanism has been observed in regional governance, primarily in the EU context. Hooghe and Marks explore this dynamic in bringing municipal governments and EU actors together in a variety of projects for different ends. They write that in the 1980s in Europe, "subnational governments were discovering Europe at the same time that Europe, under the leadership of Jacques Delors, was discovering subnational governments" (Hooghe and Marks 2001, 81). Municipal governments wanted additional autonomy and resources to implement policies, while supranational institutions wanted additional efforts with municipal

governments so they could pursue their agenda items. Once established these connections became deeper and deeper and were valuable in their own respect in the EU context. . This mechanism is crucial in understanding policy development in both the EU context (Jordan and Schout 2006, Hooghe and Marks 2001) and ASEAN context (Caballero-Anthony 2004). It provides a crucial mechanism linking the modules with one another in diverse ways to allow the bottom-up diffusion of ideas and information.

Similarly, the mechanism of trial and error experimentation provides an additional process by which the modular network structure leads to bottom-up diffusion processes. Polycentric governance studies and resilient social-ecological system studies have emphasized the key role of trial and error policy experimentation in producing learning by governance arrangements (Ostrom 2005, Anderies, Walker, and Kinzig 2006, Cardenas 2004). In single governance arrangements, the findings are robust that trial and error experimentation can lead to bottom-up learning; however, in multilevel settings with experiments in many different modules, the relationship is not clearly established. Multilevel governance studies add some idea of how experimentalist efforts may work in a regional setting (Sabel and Zeitlin 2008, Börzel 2012), but any generalizations appear largely specific to that context and of limited theoretical guidance elsewhere. The contrast with broadcasting, a primary mechanism for hypothesis 2, helps clarify the conditions. In broadcasting, learning occurs primarily by an agent directly telling another agent the conclusion reached. In trial and error experimentation, learning occurs through local experimentation but also building on the

work of others through borrowing their findings, which may include the conclusion but could also include other aspects of the experiments elsewhere.

Diffusion processes

The second part of the modular network theory contends that the diffusion processes shape the governance outcomes. The theory contends broadly that bottom-up diffusion processes will result in resilient governance which is both adaptive and authoritative while top-down learning will lead to governance arrangements which are limited in some terms of adaptation or authority. Those cases with limited networks will see no diffusion of information and largely result in governance arrangements which do not adapt and are limited in their impact. Bottom-up diffusion processes can be broadly defined as those which involve idea development and spread through multiple actors with no centralized communication center. Examples abound in international biodiversity governance of attempts to organize this: whether that is the use of indigenous biodiversity knowledge, organized science committees, or multiple levels of different projects. The key aspect is that learning is not collected by a centralized body which then transmits the conclusion to the rest of the actors. This is top-down diffusion processes and can be best understood to operate in typical international bureaucracies. Policies and ideas are established by some organ in the institution and then the lessons are broadcast to the rest of the modules in the network. The theory expects that bottom-up diffusion of lessons, associated with modular network structures, will result in resilient governance while top-down diffusion, associated with centralized network structures, will result in either equilibrium or arrested development governance. Those

governance arrangements with limited networks will see little diffusion and will see neither adaptation nor authoritative capability.

Hypothesis 4 is if a system has bottom-up diffusion of lessons and policy rules, then that system will be high in adaptive capacity and authoritative capability. Hypothesis 5 similarly argues that if a system has top-down diffusion of lessons and policy rules, then that system will be low in either adaptive capacity or authoritative capability. Hypothesis 6, finally, argues that if a system does not see any diffusion to a wider network, then that system will be low in both adaptive capacity and authoritative capability.

Similarly to the first set of network structure hypotheses, each of these connections is expected to operate under different mechanisms. Bottom-up diffusion leads to resilient governance through 1. Proliferation of ideas and 2. Tight feedback loops. Top-down diffusion leads to stale governance arrangements through 1. 2.

Emergent Causation

Network structure is an emergent phenomenon, in the sense that the whole is larger than the sum of the parts, and as such is not reducible to simple linear causal models. Emergent causation is a different type of process of description than linear or aggregate effect causation in that it fundamentally involves both upward and downward causation simultaneously. The challenge confronting research is how to maintain a coherent argument for empirical evaluation that is simultaneously mainly about agents and structures (Hedstrom and Swedberg 1998). The challenge is best dealt with through a mechanism-based focus of the argument because this allows both separations of the

different dynamics while retaining enough consistency to weigh different possible causal pathways.

Direct or linear causal stories, of the type X causes Y or an increase in X increases the probability of Y, focus primarily upon simultaneous changes in variable conditions. However, if it is contended that an outcome results from emergent processes, such relationships between variable conditions may be misleading. The problem of confounders becomes highly problematic if it is possible that there is an emergent process. For example, although supporting national constituencies or strong international institutions may correlate greatly with resilient governance, it could be caused by other dynamics that are not captured in the correlation story.

Emergent causation involves two different processes working in close relationship. First, there is an uncoordinated action by units that are analytically independent from one another. This is the bottom-up aspect of emergent causation. Second, the decisions made by these agents creates a structure that impacts future actions by those individuals. This can be conceptualized either as the feedback loop (in unstructured forms) or as the structural effects (Sawyer 2005, Davies 2006). The self-fulfilling prophecy of bank collapse is a clear example of this. Many individuals, possibly for very different reasons, form a belief in the weakness of a bank and express the belief that it might fail. These individual level actions can form a result where people begin withdrawing their funds, weakening the bank, and possibly leading to the prophesized end (Merton 1948). The bottom-up aspect and the feedback loop need not be of the same form and all that is necessary for emergent causation is that both the bottom-up,

uncoordinated processes and the feedback loop operate actively. Emergent causal stories need to have both aspects or it is different type of causation happening; so if the bank is making poor investments and that is what impacts its health rather than individual perceptions, that would undermine any emergent causal story.

There are some unique challenges to empirically evaluating emergent causation. A first problem is the difference between strong and weak emergence which relates to the amount of coordination at the lower levels (Chalmers 2006). Weak emergence can involve unstructured interactions between social agents that is not purposefully guiding the outcome. Back to the bank example, if account holders talk to one another about their belief in the strength or weakness of the bank they are not intending to produce the outcome of bank collapse but nor is the process completely uncoordinated. Strong emergence involves exactly that uncoordinated interactions where individuals make their own small decisions which are not communicated directly to other actors. For example, if account holders in the bank reduce their investment in the bank on their own, this will restrain the bank's ability to lend which may then cause other individuals to make their own beliefs further restraining the bank's activities. Weak emergence is far more likely in the social world (Clemens 2007), but the distinction between it and directed action may not always be clear.

This leads to the second problem which is how to identify and assess the strength of emergent processes in complex social environments. One popular approach is agent based modeling or the use of computer programs to test the ability for limited logic agents to create complex environments (Johnson 2001, Axelrod 1997, Holland

1992). These computer aided approaches are unique in their ability to test if units operating with simple logics can create social patterns of interest without directing their behavior. Like all laboratory findings, the limitation is on connecting these findings to real world settings in useful ways. It is also possible to do direct empirical assessment of the emergent propositions, but it is important to refine the analysis to the actual processes of production rather than variables or structures.

The focus on mechanisms then allows clear empirical support or disconfirmation of emergent causation and allows comparison with other possible systems. Mechanisms are the direct generative processes that produce key outcomes or steps in the eventual outcome of interest. They allow excellent views for evaluation of outcomes in that they can quickly disconfirm emergent arguments. If processes were generated through directed, hierarchical action, or if the feedback loops are not operative in a meaningful sense, then the empirical argument is fundamentally weakened. However, at the same time, if the bottom-up processes occur through undirected action and if there is an effective feedback mechanism for all agents, then there is good evidence of the emergent argument. The network structure theory relies upon this form of causation in order to understand and deal with the issues of complex causation and the role of network structures which are constantly in flux.

Alternatives: Regime Design and Coherence of Clusters

There are two alternative arguments often given for explaining resilient governance which do not find significant support in the history of global biodiversity governance. The first argues that regime design shapes the ability of the institutions to

respond to shocks and the second instead argues that the coherence of some cluster or party within the network is what is crucial for explaining resilience. For ease of discussion, the first will be called the robustness argument and the second will be called the social capital argument.

The robustness argument contends that stronger institutions, variously defined, will be the most capable of surviving shocks and responding to them. This argument has been pushed the farthest by Oran Young who argued that the fit of the internal dynamics of regimes will shape their dynamics (Young 2010). In this argument, the regime design matters significantly and poorly designed regimes would likely fail to see adaptive growth. Young constructs a set of different variables in the inside of organizations which would be expected to shape the resilience of organizations. The network structure argument is distinct from this argument because it both extends the focus outside of the regime itself to the larger network, as will be seen so does the social capital argument, and also because it finds that strong institutions can create significant disincentives against adaptation. Institutions create stable flows or resources and power to some and not others, to say it another way, they are distributional instruments (Mahoney and Thelen 2009). This can create powerful interests wedded to the institutions which exist and preventing adaptation or, in more perverse instances, widespread rent seeking behavior as actors work to maintain resource flows rather than achieve positive environmental action. The network structure argument highlights both the necessary strength by institutions to hold networks together in times of shock, but

also some of the limitations on adaptation which can be introduced by these robust organizations.

The second approach emphasizes that what is necessary for resilient governance is for there to be a significant invested constituency pushing the resilience. The epistemic community approach focuses on the important role of scientific communities while the national constituency approach focuses on the importance of a domestic political group dedicated to the resilient approach (Haas 1990b, Steinberg 2009). Both of these arguments see concerted, focused groups of agents working to push any governance resilience. In addition, this social capital and trust between members could be between the state members of the governance arrangement who view the effort as legitimate (Bernstein 2004). The Network Structure perspective differs from this by giving it a specific shape in arguing that it is not necessarily any trustful relationship between one cluster of actors able to push the other actors, but rather the existence of multiple different, polycentric clusters of actors. In addition, the mechanisms expected to operate in the social capital argument may differ significantly from those expected to be important in the network structure argument: namely, the emergent mechanisms.

Some of the evidence provided in the analysis of global biodiversity politics will provide significant challenges for explanation from either of the alternative arguments. The hard cases for explanation by both approaches are the UNESCO Man and Biosphere project and the Mesoamerican Biological Corridor. Both of these examples are ones where neither other argument can fully illuminate the outcomes: with weak institutional support and the limited support from a single cluster of policy-focused actors. Rather,

these cases, as will be shown are best explained through an understanding of the network structures which undergirded these governance arrangements. This does not mean that either argument is necessarily falsified by this study; rather, their limits are very apparent when looking at the various biodiversity cases which have been built around the world in the past 30 years.

Approach

Multilevel governance and resilient dynamics present challenges for study. As explored above, resilience involves multi-system dynamics and often surprising changes in system structures. Studying governance system dynamics requires an approach that is not limited to a single level and which is able to account for complexity. This study approaches these issues by paying particular attention to the cross-system dynamics, through developing multi-method indicators, and through

This study begins with a large survey of global biodiversity governance and resilience in those cases. Focusing on 10 cases from a population of 38 cases, Chapter 2 analyzes the impacts of resilience across cases. The primary methodological choice for these cases involves brief process tracing identifying the network structure and the impacts that has had on the governance outcomes. The 10 cases for analysis are selected specifically to get representation across levels (with some global arrangements and some regional arrangements). This small-n comparison allows general findings to be developed and applied across cases. A particular focus is in identifying and tracing the causal mechanisms which operate in the various cases and attempting to understand their necessary conditions. This method departs from a linear, correlational

analysis (although some of these tools will be used in Chapter 3) and focuses instead on the complex conditions which generate the observed outcomes. Appendix II will explore the epistemic understandings which support this approach.

Following this multi-case comparison, Chapters 3-5 will explore the resilient dynamics in a more focused comparison between two cases discussed in Chapter 2. Two cases for in-depth study involve the Mesoamerican Biological Corridor (MBC) in Central America and the Caribbean Challenge in the Caribbean islands. The MBC as originally constructed in the late 1990s largely excluded the country of El Salvador from participation in the project. However, as a result of local-level coalitions linking up with international funders, in the redesign of the governance arrangement El Salvador became of crucial importance. The governance arrangement was able to deal with shifts in political constituencies, institutions, and scientific thinking and adapt a expanded and strengthened biodiversity governance approach. The corridor idea has influenced a number of projects in El Salvador which, with the support of local governments, have shown dramatic results. The Caribbean Challenge as it was implemented in the Dominican Republic, in contrast, largely supported their typical top-down creation and expansion of protected areas without inclusion of alternative approaches. The governance arrangement remains tied strongly to a small group within the government which drives the biodiversity policy. In general then, the MBC has shown itself to be a resilient governance arrangement and the Caribbean Challenge has shown itself to be unable to adapt and change. Aside from being ideal cases for the

study of resilient governance, these cases present empirical puzzles that require in-depth explanation.

Within case analysis involves mixed methods for analysis including process tracing, interview and archival data, and social network analysis. This provides triangulation of indicators allowing for multiple support for claims. Study on both core studies the Caribbean Challenge and the Mesoamerican Biological Corridor focused on two national cases to focus the scope of analysis: the Dominican Republic and El Salvador. In both cases, archive data was gathered in the national environmental ministries. In El Salvador, the agricultural ministry and election ministry were also visited for select data retrieval. In the Dominican Republic, the tourism ministry document service was used for similar access to key select data. Other documents were requested from specific organizations and used in the analysis, but unless noted archival work was not conducted. In both cases, interview participants were selected as crucial individuals in the multilevel governance system. In both countries, this includes local governance planners, national level NGOs and members of the Environmental ministry, international funders, and technicians of CCAD and TNC depending on the case. Participants were selected based on elite sampling techniques aiming for individuals active in multiple levels of governance. These interviews yielded 14 interviews in El Salvador and 17 in the Dominican Republic using this selection technique. However, in order to get a fuller view of the situations in both countries, other individuals were interviewed informally in both countries for insights about particular issues. This included practitioners like ecotourist operators or protected area guards (included in

multiple site visits in both contexts) and also interviews with National level NGOs that were not part of the multilevel governance arrangement to include alternative perspectives. These additional interviews will not be quoted or used for key analysis but will be referred to as necessary.

In addition, social network data was utilized in both cases to further test the context. The information for the social networks developed significantly out of cooperative environmental grants at the international, national, and local-local manner. In addition, formal yearly accounts by most national NGOs provided significant information about cooperation, coordination, and membership of board of directors for the NGO. These provided significant introduction to the social networks of the two cases. Chapter 5 will go into the social network data in a more thorough manner, but it formed a crucial aspect of the study.

The limitation in both instances is that the multilevel nature of the governance arrangement restrains the extension of the findings throughout the governance arrangements. Indeed, case studies by other researchers about the MBC in Belize, Nicaragua, and Mexico found different outcomes. This limitation cannot be overcome in the analysis, but this does not fully restrain the point of the analysis. Multilevel governance itself does not move through uniform processes throughout the network and identifying conditions that allow or constrain resilience in one part of the network is sufficient for studying the mechanisms of resilience. The limitation is highly relevant for understanding and generalizing the findings, but the focus on mechanisms allows the research to have middle level generalizability even with this limitation.

CHAPTER 2

GLOBAL BIODIVERSITY GOVERNANCE AND RESILIENCE

What processes allow international biodiversity governance arrangements to adapt to changing environmental conditions and changing political conditions? Biodiversity governance has experienced a number of different outcomes in terms of resilience and it is an excellent area for study of these dynamics. The modular network theory expects that those organizations with modular network structures will see bottom-up diffusion in response to shocks and then will see resilient governance as a result. Alternative network structures will result in different outcomes.

This chapter analyzes the pattern in a number of global biodiversity governance arrangements in order to examine the explanatory power of the modular theory of governance. The chapter will include in-depth study of ten different biodiversity cases, selected from a larger population of 38 biodiversity governance arrangements, to identify the specific articulations of the modular network theory. The analysis finds that the network structure theory provides an excellent explanation for the outcomes in global biodiversity governance.

The Terrain of Biodiversity Governance

International biodiversity governance is one of the most complex and diverse issue areas in international governance. Unlike other areas of governance, biodiversity governance is not organized into any single, coherent organization and agreements and as a result the field has significant gaps in coverage and also significant overlap on other aspects (von Moltke 2001, Raustiala and Victor 2004). The result is that the problem of

identifying the relevant institutions participating in biodiversity governance has been limited and discerning the clear effects from any single institution has been difficult.

To make sense of biodiversity governance, analysts often use two different approaches: focusing on a single agreement and trying to isolate effects or focusing on the interrelationships between multiple agreements. Some examples will illustrate the limitations of these two approaches. The single regime approach is precisely the choice made by Curlier and Andresen in one of the most extensive evaluations of the Convention on International Trade in Endangered Species. In this analysis, the focus is solely on CITES and the impact it has had on protecting overall biodiversity. The problem is that Curlier and Andresen conclude that while CITES has been quite effective in creating shared expectations between states and stopping international trade of endangered species and products, but because it only deals with a part of the overall issue of wildlife biodiversity then the treaty has been of low effectiveness (Curlier and Andresen 2002). While valuable the approach misses some relevant dimensions about the role of CITES in a larger connection of biodiversity agreements. The second approach then is to try and capture the overall effects of the various institutions by looking at their interactions or the effects of regime complexes (Raustiala and Victor 2004, Kim 2004). Although valuable, these approaches can downplay the role of any single institution and the possibility for a single organization to disrupt the efforts of the other organizations. The most effective analytic approach then seems to be to focus on the inner-arrangement dynamics while keeping an eye on relevant interconnections.

International biodiversity governance arrangements are those with a major focus on biodiversity in general, and not a specific species or genus of flora or fauna, which involve actors in more than one country. There are a number of these governance arrangements and there does not exist a preexisting listing of the various projects. The first step in developing the analysis is to establish a list of the universe of cases which are relevant.

To construct a list of international biodiversity governance arrangements, the research started with the recently established Liaison Group of Biodiversity-Related Conventions (established in 2002) which is a group represented by the large 6 biodiversity related treaty organizations. From these set of the 6 main biodiversity treaties I included other international organizations with memorandum of cooperation or understanding with the different treaties. This method of developing a universe of cases is extensive and significant in finding a set of supranational biodiversity governance organizations. Table 2.1 provides the list of cases with 38 cases that have developed and have memorandums of understanding with the Liaison Group of Biodiversity Related Conventions.

Liaison Group of Biodiversity-Related Conventions	**Global Biodiversity Governance Arrangements**	**Regional Biodiversity Governance Arrangements**
Bonn Convention or Convention on Migratory Species (CMS)	UNEP World Conservation Monitoring Center (WCMC)	Amazon Cooperation Treaty Organization (ACTO)
Convention on Biological Diversity (CBD)	UNESCO Man and Biosphere Project (MAB)	ASEAN Centre for Biodiversity
Convention on International Trade of Endangered Species (CITES)	Global Environment Facility (GEF)	Cartagena Convention (Caribbean)
Convention on Wetlands of	IUCN	Barcelona Convention

International Importance, especially Waterfowl Habitat (Ramsar Convention)		(Mediterranean)
International Treaty on Plant Genetic Resources (ITPGR)	TRAFFIC	South Pacific Regional Environment Programme
World Heritage Convention (WHC)	International Whaling Commission (IWC)	Inter-American Convention for the Protection and Conservation of Sea Turtles
	Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities	Comision Permanente del Pacifico Sur
	Global International Waters Assessment	International Commission for the Protection of the Danube River
	Wildfowl and Wetlands Trust	Lake Chad Basin Commission
	The Nature Conservancy (TNC)	Niger Basin Authority
	World Wildlife Fund (WWF)	Comission Internationale du Bassin Congo-Oubangui-Sangha (CICOS)
	Wildlife Conservation Society (WCS)	Carpathian Convention
	Conservation International (CI)	Conservation of Arctic Flora and Fauna
	Ducks Unlimited	Western Hemisphere Migratory Species Initiative
	International Tropical Timber Organization (ITTO)	East Asian-Ausralasian Flyway Partnership (EAAFP)
		Bern Convention (Europe)
		Mesoamerican Biological Corridor

Table 2.1- List of Supranational Biodiversity Governance Organizations as of December 2011

Sufficient evidence is not available on all the cases and repeated evidence of the development within the cases is not covered by the secondary literature or available primary evidence. The set of 38 cases of supranational biodiversity governance organizations though allows some initial insight into which of them have been resilient and which of them have not been resilient or lack some of the conditions behind resilience. Although full evidence for process tracing will not be available in all cases, it is possible to learn enough about most of the cases to

Resilience Outcomes

There is a diverse set of outcomes and full evidence is not clearly available on all cases in terms of resilience. In addition, adaptive capacity and authoritative capability, the measures this study uses to assess resilience, may mean very different things in the different cases. However, there are some broad indicators which will produce basic evidence for both aspects of resilience which can assist in answering this question. The lack of either indicator would be clear evidence of a lack of adaptive capacity and authoritative capability, although there existence should not be considered definitive evidence of either factor.

For adaptive capacity, a basic indicator which can be applied across biodiversity cases is whether an institution has adopted and incorporated Ecosystem-Based Management (EBM) into their policy framework. The Ecosystem Perspective or Ecosystem Based Management has become a prolific idea in both policy-directed biodiversity science and biodiversity governance over the past 20 years. In general, the ecosystem perspective contends that policy to deal with biodiversity should be

geography based, rather than single issue based, and with a goal of ecosystem sustainability (Slocombe 1998). In practice, it would entail breaking bureaucratic boundaries, avoiding specific policy targeting, focus on multiple drivers of biodiversity decline or risk, and often would involve broadened stakeholder involvement (Murawski 2007). The early articulations argued for taking account of all environmental drivers and processes within a given geographic zone and not simply the resource of interest (freshwater, for instance) and for biodiversity would suggest not focusing on single conservation zones or single-species focuses (Gregory et al. 1991). It has been problematic in its articulation throughout the international environment with some agreements being quite active in their incorporation of the ideas and others being quite resistant. Crossing bureaucratic and funding specific focuses is quite problematic in the international biodiversity scene. Whether governance organizations have adopted a clear strategy of incorporating the ecosystem perspective is a excellent basic indicator of adaptive capacity within the organization. Table 2.2, based primarily on the websites and most recent documents within the organizations and groups divides the cases based upon their incorporation of the ecosystem perspective.

Incorporated Ecosystem Perspective	**Limited Incorporation of Ecosystem Perspective**
Ramsar Convention	Bonn Convention (varies based upon treaty)
MAB	CBD
IUCN	CITES
Cartagena Convention	WCMC
Barcelona Convention	IWC
South Pacific Regional Environment Programme	GIWA
Carpathian Convention	Waterfowl and Wetlands Trust

East Asian-Ausralasian Flyway Partnership (EAAFP)	TNC
GEF	WWF
MBC	CI
Caribbean	Ducks Unlimited
	Bern Convention (Europe)
	ITTO
	ACTO
	ASEAN Centre for Biodiversity
	Lake Chad Basin Commission
	Niger Basin Authority
n=27	

Table 2.2- Cases Divided by Incorporation of Ecosystem Perspective.

In terms of adaptive capacity, a good indicator is the development of additional, strengthened rules shared by the members. Advanced common understandings may seem to be a natural result of institutions, organizations, and regimes; however, there is significant variation in this in terms of outcomes in biodiversity governance arrangements. Some have developed significant, strengthened rules of procedure (for example, CITES rules on listing procedures) while others have been largely locked in place (IWC, for example) or advanced only around specific issues (for example, the CBD). This indicator provides a basic requirement of adaptive capacity that can be evaluated in the different cases. The evidence derives from the past five meetings (through 2011) of the parties and whether they have made significant updates to the core agenda of the biodiversity arrangement. This is a constrained and yet quite advanced indicator of the adaptive capacity of organizations. Table 2.3 shows the distribution.

Revised Core Agenda	**Limited Revision of Core Agenda**
WCMC (adaptation is built into meetings)	ASEAN Centre for Biodiversity
MAB	Lake Chad Basin Commission

IUCN	Niger Basin Authority
GIWA (adaptation is built into meetings)	Ramsar Convention
Barcelona Convention	IWC
South Pacific Regional Environment Programme	Waterfowl and Wetlands Trust
Carpathian Convention	East Asian-Ausralasian Flyway Partnership (EAAFP)
CITES	Ducks Unlimited
TNC	ITTO
CI	ACTO
Comision Permanente del Pacifico Sur	Cartagena Convention (Caribbean)
Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (adaptation built into meetings)	WWF
Bonn Convention (varies based upon treaty)	Bern Convention (Europe)
CBD	Caribbean
CBM	
n=29	

Table 2.3- Cases Divided by Incorporation of New Rules

Using these two indicators, it is possible to develop a general understanding of 25 of the 38 cases in order to understand the general distribution of biodiversity governance arrangements. Using the table developed in Chapter 1, it is possible to align the cases in the four different possible systems originally developed in Table 1.1. The result is a dispersion of cases contained in Table 2.4. The evidence shows that most supranational biodiversity governance organizations are low in states of collapse or equilibrium. One common theme in the cases is either a focus on a few species or funding from a few sources. The IWC, those arrangements focused on seabirds, and the dispersion of the Bonn Convention (CMS) are the exemplary cases in these categories. Also, the big 3 conservation organizations (TNC, WWF, and CI) have only moderately incorporated the ecosystem perspective but are quite able to adopt changed agendas.

Other arrangements like the Ramsar Convention, the Cartagena Convention and the East Asian-Ausralasian Flyway Partnership are in a state of arrested development. They have developed with incorporation of the ecosystem perspective, in form and possibly substance, but have not been able to mobilize actors to deepen the requirements on actors. A few agreements have been able to update rules and simultaneously incorporate the ecosystem perspective.

		Adaptive Capacity	
		Low	High
Authoritative Capability	Low	**Collapse (n=8)** IWC Waterfowl and Wetlands Trust Ducks Unlimited ITTO ACTO ASEAN Centre for Biodiversity Lake Chad Basin Commission Niger Basin Authority Bern Convention (Europe)	**Arrested Development (n=3)** Ramsar Convention Cartagena Convention (Caribbean) EAAFP
	High	**Equilibrium (n=8)** Bonn Convention CBD CITES WCMC GIWA TNC WWF CI	**Resilient (n=6)** MAB IUCN Barcelona Convention (Mediterranean) South Pacific REP Carpathian Convention MBC
n=25			

Table 2.4- Distribution of governance outcomes based upon their authoritative capability and their adaptive capacity.

This procedure yields significant guidance in terms of which cases can provide significant analytic leverage. Prioritizing diversity of levels and diversity of connection to the Liaison Group agreements can provide a set of cases that control for different institutional features. However, evidence for identification of mechanisms is not available in all cases and thus presents a particular barrier. The cases for extension then

include ACTO, ITTO, and the Bern Convention (from collapse), Ramsar Convention and Caribbean efforts (from arrested development), CBD and CITES (from equilibrium), and MAB, MBC, and Carpathian Convention (from resilience). These 10 cases are excellent opportunities to understand the mechanisms that produce resilient governance at different supranational levels and contexts.

Collapse: ACTO, ITTO, the Bern Convention and the Limits on Adaptive Capacity and Authoritative Capability

Amazon Cooperative Treaty Organization

The development of the Amazon Cooperative Treaty Organization (ACTO) is largely defined by sustained precariousness of the institution and staggered development. ACTO was started in 1978 as an effort by Brazil to expand and transform its foreign policy but was provided little substance or structure. Meetings were held irregularly and simply started programs typically with international funders. With changes in 2002, the organization gained a permanent secretariat and the Secretary General, Dr. Rosalia Artega, was an important pusher in strengthening the organization. However, highlighting the precarious nature of the organization, when she left the organization many of the efforts faltered and the organization took a substantial amount of time naming a replacement (Hochstetler 2011). This case provides an excellent case on some of the crucial limitations on the resilience of supranational biodiversity governance arrangements.

ACTO is highly linked directly to Brazilian interest in the Amazon region. When the military came to power in Brazil in 1964, they made development of the Amazonian region one of their primary goals. Making the Amazon a space for national development, the military government treated the area as crucial site for national security (de Onis 1992, 55). In the1968 *A National Security Policy for Amazonia* developed by the government, they contended that the "planned and methodical occupation of the region to impose, on the full extent of the territory, the characteristics of our civilization and integrate it forever into our national structure" (quoted in de Onis 1992). This entailed the deployment of massive resources into road, hydroelectric, and infrastructure projects in the Amazonian region, and the deployment of military bases and troops into the Amazon. The neighboring states were often startled by the military deployment and Brazil generally saw declining relationships with many in the Amazon basin (Ferris 1981). Regional cooperation during this early period was often based upon the goal of securing and developing the Amazon with cooperative infrastructure projects with other military governments, participating in the Bolivia military coup, and other activities (Ferris 1981). However, this foreign and regional policy eventually was replaced with the Third World Foreign Policy that Brazil adopted in the late 1970s. The oil shocks, deteriorating relationships with the United States (who had secured much of the infrastructure funding for the Amazon), and changed goals by the government resulted in the development of a foreign policy aimed at connections with other developing countries particularly within the region (Ferris 1981). Brazil actively sought

out improved relations with neighbors, but with the Amazon retained and increased in prominence as a site for national development (Hochstetler 2011).

Within this context, the Brazilians proposed and provided the initial push for ACTO. The treaty largely adheres to their regional goals; namely, promoting the harmonious development of the Amazon region while retaining national sovereignty over natural resources. Negotiations about the treaty were progressing slowly when the major focus was only on the development of the Amazon with the other states in the region being nervous about Brazilian efforts in this regard. In negotiations then, "Brazil needed a wholly different rationale for Amazonian cooperation, so diplomats negotiating the pact seized on environmental protection" (Foresta 1992, 137). Although environmental components are one area for dialogue under the treaty, the early development primarily focused on other issues of cooperation (Hochstetler 2011). Brazil's prominence in the treaty system was further accented in the particular incorporation of environmental issues in the 1989 Amazon Declaration. Section 2 of this declaration specifies the rational use of natural and environmental resources so that they can be available to future generations, but Section 3 and Section 4 assert clearly that regional cooperation was intended to strengthen sovereign ability to freely use natural resources (Schrijver 1997). The 1980s were the height of the nationalist response in Brazil to international pressure to conserve the rainforest and as such the government sought to simultaneously reduce the critique while asserting national control (Hochstetler and Keck 2007). The Amazon Declaration served to respond to

domestic criticism in Brazil and articulate the sovereignty-emphasized position of Brazilian conservation. As a result, it produced little sustained environmental activity.

As Brazil transitioned away from conservation obstruction to begin to embrace conservation and environmental action, the ACTO was transformed to reflect this changed priority. In 1998, the organization was relaunched with additional focuses, including the environment and a permanent secretariat was created in 2002 (Hochstetler 2011). The result was a set of work programs developing in the late 1990s focused on the environment and biodiversity issues. However, these were mostly focused on short-term projects of coordination and meetings without much sustained activity occurring on a regional level (Garcia 2011, Botto 1999). These developments provide clear evidence of the network structure of the organization until the 2000s which was largely a nonexistent network. Early the organization itself lacked any permanent bureaucracy and would be convened simply on an ad hoc basis as needed by the parties. However, even after the secretariat was founded, there were few permanent connections forged to allow an expanded network. The structure then would be of a largely limited network which neither centralized nor developed distinct modules.

Dr. Rosalia Artega, the former Vice President in Ecuador (and President during the crisis of 1997), became the Secretary General of ACTO in 2004 and attempted to change this. Artega was able to provide significant oversight of the organization, bringing in funding from UNCTAD, GEF, and other international funders to help the biodiversity projects of the organization. In addition, she expanded the stakeholders

involved and included a host of NGOs, both environmental and indigenous, in the deliberations of the organization (Hochstetler 2011). However, the shock that impacted the organization was when Artega's erm ended and the organization went two years without a new Secretary General and the networks largely languished. During this period, projects slowed, were halted, or ended entirely under the ACTO. The positive impact of a single individual actually highlights the precariousness of the organization. Hochstetler summarizes that "A small amount of political will and institutionalization positively transformed the organization—but it also languished again between the end of Artega's term and when her successor was finally designated in 2009. The apparent importance of a single individual suggests that ACTO may be a piece of regional environmental governance, but is certainly not one that can be taken for granted" (Hochstetler 2011, 135).

ACTO has been constrained through 1. Brazil's impact in the organization in the early development and 2. Institutional weakness . Brazil has never relented any sovereignty over the Amazon and has used ACTO as a forum to improve that control with different tools. ACTO furthered obstruction when Brazil wanted to obstruct international efforts to stop Amazonian deforestation. ACTO furthered environmental coordination when Brazil wanted to deepen regional environmental efforts. Coupled with distrust by other states about Brazil's projects in the Amazon, Brazilian dominance over the organization freeze adaptation or increased authority (Schrijver 1997). Similarly, institutional weakness was a crucial limitation on the organization at a number of key moments and the agreement had largely gone into disrepair through much of its

time. For much of its early development, the organization had not continued involvement in between meetings of the parties lacking even a stable repository of documents (Botto 1999). Although this may have changed under the leadership of Ariega, the large impact she had that quickly fizzled is probably better evidence of institutional weakness and a limited network than any permanent change.

International Tropical Timber Organization

The International Tropical Timber Organization is a global organization tasked with developing global management of the tropical timber trade. Developed originally as an organization primarily dealing with trade issues around tropical timber, the organization had some environmental provisions in the treaty that have become a priority in the organization and it has become increasingly important in biodiversity politics. However, largely as a result of the trade focus engrained in the voting rules of the organization, it has suffered decreased importance and relevance as non-state certification schemes have become increasingly prominent governance tools. The result is that its environmental programs have been largely locked in place and replaced in terms of governance by other organizations and governance areas.

The negotiations for the ITTO began during the 1960s with a series of meetings focused on the issue of tropical timber in the United Nations Commission on Trade and Development (UNCTAD) and the Food and Agriculture Organization (FAO) (Poore 2003). At UNCTAD IV negotiations in 1976, an African state coalition proposed including tropical timber into the Integrated Program for Commodities (IPC), a price stabilization effort. The boom and bust nature of international tropical timber markets persists and

may hinder environmental efforts (Vincent 1992). However, tropical timber was not included in the program and negotiations in UNCTAD really began in 1977. Japan proposed a resolution to creating a tropical timber agreement structured like the International Jute Agreement (Colchester 1990). This started a series of negotiation meetings which were largely stuck in place between consumer states and producer states until UNCTAD brought in forestry experts and UNEP into the negotiations (Poore 2003). One crucial organization include was the International Institute for Environment and Development (IIED) which argued in negotiations that any trade treaty had to include ecological issues. After this meeting, most of the substantive issues were worked out and voting rules within the organization became the main roadblock (Colchester 1990). Eventually a compromise was developed where producer states would have 1000 votes divided between them, consumer states would have 1000 votes divided between them, and 2/3rds vote would be required to pass provisions. Consumer votes were distributed based upon the amount of tropical timber bought creating a situation where "the more a country destroys tropical forests, the more votes it gets" (Colchester 1990, 167). Japan, as the largest consumer, begun with the largest share of votes. The final International Tropical Timber Agreement was open for signature in November 1983 tasked with promoting the trade in tropical timber, but also must encourage sustainable use and conservation of forestry resources.

The political dimensions of the different parties became significantly polarized in the negotiations before it went into force about the first executive director. The Consumer states quickly became divided between Western Europe on one side and

Japan on the other, with Western Europe encouraging a more conservation focused executive director. The Producer states were split between Africa and Southeast Asia, with Africa favoring a more conservation focused executive director. Japan, in the end, promised significant financial support to the organization, made a series of alliances with South East Asian countries, and according to some NGOs gave international aid and preferential trade to African and Latin American states to secure enough votes to get a Malaysian named the first executive director (Colchester 1990). Although Japan's dominant position in the organization in later years is less clear (Dauvergne 1997), this early effort shows significant strength by Japan in deciding outcomes within the ITTO.

The environmental agenda of ITTO developed slowly after the treaty entered into force in 1985. Friends of the Earth, IUCN, and IIED became very active with ITTO in developing and trying to find tractable possibilities for sustainable logging. In the late 1980s, these efforts resulted in few developments. There were some sustainable logging goals set, but they were vague and the organization was very hostile to any firm commitments for requiring any portion of the trade to be from sustainable sources (Dauvergne 1997). Colchester writes that "any moves to suggest regulations on the trade in unsustainably produced timber have been hotly resisted and even moves to monitor the trade are viewed with hostility" (Colchester 1990). Although the number of sustainably harvested timber hectares has increased significantly, much of this may be a result of switching to plantations and not through protection of forests (Poore 2003). Similarly, the ITTO chose to sponsor and support a number of projects in developing countries to encourage sustainable forestry and develop applicable best practices. The

process was not clear, it was cumbersome, and states had to often develop multiple drafts in order to receive endorsement for a project (Poore 2003). The most controversial project was the Sarawak Mission in the late 1980s that highlighted the limited ability of ITTO to ascertain and promote sustainable forestry practices (Poore 2003).

From 1990 on, the organization has been constrained by a number of different factors. Financial constraints on the organization began being a constant preoccupation of meetings in 1987. In addition, a number of studies constantly showed poor progress on increasing the sustainable forestry management or the practices in tropical timber production (Poore 2003). Problems of this sort have caused ITTO to focus an increasing amount of its efforts on dealing with illegal logging enforcement (Gulbrandsen and Humphreys 2006). Although sustainable logging is still a key agenda item, there has not been significant new goals or progress on the issue since the mid-1990s. This is most discerning in that the overall timber governance issues have seen a huge increase in programs of sustainable forestry, mostly in non-state market driven certification mechanisms (Cashore, Auld, and Newsom 2004, Gulbrandsen 2004). ITTO was initially the prime location for discussion about forest certification to take account of biodiversity and sustainable forestry. In 1990, the UK and Friends of the Earth introduced a proposal for an international certification scheme (Poore 2003). Producers quickly rejected this approach and discussions largely stalled within the organization. ITTO focuses on stopping illegal logging issues around the world, but has largely become marginal in discussions about sustainable logging.

The constraint on adaptation is the voting rules formed when the organization was intended to primarily be a trade organization, the alliances that formed in the organization which were hostile to the organization, and possibly a role of the preeminent power of a single country. It is important to note again that the role of Japan is not clear in the literature with some proposing that it is quite constraining on the organization and other authors finding it to be unclear. Supply chain linkages between Japan and supplier countries are quite significant and complicate any clear view (Gellert 2007). These hierarchical mechanisms are quite limiting in their impacts upon the organization and have constrained adaptation or adoption of new rules for the organization. This has resulted in generally marginalized role for ITTO and its position may be significantly reduced in the current era of forest management.

The Bern Convention

The Bern Convention (or *Berne* Convention) sits in an interesting space between a host of different biodiversity governance arrangements. Developed in the Council of Europe, the Bern Convention and its governance overlaps significantly with the European Union's Habitats Directive and focusing on migratory species brings it into direct connection with the African-Eurasian Migratory Waterbirds Convention and other Convention on Migratory Species treaties. However, it extends beyond the EU membership, including countries in Africa, Turkey and the former Soviet Union as active members and engages a host of efforts that work differently than other migratory species over the same area. In general though, this position between other agreements has largely limited the development of governance in the Bern Convention.

The Council of Europe is an international organization separate from the European Union that includes 47 different state members (including Russia and Turkey) and a number of active observer states (including the U.S. and Japan). Its aim is to promote the well-being and democracy throughout Europe and is composed of bodies made up of representatives from all of the countries throughout Europe. One primary organ of this body is the European Convention on Human Rights; however, it has produced a series of different declarations, treaties, and guidelines on a host of different issues.

At the 1976 Second European Ministerial Conference, they advised the Council of Europe to establish a committee of experts to draft a conservation treaty (Lyster 1985). This group of experts quickly assembled a draft treaty that was opened for signature at the meeting in Bern in September 1979. This was the same year as the first major biodiversity policy developed in the European Union with the Birds Directive of 1979 although neither made mention to the other agreement (Ostermann 1998). The Convention on the Conservation of European Wildlife and Natural Habitats, or the Bern Convention, aims for conservation of wildlife and wildlife habitats with an explicit focus on protected species divided into Appendix I (plants), Appendix II (animals), and Appendix III (species with special protections). At the time, the Bern Convention was one of the most developed conservation treaties around. State parties had strict obligations to prohibit the inference with protected animals or picking of protected plants and were required to create conservation areas to further these requirements. In addition, there is no provision for exemptions or excluding action and the requirements

are declared as mandatory on all ratifying states (Lyster 1985). Despite these requirements, the agreement entered into force in a reasonable timeframe by 1982.

The Bern Convention governance has been active in expanding membership throughout the organization. It was one of the first treaties under the Council of Europe that was adopted by states after the fall of the Soviet Union and in recent years has extended to include African countries in the projects (Burkina Faso, Morocco, Senegal, and Tunisia) contending that such states are crucial for migratory species important in Europe. Although this membership reach is valuable for the organization, the 2011 assessment of the Bern Convention found that "The geographical coverage of African countries by the Convention is also not very logical. It covers neither all countries important for European migratory species nor even all the countries close to Europe" (Lotman 2011). The extension seems to facilitate small-scale, short-term projects between these countries and the Bern Convention, but not be tools for increasing the overall level of protection in countries.

The primary tool of the governance arrangement over the past decade has been the Emerald Network, which is a list of protected areas that meet criteria established through standing committee decisions. The Emerald Network was established under the Bern Convention in 1996 (Standing Committee Resolution #3) to create a coordinated list of protected area sites within the member states. The project aims to supplement efforts taken within the EU countries to extend to additional countries. In the European Union in 1992, the European Commission created the Habitats Directive which includes a major focus on creating a network of protected areas with significant

management in those areas. The EU created a program called Natura 2000 to achieve the ratcheting up of conservation areas and includes significant requirements and monitoring provisions (Ostermann 1998). The Emerald Network was designed to explicitly expand the Natura 2000 efforts beyond the EU countries to the wider membership of the Council of Europe. The Natura 2000 effort has some problems and in the decade or its activities only about half the members of the EU have met the requirements (Lotman 2011). The Emerald Network has not been able to significantly improve the requirements on protected areas and most of its activities have been primarily aimed at pilot projects in a few countries. The most effective projects have been in countries surrounded by EU members, like Norway and Switzerland (Lotman 2011). In terms of financial support, although they include similar land areas and possibly more crucial areas to be protected in Council of Europe countries, Natura 2000 receives much more significant funding. More than 550 Million Euros will be allocated for Natura 2000 sites in 2011 while Emerald Network will receive 787,000 Euros for all its projects (Kettunen et al. 2011).

European biodiversity governance should be considered a crowded area. In addition to Natura 2000 and the Emerald Network there is the Pan-European Ecological Network (Jones-Walters 2007), the Pan-European Biological and Landscape Diversity Strategy (Jongman and Kamphorst 2002), and a number of non-state led biodiversity networks (Vasiljevic and Pezold 2011). The key analytic question is whether this rich policy environment is oversaturated or possibly even overwhelming the policy capacity and causing the Bern Convention to not maintain either adaptive capacity or

authoritative capability. Clear evidence of crowded governance areas would be if their amount of international funding were decreasing overtime. In the biodiversity political arena, international funding is in most cases increasing overtime or at least staying steady and decline across a region may be a sign of a crowded governance setting with other programs and projects getting that international funding. In the area covered by the Bern Convention, most of the parties are eligible for GEF funding (Norway and Switzerland are not) and the Emerald Network has added countries overtime. The region should be seeing increased GEF biodiversity funding and in some countries it is. However, as a whole, the biodiversity funding from GEF to the countries within the Emerald Network are declining over the period of the project. Table 6.5 presents the general decline of GEF funding to the region. In addition, other international interest is far less on the Emerald Network than on Natura 2000 or other biodiversity projects.

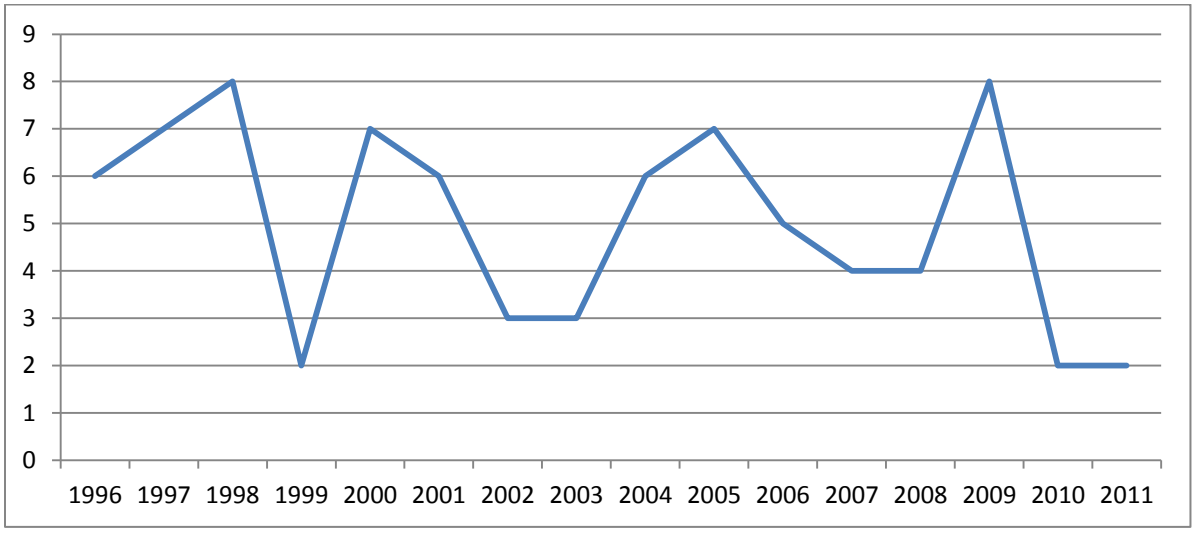


Figure 2.1- Number of GEF Biodiversity Project Per Year in Emerald Network Countries

The Bern Convention started with significant strength and was one of the first regional biodiversity or conservation agreements to require action by states. Working

with, but outside of the E.U. system has presented some opportunities and challenges for the Bern Convention. Starting in 1992, with the E.U. Habitats Directive and their development of the Natura 2000 program, the Bern Convention was no longer the main biodiversity related organization in Europe. The synergy between the two conventions is cooperative at many points, but while Natura 2000 has developed significant monitoring and compliance requirements, and partially integrated in the ecosystem perspective, the Bern Convention has changed little since the original 1979 Convention and not actively adopted the ecosystem perspective.

Arrested Development: The Ramsar Convention and the Caribbean biodiversity efforts-- Adaptation without New Rules

Ramsar Convention

The Ramsar Convention, agreed to in 1971 and entering into force in 1975, during much of its early development lacked significant capacity with a weak structure, no permanent Secretariat, and no significant monitoring capability. Although it deployed listing as a primary tool of governance, similar to some of the other projects discussed, the listing criteria were not clearly articulated until much later and the monitoring of sites throughout the network remains weak. The weak institutional capacity has had significant impacts upon the ability of the governance arrangement to adapt provisions. However, it has been able to integrate and improve adaptive capacity with increased use of the ecosystem perspective (Finlayson et al. 2011). The development of the Ramsar Convention illustrates well the way that weak institutional capacity can limit resilience.

The Ramsar Convention was developed as an extension of identification and protection of important wetlands in Europe and Northwest Africa spearheaded by IUCN. The most direct antecedent to the Ramsar Convention was Project MAR and the development of the MAR list of important wetlands. Project MAR was a program organized under the Commission on Ecology at IUCN focused on improving efforts on marshes, bogs, and other wetlands. A 1962 Conference organized by IUCN, the International Council for Bird Preservation (ICBP), and the International Waterfowl Research Bureau (IWRB) in France started Project MAR and provided its initial focus. The primary goal to develop out of the conference was a decision to create a list of wetlands of international importance in Europe and Northwestern Africa and to prioritize research and conservation in these areas (Carp 1980). The list was capped at 200 sites in order to maximize the conservation focus and impact of the efforts. Simultaneously, the International Biological Program (IBP) in conjunction with IUCN was creating Project AQUA which created a similar list of lakes and rivers which were deemed of particular importance to freshwater science. Although conservation was a goal in Project AQUA, it was not as high a priority or focus as it was in the MAR List. The MAR List, for reasons of available evidence and focus of the scientists involved, chose to emphasize ornithological criteria and evidence for the construction of its list. These programs were limited in their intended scope but were crucial first processes that were taken up in negotiations throughout the 1960s, led by IUCN, IWRB and the Dutch Ministry of Culture, Recreation and Social Welfare to develop an international convention on wetland conservations (Carp 1980).

The ornithological and waterfowl focus of the MAR List was retained through the drafts of the international treaty resulting eventually in the Convention on Wetlands of International Importance, especially Waterfowl Habitat negotiated in Ramsar, Iran in 1971 (referred to commonly as the Ramsar Convention). The main tool in the treaty is the provision that each country must declare one or more suitable wetlands of international significance and take conservation impacts to improve the health of those wetlands. IUCN served as the repository of the list of wetlands of international importance but there was no substantive secretarial or administrative functions developed within the treaty. The Ramsar list includes many sites in the MAR List and AQUA List and extends it internationally, but it flattens the categories in these earlier lists somewhat and notably excludes some of the AQUA List that did not have clear waterfowl connections (Carp 1980).

Two major changes to the Ramsar Convention happened in 1982 with the Paris Protocol that simply added a procedure for amending the Convention and the 1987 Regina Amendment that produced a series of organizational changes. The Regina Protocol agreed to in Regina, Canada created a Secretariat shared between IUCN and IWRP and most importantly created a Wise Use Working Group within the organization to develop criteria for sustainable guidelines for management of wetlands. These amendments were partial in a number of respects and the infrastructure of the organization did not become complete until the mid-1990s with the creation of the Scientific and Technical Review Panel (1994) and criteria for inclusion developed through the 1990s.

The most significant development is the conceptions of *Wise Use* included in the original treaty and significantly focused during the 1990s. Wise use is one of the key goals of the current articulation of the Ramsar Convention. Wise use, according to the Convention, aims to maximize sustainable human use of wetlands while maintaining natural properties of the ecosystem (Farrier and Tucker 2000). Although wise use of wetlands was expressed in the original Convention, the idea was not seriously articulated until the 1990s. The Working Group developed a series of guidebooks that were crucial in informing the work in the various listed wetlands of international importance. The initial guidelines developed in the mid-1990s specified that wetland preservation should integrate sustainable utilization, although not necessarily *development*, into the efforts at protecting wetlands (Finlayson et al. 2011).

During the 1990s, the organization also deepened its connections with other organizations in the biodiversity environment. Formal Memorandum of understandings have been an active part of the approach of the convention. This includes cooperative projects with other international agreements and with professional organizations: the list includes agreements with the WWF (2004), Cartagena Conventions (2000), International Association for Impact Assessment (2001), UNEP Global Program of Action (2006), UNCCD (1998), Birdlife International (2006), Society of Wetland Scientists (1999), World Heritage Convention (1999), Convention on Biological Diversity (1996), and the Man and Biosphere (1999) project. In addition, in 2003 they appointed Peter Bridgewater as the Secretary General of the organization who brought a significant experience in other organizations to the fore: being chair of the International Whaling

Commission 1995-1997 and UNESCO's MAB Project 1999-2003. Bridgewater is a prominent proponent of the ecosystem perspective as it developed in the 1990s and saw the wise use goal as a core connection between the Ramsar program and other biodiversity efforts (Bridgewater 2008).

Ramsar sites vary greatly on their impact and sustainability, similarly to a lot of the other projects. However, the list of wetlands of international importance is far less developed than other international environmental listing procedures. Monitoring of the sites is done primarily with national reporting and little international oversight (UNEP 2007). To date, no site has been delisted from the Ramsar wetlands of international importance list and no evidence that delisting has ever been considered by the organization for noncompliance. Adaptation of approach certainly has been increased in the past few years with the connections and Bridgewater's leadership; however, the involvement has not created a general strengthening or deepening of the organization. The weak institutional setting of the organization appears to be a constraint on abilities to adopt new rules.

However, the guidelines of Ramsar developed by the Conference of the Parties and expert committees have drawn significantly on ecosystem based-management. The conventions guidelines, which are adopted to varying degrees in member states, have drawn on integrated policy and focusing on multiple drivers since the mid-1990s, but particularly since the Ninth meeting of the Conference of the Parties in 2005 has made the ecosystem approach the basis for wetland sustainability (Finlayson et al. 2011). The implication is strong in that it suggests that Ramsar Convention has a fairly coherent

suite of tools for the application of the ecosystem perspective, but that it does not have the authoritative capability to integrate these into requirements or even best practice considerations. The constrained institutional setting appears to have allowed significant science-policy generation, local-learning, and other adaptive practices but not the ability to implement these lessons significantly. This lesson is significant for further discussion of resilient governance.

Caribbean Biodiversity

Caribbean biodiversity management started under the auspices of UNEP's Regional Seas Programme. However, the Protocol Concerning Specially Protected Areas and Wildlife had difficulties being ratified and although it has begun to implement the ecosystem approach in a number of aspects, the implementation is severely constrained. Because this will serve as one of the more in-depth cases for analysis, this section will only briefly detail the case and more can be found in Chapters 3, 4, and 5.

Within the patchwork of regional governance over the Caribbean, the main environmental actions taken have been through the Caribbean Environment Programme (CEP). CEP was founded under the aegis of the newly created United Nations Environment Programme (UNEP) in 1976 as one of its Regional Seas Programmes. The CEP is affiliated with CARICOM and ACS; however, UNEP and its own secretariat provide the primary organization for the agreements. The primary legal instrument is The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (the Cartagena Convention) which opened for signature in 1983 and entered into force in 1986. For much of the early years of the

agreement the CEP was met with general indifference from member states and the agreement was severely limited in funding and significance (Barker 2002). However, since the mid-1990s, CEP has been able to establish fairly regular funding to the Caribbean Trust Fund (the primary financial mechanism) from members and contributions from other environmental funders (GEF, UNEP, etc.) and continued to develop some forums for future use. However, aside from the Oil Spill Protocol adopted at the initial meeting, the development of significant international environmental law has been limited within CEP (Miller 1996, Barker 2002).

The most significant regional biodiversity governance in the Caribbean has been the Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in terms of states involved and diplomatic efforts. SPAW is a multilateral environmental agreement throughout the Caribbean that attempts regional cohesion in protected areas and species protection and expansion of these protections. SPAW encourages the creation of conservation areas throughout the countries of the region, with an expanded focus on marine protected areas, and aims to create a permanent fund for the management of these protected areas. These broad goals will be largely mirrored in the Caribbean Challenge, although some of the relevant actors will have changed.

The initial background for the SPAW agreement initially developed in 1986 from an expert panel within CEP and not from any state negotiators (de Fontaubert and Agardy 1998). The initial impetus to create regionally coordinated protected areas and species protection, however, hit a number of negotiating roadblocks. Negotiators agreed on little about the purpose or particular construction of conservation areas,

whether certification by some scientific panel would be necessary to evaluate state progress, and even how representation would be established on the science body. For example, one major point of debate was whether each U.K. territory would get one representative or would there only be a single U.K. representative for all of the territories (Vanzella-Khouri 1998). The negotiations consistently pushed back timetables and at the final round of negotiations there was not enough time to finish agreement on the necessary annexes to the agreement and so they were left to be worked out later (Vanzella-Khouri 1998).

Out of these negotiation hurdles developed an agreement with some substantive foci, but mostly a least common denominator requirement with wide leeway for national interpretation (de Fontaubert and Agardy 1998). Rather than a focus on some key or endangered species, SPAW did aim to integrate an ecosystem perspective and was one of the first multilateral environmental agreements to specifically integrate this perspective into the agreement. In addition, of all the different Regional Seas species efforts, SPAW was one of the most far reaching in working on issues of marine species and terrestrial ecosystems (Vanzella-Khouri 1998). Thus, the agreement declared protection and the need for conservation of all mangroves in member states. There was some emphasis of cooperative approaches to conservation with the need to include various social and economic actors in the agreement.

SPAW itself is in a problematic position in terms of its ability to adapt and hold parties together. This is emphasized in both its political ability to develop and its

capacity to update with the developments of biodiversity science over the past 20 years. The agreement took significant time to be approved by members of the agreement and largely came into force without significant changes to any member governments' policies. Initial enthusiasm about the protocol was lost as efforts shifted to ratification and implementation of the Convention on Biological Diversity (CBD) after 1992 and the weakness of the CEP secretariat in being able to support the protocol (Barker 2002). According to the CEP ratification website, only two members, St. Vincent and the Grenadines and the Netherlands, had ratified the agreement in SPAW's first five years of being open for ratification. With an energized secretariat in the mid-1990s, there were 6 more ratifications in the 1996-1999 period. This included the Dominican Republic which acceded to the agreement in 1998 (at the same time that it ratified the CEP and the Oil Spill Protocol). After a decade of being open, the agreement was one member shy of entry into force which came later that year with the ratification by St. Lucia. Although there is not exact overlap between SPAW and the CBD, states seem to find SPAW requirements relatively easy after they have developed a national strategy for biodiversity under the CBD and can access the funding mechanisms available under SPAW to help them with CBD efforts. During its long time entering into force, activity was conducted under interim committees which could not implement decisions but which met and developed some updates on the annexes and other procedures. When the agreement came into force significant updating of the agreement began to occur (Barker 2002); however, most of this updating was devising procedures for amending the annexes and did not change the protocol significantly. Other than sea turtle

management, which does appear to be relatively well implemented with some significant regional coordination, SPAW has seen little effort beyond the creation of some limited protected areas in the countries of the Caribbean.

Most significantly, SPAW has not altered its 1990s goals or procedures significantly to account for changed research in conservation biology over the past two decades which encourage increased participation, a richer ecosystem perspective, and accounting for, not halting, human modifications (Chazdon et al. 2009). On the ground efforts under SPAW have pushed for the creation of conservation areas and protected reserves, but not developed more advanced management strategies regarding the inclusion of surrounding communities or areas. One review of the efforts in St. Lucia concluded that "In many respects, then, the SPAW Protocol is the product of a bygone era when conservation was approached in a very narrow way, with little consideration for livelihood and development issues" (Krishnarayan, Renard, and John 2006). SPAW's efforts to push an ecosystem perspective in conservation management have not materialized in post entry adaptations which have largely focused solely on individual species nor in on the ground efforts which have instead limited to the creation of conservation areas.

Recently, the region has adopted the Caribbean Challenge designed primarily by The Nature Conservancy (TNC). It is the second largest biodiversity governance arrangement ever in the region, next to SPAW, and commits the countries of the group to creating protected areas over 20-25% of their territory. Most importantly, it targets both terrestrial and marine biodiversity.

In terms of adaptive capacity, the ecosystem approach has been significantly central in recent discussions in Caribbean biodiversity systems. However, in terms of applying this or developing coherent specifications for the ecosystem approach, this has not been a priority. Far more popular of an approach has been the declaration of parks and protected areas, both terrestrial and marine, with limited socio-economic provisions and then little else. Ecosystem assessment is done on a largely ad hoc and voluntary basis depending upon the country, a system which can have significant problems. Some policy relevant information is produced in both systems, and in terms of adaptive capacity, this is probably the strongest aspect as regional actors spend considerable time trying to develop learned management lessons and diffusing them throughout the region.

Equilibrium: The CBD and CITES and Limited Adaptation

Convention on Biological Diversity

The Convention on Biological Diversity (CBD) was one of the major treaty outcomes at the 1992 Rio de Janeiro Summit. Like the other Rio treaties, the CBD was cast broadly to organize global focus on a problem but without specific requirements or mandates. The treaty is cast quite broadly and focuses on a number of different substantive areas. In the 20 years since the treaty came into force it has increased the specificity of some provisions but has largely not mobilized on the core issue of biodiversity. This particular process of policy adaptation around the edges is an interesting outcome of a open governance system that has included a variety of different actors.

The CBD treaty sets large objectives for the treaty consisting of 1. Conservation of biological diversity, 2. The sustainable use of its components, and 3. The fair and equitable sharing of benefits from the utilization of biological diversity. The specifics of how the treaty aims to achieve this goal is contained in 42 separate articles each with broad conditions regarding some specific conception. Most of them provide broad conditions towards the achievement of the goals: for example, states are responsible for biological diversity within their territory, they should protect it while retaining protection of indigenous knowledge, etc. The treaty provides a number of different potential areas for policy adaptation to occur (Le Preste 2002). However, since being established the treaty has worked primarily through requiring states to submit biodiversity plans. Although the first round of these biodiversity plans were often late and broadly written, they have grown increasingly complex for the second and third versions. The organization though does minimal evaluation or assessment of these state submissions and instead the goal is simply to have them developed. Aside from the reports, efforts within the treaty structure have focused significantly on two major protocols that focus on trade in genetically modified organisms and access and benefit sharing.

The Cartagena Protocol to the CBD is the major component treaty, negotiated between 1996 and 2000, dealing with the trade of genetically modified organisms or living modified organisms. The treaty requires that states exporting these organisms achieve proper licensing and permission from other states based upon full disclosure of the specifics of the contents and allows states to prohibit the importation of these

organisms on precautionary grounds. The disclosure aspect of negotiations was relatively easy in negotiations while the incorporation of the precautionary concept was quite contentious. The debates about what the precautionary concept meant was whether the decision of prohibiting exporting of genetically modified organisms should be based upon unknowns about the impacts of the organism (this is the approach articulated by those pushing for the precautionary principle in the protocol) or whether it should be based upon risks discovered in the available science (this was the approach taken by the Miami group of genetically modified organism exporting countries) (Andree 2005). In the end, the group adopted a clear precautionary approach in allowing states to stop importing of these organisms even without clear scientific evidence of harm. One crucial aspect through negotiations was that NGOs were particularly active and spent extensive resources to impact the negotiations (Arts and Mack 2002). The timing of negotiations closely followed anti-neoliberalism protests against the WTO in Seattle and was also a time of heightened public awareness about GMOs in many parts of the world which spurred NGOs to see the Cartagena environment as one conducive to pressure to mitigate the impacts they saw in free trade (Kleinman and Kinchy 2007). The Cartagena protocol has had some significant applications in many countries but the large exporters of genetically modified organisms have not become members of the protocol membership.

In 2010, after a decade of negotiations, the Nagoya protocol a second protocol dealing with issues of access and benefit sharing (ABS) opened for signature and ratification. Although discussions had been developing regarding the issue for a decade,

it had reached a near crisis point at the Nagoya Conference of the CBD and the creation of a protocol on ABS was considered a vital outcome (Tsioumani 2008). The CBD's self-established goals for 2010 were not going to be met and parties needed some success to support the legitimacy of the organization. When this outcome seemed lost, the head of the conference pulled key members aside for a brief meeting to develop consensus eventually reached at 1:30 AM (Tsioumani 2010). Disagreement between members resulted in a protocol that defaulted to earlier agreements: namely the access requirements which defaulted largely to the sovereignty standard of the CBD treaty and the benefit requirements which defaulted largely to the Bonn guidelines developed earlier. Contentious issues either simply reiterated earlier agreements within the agreement or were left out entirely from the eventual Nagoya protocol. Similarly to the genetically modified organism issue, access and benefit sharing was a major focus of a large number of the NGO community. Indigenous rights organizations had been mobilized within the CBD in the discussions on Article 8(j) for over a decade and were heavily invested in the process (Jonas, Bavikatte, and Shrumm 2010). Anti-neoliberal NGOs had been active on the issue of plant breeders rights as part of their opposition to the WTO's Trade Related Intellectual Property (TRIP) agreement and with their mobilization against Monsanto's terminator seeds (Zainol et al. 2011). They were key pushers on the issue and their interest may have created the push on this issue as the major achievement in the last decade in the CBD.

The particulars of the protocols and the negotiations emphasize the role of NGOs in pushing for particular issues in the CBD. However, to fully understand the outcome it

is necessarily to evaluate this pressure in light of the other important possible actors, states and scientists.

State parties enthusiastically ratified the CBD treaty with its broad provisions and limited costs of agreement. The only major state party to remain outside of the treaty is the United States and this absence has two perverse effects on the development of the organization. First, it actually brought in a number of state parties into the organization. The CBD was quickly ratified and entered into force (quicker than either of the other Rio treaties) and achieved functional universal membership within two years of being open for signature. Raustiala and Victor explain that "the CBD's popularity stems in part from the United States' initial refusal to sign it" (Raustiala and Victor 1997). However, this perversely may include actors not willing to see the success of the organization and limits the depth actors are willing to go without the United States. Discussions at the organization have focused on the U.S. problem facing the organization and actors seem unwilling to push for funding or significant requirements without the support of the U.S. (Faizi 2004). The result is that state membership is broad but shallow. Although a number of parties are willing to expend significant effort pushing for strengthening of the agreement, there appears not to be a critical mass dedicated. This extends to other groups of actors as well and the networks of the CBD are broad and inclusive, but rarely robust or well-developed in clusters.

Scientists have a number of possible entries into the work program of the organization. However, the two major agreements of the organization on biosafety and access and benefit sharing are areas where environmental and conservation scientists

are largely marginalized: biosafety being primarily an issue of trade in the negotiations and ABS being an issue for the distribution of benefits. In addition, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSSTA), as the main science body of the organization is often a site for additional political contestation. Koetz, et. al. write that this body "remains trapped between trying to be a body of scientific nature as originally conceptualised, and depreciating the more political nature it has developed in reality, and which at least officially it is not permitted to have. SBSSTA 13, where an over-emphasis on procedural considerations has led to deadlocks and to much of the text of the recommendations transmitted to CoP9 being bracketed (i.e. not agreed on), is an example of the consequences of such situation, and left many concerned about the Convention's functioning in general" (Koetz et al. 2008, 506). The SBSSTA meetings are attended significantly by NGOs, key states, and other parties and there is no apparent insulation between the science body and the other bodies in the organization. This presents constraints on the ability of scientists to articulate and interpret their findings to the overall organization.

The CBD development is characterized by policy strengthening in issues of primary importance to NGO communities. States are largely not invested in strengthening the agreement although they will shape it when it comes to strengthening and scientists are restrained in their ability to create and provide information to the actors. Policy augmentation of the core three goals of the agreement or integration of scientific advice have not occurred to any significant level.

Convention on International Trade in Endangered Species

The Convention on International Trade in Endangered Species (CITES) was one of the first orders of business for the newly formed United Nations Environment Programme (UNEP). CITES, agreed to in 1973 at the Washington Conference, aims to regulate the trade in live and the products of endangered species around the world. The program revolves around country restrictions and regulation of species based upon international standards. Initially the international listing standards were highly politicized and contestation within the organization and interference from UNEP largely stalled efforts within the treaty system. However, a reorganization of the processes and the building of increased monitoring efforts were able to create a very different environment based largely on the evaluation of arguments based on established criteria. There are some excellent evaluations and secondary sources of the development of CITES (Sand 1997, Curlier and Andresen 2002, Gehring and Ruffing 2008) and so this section will focus primarily on building from these sources and some original documents. Since the Ivory issue regarding elephants has been crucial, the section will highlight the roles that it plays in the development of the organization.

Although the impetus for CITES had been around for years and IUCN had pressured a number of countries to unilaterally adopt import restrictions on endangered species, the agreement itself lacked clear details on the processes by which the treaty was to function. Peter H. Sand, who was the Secretary General of CITES from 1979-1981, explains that "Most of the institutional structure of CITES emerged only after the treaty's entry into force, under the residual decisionmaking powers of the Conference of

the Parties. A total of 190 recommendations adopted…since 1976 laid down a whole new body of rules…. Even though Conference recommendations interpreting and elaborating the text of the Convention are not considered legally binding, they have shaped the CITES regime in a manner hardly foreseeable at the time of its creation" (Sand 1997, 21). The treaty itself is fairly vague and broadly construed to establish a general structure for the convention including the Conference of the Parties, a Secretariat and the broad development of the listing system used by CITES.

The listing procedure by CITES is a very simple set of trade restriction by which state parties prohibit or regulate the trade of certain species or their products. Species can be listed in one of three different appendices. Appendix I are those species which are threatened with extinction and as a result the CITES provisions expect that international trade should be largely prohibited, except in extreme circumstances. Appendix II are those species which are not threatened but which either need to be monitored and trade regulated or those species which closely resemble Appendix I species and so need to be similarly regulated by parties. Appendix III is a less specific category that involves states listing species that are protected within their jurisdiction and which the country wishes to have international recognition of these efforts. The parties have also developed a possibility of a split-listing, where the species is deemed endangered in one country and listed in Appendix I but deemed stable and allow trade from another country. The procedures and politics behind listing, delisting, and adjusted listings of species is thus very important because each level implies significantly different requirements on states and impacts on the trade of certain species.

As established in the 1973 treaty there are no clear guidelines leading the Conference of Parties in its listing decision and the result was a lot of confused listing in the early years of the convention. Listing was made based largely on the political dynamics of the organization and only partially about the scientific evidence. Curlier and Anresen write that "during this first phase of its history CITES grew through a continuous adding of new species to the appendices—often without much knowledge or scientific justification" (Curlier and Andresen 2002). This process is exemplified in the early Whale decisions of CITES. Prior to the 1979 meeting of the Conference of Parties to the treaty in San Jose, Costa Rica, the United Kingdom in conjunction with the pre-moratorium International Whaling Commission (IWC) recommended listing of all whales in Appendix II. This was essentially a move to bring CITES listing into agreement with the IWC regulations at the time. However, while the IWC continued debating whether to stop all whaling or continue with its stock-quota system over the next couple of years, some actors preferred to try and gain leverage on the issue in CITES. West Germany was a major pusher at the 1981 COP in New Delhi and the 1983 COP in Botswana to list all whale species in Appendix I. In the 1983 COP, the parties voted to list some key species, most notably the Minke whales, in Appendix I, despite the fact that there was no evidence presented of their endangered status at the meetings (Gillespie 2002). The United States and the Secretariat of CITES both argued extensively against this proposal, but did not receive majority support (Curlier and Andresen 2002). This decision was so divisive and controversial that the Secretary General chose to delay its implementation until after the IWC moratorium came into effect. Political wrangling

and not the particular status of a species were more common on the controversial listing decisions in the early era of CITES protection. The result was protracted, ongoing struggles to get enough votes to list species in a particular way and a preference for those "charismatic" species of large mammals (Gehring and Ruffing 2008).

The listing problems in CITES came to a head in the late 1980s with the ivory dispute creating significant discord within the organization and bringing it to a large scale crisis in the legitimacy of the organization. Starting in 1985 there began to be significant proposals from countries for listing the African elephant in Appendix I which would then require states to prohibit the trade in ivory from the elephants. Significant study was expended to evaluate the status of the African elephant and provide a basis for action. In early 1989, UNEP and CITES own Ivory Trade Review Group released their studies identifying poaching and trade in ivory as significant threats to the health of the species. These were significant in spurring the most significant proposal in the 1989 meeting by Australia for moving the African elephant from Appendix II to Appendix I. Range states responded in a variety of ways to this proposal. West African states where the species was in the most dire situation generally embraced the new listing for the African elephants while South African countries emphasized that populations were stable in their countries and that the changed listing could make elephants into a nuisance species if there is no economic reason for their maintenance. Botswana, for instance, responded that "The government needs to maintain the economic value of the elephant so that increased conflicts with genuine human development and negative impacts to habitats where elephants congregate most will not be viewed as an

unlikeable species. The elephant must remain in Appendix II and decisions to the contrary must be based on country to country merits" (CITES 1989). There was thus significant divergence in positions and the listing decision was highly contentious.

The Secretariat of CITES was particularly active through this process. Eugene Lapointe, a Canadian lawyer, had been the Secretary General of CITES since 1982 and had begun embracing the endangered species as resources view in some of the earlier listing disputes (for example, the crocodile decision.). The Secretariat in general included a set of actors committed to this view of endangered species, namely Jacques Berney, Obdulio Menghi and David Brackett. Lapointe, Berney, and Menghi retain today relevance through their leadership positions in the IWMC World Conservation Trust which advocates sustainable level of endangered species use as the economic pathway to maintaining population health. This group of actors in the Secretariat actively opposed the proposal by Australia and instead supported a country by country system that would allow continued sales of ivory from African elephants. IUCN, WWF, and TRAFFIC were powerful NGOs that also supported the split position which would keep populations in South Africa, Botswana, and Zimbabwe in Appendix II listing.

This active role of the Secretariat was strongly opposed by the strict conservation NGOs mainly located in the United States (led by Greenpeace, Defenders of Wildlife, and the African Wildlife Foundation, and the Environmental Investigation Agency). 26 of these NGOs sent a letter to Mostafa Tolba, the Secretary General of UNEP the governing organization of CITES, demanding the termination of Lapointe and his staff. Criticizing a "lack of leadership and judgment" by the Secretariat, the letter

specifies that "'Mr Lapointe and his staff have exceeded the responsibilities and mandate of the secretariat" (Cater 1989). The Greenpeace report of the meeting found that "The Secretariat have been openly lobbying against an Appendix listing for African elephants and were manipulating the meeting, timing of debates, votes etc. to favour their position." This pressure led to the United States delegation requesting UNEP to take the situation under its consideration. The UNEP inquiry revealed no evidence for some of the more serious allegations of financial mismanagement or significant wrongdoing. However, by early 1990, Lapointe and the staff had been dismissed by Tolba without consultation with the Conference of the Parties.

This legitimacy crisis within the organization resulted in two significant changes for the organization. First, it highlighted the need to bolster a system of listing that was not subject to significant political wrangling. The treaty itself provides little specification for how the decisions about listing are to be reached. At the first meeting of the Conference of Parties, they adopted the Berne Criteria for listing and delisting species. The Berne Criteria (Resolution 1.1) had broad conditions for listing a species in Appendix I, primarily that it be threatened with extinction and that trade impacts that status. It was far more precise in adopting a high level of necessary evidence that trade would not harm a species status. The result was controversy that the inclusion of species would be largely politically determined but that delisting would be very difficult (Lyster 1985). The not surprising result was a significant proliferation of species in Appendix I in the 1970s and early 1980s. The parties in 1983 began an effort to assess whether the species listed in Appendix I were actually or still endangered and sought to establish a

scientific basis for the listing decisions. 1983 they created the Plants Working Group and in 1987 they created the Animals Working group which were both made up of scientific experts to assess the status of various species. However, these were not formalized bodies and did not have significant impact on the discussions in the later part of the 1980s. The 1994 meeting in Ft. Lauderdale, Florida resulted in significant refinement of both the explicit listing criteria and strengthening of the Animals and Plants Committees (Wijnstekers 2003). Although further refinement followed of these provisions, the listing process had been changed dramatically.

Second, the legitimacy crisis around ivory clarified the role of the organization with other international environmental organizations: namely UNEP. The dismissal of the Secretary General by the UNEP Executive Director caused a serious problem in regards to the legitimacy of CITES procedures. As a result, UNEP and CITES developed an agreement between the organizations regarding how this nesting procedure would operate. The solution derived at was that the Executive Director of UNEP would retain appointment and dismissal authority over the Secretary General of CITES but only after consultation with the sitting committee of CITES. This is significant in providing some crucial check on outside involvement and the consultation has generally meant that both the Conference of the Parties and Secretary General have been largely together in many issues since 1990. This clarity has increased the independence of CITES and yet retained a close relationship with UNEP and other organs of international environmental politics.

These changes, with adaptations and adjustments at future Conference of Parties, have changed fundamentally the processes inside of CITES. As opposed to the political wrangling of many of the early listing decisions, listing decisions now are channeled into specific committees and collectively established criteria for listings. Gehring and Ruffing argue that ¨The scientific assessment stage establishes a veritable discourse on the merits of a listing proposal. Its triadic structure and its integration into the larger listing procedure deprive the member states, and other stakeholders, of their bargaining power and commit them to the commonly accepted listing criteria. As a result, a protected niche for the exchange of arguments emerges¨ (Gehring and Ruffing 2008). The triadic structure discussed by Gehring and Ruffing is the division of decisions split between the Animals and Plants Committees, the Conference of Parties, and the Secretary General. The process now moves through each of these different bodies with discussion on the situations for the species as they meet clear criteria ending with decisions by the Conference of the Parties and the 2/3rds vote requirement to list or delist a species.

The continued ivory issue in CITES emphasizes this changed situation. The controversy continued at the 9th COP in Fort Lauderdale and the 10th COP in Harare, Zimbabwe. In Harare, the state parties agreed to a significant review to discuss the elephant population health through an expert committee. The Committee was to be composed of 6 members with geographical diversity and work closely with TRAFFIC, IUCN, and UNEP. Coupled to this was the creation of the Elephant Trade Information System which aimed to provide relevant information. Evidence is gathered through the

various research arms including the Elephant Trade Information System, the Monitoring of Illegal Killing of Elephants, TRAFFIC, and other sources (Stiles 2004). The Expert Panel then uses this evidence to make very specific recommendations to the Secretary General and the Standing Committee. Negotiations by the COP finalize any decision about listing or granted exemptions from listing status. There is extensive monitoring established through these committees and every sale of ivory on the international market is very well monitored. Sales of ivory from range states were permitted twice since the 1989 ban. NGOs and many states have argued that these create a legitimate market to hide illegally harvested elephant ivory. In both occasions the decision has been quite contentious, but has not resulted in opting out like the 1989 decision did nor the legitimacy crisis in the organization that followed the 1989 decision.

CITES has changed since its establishment from a hyper-partisan organization that held together largely because of very easy opt-out clauses for any decisions reached. However, following the high point of this contestation around the ivory issue in 1989, the organization underwent a series of reforms that have changed the discussion dramatically. This transformation has added independent assessment and monitoring capacity, focused discussions, and criteria for decisions to be made by the parties. This is a significant transformation in the organization and really adjusted its procedures.

Resilience: MAB, MBC, and the Carpathian Convention

UNESCO MAB Project and the World Network on Biosphere Reserves

The Man and Biosphere Project (MAB) under UNESCO started in the early 1970s as a project focused primarily on research of human impacts on the environment. It was initially designed for a short-term international science initiative but has developed over 40 years into a significant and lasting biodiversity project linking conservation projects, studies of relationships between humans and biodiversity, and exchange of ideas from varied locations. This process occurred as a result of rebranding the organization and expansion from Europe and North America to additional regions. The result has been an adaptive organization with significant lasting power.

The Man and Biosphere Project (MAB) developed starting in 1966 when UNESCO, responding to declarations for a health of the environment conference by IUCN and the United Nations Resource Research Advisory Committee (headed by Michel Batisse), passed a resolution to host a conference to "continue to stimulate research and training relating to the natural environment and resources of the land areas and their conservation by encouraging synthesis of knowledge" (UNESCO 1967, 1).

A steering committee, consisting of representatives from UNESCO, IUCN, the Food and Agriculture Organization (FAO), World Health Organization (WHO), and the International Biological Program (IBP- part of the International Council for Science ICSU), began work organizing a conference on the "rational use and conservation of resources of the biosphere" (UNESCO 1967). The conference in September of 1968 brought together over 300 representatives of states, international organizations, and

nongovernmental organizations (UNESCO/MAB 1993). The Biosphere Conference was heralded by some as the first major world environmental conference. Batisse wrote a year after the conference that it was the "first occasion on which representatives of governments have met to appraise the world [environmental] situation and to initiate steps for remedial action" (Batisse 1969, 4). Concluding with a plea for a balanced approach between consumption and preservation and finding that "man is the key component of the biosphere", the Conference made 20 separate recommendations. The final one encouraged UNESCO to create in the 1969-1970 period, the groundwork for a long-term program dedicated to studying the role of man in producing positive outcomes in the biosphere (UNESCO 1969).

Work on this long-term program began almost immediately in UNESCO and led to the development of a strategy for establishing such a program. The strategy from the beginning was defined as primarily aimed at developing a scientific basis for understanding the interactions between humans and the environment. The initial statement for the creation of the program maintained: "The general objective of the programme is to develop the scientific basis for the rational use and conservation of the resources of the biosphere and for the improvement of the global relationship between man and the environment" (UNESCO 1970, 7). As originally conceived, the program was to have some limited scientific-research aims and to complete most tasks in about 10 years. 31 interdisciplinary research themes were developed focusing on various different ecosystems for study. It is within this context that the World Network of Biosphere Reserves developed. Biosphere reserves were justified on the research

opportunities that they produced for the scientists affiliated with the MAB project. The 1970 foundational documents proclaimed the need for biodiversity reserves because "it is foreseen that the pursuit of the various studies called for in the programme will require the availability of undisturbed natural areas for scientific study as well as areas in which the conditions or disturbance are under careful control by the scientists involve in the research projects under the programme" (UNESCO 1970, 23) From a scientific study standpoint though "the presently existing national parks, biological reserves, and similar areas are representative of only a small part of the ecosystems of the world" (UNESCO 1970, Annex I, 10). It was thus seen as necessary to create a funded and supported worldwide network of protected areas that will be representative of different ecosystems and maintained for representative scientific study. The report then continued by specifying that "it will be essential therefore for each Member State to designate within its boundaries 'biosphere reserves' containing representative areas of each of the major or otherwise relevant ecosystems within the nation's boundaries" (UNESCO 1970, 23). In the plan to develop the world network of biosphere reserves, the plan was largely aimed at creating best practices: best practices in protected area management for scientific study and highlighting in the network sites of excellence in these practices (UNESCO 1970, Annex I). The World Network of Biosphere Reserves then was a primary part of the UNESCO MAB focus on scientific study.

The WNBR has generally seen four different stages of governance which make identification of dynamics within the arrangement easier. The first stage dates from the implementation of the organization in the mid-1970s until the First World Congress of

Biosphere Reserves in Minsk in 1985. The second period dates from this until the Second Congress in 1995 in Seville. The third is the period following Seville and ended with the development of the Madrid Action Plan in 2008. We are currently in the fourth period which is scheduled to last until 2013. The expansion of the World Network of Biosphere Reserves arrangement has varied widely during these periods. The World Network started with very vague requirements and little actual change in policy by states to transform protected areas into biosphere reserves; however, with the Seville Strategy in 1995 and the Madrid Action Plan (2008), the MAB has transformed this network into a governance arrangement which could transform and improve practices of state agents and local actors (Price, Park, and Bouamrane 2010).

The first period was largely characterized by rapid growth in the number of biosphere reserves; however, evidence suggests that few of these sites included in the World Network changed substantially their management as a result of their application or inclusion in the program (Batisse 1997, Shelton 1988, UNESCO 1996, UNESCO/MAB 1993). The first era was largely defined through the identification of sites for unique scientific research into ecosystems and management of the areas aimed to further this investigation aim (Batisse 1997). With the largest scientific budgets, scientific infrastructure, and expert personnel being located in the United States, Canada and Western Europe and with extensive protected areas already existing in these regions, most of the early creation of protected areas overlapped with already protected areas whose management did not change significantly as a result of inclusion in the World Network (Ishwaran, Persic, and Tri 2008). International governance of the areas was

weak and ill-defined in the first period and, if positive effects occurred, it was largely a result of the specific political will at the national or individual protected area level.

The second stage was an era of limitation in the expansion of the World Network of Biosphere Reserves. Conservation fatigue among professionals, the loss of easily designated sites, lack of even basic protection over some sites, and local resistance to conservation all seriously slowed down the expansion of biosphere reserves around the world. For example, in Latin America the number of annually designated biosphere reserves fell from 4.5 in the 1970s to 2 in the 1980s and to 1.8 from 1990-1996 (and this includes the aberrantly large year of 1993 when Latin American countries were most enthusiastic about biodiversity governance because of the recently completed Rio Conference and international support) (Danielle and Carenzo 1999).

The addition of this more complex focus and the wider problems regarding conservation were coupled to institutional difficulties faced by MAB's secretariat-hosting organization of UNESCO. The United States and the United Kingdom withdrew support for UNESCO in the 1980s with strong criticisms about the management of the organization. The United States government had long had a quite suspicious attitude towards UNESCO, including investigations of the organization under the House Un-American Committee's work, criticisms of the organization over Israel and China issues, and a number of other issues. In the 1983 withdraw statement, the United States argued that although it supported the projects of UNESCO, the forum had become "politicized" (Preston Jr., Herman, and Schiller 1989, Jordan 1984). MAB was one of the projects sparred as U.S. scientists and all of the biosphere reserves remained within the

WNBR. However, the larger situation did prevent UNESCO from supporting MAB or the WNBR to a significant extent. A problem highlighted in the SCOPE review of 1991 that noted that the UNESCO General Council had been resistant to reforms suggested by ICC and the MAB Bureau (ICC-MAB 1992).

The large result then on the WNBR was that the 1980s was a lost period with little improvement in the structure of governance or in the expansion of the membership. Only 84 new sites were designated during this period from 1985-1995 and not much more than that were proposed to MAB for inclusion. The vast majority of these (80%) were limited to Europe and the Americas with little expansion in Africa, Asia, or the Middle East. Many of these sites were either already planned prior to the conference in Minsk or were part of the focus on biodiversity in Latin America around the Rio Conference. In addition, problems of vagueness in guidelines and monitoring of sites persisted throughout the second stage. The Minsk conference produced some notably expanded ideas of what a biosphere reserve was, but without clear procedures or guidelines for management of those sites (ICC-MAB 1988a). However, there was significant operation within the organization in the late 1980s and 1990s around the Action Plan for Biosphere Reserves which had begun discussing integration of sustainable development into biosphere reserves in 1984. However, very few of these were integrated and used to strengthen the governance arrangement. It is not a stretch to say that the WNBR was close to collapse during this period. The 1992 report, following the Rio Conference, emphasized at a number of points that the membership

was actively engaged in justifying their program to the world biodiversity governance community (ICC-MAB 1992).

However, some significant efforts did occur during the 1980s which helped transform the organization in the 1990s. Of initial importance were a host of different reflexive activities. The 1984 meeting specified the creation of two internal efforts at reform of the organization. The Biosphere Reserve Survey involved a significant effort at understanding some of the basic conditions that were happening in biosphere reserve efforts (ICC-MAB 1988c). The most significant finding of this effort was that the World Network of Biosphere Reserves was not a functioning network (ICC-MAB 1988b, Annex I). There was no clear processes of feedback, exchange, or sustained engagement with various sites. This was exemplified by the results that engagement with other national biosphere reserves and other international biosphere reserves were ranked as the least two types of actors of interaction by biosphere reserve managers in the survey. Any connection or glue of the network was achieved through the common methodologies for creation of biosphere reserves, study of those reserves, and reporting. Haas, Williams, and Babai explain that "The main function of the MAB secretariat has been to contact these groups, link them with an international network of similarly or newly created committees, and urge them to continue their research in a manner relevant to the MAB projects and consistent with uniform methodologies. This stress on a common methodology…has been one of MAB's successes. Thus, countries without the resources of a strong national committee have been able to

participate…through a regional division of labor made possible by comparative research methodologies" (Haas, Williams, and Babai 1977).

These reflective practices did yield results as proposals for changing MAB and the WNBR program did begin to percolate in the development of the Action Plan for Biosphere Reserves, adopted in the 1984 meeting but with significant efforts in the late 1980s and early 1990s. Most of the governance increases focused around the 10th meeting of the International Coordinating Council in 1988 which developed a strategy for the period of 1990-1995 which built from the reflective processes discussed above and set the ground for the breakthrough in Seville. Since the Biosphere Reserve Survey emphasized that development functions were largely not dealt with, the 10th meeting of the ICC recommended deepening development and inclusion of local communities in the action plan for 1990-1995 (ICC-MAB 1988a). Recognizing financial limitations relating to UNESCO, the action plan for 1990-1995 largely emphasized developing and encouraging sites of excellence that emphasized the changed focus supported by the Survey and the General Scientific Advisory Panel and also to work at deepening the network (ICC-MAB 1988b). Specific focus was aimed at regional cooperation in key areas of the world that had not been fully represented, namely Latin America and to "seize opportunities for developing a new generation of activities at the interface between man and the biosphere….making a distinctive contribution to the issues of sustainable development and global change" (UNESCO 1989, 11). These various changes then resulted in an Action Plan that aimed at a reassessment of the World Network of Biosphere Reserves and MAB more generally in the period of 1990-1995.

This reassessment resulted in the 1994 Seville Strategy aiming to provide better guidance to resource managers. This is exemplified by the fact that two years after the Seville Strategy was developed, the North-east Svalbard Biosphere Reserve in Norway was withdrawn by the National MAB authority for not having any population in the biosphere zone (this was the only biosphere reserve in Norway and one of only four in Nordic countries) (Price, Park, and Bouamrane 2010). Coupled with this, the Seville Strategy created growth in new sites that could be developed, expanded the management in those sites (which now had to include management with local communities), and encouraged development of biosphere reserves outside of Europe and North America. During the post-Seville phase, Asia and Latin America both saw their most dramatic increases in biosphere reserves, and every region saw a significant upswing in the number of new biosphere reserves. In addition, although Europe and North America had designated more than half of the new sites in the first and second phases, in the third phase they still made up the largest percentage of any region but had decreased to 40% of newly designated site.

The Madrid Action Plan is following up on this with further internal review of biosphere reserves, network deepening, and seeks to further augment funding from other sources for biosphere reserves. The Madrid Action plan aims on "developing models for global, national and local sustainability, and for biosphere reserves to serve as learning sites for policy professionals, decision-makers, research and scientific communities, management practitioners and stakeholder communities to work together to translate global principles of sustainable development into locally relevant

praxis" (UNESCO 2008). It involves 30 different explicit goals for the organization, its national membership organizations, specific biosphere reserves, and partnerships. The Madrid Action Plan specifically emphasizes "result-oriented" partnerships with private entities, universities, and civil society to deepen managed use and monitor biosphere reserves around the world. The Seville Strategy and the Madrid Action Plan largely have their results in the efforts taken in the late 1980s and early 1990s to broad and deepen the network behind the WNBR.

This strengthening occurred to a large part as a result of the expansion of the agenda and scope of the project in the 1980s. Including additional actors allowed the organization to gradually ratchet up the relevance of the organization. Constant reflective practices, involving both internal and external evaluations, similarly proved crucial in spurring the adaptive changes of the organization. Limits on the resilience in the 1980s were the constraining institutional setting, the resistance to the expanded agenda by some of the original members, and wider constraints about conservation fatigue. This long history and level of adaptation and improved stance of the organization are quite significant.

Mesoamerican Biological Corridor (MBC)

The Mesoamerican Biological Corridor (MBC) had significantly transformed between its formation in 1997 and its relaunch in 2010. Starting as a largely centralized project that only narrowly included El Salvador, it grew into a set of local projects linked together in a variety of different ways that expanded activity in El Salvador significantly.

This expansion of the project will be the focus of later chapters, in comparison with the Caribbean case, so this will simply be a brief description of the project.

The MBC began as a project to link the major protected areas from Panama to southern Mexico with a variety of corridor and other protected areas in 1997. However, overtime this transformed significantly into a project led by hundreds of local projects throughout the region. Table 2.6 shows one indicator that accents this point and the development of the project from the mid-1990s until 2010 as recorded by GEF corridor related grants. The early project from 1997-2000 was dominated by a few, heavily funded projects. Most of these were large regionally organized GEF grants for the corridor project. Small grants during this time involved in the corridor were completely dedicated to Costa Rica efforts. Starting with a grant to El Salvador in 2002, the small grants became more diverse and included all the countries in the region in the efforts. The centralized project largely gave way to a variety of different projects throughout the region connecting with the corridor. The GEF funding decreased, but as will be highlighted below many of the projects diversified funding and brought in a number of alternative funding sources. Exploring this process more generally adds specific ways to understand the development of resilient governance.

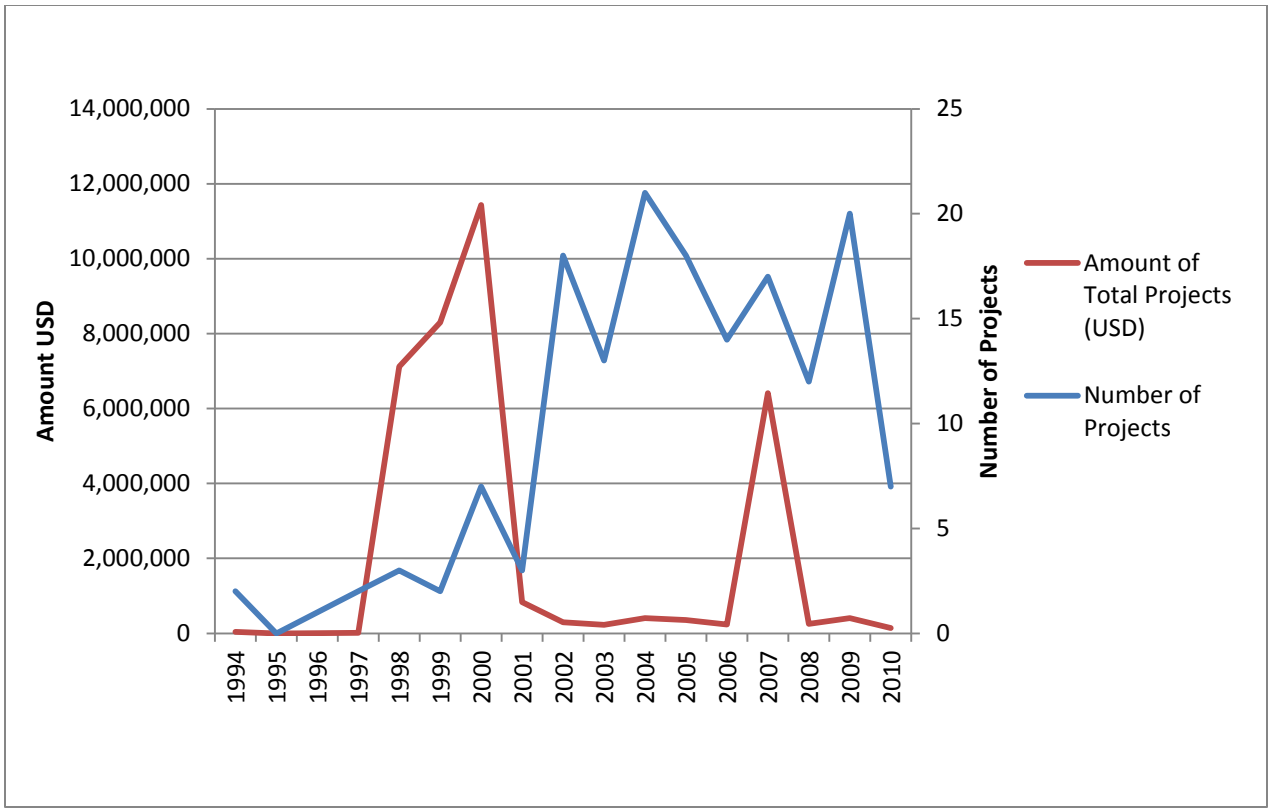


Figure 2.2- Number and Amount of all GEF Corridor Related Grants to Central American Countries 1994-2010.

In many respects, the MBC project shifted from the centralized management and few funders to a variety of projects at local levels. The initial effort largely revolved around state members expanding protected areas, creating buffer zones and corridors. Funding came either from those states or from international funds those states could acquire from international funders. Costa Rica's *Paso de la Danta* project was funded primarily by the government of Costa Rica, the Atlantic Biodiversity Corridor in Nicaragua relied upon funding from the World Bank. El Salvador's shade coffee efforts with the corridor was initially given funding from the World Bank and the government of El Salvador (Miller, Chang, and Johnson 2001).

Starting after the initial funding from the project, however, a host of national and local NGOs and groups became active in developing their own projects aiming to deal with ecosystem fragmentation. A first change was that the actors involved in the corridor project changed dramatically in the post 2002 era as a host of national and local NGOs began to be involved in corridor projects. As discussed earlier with Table 2.6, smaller and more varied grants became crucial in the arrangement and replaced the larger projects. Without the coordination office from 2006 on, this became more pronounced. Second, this represented an expansion of the project. Costa Rica NGOs had been engaged in corridor activities even before the formal establishment of the MBC and used the project to increase their projects. However, starting in 2002, a small GEF grant to an El Salvadorian community NGO really opened the involvement of local NGOs from countries throughout the region. These different strategies were distinct as one national NGO leader mentioned in El Salvador, they did not intend to follow "the Costa Rica example." Related with both of these, participation took a predominant role in many of the areas. Local NGOs and indigenous groups actively engaged with the corridor project. Various NGOs affiliated with the Kuna indigenous group in Panama had resisted earlier attempts at linking the MBC over their territory with claims of a lack of accountability. However, these same NGOs in the later project were leaders in receiving funds and undertaking a variety of different project with the corridor focus. One addition move for this era was that funding changed from large individual projects with significant funding from one or two sources to projects with multiple different funding streams. The Atlantic Biological Corridor in Nicaragua was almost exclusively funded by

the state and World Bank. NGO involvement, however, without the stable large stream included a host of different funding stream from Conservation International, Critical Ecosystem Partnership Fund, and international aid groups from Switzerland, Denmark and others.

One aspect which continued largely throughout the decade was the extensive aerial monitoring exercises. NASA's jet propulsion laboratory continues to be engaged with CCAD on detailed analysis and findings regarding fragmentation in the region. However, with the switch there are a variety of other indicators of success that are integrated into programs. With the variety of funding sources, each adopts different indicators of effectiveness and most projects include some assessment in funding requests. Ecosystem service provision is one popular indicator in many of the GEF Small Grants Programme funding provisions, with freshwater availability being one of the most common. This information is often integrated into future funding requests and management choices by local and national NGOs. One aspect that has been lacking in the program throughout has been regular, organized assessment of management lessons. Although some assessments have happened, these are largely ad hoc, partial, or completely unconnected from the ongoing work being done by actual managers (IEG (Independent Evaluation Group) 2011). Policy relevant knowledge generation then is partial and although many insights are created, they are not assessed in a regular fashion.

The impact of a regional corridor project has had a lasting impact. In 2010, for example, every single biodiversity focused GEF Small Grant going to Central America

tied in with the corridor project in some manner (GEF Small Grants Programme 2011). The MBC remains a key invocation in policies and proposals and efforts; the map of the MBC is prominently displayed in environmental ministries.

One crucial transformation from the first project design to later articulations was the inclusion of projects in El Salvador. The country was largely left out of the project conception in 1997 and considered to only contribute little to the implementation or creation of the corridor. In a context of a fairly weak environmental ministry with only limited efforts on biodiversity protection, little primeval forest remaining, and the severe destruction of the civil war, El Salvador seemed unlikely to engage to a significant extent on regional biodiversity projects. Indeed, the environmental decision-makers in the state of El Salvador were generally unenthusiastic about the involvement of the country in the MBC. The map of the MBC then only highlighted some restricted use areas that El Salvador would create to link in with the project, around the borders of the country. Starting with the shade coffee proposals in the Western part of the country and expanded efforts in the Eastern bay contested by Nicaragua, Honduras, and El Salvador though the project increased significantly.

Carpathian Convention

The Carpathian Convention, which entered into force, is designed to be a governance project working toward sustainable development of communities living in the Carpathian Mountains, including parts of the Czech Republic, Hungary, Poland, Romania, Serbia, Slovak Republic, and the Ukraine. Spurred by concern within the states about the Carpathian region, an international focus on the environment in

mountain regions, and key assistance from environmental organizations resulted in a highly dynamic and active treaty in the region that has already seen a major protocol enter into force that relies significantly on the ecosystem perspective.

The Carpathian mountains form a key geographic region that has key environmental areas for Europe, including the sources of freshwater resources, primary forests, and some of the last populations of large European mammals. With the end of Soviet inspired systems in the region after 1989, a number of social forces impacted the ecology of the region. Farmland abandonment, private property lines resulted in increased parcelization of the land, and increased extractive industries (namely logging) became significant problems in the post-1989 era (Hoster et al. 2008).

Europe had a number of policy networks and organizations that had been dealing with mountain ecosystems for years, mainly around the Alps. In 1952, International Commission for the Protection of the Alpine Regions was founded by some of the governments, IUCN, and some German mountaineering organizations. This group called for an Alpine conservation convention in its founding statement but functioned primarily as an expert stakeholder group until 1987. In that year, an extensive IUCN study surveying hundreds of local governments, NGOs, and other actors was released providing a spur to negotiations (Price 2000). After two years of extensive negotiations, the Alpine Convention was opened for signature in 1991 and came into effect in 1995. The Convention is primarily a framework convention and the content was to largely come from protocols. Despite its broad, hortatory form it still had significant delays in ratification by key states like Italy and Switzerland (Price 2000). Italy did not ratify until

1999 and Switzerland did not ratify because of canton opposition to the conservation provisions in the Convention until 2000. This may have been a result of the negotiations which took place primarily at the level of states and did not include other actors (Fall 2006). The result of this is that although there were protocols developed and signed by parties, they took significant time and harmonization or consistency between them was not always clear (Price 2000). Price writes that "On one hand, signed protocols are a measure of the success of implementation, even if none, except the one dealing with the addition of Monaco as a party, has yet been ratified. On the other hand, the sequence of preparation of protocols has led to certain difficulties, given that the convention has strategic aims and that harmonization is needed both between protocols and between these and national (and EU) legislation" (Price 2000). At the date of writing, this has improved with a number of protocols being ratified, including significant multiple-protocol ratifications by Italy in 2012. However, no protocol except the one adding Monaco has received full ratification of all members with the Swiss being particularly hesitant on most protocols. The Alpine Convention though did foster a series of expert groups, policy advice to other mountain regions, and served as a direct model for the Carpathian Convention (Regional Environmental Center for Central and Eastern Europe 2007).

Along with the Alpine Convention, a significant set of mountain experts had been leveraging the international environmental agenda for years. One of the core areas of UNESCO's MAB project was study of Mountain Ecosystems (MAB-6) which spurred a series of expert meetings on mountains in the 1970s and 1980s. This group was

dominated by a, self-named, Mountain Mafia of experts who included geographers, biological scientists and others dedicated to elevating the Mountain issue on the global environmental agenda. These advocates were able to get mountains onto the agenda and as a major item at the Rio Conference in 1992 and were able to ratchet up the focus on mountains after that conference (Rudaz 2011). With a core scientific group focused on mountains attention of the actors moved to widening participation and including a host of different actors. These efforts resulted in 2002 being declared the International Year of the Mountain and the creation of the Mountain Partnership (Ross 2007). These efforts created a global focus with local experts receiving increasing support in efforts dealing with mountain ecosystems. This global issue elevation and creation of partnerships and other networks is essential background for wider movements contributing to the development of the Carpathian Convention.

The Carpathian Convention process started in earnest in 2001 when Ukraine petitioned the UNEP-Regional Office for Europe to facilitate consultation among the Carpathian countries (Regional Environmental Center for Central and Eastern Europe 2007). Negotiations moved quickly and the Framework Convention on the Protection and Sustainable Development of the Carpathians opened for signature in May 2003. Nongovernmental parties were quite active during the negotiations with UNEP, WWF, the European Mountain Forum, Regional Environmental Center, Central and East European Working Group for the Establishment of Biodiversity, the European Academy in Bolzano (Italy), and the Northern Alliance for Sustainability were quite active in negotiations (Ramčilović and Shannon 2008). Austria and Italy were also very important

non-parties that were crucial in negotiations. Local level actors were limited because their authority and connections were not clear in most of the states. The result is quite significant as the Convention is the first one to embody the ecosystem perspective and transnational protected areas directly within the framework convention (Ramčilović and Shannon 2008). The Convention entered into force for all parties in 2006 and by 2008 all seven states had passed legislation to bring the treaty provisions into force.

The governance arrangements associated with this project have included some of the usual biodiversity tools. The Carpathian Network of Protected Areas was created soon afterward and involves exchange of best practices between the network but few requirements and the Mountain Research Initiative started the Science for the Carpathians Network in 2007 which links different research programs together. However, unlike the delayed Protocols in the Alpine Convention, the Carpathian Convention has shown relatively coherent updating of basic governance arrangements. The Protocol on Conservation and Sustainable Use of Biological and Landscape Diversity was negotiated quickly after the convention came into force. Opening for signature on June 19, 2008 and entering into force in December a year later. To date, all members except Serbia have passed legislation to bring their national laws in conjunction with the Biodiversity Protocol. Like the original Convention, this protocol advanced cross-policy implementation of the provisions, working geographically rather than jurisdictionally, and focusing on ecosystems rather than species. The treaty works through the Carpathian Network of Protected Areas, increasingly its presence and requirements, and a list of species for specific attention. Listing criteria are absent from the protocol for

the list of species except that it shall be based on international criteria. Most significantly, it includes efforts at restoration and development of native species in its requirements, which has in some of members of the network involved incorporation of agricultural landscapes in the species protection. The Biodiversity Protocol and its quick agreement by most members is a fairly positive sign of the resilience of the arrangement.

Outside support and guidance coupled with significant state involvement in the project has created a conjoined effort that is being significant in updating the rules and doing so in a way informed by information provided to the actors. Focusing on both biological and landscape diversity in the Protocol to the Carpathian Convention is a significant push forward. As a young agreement, its adaptive capacity and authoritative capabilities may be reduced and undermined by various future outcomes. However, it appears that the external interest in the agreement may provide a significant reservoir for support in times of stress within the governance arrangement.

Conclusion

The next chapter will explore generalized findings from these cases and how they show larger patterns of impact. But before moving to that analysis it is important to take a moment and assess rival possible arguments that do not find significant support in the arguments. The robust institutions explanation seems to be only weekly supported by the evidence. Some governance arrangements with significant capability like ITTO and CITES actually find this constraining on adaptability of the governance arrangements. Other examples, like MAB and MBC seem to reach resilience because

they do not have strong institutions directing activity. The institutional robustness argument finds little initial support in the biodiversity cases. A similar explanation could suggest that national context determines resilience of governance relationships. Although the data above is significantly about the governance cases themselves, it is useful to note that resilience does not appear in many cases to result from national leadership. ACTO, ITTO, MAB, and other examples seem constrained by powerful states that exert significant leadership over the structure of the organization. When leadership is diversified or issue based (like in CITES) then the results appear more favorable. National context may explain some aspects, but does not fare very well in the array of biodiversity governance arrangements.

CHAPTER 3

RESILIENCE AND EFFECTIVENESS

The ten biodiversity agreements of the study show wide diversity in terms of effectiveness. There is some overlap between effective agreements and resilient agreements, as will be shown. However, there is not exact overlap and the result of a comparison shows that effectiveness and resilience have different causal structures. This section will explore the various cases and their outcomes in terms of effectiveness while highlighting the outcomes in terms of resilience in the previous chapter.

As defined in Chapter 1, effectiveness is simultaneously a political and environmental outcome involving change to human behaviors and institutions which produce positive and desired environmental outcomes. For ease in understanding there are three broadly possible outcomes for effectiveness: 1. Ineffective, those agreements which neither shape human institutions nor have an impact on the environment, 2. Politically effective, those agreements which shape human institutions but do not impact the environment (often because the changes are too minor or not well-suited to the problem), and 3. Completely effective, those agreements which shape human institutions and have a positive impact on the environment. Few biodiversity governance arrangements have reached the level of sustained complete effectiveness. However, some have seen improving conditions over their part, if an agreement is considered effective then that means that it has change political institutions in some way and been able to show clear improvement in biodiversity loss as a result.

Factors contributing to Resilience

These cases provide an extensive set of histories and experiences with different outcomes. What mechanisms help us understand the wide diversity of outcomes experienced in biodiversity governance? Does the network structure argument about resilient governance hold generally across cases or is there another set of mechanisms that is important?

The limiting cases are clearly highlighted in the case as adhering to the overall theoretical expectations. ACTO, ITTO, and the Bern Convention have limited networks outside of their organizations and connect in a limited manner to other actors and in many of those cases even with on-the-ground efforts of their own organization. When shocks occur, there is little diffusion through the organization or the limited network and the organizations largely remain weak with limited adaptation and limited authoritative capability. The null states of the modular network argument and Hypothesis 3 and Hypothesis 6 then find general support in this instance.

Similarly with the positive cases of resilience, except for the Carpathian Convention which cannot be said to have experienced a significant shock to study the diffusion process during and after the shock, the cases largely support the theory. The most modular network structure of any of the cases studied is the Man and Biosphere project with wide connections at multiple levels. When there have been various shocks to the organization, the response is often bottom-up learning, integrating lessons from individual sites, and transmitting these through informal networks throughout the governance arrangement. Similarly, in the Mesoamerican Biological Corridor, as will be

shown, the modular structure spurred bottom-up diffusion which allowed increasing membership.

The more difficult cases are the arrested development and equilibrium outcome cases. Although all but the Ramsar Convention have centralized networks, they vary greatly in how this network operates with the Caribbean having an elite centralized network and the CBD having an expansive network including a host of different actors but without well-organized modules, a similar problem early in CITES although they have deliberately tried to move to a modular network structure in recent years. The Ramsar Convention though does appear to have what could be described as a modular network structure. National committees, a wide network of actors involved, and other clusters of actors make the Ramsar a modular network. As noted above and discussed more below, Ramsar may be an aberrant case in that the modular structure is a result of weak institutional context without the ability to connect the various actors together in a centralized way. This may explain why rather than leading to top-down or even bottom-up diffusion processes, Ramsar has seen limited diffusion.

Case	**Network Structure**	**Diffusion Processes**	**Result**
ACTO	Limited	Limited	Collapse
ITTO	Limited	Limited	Collapse
Bern Convention	Limited	Limited	Collapse
Ramsar Convention	Modular	Limited	Arrested Development
Caribbean	Centralized	Top down	Arrested Development
CBD	Centralized	Top down	Equilibrium
CITES	Centralized (moving to modular)	Top down	Equilibrium
Man and Biosphere Project	Modular	Bottom-up	Resilience

Mesoamerican Biological Corridor	Modular	Bottom-up	Resilience
Carpathian Convention	Modular	No shock for testing	Resilience

Table 3.1- The results of the 10 Biodiversity Governance Outcomes.

Although the ten cases largely adhere to the modular network theory and provide key support for all the hypotheses, the specific histories of the cases help us understand the mechanisms and scope conditions that are important here.

Observed mechanisms and scope conditions

The cases highlight a number of mechanisms that constrain resilient governance in international biodiversity governance at different levels. The specifics seem to highlight that different processes may impact the different dimensions of resilience (adaptive capacity or authoritative capability) and thus it may be analytically helpful to focus on those that impact adaptive capacity and authoritative capability.

In terms of authoritative capability, *competition* with other governance arrangements appears to be one condition that is quite constantly constraining on activity. Competition as a mechanism could be defined as a set of actors making decisions to gain political or economic advantage over other actors. Preference for the default position in the Dominican Republic case of the Caribbean Challenge was largely a result of the competitive environment between conservationists and tourist industry. Similarly, competition between formal governance and non-state market based certification seems to have had a constraining role on the International Tropical Timber Organization. The crowded policy environment with the Bern Convention, competing with EU-based and other biodiversity governance projects, has similarly caused a well-

developed framework treaty to develop minimally. Further work could reveal that ACTO was similarly a competitive governance arrangement, but at this point there is not enough evidence to confirm that basic argument. There are no instances of competitive governance environments and cases with high authoritative capability which may suggest that when actors are competitive in a governance space that can often prevent them from being particularly resilient. Clarifying roles between governance arrangements, defining overlap precisely, and creating formal linkages between different biodiversity efforts has been a major goal for the past few years (Pittock 2010). The evidence from these cases suggests that these efforts are potentially valuable not just for effectiveness but also for the authoritative capability of the agreements themselves.

Institutional embedding, defined as a process where an interest group provides crucial political, financial, and personnel support to an organization, is another fairly constraining mechanism on the authoritative capability of a governance arrangement. Political scientists have long found that iron triangles can create incentives among interest groups and institutions to lock policies in place overtime (Adams 1982). Most of the organizations with low authoritative capability are defined by the institutional embedding of some interest group at some level of governance: whether this is Japan in ITTO, Brazil in ACTO, or the conservationists in the Dominican Republic. Some of the shadow cases may also highlight this aspect with the limited incorporation of the MBC in Costa Rica and the mountain experts embedded in the Alpine Convention. Institutional

embedding of an interest group in a governance arrangement is a highly constraining force on the ability of it to adopt significant new rules.

However, *weak institutional strength* is similarly constraining. As a mechanism, this could be defined as sustained interactions between all actors in a consistent forum. If forums have irregular, poorly attended, or inactive meetings between members this would be a sign of weak institutional strength being an active practice. Although a number of studies of global environmental politics have focused on weak institutional strength as a constraining force, this definition allows us to see what exactly this would do in terms of response to shocks. Ramsar Convention has weak institutional strength until arguably the 1990s. ITTO suffered some financing and relevance parties starting in the 1990s. ACTO has been a weak institutional space for most of its history. The Dominican Republic example may be a counter-example to this with the extensive protected area system; however, the case study reveals that that strong institution may be constrained by its exclusive forum membership. The Bern Convention similarly may be an example of a somewhat robust institutional space that still cannot improve its authoritative capability.

One mechanism that features prominently in the political economy and fit theories is political contestation. Political contestation is hypothesized to provide a key dynamic that can constrain the ability of governance arrangements to progress (this seems to be one of the key conditions in the seal case in Young 2010). This mechanism appears to be clear in the ITTO example between the European-North American division from Japan. Voting rules in the organization tended to exacerbate this split significantly.

Similarly, ACTO may have been restrained by general regional distrust about Brazilian motives in the Amazonian region. However, it does not find evidence in the Caribbean Challenge (contestation remained inner-elite), the Bern Convention, or the Ramsar Convention. Similarly, political contestation is persistent in some of the other cases that showed authoritative capability presenting limitations on its ability to be considered a robust finding from the cases.

Case of Limited Authoritative Capability	**Relevant Constraining Conditions on Authoritative Capability**			
	Competition	Institutional Embedding	Weak Institutional Strength	Political Contestation
Caribbean Challenge	X	X		
International Tropical Timber Organization	X	X	X	X
Amazon Cooperation Treaty Organization		X	X	X
Bern Convention	X			
Ramsar Convention			X	
X=Clear Evidence =Clear Absense				

Table 3.2- Relevant Constraining Conditions on Authoritative Capability in Limited authoritative capability cases.

In terms of adaptive capacity, the findings support a set of different mechanisms that can constrain the development and deployment of specific scientific findings for the governance arrangement. *Politicized Science* is one mechanism that a number of analysts have seen as a constraining force on learning (Clark and Majone 1985, The

Social Learning Group 2001). Interference by political forces, structure of the scientific meetings, and other shaping exercises by states can be a large constraining force on governance arrangements. This finding is generally supported with the highly politicized science body in the CBD, the similarly politicized science body in CITES during the early years, and in some of the struggles about defining 'sustainable forestry' in the ITTO. In these governance arrangements, the science body is merely another forum for political contestation and strategy between member states, NGOs, and other groups. The absence of politicization in ACTO and the Bern Convention is a result of them lacking scientific bodies of significance. Although both maintain expert groups, they are largely limited to pilot projects and have not increased their prominence in the organization.

Similarly, limitation of monitoring may interfere in adaptation and limited funding may prevent significant funding. The CBD, ITTO, and Bern Convention are all limited by monitoring and funding controls that prove to be highly constraining. State parties in all three are highly resistant to overly burdensome monitoring provisions; however, in the case of ITTO, the competitive situation with non-state certification schemes may be what prevents significant monitoring efforts. CITES, in contrast, has long had significant monitoring assistance from IUCN's TRAFFIC monitoring program. The conclusion is not surprising, limited monitoring prevents adaptation but good monitoring does not guarantee adaptation.

Based upon the efforts of Tolba in the Ozone negotiations in moving science to the fore of the debates, there has been an argument that leadership would be essential for adaptation (Ivanova 2010, Litfin 1994b). The fit theories of governance may consider

this a crucial aspect in spurring adaptation during times of ecological shock. Lack of leadership would be seen as a constraining force in adaptation; however, the cases do not support this contention. In CITES, leadership by the Secretary General caused legitimacy crises and prevented adaptation of the approach in some of those key meetings. Similarly, in ACTO, Ariega was a key leader but did not spur enough of a change to push adaptation in the organization. Lack of leadership may be constraining, but it was not highlighted in the negative cases of adaptation and finds no support in this analysis.

Case of Limited Adaptive Capacity	**Relevant Constraining Mechanisms on adaptive capacity**			
	Politicized Science	Limited Monitoring	Funding Limitations	Lack of Leadership
CBD	X	X	X	
CITES	X (early)			
International Tropical Timber Organization	X	X	X	
Amazon Cooperation Treaty Organization				
Bern Convention		X	X	
X=Clear Evidence of Mechanism =Clear Lack of Mechanism				

Table 3.3- Relevant Constraining Conditions on adaptive capacity in limited adaptation cases.

The mechanisms that are seen to be constraining on resilience then include competition, institutional embedding, weak institutional strength, political contestation, politicized science, and limited monitoring and funding. This does not supplant the

process tracing of the cases above; however it does highlight some of the key conditions that constrain resilience in some of the different cases. Politicized science is a significant constraint on adaptation and competition and weak institutional strength are significant constraints on authoritative capacity. These findings do not reverse the study of global environmental politics and discover constraints accented in the literature. Two general comments though about these findings of mechanisms that constrain resilience. First, the fit theory seems to be generally inadequate to the task of explaining institutional dimensions. Institutions can become grounds for wider struggles and are kept weak for reasons external to the institution itself. The negative impacts of competitive environments and institutional embedding on resilience of governance arrangements is good disconfirming mechanisms of the fit argument if it retains a explanatory coherence. Second, too little institutional strength constrains resilience and too strong institutional strength constrains resilience. Institutional weakness is problematic in that it may limit any possibility for adaptation or development of new rules. The Ramsar Convention may be the prototypical case that is largely constrained only by the weak institutional rules in the situation. However, strengthening of the organization is not necessarily a clear solution and may instead transform institutions into ground to be gained in contestation with other actors. This risk appears to be present at local, regional, and international levels and hold in multiple cases in different aspects.

Mechanisms that Generate Resilient Governance

Breaking apart the state proves to be a crucial aspect of generating authoritative capability in the set of governance arrangements. *Circumventing Projects* is a crucial aspect of both the MBC and UNESCO's MAB project. Liking local actors with international actors creates different policy competencies that can assist significantly in times of political shock. Similarly, *trust in small-scale networks* is an important mechanism in CITES, MAB, the Carpathian Convention, and in the MBC project. As the network analysis in Chapter 5 found, it is these tightly knit sub-networks that can provide significant support for resilient governance. The CITES ivory case exemplifies this with controversy at the point that there are no networks but throw the elephant study groups, monitoring groups, and just generally expanded stakeholders to create very trusted networks in the arrangement.

The most insightful aspect appears to be the importance of the *policy ratchet effect* and the weakness of *stable bargaining outcomes* or *rule enforcement* as crucial mechanisms in the arrangements. The policy ratchet effect is conditions where new constituencies are brought into the governance arrangement and this creates a new base of support for improving governance. The MAB development is one example of this where sustainable development in the 1980s allowed the members to expand to a whole host of human-impacted sites for expansion of the program. This new constituency then proved crucial in pushing the project to further deepen its focus on development of communities and creative protected areas. Similar arrangements are seen in CITES, the Carpathian Convention (with its network expansion efforts), and the

MBC in El Salvador. This finding is significant when compared to some of the other possible mechanisms for governance arrangement updating: stable bargaining outcomes and rule enforcement. CITES is notorious as a treaty that has significant enforcement capabilities with sanctions being used many times to ensure compliance. MAB's delisting procedures can be similarly an enforcement mechanism. However, aside from those examples, there is not clear support that either reaching political economy bargaining outcomes nor robust enforcement regimes are necessary. The outlier is the CBD which for the most part does not have any of the mechanisms and yet does have high authoritative capability. Although there is some competition at a variety of levels, the CBD is generally treated as the preeminent forum for biodiversity issues and although it does not have consistent constituencies, it has a constantly large number of groups attending and participating. This preeminent position may explain its authoritative capability while the other mechanisms are largely lacking.

Case of Positive Authoritative Capability	**Relevant Generative Mechanisms on Authoritative Capability**				
	Circumventing Projects	Trust in Local Networks	Policy Ratchet Effect	Stable Bargaining Outcome	Rule Enforcement
CBD					
CITES		X	X	X	X
MAB	X	X	X		
Carpathian Convention		X	X		
Mesoamerican Biodiversity Corridor	X	X	X		
X=Clear Evidence of Mechanism =Clear disconfirmation of Mechanism					

Table 3.4- Relevant Generative Mechanisms on Authoritative Capability in high authoritative capability cases.

Adaptive capacity in resilient systems can be fed by a number of different directions and the difference is really who are the merchants of ideas. *Trial and Error Experimentation* (as defined in Chapter 2) consists of a wide range of learners spread out throughout a governance arrangement with some system of idea exchange. The *Development of Network Norms* consists of agreement throughout the network of basic ideas and then diffusion through membership requirements, meetings, publications, etc. *Institutionalized Persuasion* involves learning facilitated by the Secretariat of various offices or external formal institutions. *Ideational entrepreneurship* is that mechanism where a set of experts, working outside of the governance arrangement sharing a similar basis of evidential requirements begins to articulate policy propositions for the governance institution. Epistemic communities can be active in these various activities,

but should be considered to be most active in ideational entrepreneurship and institutionalized persuasion.

Across the cases, there is significant evidence of ideational entrepreneurship happening from a variety of different levels. Consensus based expert committees are important in the Ramsar commission with a coherent wetland experts committee that has significantly improved the guidelines in the organization, MAB's committee was substantially important in pushing adaptation, and the international mountain groups that had been active since the 1980s were crucial in the Carpathian Convention. There does not appear to be the same level of activity in the MBC case, but it is possible that CATIE experts in Costa Rica or other people and parks entrepreneurs like PRISMA in El Salvador were important. The crafting of ideas in expert groups and articulating those for policymakers is thus a crucial part of adaptive response. Similarly important across different cases is trial and error experimentation which is a crucial aspect of adaptation in the MBC and MAB cases. There are signs of such systems operating in Ramsar and the Carpathian Convention, but the processes are weak at this point.

Interestingly, the development of network norms (or socialization) and institutionalized persuasion are found to be weakly important and both cases where they show impact, ideational entrepreneurship appears to be more significant of an impact. The development of shared standards across a network and the use of this to support learning throughout is only clearly evident in the MAB case, although there may be the beginning forms of this in the MBC and Ramsar. MAB global and national committee networks are crucial in diffusing the agreements of Madrid and Seville into

various situations around the world. The integration of local-community participation throughout the MAB network, for instance, was largely driven by local managers connecting with national committees to change their approach (Schultz, Duit, and Folke 2011). However, this may rely more on ideational entrepreneurship of key scientific community rather than a pure case of the impact of socialization. Similarly, institutional persuasion or top-down learning seems to only be the case, and with weak impacts, in the Ramsar Convention. The activity of the technical panel in Ramsar is largely as a mouthpiece for the wetland epistemic community to influence, update guidebooks and gradually impact wetland management around the world. Any learning impact in Ramsar though is probably more a result of the coherent wetland expert group ideational entrepreneurship and not the institutionalized persuasion. In addition, there is a negative case where the secretariat controversy in CITES appears to be a clear example of an attempt at institutionalized persuasion with negative resiliency effects. This form appears to have little impact in the case of MAB, Carpathian Convention or the MBC which rely upon different, less directed forms of learning primarily. Socialization and top-down learning then find limited support in the biodiversity cases. The conclusion will expand on this finding as it seems to have highly relevant implications for wider issues.

Case of Positive Adaptive Capacity	**Relevant Generative Mechanisms on adaptive capacity**			
	Trial and Error Experimentation	Development of Network Norms	Institutionalized Persuasion	Ideational Entrepreneurship
Ramsar			X	X
MAB	X	X		X
Carpathian Convention				X
Mesoamerican Biological Corridor	X			
X=Clear Evidence of Mechanism =Clear Lack of Mechanism				

Table 3.5- Relevant generative mechanisms on adaptive capacity in high adaptive capacity cases.

Many of the mechanisms of adaptive capacity and authoritative capability appear to be quite complementary with one another. Trust in small networks and ideational entrepreneurship, for example, are analytically and empirically quite related to one another. In addition trust in small networks and the policy ratchet effect seem to be rather consistent intertwined mechanisms. However, circumventing projects does not appear to be necessarily a collaborative mechanism with any of the other mechanisms and thus may simply be one pathway amongst many of producing resilience. In addition, some of the other mechanisms that hold in a few cases appear to come at the expense of resilient mechanisms. Rule enforcement and stable bargaining outcomes appear in the cases as crucial aspects of the CBD and CITES which are both groups that see the limited existence bottom-up learning procedures. CITES sees

institutionalized persuasion as one key early attempt with problematic impacts, especially when combined with the politicized science that exists in both examples. This highlights one of the key findings from this analysis, that authoritative capability and adaptive capacity made tradeoff with one another at key points. The CBD and CITES present ideal opportunities for further study to identify exactly how such a tradeoff exists in practice.

Resilience in Biodiversity Governance

The network structure argument finds general support in the positive cases of resilience. The Mesoamerican Biological Corridor's adaptation and authoritative capability is created by projects that connect local-governments with multiple international funders in biodiversity projects outside of the central state and trial and error local experimentation with different biodiversity approaches. This is a largely undirected process, largely a result of multiple communities responding to natural disasters in ways which are separate from one another but similar. UNESCO's Man and Biosphere governance arrangement responded to political shock in the 1980s by expanding its focus with sustainable development into Africa, Latin America and Southeast Asia. Expanding its constituency through active engagement with the central MAB network resulted in an adaptive agenda integrating in a host of additional creative procedures and programs. The Carpathian Convention has engaged a host of different stakeholders in its program which has allowed it to quickly push a new protocol on biodiversity protection with a large emphasis on the ecosystem perspective. These cases closely adhere to the network structure theory of resilience.

The cases analyzed above similarly show that mechanisms which adhere to the network structure theory are the most important. Undirected action is prominent in many of the limiting examples: including the CBD and the Ramsar Convention. However, these limited actions rarely cohere into any adaptive change in the governance arrangement (Sawyer 2004). This finding is potentially significant in refining the network structure theory in that it finds that it is not sufficient for a governance arrangement to encourage multi-actor, undirected action. This type of governance is deployed actively in the CBD with the result of hyper-politicization, adaptation at the margins, and few coherent constituencies. However, the severe limiting cases, ACTO, ITTO, and the Bern Convention, are severely constrained by either competitive governance environments or weak institutional strength so that emergent mechanisms have little room to develop. So the limiting cases do generally support the overall argument, but require refinement in order to make it clear precisely what is necessary.

A precarious aspect of modularity governance then is that it may lead to only limited learning by the governance arrangement.

Small-group trust connected with other small-groups proves crucial for the authoritative capability, and possibly also the adaptive capacity, aspect of resilience by providing groups that are committed to the governance arrangement, but not completely unconnected. There are clear examples of this process being crucial in the MBC, MAB, and in post-1996 CITES which is an organization with significantly improved authoritative capability. Local government networks in El Salvador (Chapter 5) organized for very different goals became crucial in adapting biodiversity governance

strategies and introducing them into the network in various places. In MAB, the policy ratchet effect is largely about building trust in small pockets of national committees and then expanding them through the system through a variety of reflexive and consensual processes. CITES segmentation of issues into smaller groups has slowly achieved this as parties have began to trust the results from micro-groups which retain themselves in the overall hierarchy. This dynamic of small-groups with trust between them is one of the key pieces of evidence from the evaluation of network evolution. The argument is that these provide simultaneously redundancy and modularity to the governance system which are crucial aspects for resilience (Anderies and Janssen 2011). Small-groups connected with other small-groups tend to be highly redundant in their connections with another, often with shared ideas (whether ideological in ex-FMLN communities in El Salvador or epistemic in the case of the MAB) or shared conditions (the Usulután activity in biodiversity policy is largely influenced by the land reform networks established- Chapter 5). However, in addition, these groups prevent shocks to the authority of the overall network from moving throughout the network. When the U.S. and U.K. withdrew from UNESCO the shock certainly impacted the overall organization, but national committees (including those in the U.S. and U.K.) were able to continue their activities and participate in the ratcheting up of the organization. This modularity provides a system that can protect itself from wider political shocks which can prove crucial in international biodiversity governance. This is lacking in all of the limiting cases that either have small-groups unconnected to other actors, ACTO and the

Bern Convention, or do not have such small-group activity at all in the organization, ITTO, Dominican Republic, Ramsar Convention.

However, at the same time, a limiting condition on the situation would be hierarchical ordering mechanisms which either make the arrangements an environment of dominance by one small-group or put it in competition with other governance arrangement. The Dominican case study highlights excellently these situations at the same time. A strong conservation national system has allowed an active epistemic community to maintain key relationships with one another and exclusive forum membership. This group retains prominence and makes the environmental ministry and international governance arrangements largely go through their significant gatekeeping role. However, at the same time, this results in a competitive environment with the tourist economic sector further weakening the adaptive ability of the arrangement. Similar processes exist in ITTO and its competitive governance environment with the rise of non-state certification regimes for forests, the Bern Convention and its competitive governance environment with EU biodiversity programs, and in ACTO with the large influence of Brazil over the organization. This is not necessarily related to the strength of the institutions and institutional weakness may be a significant constraint as highlighted above; however, hierarchical ordering can weaken any supporting efforts by the organization.

Effectiveness outcomes in global biodiversity governance

In addition to the diversity in resilience, the 10 cases also have significant diversity in terms of effectiveness. As defined in Chapter 1, effectiveness is

simultaneously a political and environmental outcome involving change to human behaviors and institutions which produce positive and desired environmental outcomes. For ease in understanding there are three broadly possible outcomes for effectiveness: 1. Ineffective, those agreements which neither shape human institutions nor have an impact on the environment, 2. Politically effective, those agreements which shape human institutions but do not impact the environment (often because the changes are too minor or not well-suited to the problem), and 3. Completely effective, those agreements which shape human institutions and have a positive impact on the environment. Few biodiversity governance arrangements have reached the level of sustained complete effectiveness. However, some have seen improving conditions over their part, if an agreement is considered effective then that means that it has change political institutions in some way and been able to show clear improvement in biodiversity loss as a result.

Cases with No Observed Effectiveness

Five cases have no observed effectiveness at this point and have been seriously limited in their ability to implement governance strategies. The Carpathian Convention is too recent of an international biodiversity agreement for full assessment and so will be excluded from the discussion. The other cases with no observed effectiveness then include the Amazon Cooperative Treaty Organization (ACTO), International Tropical Timber Organization (ITTO), the Bern Convention, and the Ramsar Convention. These four organizations have had limited impact on locations with the Ramsar Convention having the largest impact in the creation of wetland protected areas, but limited impact

in all of these areas. ACTO has produced few institutions and not significantly changed behavior in any measurable manner. ITTO, Bern Convention, and Ramsar Convention have all changed institutions and behaviors, but these have been very limited or cosmetic. ITTO has undertaken some pilot projects, but has for the most part not been able to establish effective guidelines for implementation in various countries. Both Ramsar and the Bern Convention have been significantly limited in their ability to review, delist, and encourage improvements to their sites. Ramsar is more advanced in these aspects than Bern and with more time may began showing political effectiveness; however, right now, there is no observed effectiveness of either agreement.

These cases are similarly some of the lowest in terms of resilience. The last chapter demonstrated that ITTO, Bern Convention, and ACTO are low in terms of both adaptive capacity and authoritative capability. The Ramsar Convention is relatively high in terms of authoritative capability but as of yet limited in terms of integration of adaptive ideas. The argument pursued in the last chapter is that many of these organizations are institutionally constrained, clear in the case of ITTO, ACTO, and the Ramsar Convention and with the overlapping EU and Council of Europe biodiversity politics of the Bonn Convention may also be said to exist there.

These cases then may be clear examples of where effectiveness and resilience overlap. In situations that are institutionally weak, it would appear highly unlikely that a governance arrangement would be either effective or resilient. A strong enough institutional space to make clear the authoritative structure and to facilitate adaptive learning appears to be crucial to both resilience and effectiveness. Below some

institutional strength threshold, it would appear unlikely for either processes to operate effectively.

Cases with Political Effectiveness

There are a host of other projects which have demonstrated political effectiveness in creating and changing human institutions, but have not shown significant results in terms of environmental improvement. The clear cases include the Convention on Biological Diversity and the Caribbean Challenge. If a full evaluation of the Carpathian Convention's impacts were available, it would most likely be here. Both of these governance arrangements have been very effective at spurring the creation of protected areas around the world; however, they have been limited in their ability to change how those areas are managed or to see wider impacts on biodiversity generally.

In terms of effectiveness, both the CBD and the Caribbean Challenge have set significant goals of creating protected areas and both have in general met those goals. The problems come about through meeting the specifics of those goals (such as creation of marine protected areas or coverage in multiple biomes) and in creating effective ways to ensure those protected areas achieve positive biodiversity outcomes. This has limited any clear evidence of environmental effectiveness and most analyses find that these are both going to be limited without ensuring protected areas improve management and reaching out to greater different biomes. The effectiveness has then been in the political creation of rules and institutions, but limited in terms of if those rules have been implemented in a meaningful fashion or if they are having a political impact.

In terms of resilience, these cases are of different orders with the Caribbean Challenge largely having a narrow set of authoritative capability and the CBD having limited adaptive capacity. However, they similarly demonstrate that changed political institutions hits a wall very rapidly if it does not come with expanded authoritative capability to implement those decisions. Although the CBD has a wide range of actors involved and the ability to develop international guidelines, it is limited in terms of effectiveness by the inability to see those decisions mean much on the ground. The Caribbean Challenge is similarly limited by the domestic elite in the Dominican Republic who constrain the ability to develop new rules. A major lesson then about the relationship between resilience and effectiveness is that domestic elites can be constraining on both processes. Although national actors are crucial to any governance processes, they can similarly skew such processes to augment their own interests.

Cases with Political Effectiveness and Environmental Effectiveness

CITES, the MAB project, and the MBC have all shown the most significant levels of environmental effectiveness in the biodiversity realm. Not all have been universally effective, but all have shown significant examples of both political effectiveness and sustained political development. This section will explore each example in terms of their effectiveness and then conclude with the discussion regarding the relationship between relationship and effectiveness.

CITES has proved a difficult agreement for there to be clear analysis about its environmental effectiveness because of its limited scope on trade in endangered species. The result is that CITES could be quite effective at stopping trade related

impacts on particular species, but habitat destruction, domestic use, and large scale problems like global warming continue destroying the species. This problem has made assessment of CITES difficult to ascertain. Curlier and Anderson look at the prominent species (such as the African elephant and crocodile species), and the most commercially valuable and politically contested species in CITES, to find that CITES has been of limited effectiveness but with some improving potential (Curlier and Andresen 2002). Similarly the 2000 IUCN evaluation of CITES confronted this by looking at a group of select taxa to assess effectiveness and similarly finds some limited improvement (effectiveness over spotted cats, ineffective over rhinoceros species)(IUCN- The World Conservation Union 2000). This is also a similar method as that used by WWF for its 2012 Enforcement Scorecard that focused on illegal trade of select taxa in different countries (Nowell 2012). In terms of political effectiveness, CITES (working significantly with IUCN) has developed significant monitoring of trade in species around the world. Membership has expanded and with some financial help, countries around the world have standardized and increased regulation in customs offices. However, this has not always had clear impact on the conservation of species.

Rather than taking a limited view with the taxa that have sufficient information, there are two other holistic measures possible for assessing effectiveness. One measure is to evaluate the movement of species between the two Appendices of CITES. This measure was originally proposed by Wijnstekers contending that every species that moves from Appendix II to Appendix I is a clear sign of treaty failure while moves from Appendix I to Appendix II is a sign of treaty effectiveness (Wijnstekers 1995). Updating

those findings from 1995 shows that although in the early years of the agreement the primary movement was from Appendix II to Appendix I (showing ineffective treaty implementation); however, since 1997 more species have been moving from Appendix I to Appendix II (showing improved treaty implementation) making a larger percentage of the overall listing moves each year (See Table 7.1). A second measure is to look at the Review of Significant Trade and analyze the species with improving measures. The Reviews in the Animal and Plants committees focus on the trade and impacts in a variety of countries on a variety of species. The record is mixed with some particularly problematic states, but there has been significant improvement in general in the Reviews for the past decade. Both of these measures show holistic effectiveness measures that support the taxa specific conclusions. CITES has been effective over many realms but is constrained in some range countries and over some key species.

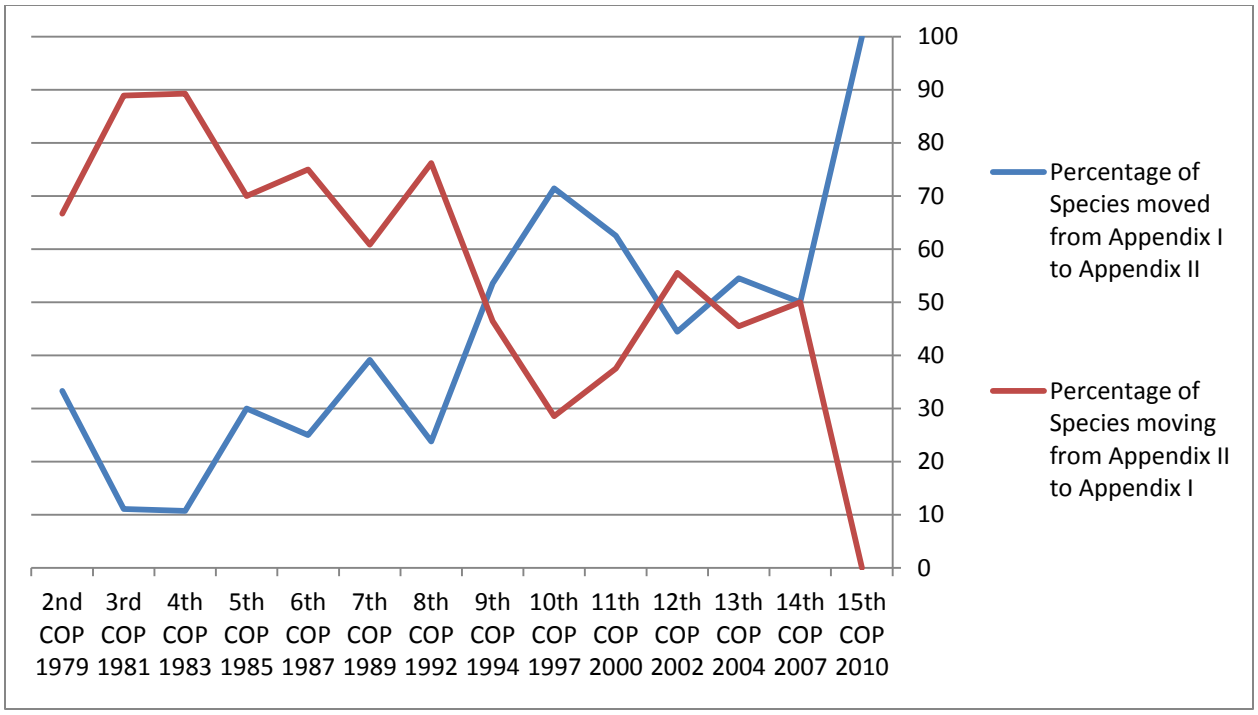


Figure 3.1- Species listing movement in CITES from 1979-2010.

UNESCO's MAB program has developed regular requirements on members and assessments of the biodiversity impacts in its conservation areas and wider areas of society. In contrast to the CBD or the Caribbean efforts, the MAB has been effective at creating protected areas, expanding to countries not covered earlier, and doing that. The question is two-fold to assess environment effectiveness: a. have areas had an impact and b. how many have had an impact. Secondary literature provides partial coverage for both of these questions. Between 2001 and 2011 a number of assessments appeared in articles in different journals. 15 different case studies with significant evidence show 8 with positive outcomes, 6 with negligible environmental outcomes, and 1 with no clear outcome. With over 500 biosphere reserves, the 15 that have received significant scholarly attention is quite limited. However, geographic

disparity is quite positive with 6 from Asia, 1 from Europe, 3 from North America, 3 from South America, and 2 from Africa. Additional study occurs within the MAB itself and shows similarly that while not all biosphere reserves have a positive impact, a significant number have shown positive impacts in both core and buffer zones. The conclusion then is that MAB has shown significantly positive impacts with its Biosphere Reserves, but that this is not true in all cases. In addition, increasing requirements and evaluations in the organization appears to be improving outcomes(Price, Park, and Bouamrane 2010). The result then is some significant effectiveness within the project although in many cases this does not happen.

The Mesoamerican Biological Corridor similarly has shown differing degrees of political and environmental effectiveness. While Belize and Costa Rica showed little political willingness to expand protected areas or buffer zones, Guatemala, Nicaragua, and El Salvador all demonstrated minor expansion at first followed by more significant expansion after 2004. El Salvador is the most dramatic case, but both of the other countries similarly experienced project led growth. These efforts have been effective at restoring significant areas and are a partial contribution to the forest resurgence in El Salvador. Although it is not possible to fully assess their effectiveness, study in the areas created through the circumvention projects in El Salvador has shown significant improvement to the coherence and status of the created areas (Hecht, Kandel, and Gomez 2006, Valencia et al. 2011)

Importantly, two of these show high levels of resilient governance and the third is limited in some adaptive aspects but shows high authoritative capability. What is

unique about these cases, in the universe of cases, is their distinctive modular structures. CITES divides specialist groups out and has NGOs like IUCN assess and monitor illegal trade. UNESCO's MAB project divides into national groups and has expert management core of experts at international meetings. The MBC is similarly structured in a highly modular structure. Each is limited in their effectiveness to some extent by this process but it may be the modular structure which causes resilience and effectiveness to overlap if at all. The modular structure allows progress on some areas and zones while others stay limited.

Augmenting Effectiveness and Resilience

The findings above show that effectiveness and resilience are not necessarily coordinated processes but that there are key conditions for both outcomes. In order to achieve both, governance arrangements have to find effective means for 1. Institutional Strength, 2. Preventing Governance Capture and 3. Limiting Political Contagion. Each of these barriers will be discussed in terms of both their empirical support and avenues for operationalizing and additional study of the barriers for the study of global environmental governance.

Institutional Strength

This study makes a unique contribution to effectiveness studies is clearly identifying a tipping point to the argument about institutional strength. Biodiversity governance shows that institutional strength can be absolutely constraining for the ability of governance to be effective or to adapt into an effective effort. This presents a corollary to the hypothesis that institutional strength causes effective governance by

finding that any relationship is not linear but of a tipping point type. Below a certain level of institutional strength, effectiveness or resilience is unlikely. Above that level, institutional strength contributes to resilience to an equal amount and not an increasing amount. The corollary hypothesis then is: Institutions with limited institutional strength are unlikely to develop into stronger agreements if they cannot effectively transmit ideas throughout the organization.

The evidence assembled here shows is that this problem of institutional strength is one common to both resilience and effectiveness, but not in a linear fashion. The Convention on Biological Diversity is, by many measures, the strongest biodiversity institution and the Caribbean efforts have stronger institutions than the Central American efforts. However, if institutions fail to reach a certain level to allow transmission of ideas and clarity of authority, then it is highly unlikely that the institution will show either resilience or effectiveness. ACTO provides the clearly constraining case where the institution is unable to coordinate efforts in the region and its biodiversity projects. Without even a loose coordination role, it appears unlikely that the agreement can mobilize into a more effective arrangement. ITTO and Ramsar are both examples where weak institutions with limited ability to coordinate efforts have been dealt with recently but with less than significant improvement. Both are constrained and if to see significant improvement on the road to significance will require expenditure of key political power and will most likely not come from within the organizations themselves.

In contrast, other governance arrangements have been able to work on growth of authoritative capacity internally with some organized coordination, even if very limited. UNESCO's MAB project, the MBC, the Bern Convention, CITES, and the CBD are all arrangements which may not have the most significant institutional strength, but have a sufficient capability to augment their authority slowly. One condition which is important is to have a key coordinating organization with connections to other organizations. Ramsar, ITTO, and ACTO are relatively unconnected in many aspects, while the other cases of the biodiversity governance programs are more connected with other agreements. Formal embedding is one aspect that is common in many of the more effective arrangements but loose connections are similarly important.

One major issue that study of international environmental governance has been focusing on recently is institutional linkages (Aggarwal 1998, Jinnah 2011, Young 1996, Oberthur and Gehring 2006). This is recognized in practice in biodiversity as well with the creation of the Liaison Group of Biodiversity-Related Conventions and other coordinated efforts. In addition, many of the agreements have also developed linkages with trade agreements. The CBD is an essential organization developing a variety of links and fostering multiple connections. This study does not directly evaluate the impacts of linkages on effective or resilient governance, however the findings can highlight important aspects about this. Oberthur and Gehring specifically explain how modular network processes, like emphasized in this study, can lead to effectiveness. They write "interaction between nested institutions may help extend an obligation from a smaller institution to an institution with a larger membership and similar objectives.

Because all members of the smaller institution will tend to favor the extension of the obligation, the relevant coalition in the bigger institution will be strengthened" (Oberthur and Gehring 2006). This may be one international form of the policy ratchet effect described in the El Salvador case in Chapter 3. Effective linkages and interactions between institutions can provide the minimum amount of institutional strength throughout the arrangement while still allowing small groups to make their decisions and move toward adaptation. For biodiversity governance in this study, this process appears to work in some key instances. Examples include the nesting of local study groups in CITES, the nesting of local-local agreements in a web of interactions, and the agreements manifest as small outputs of scientific communities in CITES, MAB, and the Carpathian Convention. Nesting and linkages then may present a very useful strategy for achieving a sufficient amount of institutional strength to allow progression. The risks of governance capture may remain in the situation and nesting is not a guaranteed factor, but it offers a productive avenue for achieving sufficient institutional strength.

To put the argument differently, weak institutions are absolutely constraining on the effectiveness of a governance arrangement. The impacts of weak institutions though is constraining in two respects: 1. Lack of capacity for effectiveness but also 2. Lack of ability to take advantage of resilient dynamics to eventually grow into effective institutions. Diffusion of ideas, feedback, and the policy ratchet effect, all of which are crucial for resilience, do not

Governance Capture

A second constraint on resilience and effectiveness is the process of governance capture or a process where the benefits of governance are distorted through actors making strategic decisions to benefit themselves or their interests. This problem takes on a number of different forms like free riding, defection after initial project, opportunistic definition of the rules, and rent-seeking behavior. Two of these are particularly important when considering resilience and effectiveness: rent-seeking behavior and defection. Each of these are constraining factors and each are dealt with in a variety of ways by biodiversity governance arrangements.

Rent-seeking behavior is manifest in international biodiversity governance when local and national actors become largely dependent on the funding and technology in projects but divert the resources to keep funding flowing rather than working primarily on the problem. Rent seeking behavior happens when actors pursue strategic behavior to achieve access to resources rather than delivering performance. Projects and international funders provide rents in terms of funding, connections, and resources. In worst situations, recipients pursue projects for the resources and not for any interest in environmental action and strategically keep projects unfulfilled to continue receiving funding. In better situations, recipients simply adhere to project provisions without local experimentation or learning.

The second problem confronting actors, and one they are very aware of, is that of short-term gains followed by defection when the projects end. This problem arises when local and national actors fit projects to receive funding but not adapt any deeper

implementation of the projects goals. When environmental change only occurs for the length of the project and then terminates or moves to a new trend in international funding, then the impact and resilience of the governance arrangement is limited. The CBD may be an example of both of these features constraining its effectiveness. With broad guidelines that can be interpreted in a strategic manner there has been the rise of a number of projects but without significant depth in these efforts. Study into the lasting nature of environmental projects is necessary for a full assessment of this problem; however, it is a key problem which may constrain a number of different governance arrangements in the current milieu.

Effective and resilient governance arrangements deploy a number of ways to limit the problems of rent-seeking behavior. Listing procedures provide a means of certification and providing the lasting of projects and increasing their provisions. Funding from MAB is limited and provides only limited non-technical funds which effectively limit rent seeking behavior by actors. The MBC in Central America does not have an effective mechanism to deal with either problems. However, the analysis in Chapter 3 contends that there is a deeper interest behind the circumvention projects in local communities, in terms of response to natural disasters, which may provide some control on the features. In these instances rent-seeking or shallow projects would be unlikely as long as lessons from natural disasters are present. CITES ban provisions are quite controversial in many of the assessments and by key members of the CITES community; however, this highly restrictive process with only very contentious allowances of trade may provide some key limitation on these provisions. States that

want to sell legal ivory, for instance, have such an up-hill battle that their commitment to conservation and health of the species has to be quite established. Similar to the MBC, in the CITES there are clear motivations by local actors working against clear rent-seeking or shallow project processes.

Political Contagion

This is an oft-noted but not fully analyzed problem of environmental governance. The condition is one where contestation in one realm results in contestation in other realms of governance. This may occur through strategic actors who are using some forum of governance to push arguments in other, as may happen in politicization of science in the CBD for example. However, it may also occur simply as factions and large issues contested in one sphere became important in another sphere. The early years of CITES for example saw contestation move between the different committees with each one being part of a larger struggle on whether to ban or regulate trade in endangered species. Political contagion can be a constraining factor on governance by making political shocks unmanageable, constraining adaptation by limiting the perceived truth from scientific bodies, and by leading to protracted struggles on small adaptations. As noted above, agreements that show effectiveness are those which can control this through the creation of different governance modules insulated from some political contagion.

Modularity is considered a key aspect in ecosystem studies of resilience because it allows individual groups of species or components of the ecosystem to remain relatively safe from disease, natural disasters, etc. The argument is that you want

connected systems so that feedback mechanisms can operate, but tightly coupled, connected systems are particularly vulnerable to contagion type shocks. Similarly, the U.S. power grid is tightly coupled making it a particularly brittle system (Lovins and Lovins 2001). Modularity is an abstract notion that looks at divisions between the different parts of the population for whether there are buffers and transmission processes that can constrain harmful inputs while allowing positive inputs. Systems should be connected while remaining modular for resilience.

The biodiversity cases in this study demonstrate that modularity is a crucial aspect of governance resilience and effectiveness also. A number of cases are beset by chronic political contagion with disputes from one realm quickly impacting all others. This is the case in ITTO and the CBD. In both of these cases, contestation travels throughout the organization rapidly impacting multiple different institutions. This is also what impacted the early CITES structure with disputes moving into all of the committees and leading to significant problems with its early operation. Modular cases, with clear buffers between different actors, include the MAB structure which has buffers between the scientific body and the political body and some buffer between different national MAB office, and the CITES structure currently. The MBC's decentralized system of governance is similarly modularized with different projects being loosely connected, but with significant difference. Although the problem is not a problem in all cases, modularity is a crucial guard against political contagion.

PREFACE TO CASE STUDIES

The location of institutions can tell you a lot about their relationships with other institutions. In El Salvador, the Environmental Ministry is on the grounds of the much larger Agricultural Ministry, a ministry which crucially guides coffee production in the country and the land reform efforts at the end of the civil war in that country. In the Dominican Republic, the Environmental Ministry sits on a remote hillside, very far from the rest of the organs of the government. These two comparisons tell significant amounts about the networks in which these institutions are embedded. The following chapters will directly compare these two cases to develop a deeper understanding of the dynamics identified in Chapter 2 and Chapter 3.

To organize the case studies, the focus will be on analytic stages in the network structure theory rather than the development in a single case. Chapter 4 will focus on the network structures, the processes by which these developed, and their impact on the learning dynamics within the different governance arrangements. After establishing this comparative distinction, Chapter 5 will analyze the post-shock efforts at learning in both governance arrangements. El Salvador saw significant trial and error experimentation result in the creation of many small-scale biodiversity projects. The Dominican case, in contrast, saw limited development of new perspectives and largely reiterated the conservation approach that dominates the biodiversity policy in that country. Finally, Chapter 6 will show that these different learning dynamics, shaped by the network structures, result in different outcomes in terms of resilience with the MBC showing significant resilience and the Caribbean case instead resulting in arrested

development as an outcome. The cases will highlight some of the key mechanisms an contexts discussed in the previous chapter.

CHAPTER 4

NETWORK STRUCTURE IN EL SALVADOR AND DOMINICAN REPUBLIC

Network structure has a significant impact on the response to shock in governance arrangements. Biodiversity governance in the Caribbean and Central America both involve extensive national and international networks. Each governance institution has a network structure both within the institution and in a larger embedded system. While Central America is best defined as having a modular structure, with a series of distinct clusters of actors, the Caribbean context is best defined as having a centralized network structure. These resulted from very different national contexts and biodiversity politics for the decades before these networks formed. However, the analysis in later chapters will show that neither national contexts nor the institutions themselves made the most dramatic difference in terms of resilience, but the network structure itself.

This chapter will first study El Salvador and the developed network that involved a number of clusters of connections linked across levels by a network that dealt with coffee issues. The network structure was thus very modular with broad connections between different actors, but Dominican context, in contrast, had similar networks at local, national, and international levels. However, this network was largely centralized with a dense network of state and non-state actors in the Dominican Republic. The result is that biodiversity politics in the two national contexts developed in two distinct network structures. Chapter 4 will argue that following shocks in the middle part of the

first decade of the 21st century, these network structures shaped the processes of learning in the different governance arrangements.

The creation of modular networks: El Salvador and the Mesoamerican Biological Corridor

The modular network for biodiversity governance in El Salvador is both surprising and significant. The biodiversity network that initially developed in the 1980s and 1990s appeared to be highly centralized in the environmental ministry and with USAID. However, following the civil war (1980-1992) and with active post-war reconstruction and peace efforts, this network developed a series of focused clusters at the local, national, and international levels. This development provides an excellent check on the institutional aspect in that some of the networks were designed for very different purposes and the institutional context was quite limited. The modular network design in El Salvador then provides an excellent opportunity to see how network structure can influence the responses to shocks.

The network prior to around 2004 was constructed largely with multiple different networks with tenuous links to one another creating repeated modules of action with very small overall connection. The ministry of the environment linked key actors like the NGO SalvaNatura and the international funding through FIAES. Both of these networks were further connected to elite coffee networks, some other NGOs, and significantly to USAID. However, there was at the same time a number of local-local networks which had developed in the aftermath of the civil war and which had clear clusters of action. This local-local set of networks were only partially connected to the

ministry of environment and international networks at this point; however, there were enough connections to produce a connected network structure although the clusters were more finely distinguished at the local level.

For analytic leverage, the description of the different networks and how they developed will be separated out by different level: starting with the national level which forms a core of the network, then moving to the international level and the local levels. The coffee network serves as a key horizontal connector in the overall network at this period linking local actors and national actors with international actors. The coffee network will then be presented separately at the end although it will appear at key moments in the discussion at the other levels of governance.

Environmental Policy Network

The national environmental policy network included a host of actors tied directly to the Ministry of the Environment as well as environmental NGOs (typically with international funding). The network appeared held together through a few key bridging actors with the Environmental ministers (prominently Miguel Eduardo Araujo Padilla from 1997-1999 and Walter Jokisch, Environmental Minister starting in 2003) serving roles connecting with a variety of issues. In addition, short-term projects connected other networks of actors into the environmental policymaking network. Aside from a shared focus on environmental issues, broadly defined, and a few cooperative reports and projects, the network was held together by very little. The best descriptor of the network may be that it was an issue area network held together predominantly by shared interest rather than either shared values, approach, or goals.

The early development of the environmental ministry in El Salvador was a heavily centralized bureaucracy, similar to the larger bureaucratic context in El Salvador. This military and agro-elite compacted regime which dominated Salvadorian politics for most of the 20th century had many different projects, goals, and ideological components; however, centralized governance was one of the major shared commitments between the military and the agricultural elite. Véliz argued that throughout Latin America in the mid-20th Century there developed a strong "centralist disposition" (Véliz 1980). However, in all of Latin America, El Salvador was one of the countries that pursued centralization with the greatest effort and at almost any cost (Guillen 2001). This centralization of politics and policy-making in El Salvador sets the context for much of the natural resource and biodiversity policy to follow.

In the 1970s, El Salvador focused significant resources on building the most sophisticated environmental monitoring infrastructure in Latin America in its Direccíon General de Recuersos Naturales [Director General of Natural Resources] (DGRN) (PRISMA 1995). The DGRN was one office within the Agricultural ministry which was aimed primarily at developing an environmental monitoring capacity and investigating possible laws to manage access to the resources. The government started passing a series of laws, initiating with the 1974 passage of a forestry law, which sought to centrally manage resource access. All told, the government of El Salvador was expending significant time and effort at developing a centralized natural resource strategy.

Regional efforts were similarly aimed at centralization of management at the state or regional level. This process of integration has mostly focused on removing internal barriers to trade and building the capacity for the countries of Central America to increase trade internally. ODECA's economic integration efforts had been stalled since the 1969 El Salvador-Honduras war (Proyecto Estado de la Región 1991). However, during the 1970s the one area where regional integration was being relatively lively was in management of protected areas. This area of integration was generating extensive regional interaction as a result largely of increasing environmental awareness and support following the 1972 Stockholm Conference. Central America became a region of significant interest by new international institutions and international donors. In 1974, the First Reunion Centroamericana Sobre Manejo de Recursos Naturales y Culturales, developed the first proposal for a regionally connected protected area system (PROARCA 2003). Although never pushed with any agreements, this proposal was one of many centralizing efforts in Central America through the 1970s and 1980s. Centralization was pushed in order to gain access and funding from the large funders for the entire region rather than getting smaller funds for national projects.

This legacy of centralization gave way to a different network construction following the civil war from 1980 until 1992. This was the result of three different factors. First was a split in the oligarchic elite in the country with a split in the coffee industry, between Asociación Salvadoreña de Beneficiadores y Exportadores de Café (ABECAFE) and the older *La Cafetalera*. For Paige, during this split, ABECAFE began to pursue more decentralized and smaller projects as part of its approach (Paige 1997).

Second, international aid and organizations began supporting decentralization as a peace building process and for presumed economic efficiencies. A region overview of decentralization pressures explains that "economic reformers and international aid agencies have touted decentralization as the means of reducing the inefficiencies" of central control and "has also been championed as the route to greater accountability and transparency of governance" (Willis, Garman, and Haggard 1999, 7). In the case of El Salvador, the UN sponsored peace process pushed decentralization as part of the peace building process. Various pieces of legislation slowly increased fiscal and authoritative decentralization (Hecht, Kandel, and Gomez 2006). Finally, in many communities in the country, the civil war created alternative modes of politics which broke free from the centralized control by the national government. Many of those communities engaged actively in opposition to the government designed alternative governments to deal with necessary issues. Many of these alternative programs (schools, literacy programs, health clinics, and collective dispute settlement) developed from within the FMLN structure or from liberation theology organizations which had become active in the areas in the 1970s (Binford 1997). Elizabeth Jean Wood has documented the emergent growth of agency in El Salvador. Developing from an inactive, repressed, and disjoined movement, during the civil war there developed a general "pleasure of agency" in many communities (Wood 2003, 2000). These three factors created a situations where the environmental network shifted away from the state bureaucracy.

The environmental policy network which developed after the civil war then moved outside of the environmental ministry, but through some clear connections to that ministry and some of the centers of power. An increasing number of NGOs and environmental groups became part of the network and could follow independent policy at certain points. SalvaNatura and FIAES were two large funding projects, with deep connections to the environmental ministry of El Salvador. In both instances the Secretary of the Environment held leadership positions and many other people moved between the bureaucracy and the organizations. SalvaNatura, as explored in Chapter 3, is a national-level environmental NGO which directly manages Parque El Imposible in the Western part of the country and engages in other co-management projects throughout the country. Although in recent years it has developed a regional strategy incorporating additional areas into its projects, for the era being discussed here the organization was largely a nationally focused organization. FIAES is a funding mechanism formed by cooperation between the Environmental Ministry and USAID.

SalvaNatura and FIAES operate as key bridges from the environmental ministry to wider organizations related to the environment. For SalvaNatura this expanded the network to many of the primary business organizations in the country, crucially including: Fundación Salvadoreña para El Desarrollo Económico y Social (FUSADES) and the Salvadoran Business Council on Sustainable Development (CEDES). The board of SalvaNatura includes a number of members of the wealthy coffee families in El Salvador: De Sola, Yarhi, Bloch, Llort and others. FUSADES was created in 1983 in order to facilitate the development of private sector in the country and was significantly funded

and supported by USAID (van der Borgh 2000, Rosa 1993). FUSADES promoted and spearheaded a number of the privatization projects during Cristiani's Presidential administration; Cristiani was a key member of FUSADES before assuming the Presidency. These particular connections prove crucial in connecting these groups to some of the coffee networks to be explored below. CEDES is similarly composed significantly of export-oriented business members throughout its organization and was founded in 1995. For example in the 1990s, of the 30 SalvaNatura board members in the 1990s, many with positions lasting multiple years, 7 were also members of the CEDES board of directors in 1995. These connections were primarily developed by a variety of different individual members and families who maintained membership in SalvaNatura and in the business networks.

Similarly, FIAES serves as a crucial forum that provides excellent data regarding the terrain of environmental politics in the country. Although the core membership always includes members of USAID and the Environmental Ministry of the Government of El Salvador, the other membership is made up of a rotating members of NGO groups in El Salvador: many being environmental groups. Two individuals have held leadership posts in SalvaNatura and held posts in FIAES, both through becoming Environmental Ministers of El Salvador: Walter Jokisch and Miguel Eduardo Araujo Padilla (Araujo also was key in FUSADES). Other than that, the FIAES network is largely separate from the SalvaNatura network with many people providing no overlapping positions between the organizations. *El Centro de Protección para Desastres* (CEPRODE), which becomes

crucial for conservation efforts later in Bosque San Diego La Barra, is drawn in through these particular efforts.

Outside of this network, or on the edges of it, are some activist or expert groups that are active in the influence they can have on the environmental network but which cannot be said (until recently) to be part of the environmental politics network. The two most important are the Centro Salvadoreño de Tecnologia Apropiada (CESTA) and PRISMA. Both were formed during the civil war and became particularly active with the peace process on a host of environmental efforts. CESTA is associated with the Friends of the Earth international efforts and participates in a host of activism for the environment. PRISMA is more of an analysis organization with a number of international connections to fund original research in the context of El Salvador.

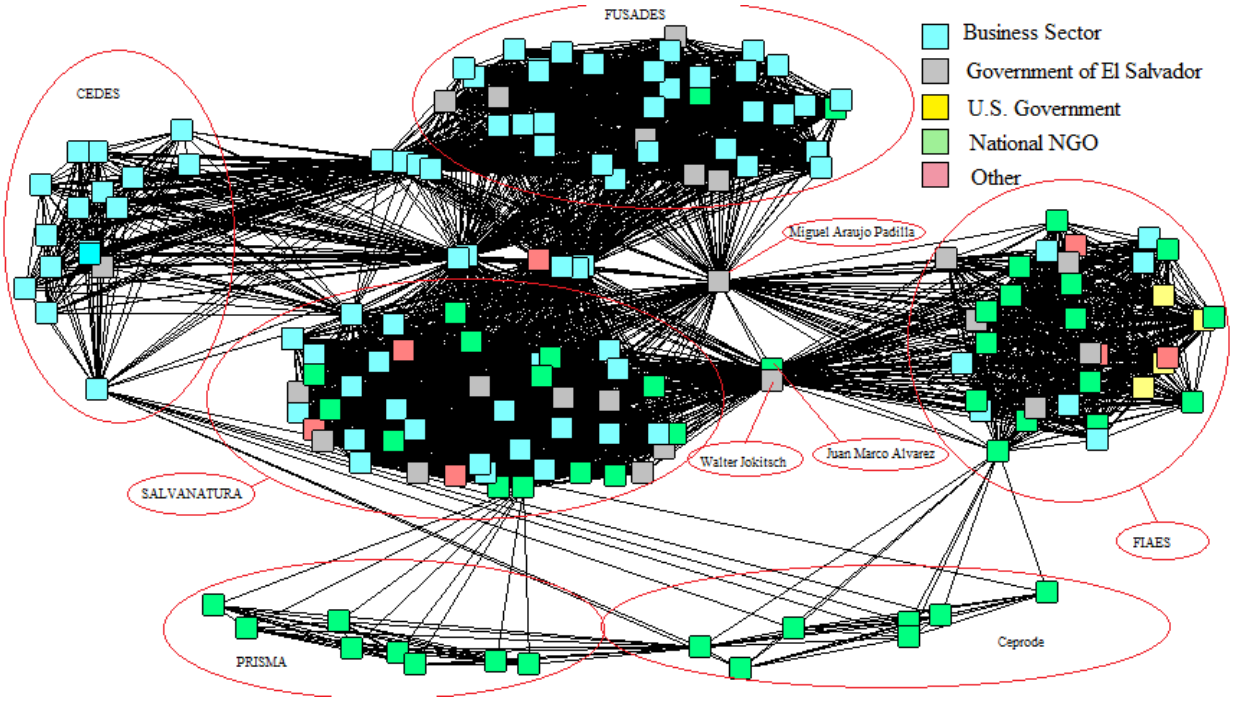


Figure 4.1- Network Map of El Salvador Environmental Governance Network 1993-2003 with important labels of key actors and clusters.

The resulting network produces a number of modular constructions with FIAES and SalvaNatura split between them with key environmental ministry leaders linking these two organizations with FUSADES. Figure 4.1 provides the network map of the environmental governance network during the key period of development from 1993 until 2003. The Government of El Salvador is the most central actor in all aspects with a significantly high betweeness score. What this means is that the Government of El Salvador had significant linkages to many actors and serves as particularly crucial in keeping the network parts together. The Business sector has significant centrality and connections but not a significantly different betweeness or eigenvector score from other actors. The best explanation for this is the large number of connections they

maintain with one another in FUSADES and CEDES but the limited engagement with other actors. The U.S. Government has a high centrality score, but a significantly reduced betweeness and eigenvector scores which may lead to a conclusion that they primarily use connections by other actors as their crucial importance. National NGOs maintain some centrality, but it is far less on all indicators than other actors. The conclusion of this network being that the Government of El Salvador and the Business Sector were crucial central in the Environmental Policy network and National NGOs were restrained in their activity.

	Average Centrality	**Average Betweeness Score**	**Average Eigenvector**
Government of El Salvador	34.35814	10.06167	11.42105
Business Sector	29.28744	3.263182	9.883111
U.S. Government	23.529	0	3.069
National NGO	21.288	1.0253333	6.270907
Other	30.39189	2.531	8.580889
Overall Network Average Network Centralization Index	27.926 19.723%	.509 19.81%	8.825 9.49%

Table 4.1- The Average centrality and betweeness scores of various types of actors in El Salvador environmental network.

CCAD: Regional environmental coordination

Regional conservation experts share a common vision for a unified protected area network and found a favorable institutional environment in the Central American Integration System [*Sistema de la Integración Centroamericana*] (SICA). The network saw significant concern regarding ecosystem fragmentation in Central America and sought to expand and connect conservation areas in order to deal with this problem. A

number of early proposals found resistant institutional spaces, until SICA expanded its sustainable development efforts and created the first Mesoamerican Biological Corridor (MBC).

The problem of habitat and ecosystem fragmentation has been a major theme in conservation biology for decades and has had a significant impact on conservation planning around the world. The argument initially developed from island biogeographic studies which emphasized that species diversity on islands is not simply a result of the size of the islands but the divisions and space between them (MacArthur and Wilson 1963). This insight was quickly translated into guidance for conservation arguing that if there are two options for protected areas of equal size, the areas with the most coherent connectivity will see less species extinction (Wilson and Willis 1975). Connectivity then is the crucial component that is translatable from a focus on fragmentation for policy (Bennett 2003). Debates were active for many years about whether a critical size of protected area is necessary or whether multiple, small, linked protected areas could deliver similar results (Simberloff and Abele 1982), but these seem to have translated into practice less than the general argument for connectivity.

The problem of fragmentation can be quite severe on even well-defined biodiversity strategies (Harris 1984). Outside of island habitats, fragmentation results from ecosystem boundaries, land utilization patterns (clear-cutting, infrastructure projects, large scale agriculture, and urban expansion), and also from conservation strategies which are narrowly tailored to specific jurisdictions. The result is that biodiversity which does not account for ecosystem movements and boundaries may see

regular degradation with a scale mismatch or may be unable to deal with ecosystem shocks. For example, with severe tropical forest fires in the late 1990s, bird species were able to survive to the extent that they could find other refuge habitats in agroforestry or other areas (Griffith 2000). Wilcox and Murphy contend that "habitat fragmentation is the most serious threat to biological diversity and is the primary cause of the present extinction crisis" (Wilcox and Murphy 1985, see also: Collinge 1996).

The response to the question of fragmentation involves developing a host of different management strategies to deal with the problem. Increased cohesion of protected areas, corridors to increase connectivity, awareness of the array of protected areas, and managed use buffer zones are all crucial aspects in dealing with fragmentation. Bennett argues that the issue of fragmentation and these various strategies became popular in the 1980s and 1990s because of intuitive aspects for managers and its tractable application at multiple levels (Bennett 2003). In terms of its intuitive aspects, many of the articulations construct heuristic geometric suggestions for conservation area design. The 1980 IUCN *World Conservation Strategy*, for example, constructed a table of better and worse designs emphasizing size, spacing, and connectivity as crucial for conservation area success (IUCN 1980). In the Latin American context, buffer zones have provided some of the multiscalar projects providing linkages between different protected areas (Silvius, Bodmer, and Fragoso 2004). The key point of this discussion is the scale and level of action is a crucial dynamic in which policies dealing with fragmentations engage. Changes in these dimensions can be crucial aspects of resilience in governance arrangements.

Ecosystem fragmentation has been highlighted in Central America for a number of years as a crucial problem constraining both biodiversity and ecosystem service provision. Reports in the 1980s emphasized that fragmentation of ecosystems may be a crucial pressure on the ability to sustain the environmental health of Central America (Leonard 1987). More recent reviews have similarly emphasized the problem of fragmentation. Harvey, et. al. emphasized increasing fragmentation in Central America driven significantly from export agriculture, increasing urbanization, and divided jurisdictional issues as the crucial issue in biodiversity pressures in the region (Harvey et al. 2008). The UNEP 2010 assessment of the environment in Latin America and the Caribbean emphasized fragmentation as a problem particularly acute in Central America and parts of the Amazon (UNEP 2010).

The problem of ecosystem fragmentation and the attempt to solve it with increased connectivity of protected areas in Central America had a long history of proposals, but the first real developments on the issue started in the early 1990s with the creation of SICA and its environmental body the Central American Commission on Environment and Development (CCAD).

Although it became the environmental arm of SICA, CCAD actually preceded the latter by two years being founded in 1989. The initial 1989 CCAD agreement required the states in the region to create an environmental office and to organize a National Environmental Commission [*Comisión Nacional del Medio Ambiente*] (CONAMA) made up of relevant ministers in the government dealing with environmental affairs. The implementation of this agreement varied across the different cases with some countries

creating environmental ministries which could organize and direct the activity of CONAMA: this was the case in Guatemala and Costa Rica. In the contrasting case of El Salvador, the environmental office was weekly funded, contained in the agricultural ministry which largely dominated its work, and CONAMA primarily did not function (PRISMA 1995, 2). The initial support, impetus, and funding for CCAD, and many of the CONAMAs at the national level, was largely supplied by USAID.

CCAD was supported significantly in 1991 with the creation of SICA and the ending of the old ODECA system (Chamorro Marin and Najera 1996). However, the tasks of the organization were significantly different from those of ODECA in two respects. First, as part of the 'new regionalism', SICA aimed less for regional efforts at infrastructure and inward development and more towards improving the regional access in global markets (Bull 1999). Second, it augmented this economic agenda with a host of other issues. As expressed in the *Esquipulas Accords*, SICA aimed to make Central America into a region of peace, liberty, democracy, and development (Secretaria General de SICA 1993). Specific focuses of SICA identified by the ministers were dealing with reducing extreme poverty and improved environmental protection. CCAD became the organ of SICA tasked with dealing with the environmental agenda. Spearheading the development of SICA were the key regional actors: Organization of American States, Inter-American Development Bank, and the Costa Rican administration of Oscar Arias (but other states played key roles later), and some significant assistance came from international actors like the European Union.

At around the same time in 1990 and 1991, the first sustained efforts at creating a program for a regional conservation strategy was being crafted. Archie Carr III, a professor working on conservation issues at the University of Florida, was bringing together a group of conservationist groups and individuals to develop a plan for the *Paseo Pantera*. Carr had a long history of working with the development of conservation areas in Costa Rica (there is now a wildlife refuge named after him there), particularly around the issue of sea turtles and had worked significantly with many of the most active NGOs in the United States dealing with biodiversity in Central America, namely the Wildlife Conservation Society. The project brought together the Wildlife Conservation Society, the Caribbean Conservation Corporation, Tropical Research and Development Inc., USAID, and researchers at the University of Florida to develop a plan focused primarily on creating a corridor system of conservation areas. The plan found key support in the conservation NGOs in the United States and in the developing ecotourism industry. In the 1992 IVth World Congress on National Parks and Protected Areas, the *Paseo Pantera* project was promoted as a project for development of more ecotourism in Central America (Kaiser 2001, Illueca 1997).

Paseo Pantera aimed to create additional conservation zones that linked already existing conservation areas to one another. The *Paseo Pantera* would link protected areas from Southern Mexico down all the way to Colombia, but would not include any projects in El Salvador (Illueca 1997). The focus of the project on creation of conservation areas and ecotourism was met with skepticism by indigenous

organizations and rural organizations and so the plan never received the support by the collected governments of Central America through SICA or CCAD.

1994 was a year of "extraordinary effervescence" in terms of regional environmental efforts in Central America (Ferrer 2000). The development in SICA of its Alliance for Sustainable Development [*Alianza para el Desarrollo Sostenible*] (ALIDES) was aimed at introducing an environmental agenda into the economic integration efforts and developing some specific environmental aims within the organization. Although some initial assessments saw ALIDES as the first sign of a truly different integration effort (Schatan 1998), the integration of the sustainable development concept into economic integration efforts has been partial and incomplete (Zavala 1999). ALIDES though does direct the work of CCAD and provide some specific goals and some general approaches to the issue. One of the key proposals specified in the ALIDES project was for a regional protected areas corridor project (PROARCA 2003).

The Mesoamerican Biological Corridor (MBC) was agreed to in 1997, with a substantial focus on the sustainable development guidelines from ALIDES. The aim of the project was to connect some of the main protected areas in Central America together through a series of creative, context-specific biodiversity linkage projects in a regional "mosaic" of biodiversity protection (the 'mosaic' metaphor was used repeatedly in interviews with planners of the original project). The project included all seven countries in Central America and soon included the southern five states in Mexico. Some initial funding from GEF and GTZ supported exploratory work and with major funding from the World Bank and NASA, the MBC opened regional coordinating

offices in Managua, Nicaragua and began supporting a series of efforts in the countries involved (Miller, Chang, and Johnson 2001). The Regional Office Coordinating Unit in Managua organized a host of different efforts in the region in order to push for the development of the projects in the various different countries. The NASA, World Bank, CCAD agreement formalizing this arrangement specified that the Regional Office should act as "a coordination hub within CCAD's institutional framework to standardize data and information, provide regional overviews on common resource management problems and integrate the basic parameters that link socio-economic and environmental processes" (CCAD Joint Declaration 2002). As a hub, the Regional office connected projects and tried to provide funds to national projects, but provided few mandates.

Building from some of the key, large, and established conservation areas in Costa Rica, the Honduran-Nicaragua border, and Belize/Guatemala/Mexico border region, the MBC began a process of creating a series of proposed corridors connecting these projects. However, the created corridor dimensions were largely the result of domestic political bargaining rather than developed from a regional plan or scientific input. The significant region-wide census by NASA and the World Bank came after most of the initial plans for corridors had been drawn up. Kaiser summarized the early development of the project by finding that "it includes hundreds of strips, many just 2 or 3 kilometers wide, connecting both big parks and tiny protected areas… it's unclear whether some of these planned corridors would confer much ecological benefit" (Kaiser 2001, 2197).

Differentiated zoning (with core zones, buffer zones, corridor zones, and multiple-use zones) was a key tool in this approach aiming to provide a wider area of managed use in order to maximize the overall protection of biodiversity within protected areas. The goal is for an integrated biodiversity strategy involving core conservation areas, buffer zones of limited human activity, corridors connecting different areas of conservation areas, and multiple-use zones which take account of the other zones in their planning but can have significant human activity. Core zones are the only zones which have clear definitions and are typically clearly spatially defined (Miller, Chang, and Johnson 2001). The other zone concepts are often vaguely defined and what constitutes a buffer or corridor zone is not clearly specified in CCAD guidelines.

As a network, the early phase of the MBC largely included national level bureaucrats in the relevant countries, some local park managers, CCAD technicians, NASA in the United States, and the World Bank/GEF. One of the major problems, as will be shown next chapter, is that this network did not extend very deeply in the countries and thus was primarily a high-level project without connections to a wider network. What this meant in practice was that the network largely adhered to the national networks that existed. Since one of the fundamental growths of the network in the MBC was into the country of El Salvador, the modular structure of the environmental policy network is important.

Local-Local Networks

A final relevant set of networks involves various Local-Local Networks that developed at the end and after the civil war which linked together a variety of communities. Three relevant networks to be discussed briefly include the FMLN municipal network that developed over elections in 1994, 1997, and 2000, the Programa de Transferencia de Tierras (PTT), and the other municipal networks that developed through dynamics at the national and international level. None of these networks could be said to have a particular environmental focus during the years 1993-2003. However, they provide crucial networks whose later integrations into relevant biodiversity efforts allow key testing of some of the hypotheses. Although significant network analysis is not available for each discussion, it is possible to discern possible important effects that could develop from these networks.

The FMLN municipal network built largely out of a post-war generation of FMLN civil servants that were not from the party hierarchy but instead operated very locally. These municipal actors were confronted simultaneously by a central government dominated by a hostile party, ARENA, and a party structure that largely limited their input within the FMLN. Alliances between mayors and other municipal actors were thus crucial during this timeframe. Manning writes, for example, that "FMLN mayors have demonstrated flexibility and creativity in working at the municipal level, well beyond even the rhetoric the party has been able to muster for its national campaign platform. They have courted alliances with other parties; have worked with donors and civil society organizations to broaden citizen participation in decision

making" (Manning 2007, 267). It will be highlighted below that through COMURES, the FMLN, ARENA, and other parties at municipal levels crossed party borders in other networks; however, here the argument is that local-local FMLN networks may serve as a unique network relevant for observing results. The network is those communities who voted in the FMLN as mayors in the municipal elections of 1994, 1997, or 2000. The FMLN network grew gradually over each year and they were a significant number of the overall municipal governments and a significant part of the population. Local elections are notably not necessarily endorsements of the FMLN's platform and there are clear cases of municipalities that temporarily rejected the ARENA party and embraced the FMLN but were probably very restrained within the network. Thus, the repeat engagements by municipalities should be a crucial aspect highlighted by social network analysis.

Figure 3.3 presents a network map of the municipal governments which joined the FMLN network in the municipal elections of 1994, 1997, or 2000. Similar to the other network maps, the more central an actor represents their general centrality in the network as a whole. The result is a large mass of very connected across with large parts of the middle clouded with multiple connections between the nodes. The general network terrain then is not particularly distinctive, until the specific years of joining the network are joined. The colors in the network then represent different years of connections being created with the center part composed of a few municipalities that joined in 1994 and a number that joined in 1997. This core of the municipal network may be crucial for hypothesis evaluation and if the network is relevant some key growth

in biodiversity projects should come from some of those central communities, and it may even be possible to see some of the movement of the corridor idea through the network. In this respect Table 4.2 lists some of the communities with significantly high Freeman Betweenness scores in the network.

List of Communities with High Betweennees Scores
Las Vueltas
Tecoluca
El Paisnal
Arcatao
Las Flores
Suchitoto
San Antonio Los Ranchos
Jocoatique
Perquin
Torola
Armenia
Nueva San Salvador
Quezaltepeque
La Libertad
Zaragoza

Table 4.2- List of FMLN communities with high betweeness scores.

A second related and partially overlapping network that is particularly relevant is the networks created through the Programa de Transferencia de Tierras (PTT), the land reform package agreed to as part of the peace accords. 200,000 acres were purchased by the government and provided to a number of people, 75% of the land going to ex-FMLN members throughout the country. Although not a formal network space with repeated interactions, the PTT and the Instituto Salvadoreño de Transformación Agraria (ISTA) became crucial agencies that linked a variety of actors together with one another. Both as a result of the implementation of this project and mobilized efforts to express grievances within ISTA provided networks across the communities. Reliable data about

networks involved in PTT is not available; however, numerous interviews mentioned the cooperative networks formed as part of the project as essential. An approximate understanding of the relevant networks is provided simply by analyzing the states that saw significant land area transferred under the PTT. Figure 3.4 provides a state-level map of acres transferred under PTT emphasizing the significant amounts in Usulutan (65,595 acres), San Vicente (43,282 acres), and Chalatenengo (27,304 acres). If this network maintains particular relevance in terms of eventual environmental networks, then we should expect those states to see particular growth in environmental networks in the post-2003 period. The impact of this network thus can provide significant support for the crucial aspects of the mechanisms being evaluated.

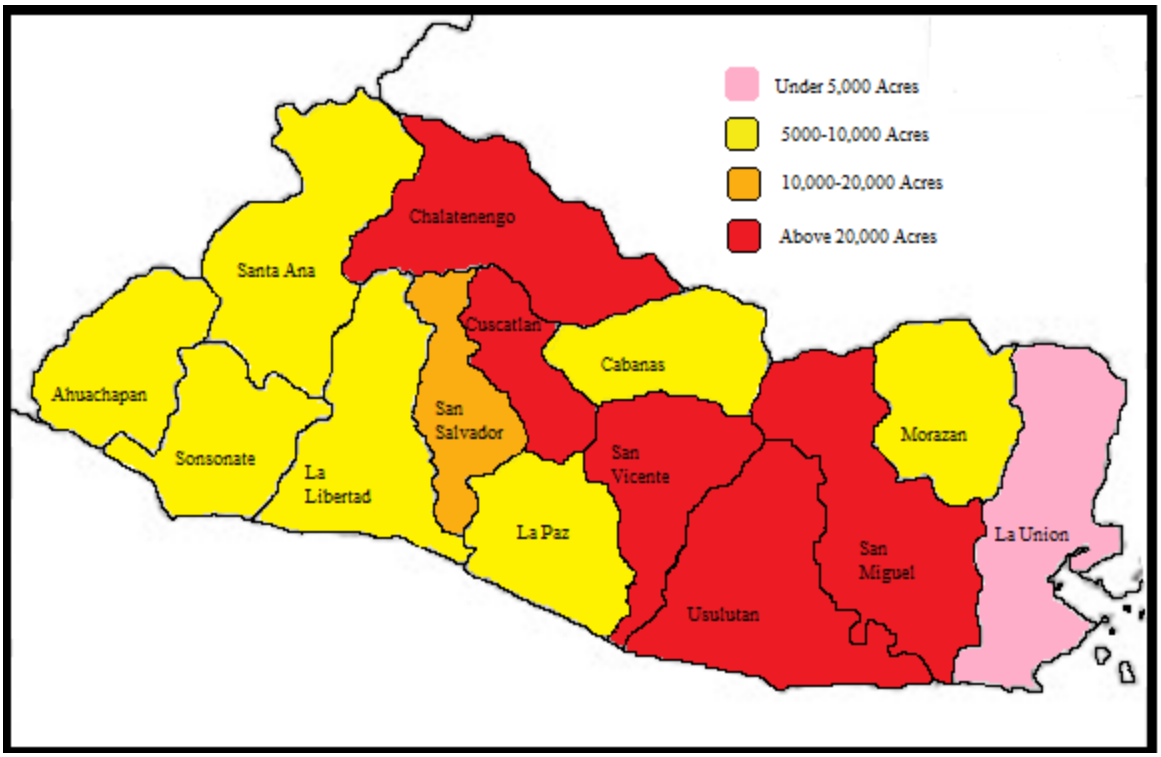


Figure 4.2- Map of PTT Projects by state in El Salvador.

The additional network for municipalities was a series of non-partisan municipal linkages forming in the post-civil war era. Some of these were initially brought together by UNDP as part of the reconciliation process that devised a series of projects bringing FMLN communities, ARENA communities, and Christian Democrat communities together. For example, UNDP's binding role in the land tenure negotiations encouraged the PTT to be mixed with additional efforts bringing the different parties together (Stanley and Holiday 1997). Additionally, municipal networks were fostered by other post-civil war organizations and the creation of the Corporacion de Municipalidades de La Republica de El Salvador (COMURES) was created in 1993 as a non-partisan group bringing together different municipalities in a host of activities. It fostered and created a network able to push for the 6% of the budget provided to municipalities and also to

foster linkages between municipalities. It is a particularly active group cutting across partisan boundaries and requiring representation from all major parties in the state for any forums, projects, or mobilization efforts. There is no clear social network analysis indicators for these different networks because both were wide-ranging and included actors rather than excluded them providing few distinguishing features between actors in the 1993-2003 period. They instead provide background forums that led to relevant growth of networks in the post 2003 development.

The Coffee Network

The divisions between the levels, located in distinct institutions and with separate clusters of actors have some connections between the levels. USAID links with a number of actors at the various levels as do the environmental ministry and FIAES. However, the coffee network provides a deeper set of repetitive connections between the levels and one that bridges the levels in some unique ways. The network is particularly relevant as it came together to create the first large scale biodiversity project in the country of El Salvador in 1998 with GEF Project 466 (GEF Grant 466). The domestic environmental policy network was connected to the regional biodiversity network largely through GEF 466 and the network that was connected in that project.

GEF Grant 466 aimed to be a pilot project on the promotion of biodiversity in coffee agriculture and spent over $3.8 million (the bulk from the World Bank but sizable portions from the government and GEF also) to increase coffee certification in El

Salvador and to draw the coffee landscape into the MBC.[10] The project had three specific goals: 1. Increasing recognition of shade coffee throughout the country, 2. Create biodiversity corridors within the coffee growing landscape, and 3. Increase certification of biodiversity friendly practices in coffee agriculture.

The program was largely set by the government of El Salvador with assistance from GEF and the World Bank, but the implementation and the primary grantee organization was the Fundación Salvadoreña para la Investigación del Café (PROCAFE). PROCAFE is a research and policy forum that is composed of rotating members from the large coffee exporting organizations: ABECAFE, UCAFES, UCRAPROBEX. USAID in 1990 recommended that the various coffee export organizations create a formal organization to spearhead and drive policies to help coffee from El Salvador reenter international markets after the civil war (USAID 1990). Discussions to create PROCAFE began in earnest in 1991 and it was a formal, recognized organization by 1992. The initial funding for the organization came substantially from USAID.

PROCAFE, as noted above, is affiliated domestically with the large scale coffee organizations and the representatives of the organization are directly affiliated with one of the three large coffee organizations. ABECAFE or the Asociacion Salvadoreña de Beneficiadores y Exportadores de Café was the lead of the coffee exporting factions that was key in the creation and solidification of ARENA and excluding some of the extreme cultivators from the political arena (Paige 1997). It is a very powerful organization

[10] The certification to be expanded was the Rainforest Alliance's Eco-O.K. certification (Philpott and Dietsch 2003) This proved to be a crucial time period for Rainforest Alliance's certification scheme and proved useful in expanding and allowing them to get a foothold in a region otherwise unlikely to have adopted the Eco-O.K. certification.(Auld 2010)

within government, exemplified by the fact that Alfredo Cristiani was President of ABECAFE prior to becoming President of El Salvador. The membership of the board includes many of the coffee elite families like Llach, Cristiani and others. Combined with them is the *Unión de Cooperativas de Caficultores de* El Salvador or UCAFES which represents 2300 medium and small scale coffee cultivators. This group is predominantly made up of western coffee growers but expanded into other areas in recent years. Finally, the *Unión de Cooperativas y Beneficiadores de la Reforma Agraria* (UCRAPROBEX) which was founded in 1988 and represents over 50 different cooperatives spread throughout the country. The organization has been largely wedded to supporting shade grown, organic, and fair trade coffee exports and there are requirements of member cooperatives to adhere to such standards. UCRAPROBEX was one of the major pushers for the founding of *Asociación de Pequeños Productores de Café de El Salvador*[11] in 1997 which serves as the primary organization for facilitating certification on a host of issues throughout El Salvador. PROCAFE is thus a research and facilitation organization representing a large amount of the domestic coffee production system.

PROCAFE similarly has significant connections with the government of El Salvador and various ministries take them extremely seriously. ABECAFE and the ARENA party are of course closely aligned in most aspects. Beyond that, PROCAFE and its

[11] Commonly the Asociación de Pequeños Productores de Café de El Salvador is referred to as APECAFE. However, since it will not play a primary role in the further analysis and because it may create clarity problems with ABECAFE, it will instead be referred to in whole in any additional references. Analysis using this work though may find it useful to refer to it as APECAFE.

members are crucial in activities by the Consejo Salvadoreño del Café (CSC), an autonomous government agency tasked with managing exports of coffee. The CSC was created in 1989 as a favored alternative by ABECAFE to the Christian Democrat efforts to manage coffee (with INCAFE) in the early 1980s (Paige 1997). However, the influence extends to the Ministry of Agriculture, Ministry of Foreign Affairs, Ministry of the Economy, and the Environmental Ministry. These are not secondary linkages and instead are primary to the regular engagements of the groups. Individuals move from working for PROCAFE to working in government and they are a crucial organization consulted on policies impacting coffee.

In addition, PROCAFE maintains a number of international linkages beyond their significantly intertwined relationship with USAID. The most significant of these is the relationship with the regional coffee organization: the Programa Cooperativo Regional para el Desarrollo Tecnológico y Modernización de la Caficultura (PROMECAFE). PROMECAFE is a regional organization aiming to coordinate coffee activities in Central America and is headquartered in Guatemala. PROCAFE is the official representative of El Salvador within the organization and this links it with a host of international agrarian organizations: notably from Brazil, the United States, France, Portugal, and Spain. It also links it to research organizations focusing on agricultural issues such as Inter-American Institute for Cooperation on Agriculture (IICA), CATIE in Costa Rica, and others. Aside from PROMECAFE, USAID and GEF provide the most substantial international connections for PROCAFE.

The GEF-466 project network does not lend itself to quantification and quantitative visualization because the connections are sometimes completely embedded in one another and other connections are important but not direct. However, the network is absolutely essential in the later manifestation and so it is valuable to capture the network structure that contributed to GEF-466 for later analysis and assessment on networks that can be quantified and visualized. The core of the project was the conjunction between the Government of El Salvador, GEF, and PROCAFE. However, behind this initial network is relevant suborganizational actors: the organization members of PROCAFE and the ministries of the government of El Salvador. Other crucial actors connected to this includes USAID, PROMECAFE and the ARENA party. Central in the network is certainly the government of El Salvador and the alliances of PROCAFE. International and national level connections prove crucial in bolstering the project and the network maintains significant aspects of overlap with these international and national actors: USAID and ARENA are very connected in the late 1990s projects.

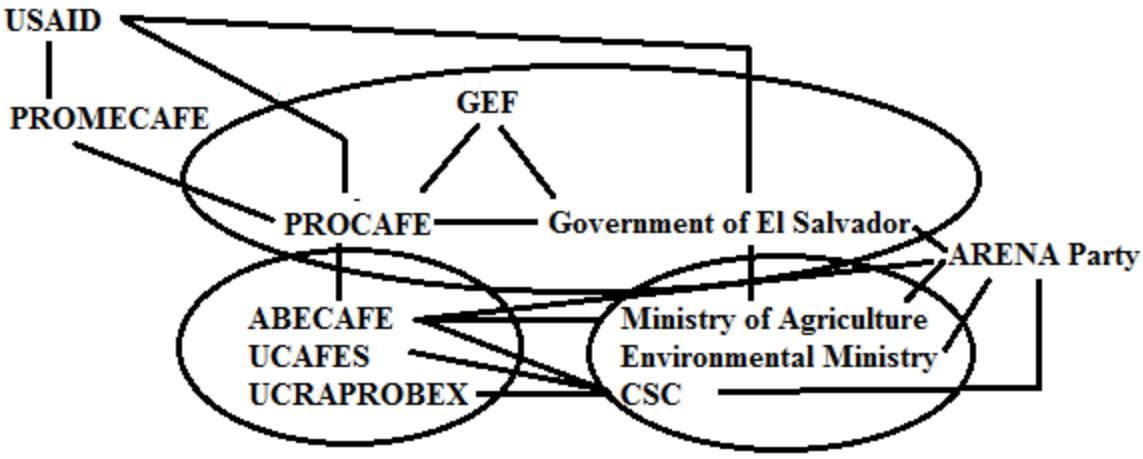


Figure 4.3- Visual Representation of the relevant connections in the Coffee Policy Network.

Centralizing Networks and the Dominican Republic

Centralized networks can be difficult to maintain, especially on the level of multilevel networks. There are always a host of different actors connected to individual members of the network who may be integrated and break up the centralized network. In international environmental politics, centralized networks may need significant resources and shared identity in order to justify the exclusive nature of the network. The Dominican Republic biodiversity arena was built in an authoritarian context and with this background formed a centralized environmental network that was able to be gatekeepers for future members of the network. This will be illuminated by first detailing the development of the centralized network in the Dominican Republic and the international network that interacts with this network but in a limited manner.

The most relevant network in the Dominican Republic in biodiversity governance is a strong, domestic set of actors focused on conservation. This network was fostered

through institutions developed under the government of authoritarian Joaquin Balaguer and then further strengthened in the post-authoritarian party competition. Associated with this core domestic network are a ecotourism network connected with the coastal resorts which developed significantly beginning in the 1980s. In addition, the international conservation network around Caribbean issues has developed significantly in the 2000s and has some impact. As will be seen in future chapters, these networks connected with one another in the Caribbean Challenge; however, because there was such a strong core part of the network in the domestic environment, it largely channeled the efforts and prevented adaptive learning. However, before detailing these processes, this section will establish the history which developed these networks into the mid-2000s.

Domestic Conservation Network

The domestic conservation network in the Dominican Republic includes a fairly diverse set of actors including NGOs, scientists, politicians, and bureaucrats; however, the network was shaped during the conservation policies of the authoritarian Joaquin Balaguer administration and the post-authoritarian democratic contestation.

To understand the background history and conditions which initially fostered the network, the history and political background of Joaquin Balaguer and the *Los Haitises* protected area are illuminating. A brief introduction to both of these themes will help explain the impact they had on shaping the domestic environmental network.

The dominating figure in the history of environmental politics and biodiversity protection in the Dominican Republic is Joaquin Balaguer, the authoritarian President of

the country on 3 separate occasions and for the most significant periods from 1966 until 1978 (referred to as the first era) and then again from 1986 until 1996 (second era). Environmental protection took a prominent place in both eras of Balaguer's government and he spoke of the need for environmental protection regularly (Diamond 2005). Balaguer is seen by some as the benevolent father of conservation and environmental protection in the country with broad environmental views, extensive foresight, and a developed articulation of sustainable development a decade before Brundtland formally articulated the concept (Ramirez Pena 2009, see also the less celebratory, but still somewhat positive, articulation in Diamond 2005). However, as an authoritarian leader with a developed rural clientalist network in the global context of the Cold War, Balaguer's environmentalism can also be seen as part of a system of domination and control over the country (Rocheleau and Ross 1995, Rocheleau et al. 2001, Diamond's interviews highlight these aspects as well, Diamond 2005). Regardless, the two eras of Balaguer had a huge and lasting impact upon conservation in the Dominican Republic. Even more was that Balaguer continued being a major player in environmental politics after being forced from office in 1996. Diamond recounts that "His last decisive intervention into Dominican politics, his rescue of the country's natural reserve system, came in the year 2000 at the age of 94, when he was blind, sick, and two years short of his death" (Diamond 2005).

In addition, one of the key sites throughout the development of conservation politics in the Dominican Republic is *Los Haitises*. The area was one of the first conservation areas created during Balaguer's first era (1968), saw significant growth of

human population within the area during the PRD era that separated Balaguer's two administrations, and then witnessed significant mobilization of the armed forces to clear the area of human populations during Balaguer's second administration, and finally has been a locus of two significant political mobilizations to prevent large-scale economic extraction in the area since the end of Balaguer's presidency. *Los Haitises* is a particularly useful site to emphasize key political points about conservation politics in the Dominican Republic. Although it is an extreme analogy in many respects, with far more intense action than other protected areas throughout the country, it does illustrate activity that happened throughout the country and grounds some of the more general points.

The environmental policy network was initially formed as a response to deforestation and part of authoritarian attempts to halt deforestation. Balaguer's predecessor, Rafael Trujillo, had adopted land policies based primarily on building support in the rural areas of the country. As a result, those who were loyal to Trujillo's dictatorship were given large allowanced to deforest the country while those who were not completely loyal would be met with restrictions and repression (Turtis 2003). Managers of the forests were largely figureheads that served Trujillo's monopoly (Moya Pons 1998). The result was dramatic deforestation throughout the country and general disruption of ecosystems during Trujillo's reign.

When Balaguer came to power in 1966, deforestation had come to be seen as a significant problem in the country. On March 8, 1967, the Congress of the country, dominated by Balaguer's party, passed Resolution 104 on deforestation which

expressed “The highest patriotic interest in an active and permanent campaign of reforestation in all the territory of the Republic” (quoted in: Ramirez Pena 2009, 15). With this lofty pronouncement, Balaguer wrote a number of presidential directives and passed laws which were extremely punitive of forest use. Directly after Resolution 104, Balaguer issued a directive which stopped any export of wood from the country (Ramirez Pena 2009). Most extremely, Law 206, passed in 1967 (shorthand: 206-67), protected trees in the country; not just specific areas or forests, but every single tree could only be felled with permission from the government. The military, the body most closely controlled by Balaguer, retained preeminent position in the policy articulation and enforcement of these laws and used 206 to establish authority and control in mountainous territories which were seen as possibly providing areas for the organization of insurgents (Rocheleau et al. 2001). Those peasants who were seen as not supportive of the administration would be targeted by the military and have their crops destroyed and pine trees planted on the land (Light 2008). The military did extensive monitoring and flyovers of forested areas and engaged in a number of engagements with peasants and illegal logging enterprises; including a night raid on one of these enterprises that killed a dozen loggers (Diamond 2005). Decree 3676 in 1969 was explicit that the head of the armed forces was at the head of the table when it came to matters regarding forestry in the country. The result is that for many in the rural areas of the country, trees became “green enemies” and elaborate “accidents” were devised by peasants to remove trees (Rocheleau and Ross 1995). Law 211-67 did allow felling for construction of houses, however there were not clear ways to

implement this or make the exception in a nonarbitrary manner and so 206-67 remained the significant piece of forestry legislation.

1967 also saw some of the first laws regarding management of various species from fish, turtles, and others (Ramirez Pena 2009). It also yielded some of the first protected areas in the country with the creation of protected areas in *Isla Saona* and in 1968 in *Los Haitises*. The creation of these protected areas was almost exclusively done by presidential decree, a situation that would demonstrate its extreme brittleness in future administrations that could easily alter these decrees.

The most significant developments regarding the policy network occurred in the 1970s with the creation of institutions under Balaguer whose focus was on conservation, broadly conveyed. In 1974, Balaguer created the Parks Authority and in 1977 created an Environmental Affairs office. However, neither were involved in an independent bureaucracy and both were directly centralized in the President's office. These were joined with the creations of the Moscoso National Botanical Garden (1976) and the National Natural History Museum (1974) which provided crucial scientific study and presentation of findings relevant to biodiversity conservation. Some authors see these moves as signs of Balaguer's enlightened environmental ethos (Ramirez Pena 2009) while others find it as simply an excuse for Balaguer to deepen patrimonial ties and potential clientalist pay-offs in the rural areas (Rocheleau and Ross 1995, Moya Pons 1998). Holmes' history of conservation in the Dominican Republic holds both positions in that even if Balaguer had some environmentalist beliefs, the implementation of this took the form of centralized, personalist, and clientalist politics.

Holmes writes that "Whatever the roots of Balaguer's environmental views, the protected areas policies of his administrations were the result of a particular conservation elite, uniquely placed in Balaguer's style of government…Despite Balaguer's strongly held environmental views, he created no environment ministry, keeping close control over environment issues; the forestry service was military and thus part of his political inner circle, and the protected areas directorate was part of the office of the presidency" (Holmes 2010, 633).

During the PRD interlude (1978 until 1986), the institutionalization of Balaguer's conservation organizations and PRD weakness meant that few large changes happened one way or another. Some logging was allowed to be active again and conservation area enforcement largely lapsed. However, even highly unpopular or difficult to enforce laws were not overturned by the PRD in this particular era (Diamond 2005). When Balaguer returned to office in 1986, increased environmental attention internationally, his focus on large infrastructure projects, the maturation of the scientific institutions, and some further environmental degradation all resulted in significant environmental action by his government.

Operation *Selva Negra* commenced soon after Balaguer had returned to power and involved the militarized forestry service fining, confiscating, and sometimes violently attacking peasant use of forestry resources for charcoal or small-scale woodcutting (Roth 2001, Camara, Martinez, and Diaz del Olmo 2005, Rocheleau et al. 2001). The dramatic increases in the price of charcoal, and falls in the price of other commodities globally, throughout the country drove many agriculturalists to abandon

subsistence or small-scale agriculture and focus on cash crops like cassava or tobacco (Rocheleau et al. 2001, Camara, Martinez, and Diaz del Olmo 2005). Similarly to the expansive forestry laws of his first term, Balaguer pushed a number of expansive environmental directives. A series of directives on October 14, 1986 expanded species protections throughout the country, not simply limited to threatened or endangered species, but regulating many uses of a number of species (Ramirez Pena 2009, chapter 3 provides a full list of this series of decrees). While any exceptions to these laws and the ability to access resources were largely based upon clientalist exchanges in the first era, in the second era they began to involve side-payments from businesses for the ability to access resources into private accounts controlled by Balaguer alone (for details of this activity, see: Hartlyn 1998, chapter 7).

A significantly expanded tool of environmental politics during the second era of Balaguer was the expansion of conservation areas. Although significant creation of protected and conservation areas had happened during his first period as president, they took on a significant importance in the second era. In his first year back in power he doubled the amount of land under protected areas and this continued with significant other expansions, including over 4,000 square kilometers of expansion 12 days before leaving office (Holmes 2010).

In addition, enforcement of protected areas took on increased severity during this time period as demonstrated most directly in *Los Haitises*. A population already living within the declared protected area with natural population increase and populations from surrounding areas displaced by hurricanes meant that in the 1980s

more than 40,000 people lived within the protected area and largely undefined buffer zone (Sycos and Duarte 1994). A government report in 1991 found significant agricultural transformation around the park by the communities which required significant management to reverse the impact (Direccion Nacional de Parques 1991). In 1992, Balaguer instituted a ban on a host of activity in the protected areas: including planting additional crops, entry into the area, and building of new structures. The armed forces were tasked with relocating 20,000 people from the area and enforcing the prohibited actions. Although there was some initial ambiguity about how this would happen and which people would be resettled, in 1993 a definitive Presidential directive announced that everyone in the protected area and the protected zone would be removed (Sycos and Duarte 1994). Although the army maintained a significant presence in the area, over a year later little resettlement had actually occurred.

In terms of international environmental law, Balaguer was active in signing onto international law, but pushed little ratification of the laws. Although accession of the Convention on International Trade in Endangered Species (CITES) was one of the early things that Balaguer undertook, this was the only significant conservation, species or biodiversity treaty that was ratified during Balaguer's administration. The Ramsar Convention on Wetlands, the Convention on Migratory Species, and the Convention on Biological Diversity all were open for possible ratification during the Balaguer administration. Indeed, in terms of the Convention on Biological Diversity, the Dominican Republic was the last Caribbean party to join the treaty. This does not appear to reflect a general reticence about either international law or international

environmental agreements by Balaguer more generally as ratification of various Ozone treaties and other agreements were made under Balaguer; however, international conservation law was one area Balaguer was particularly hesitant to join. One person who worked in conservation at the time of Balaguer believed this was the result of his personal interest in conservation and unwillingness to accept significant influence in this particular project.

The result of these policies was that there formed a network of environmental officials, connected to one another typically through involvement with one of the bodies created by Balaguer (either Moscoso or the National Museum) or with a shared idea in conservation, defined in terms of nature separated from humans. It is important to note that this does not mean that the individuals involved were part of Balaguer's personalist networks or that they were allied politically with him. Indeed, some of the individuals involved opposed his rule and were key supporters for democratization at the end of his reign. However, the networks remained closely tied with the institutions and the frame largely created during his reign.

The network really became an independent network in the post-Balaguer political environment. In the first period (from approximately 1996-2005) conservation largely struggled to find a prominent position in the government. Balaguer continued to exert influence through broad coalitional politics and many institutionalized actors in the government were able to maintain their influence. In 1997, the forestry service, still run largely by the military, was able to expand actions in *Los Haitises*. These actions were less about resettlement than they were about enforcement and confining activity

in the country. Later, Fernandez began working on limiting and possibly changing some of the protected conservation areas in the country. Since the majority of the policies had been created by presidential decrees, Fernandez was largely able to change the programs at will. Balaguer was able to work with future President Mejia to create a firmer legislative basis for the conservation areas (Diamond 2005). Some mobilization from the environmental elites, namely publications and news articles by Eleuterio Martinez, did occur during this struggle in 2000; however, largely it was centered in the big players in Dominican Politics with the heads of all three parties working different sides of the issues. This network though was largely centered on Balaguer himself and only narrow expansion of the network existed.

The various NGOs and science bodies began to be a more active network in the competitive political setting toward the end of the 1990s. The most significant event was the formation in 1999 of the Consorcio Ambiental Dominicano (CAD). CAD brings together, formally, many of the prominent environmental NGOs in the country for coordinated efforts. Located across from the Moscoso National Garden, CAD is merely a manifestation of larger linkages occurring between different non-state actors in the Dominican context. Although a complete network map would be difficult to form for this early period, the key actors would include the formative members of CAD: Fundación Progressio, Fundación Loma Quita Espuela, Grupo Jaragua Inc., Centro para la Conservación y Ecodesarrollo de la Bahía de Samaná y su Entorno Inc. (CEBSE), and Centro de Agricultura Sostenible con Tecnología Apropiada (CASTA). In addition to this are the key government research centers, Moscoso National Botanical Garden and

National Natural History Museum. Key international support was primarily from GTZ and Helvetas.

This network was active in influencing policy when the key interests became threatened by policy decisions. For example, this group became actively mobilized when Fernandez proposed a change in the protected areas system which would have effectively excluded all beached from protected areas and opened them up for tourist development. The strong membership, long histories of engagement by many members, and political capital was able to disrupt this attempt.

This network of Dominican environmental policy makers is noted by a number of accounts; however, they often disagree about the specifics of the network. Jared Diamond writes that "Dominican measures to protect the environment began from the bottom up, shifted to top-down control after 1930, and are now a mixture of both." And further that, "In contrast to the situation in many developing countries, where environmental efforts are mainly developed by affiliates of international environmental organizations, the bottom-up impetus in the Dominican Republic has come from local NGOs concerned with the environment. Along with universities and with the Dominican Academy of Sciences, these NGOs have now become the leaders of a homegrown Dominican environmental movement" (Diamond 2005).

Holmes presents a different picture where there is a domestic environmental elite which is able to simultaneously prevent international NGOs from entering the country and in furthering their own goals. Holmes writes that the Dominican Republic demonstrates how "a well-connected elite can be very successful, creating one of the

most extensive protected area systems in the world despite the pressures of working in a densely populated island. This was for many years driven by the personal wishes and centralising power of a quasi-dictator, shaped by the environmentalist who had unique access to him. Later, it became dominated by a network of social elites, political elites and NGO directors, with access and personal contacts as key commodities in the network" (Holmes 2010). This thus may be a national and Dominican-led process, but is not necessarily the "bottom-up" approach that Diamond argues exists. Instead, it is a national elite that can limit access, ideas, and set the agenda in a centralized location.

There is little evidence of bottom-up environmental politics in the country, prior to the recent popular action regarding *Los Haitises* which if it persists and moves to other issues may signal the rise of an active environmental bottom-up movement. Diamond does not present formal examples or evidence for the bottom-up environmental management system actually acting and instead simply asserts that the diversity of actors is a sign of its existence. Although this diversity certainly does exist and there are a number of active NGOs and actors from a variety of different perspectives (conservationists, scientific based organizations, ecotourist operations, etc.), the elite nature of conservation remains an absolutely constraining force in the development of politics. The environmental ministry, although underfunded and often marginalized within the government (its offices are the farthest from other government offices in Santo Domingo), forms a key organizing force in the environmental politics of the country. The elite largely prioritizes protected areas as the only promotion of biodiversity, the precise reasons provided in interviews will be discussed below;

however, it is clear that protected areas forms a conceptual center in most of the discussions and debates. The result is that rather than a bottom-up, top-down mix of environmental policy and politics, the situation is one where debate is centralized around a core of national elite who can constrain the agenda and policies.

The Tourism Network

The tourism sector became a prominent part of the Dominican economy from the 1980s onward and received significant governmental support. The sector is significant, with high levels of competition between different regions and resorts for customers. However, for the focus of this discussion, the ecotourist network which developed in the 1990s is the most particularly relevant. This network centered around a host of attempts to integrate ecological options for tourist activities. The most active organizations involved in these processes are typically along the coast, with most of the tourist sector, and the most active were CEBSE and the Punta Cana Ecological Foundation.

The tourism industry began in the 1970s and expanded significantly in the 1980s with significant government infrastructure projects. Four main regions participate in the tourism economy, largely centered around international airports built recently: the region around Puerto Plata, the Southeast Region, Santo Domingo, and Punta Cana (Padilla and McElroy 2005). The Dominican tourism context is similar to many others in that infrastructure is created in very limited manner and the resorts adopt an enclave model, typically the all-inclusive form of organization.(Roessingh, Duijnhoven, and Berendse 2008). The tourist sector quickly became a predominant force on the island

and by 1992 it was the largest export sector, overtaking sugar and tobacco. Throughout the 1990s, the tourist sector continued to grow and was a large part of the economic growth experienced in the Dominican Republic during this decade (Padilla and McElroy 2005).

Some members of the tourism sector were relatively quick to integrate ecological and sustainability programs into their all-inclusive packages. The leader in the field was the Punta Cana resort which started significant sustainability projects in the early 1990s. Other resorts have adopted similar projects and ecotourism has grown in many of the protected areas across the island. While the number of these projects has increased dramatically, it is unclear if they depart from the tourist sector more generally and create a biodiversity governance module. The question impacts directly on a core issue of governance competition. If the tourist efforts are an attempt to compete with the conservation network for resources and control of property, or even to try and lessen any perceived need for conservation of the beachfronts, then this may negatively impact the overall network. If the network is instead an effort to engage with the conservation activities, then it may be the nascent construction of a modular network structure.

Except for CEBSE and Punta Cana Ecological Foundation, there is little evidence of a secondary biodiversity module forming. Both of these organizations have connections to the rest of the biodiversity network detailed above; however, at least until 2009 there does not appear to be the growth of a coherent secondary cluster of actors. While pursuing largely their own projects, CEBSE and Punta Cana appear to fit

into the more significant centralized network that defines biodiversity governance in the Dominican Republic. However, other tourist activities regarding biodiversity are not as connected to the network and may then be a counter-network in competition with the biodiversity network described above. Table 4.6 shows these two different networks separated from one another.

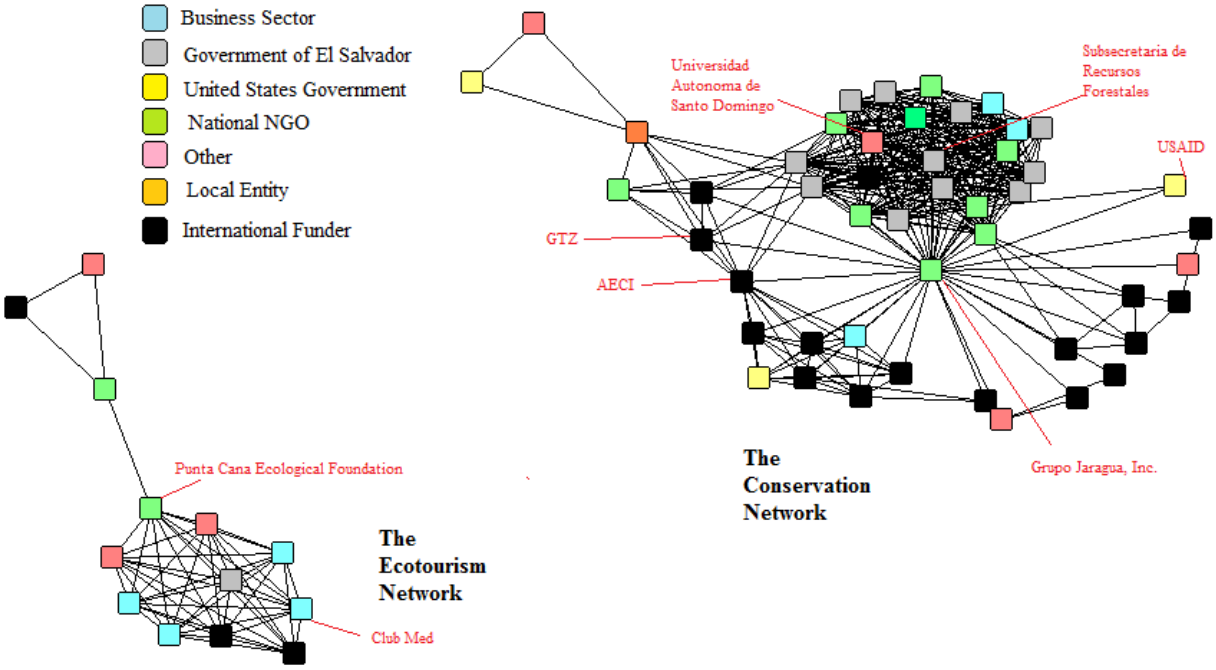


Figure 4.4- Labeled Network Map of Dominican Conservation Politics Network 1999-2009.

Regional environmental network

The regional network is highly institutionalized in the Caribbean Regional Seas Program. This Regional institutions have typically had a limited relationship with the Dominican Republic, but shared problems have increasingly drawn them together.

The Dominican Republic began integration into SICA in 2004 in preparations for the U.S. and Dominican Republic-Central American Free Trade Agreement (DR-CAFTA). Their integration to many areas of regional policy making in Central America is limited and they are considered an *associated* member of SICA; however, they have been integrated actively in the customs issues and other economic matters and have been added to the SICA seal. They have been involved in some regional environmental discussions and have participated in some regional projects with Central American states through cooperative GEF grants. CCAD and the Mesoamerican Biological Corridor, however, have largely not involved the Dominican Republic to any significant extent.

Although the Dominican Republic has pursued integration into the Caribbean Community (CARICOM) in the 1990s and at the same time it was integrating into the DR-CAFTA arrangement, these have so far been fairly limited. CARICOM is an organization originally of mostly English-speaking countries and territories that has only really expanded to other countries in the area over the past 15 years. The Dominican Republic was not originally involved in CARICOM and only became significantly involved in the 1990s when the European Union's ACP (Africa, Caribbean, Pacific) program encouraged regional integration in the Caribbean as a whole. As Haiti, Suriname and the Dominican Republic became key members of the ACP program, the EU pushed for their inclusion in CARICOM. CARICOM then created CARIFORUM as a agreement-making body linking these other countries with the rest of the organization. As Haiti and Suriname became members of CARICOM, CARIFORUM became an organ simply linking CARICOM with the

Dominican Republic. The result has been a free trade arrangement covering goods between CARICOM and the Dominican Republic since 2001 and efforts at expanded free trade agreements and other policymaking between the bodies (Byron and Lewis 2007).

Although substantial policymaking happens within CARICOM, a wider regional organization which includes the Dominican Republic is the Association of Caribbean States (ACS). This organization aims at policy work which includes all the states which have a direct stake in the governance of the Caribbean (and thus includes all SICA members, CARICOM members and other regional states). ACS is fairly limited to some small-level coordination roles between states and policy capacity is significantly behind that in CARICOM and SICA. One significant project is the Caribbean Sea program which has included a host of efforts at coordinating activity and achieving recognition of the Caribbean as a "Special Area for sustainable development." Mid-1990s efforts at this resulted in the passage of a UN General Assembly resolution 54/225 in 1999 which recognized the Caribbean as a special area and encouraged a regional integrated approach to protecting that resource. In 2000, ACS suspended the spearheading organ of this effort, the Environmental Committee, and shifted the work to the Special Committee on Sustainable Tourism which effectively ended any momentum or action on the issue (Insanally 2003). Stalled effort until the 2008 creation of the Caribbean Sea Commission which organized a series of engagements promoting the goals in the UN General Assembly Resolution; however, by the time of this writing the effort has produced some organizational structure and the passage of further UN resolutions, but substantive work has progressed little.

CARICOM and the ACS differ from SICA in some substantive points. First, the separation of economic integration from political and social integration are significant in that it means that programs like ALIDES to make sustainable development a goal of economic integration is difficult to easily negotiate and implement in CARICOM. All the problems with ALIDES and the attempts in CARICOM to integrate other regional issues do not undermine the existence of dual tracks in the Caribbean. Second, the international pushers of integration are different in the Central American system and the Caribbean system. In contrast to the United States as the primary international supporter of integration, CARICOM and CARIFORUM have the European Union and, more recently, Japan as substantial international pushers. The United States is certainly not absent and plays a key role at many points: however, the E.U. and Japan's influence is notable in the development of the organization.

Within this patchwork of regional governance over the Dominican Republic, the main environmental actions taken have been through the Caribbean Environment Programme (CEP). CEP was founded under the aegis of the newly created United Nations Environment Programme (UNEP) in 1976 as one of its Regional Seas Programmes. The CEP is affiliated with CARICOM and ACS; however, UNEP and its own secretariat provide the primary organization for the agreements. The primary legal instrument is The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (the Cartagena Convention) which opened for signature in 1983 and entered into force in 1986. For much of the early years of the agreement the CEP was met with general indifference from member states and the

agreement was severely limited in funding and significance (Barker 2002). However, since the mid-1990s, CEP has been able to establish fairly regular funding to the Caribbean Trust Fund (the primary financial mechanism) from members and contributions from other environmental funders (GEF, UNEP, etc.) and continued to develop some forums for future use. However, aside from the Oil Spill Protocol adopted at the initial meeting, the development of significant international environmental law has been limited within CEP (Miller 1996, Barker 2002).

The most significant regional biodiversity governance in the Caribbean has been the Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in terms of states involved and diplomatic efforts. SPAW is a multilateral environmental agreement throughout the Caribbean that attempts regional cohesion in protected areas and species protection and expansion of these protections. SPAW encourages the creation of conservation areas throughout the countries of the region, with an expanded focus on marine protected areas, and aims to create a permanent fund for the management of these protected areas. These broad goals will be largely mirrored in the Caribbean Challenge, although some of the relevant actors will have changed.

The initial background for the SPAW agreement initially developed in 1986 from an expert panel within CEP and not from any state negotiators (de Fontaubert and Agardy 1998). The initial impetus to create regionally coordinated protected areas and species protection, however, hit a number of negotiating roadblocks. Negotiators agreed on little about the purpose or particular construction of conservation areas, whether certification by some scientific panel would be necessary to evaluate state

progress, and even how representation would be established on the science body. For example, one major point of debate was whether each U.K. territory would get one representative or would there only be a single U.K. representative for all of the territories (Vanzella-Khouri 1998). The negotiations consistently pushed back timetables and at the final round of negotiations there was not enough time to finish agreement on the necessary annexes to the agreement and so they were left to be worked out later (Vanzella-Khouri 1998).

Out of these negotiation hurdles developed an agreement with some substantive foci, but mostly a least common denominator requirement with wide leeway for national interpretation (de Fontaubert and Agardy 1998). Rather than a focus on some key or endangered species, SPAW did aim to integrate an ecosystem perspective and was one of the first multilateral environmental agreements to specifically integrate this perspective into the agreement. In addition, of all the different Regional Seas species efforts, SPAW was one of the most far reaching in working on issues of marine species and terrestrial ecosystems (Vanzella-Khouri 1998). Thus, the agreement declared protection and the need for conservation of all mangroves in member states. There was some emphasis of cooperative approaches to conservation with the need to include various social and economic actors in the agreement.

The network though is narrowly constrained largely to the institution itself and a few international partners. In terms of domestic depth of networks, SPAW appears to be limited to environmental ministries without active subnational projects. This has

changed recently with the Caribbean Challenge, as will be explored below; however, in the Dominican case, the centralized national network means that SPAW largely adheres to that network. The impact appears limited, there are not significant network connections aside from scientific engagement. In the words of one Dominican authority "the environmental ministry limits anyone that wants to have an environmental project in the country" and this appears to extend to the international level. Similarly to the tourist sector, the international network then is not a separate module for governance relevant to the main domestic network as much as it fits within that network.

Network Structure Conclusions

As this chapter makes clear, the network structures in both El Salvador and the Dominican Republic are of fundamentally different types. The biodiversity network in El Salvador is defined by a number of different clusters of actors linked together through key individuals and the coffee network. The Dominican Republic network in contrast is highly centralized in the national environmental ministry. The tourist and international networks largely fit within this centralized network and there are no rival modules of organizing the way there is in El Salvador. The result is a clear distinction of the two different governance arrangements in terms of network structure.

Crucially for hypothesis evaluation is two situations that the analysis above demonstrates: first that national context is not fully determinate and second that the network structure transcends institutional design.

It is sometimes argued that domestic context determines network structure and influences network development and the transfer of ideas (Gourevitch 2002, Kelly 2004,

Cortell and Davis 2005, Bach and Newman 2010). The limiting case of the Dominican Republic may be seen as confirming evidence for this argument (Holmes 2010). However, there are some problems with such an argument. First, networks are of course sensitive to domestic politics, but biodiversity networks often extend outside of these confines. What the analysis above shows is that in both instances, networks extended in ways not completely explainable by domestic political context. For example, with the local-local collaboration in the El Salvador case which will prove crucial in the next chapter. In addition, the tourist developed biodiversity network began developing in the late 1990s offering a potential different organization. Second, and most important, is that networks are happening at multiple levels simultaneously. The MBC regional network provides an example of a regional network developing which need not particularly adhere to the local situation. Although the international network in the Dominican case proved to not be able to challenge or transform the national network structure, this should be seen more as weakness of that network and institution rather than as proof that domestic context matters. Indeed, in an interview with an international actor, the claim was made that they did not have a secondary network possible of replacing the national network. While not ignoring the national context, the analysis above should not be interpreted as justifying the argument that national context is determining on network structure.

Finally, the relationship between networks and institutions is a complex relationship and neither reduces to the other. This is important and relevant because the main rival argument regarding resilience is that institutions and their design

determine resilience of those organizations. This is the robustness argument which contends that institutions which are less vulnerable to shocks will also be better able to adapt to the shocks (Young 2010). The difference for network structure and institutions is that network structure includes actors that are outside of the institutions (in the El Salvador case with the PTT and FMLN municipalities during this period). In the Dominican case also, although the institutions were crucial, the network design extends beyond these formal levels. Most importantly, as will be seen, is that the formal institutions in both cases were not the primary system shaping the learning processes. In El Salvador, it was trial and error experimentation and in the Dominican Republic it was the forums that shaped the meetings. Neither of these was primarily the result of the institutional structure but of other dimensions in the network structure. The analysis above, although it highlights the key role of institutions in the network, establishes also the core distinction in learning that will be explored in the next chapter.

CHAPTER 5

SHOCKS AND PROCESSES OF LEARNING

Following the rain from Hurricane Ida (2009) which caused significant landslides throughout El Salvador, I visited a highland community which had been actively engaged in shade coffee biodiversity projects for a decade. Although the community was relatively less impacted by the landslides than other communities, the precarious steep hills throughout the town made them very aware of the situation. The first goal was of course to repair damage and restore connectivity where landslides had disrupted roads. However, a secondary goal was to figure out exactly where the landslides had happened and try and identify some common aspect which could be used for future prevention. This was done relatively quickly after the storm and although it happened with few committed resources, it was a decided effort by the community to identify the problem and try and develop some applicable lessons for the community.

Resilient governance is fundamentally about the ability of a governance arrangement to adapt and respond to shocks that occur. Disruptions to the political or environmental system often stimulate learning and assessments of the current governance arrangement. But the learning that occurs after these shocks can come in many different forms including learning through sharing experiences, learning through instruction, inclusion of new perspectives, reassessing causal connections, etc. The modular network theory of resilient governance contends that diverse, modular network structures will shape the learning that occurs within governance arrangements. Rather than occurring through a centralized collection of findings and then the diffusion

throughout the network, these network structures will result in bottom-up learning. This chapter explores this contention by exploring three pathways of learning that happened in the case of the MBC and the Dominican Republic. These pathways include trial and error experimentation (an important force in the MBC), network expansion (seen in both cases but through different mechanisms), and broadcasting (absent in the MBC and important in the Dominican case). Exploring the empirical context of how these operate provides significant support for the contention that network structure impacts the learning dynamics within governance arrangements.

Shocks and International Biodiversity Governance

Shocks are defined as events which cause a significant part of a governance arrangement to question the believed causal connections of the governance rules or to question the political structure of the organization. They are thus defined here in largely social terms and are shaped primarily by the social relations between actors (van der Leeuw and Aschan-Leygonie 2000, Folke 2006). Although it is possible to look at events which had a significant impact on human and ecological systems and contend that they should have triggered a reassessment of the governance system, the history of environmental politics clearly warns against the assumption that large impacts will necessarily generate learning (European Environment Agency 2013). Shocks are thus only shocks if they are considered such in the social environment of the governance arrangement.

Studying governance shocks is difficult because of the intertwined nature of shocks at multiple levels with one another and because they are rarely exogenous from

the network structure. The introduction divided shocks into political and environmental types. In actual governance practice, this distinction does not appear clear and the two types of shock interact with one another significantly. For example, declining elephant populations for CITES are simultaneously a political shock reflecting problems with the governance arrangement (and for a number of years, political intractability) and problem with the environmental system. In addition, there is an endogeneity problem in that shocks are themselves highly related to the network structure. For example, in a centralized network structure, the loss of a member may be relatively minor with multiple other actors able to play a similar role. In contrast, in modular network structures the loss of a key bridging actor may irreparably transform the network. Similarly, problems like groupthink and contagion of political intractability are more significant for centralized networks than they are for modular networks (see the discussion of insulation in Goffman 1969, 76-78). Despite these problems, the discussion and identification of political and environmental shocks makes it easier to conceptualize the impact of the disruptions and to more effectively deal with alternative causation which argues that the type of learning is mostly impacted by the type of shock experienced.[12]

The way this analysis deals with these problems is not to ignore them but to locate them so that the endogenity and the interrelationships can be more fully

[12] The argument that type of shocks impacts the learning in regimes has not been fully theorized but would connect with functionalist arguments and discussions of problem structure in the study of international environmental politics (Mitchell 2006). Although the type of shocks experienced in the cases differed, it is unclear how they would significantly determine the resulting learning.

understood. However, the distinctions between political and ecological shocks and between slow-moving and sudden shocks can be helpful in understanding the contexts more fully.

Political shocks come in a number of different forms and can be the result of slow-moving processes or sudden transformations. Three of the most prominent include transfers of power, assessments, and political intractability.

Transfers of power can impact governance arrangements whether they happen in the governance arrangement itself or in other institutions. In the Dominican Republic case, this is exemplified when Balaguer left office in 1996 and handed power to the Fernández administration. The result was that the conservation policies which he had put in place over his many terms were threatened. An example at the international level is the transfer of power in the Amazon Cooperative Treaty Organization when Artega left the position. Regional, national, and even local turnover of positions can be shocking to the governance arrangement leading to a reassessment of the governance arrangement.

Assessments serve as another political shock that can impact governance arrangements Any of a host of reflective mechanisms can catalyze learning, but first they must highlight the limits of current efforts (Siebenhuner 2008, 2002). These can be slow moving processes, for instance where political intractability gradually grows increasingly more problematic, or fast moving shocks that were unexpected. Assessments, particularly outside assessments, were crucial mechanisms in spurring the learning in many of the governance arrangements in chapter 2. Most notably with the

Man and Biosphere assessments which proved crucial in spurring the changed focus to include sustainable development concepts.

One other political shock is that of intractability in the discussions. Although this is a more gradual shock that often builds until it reaches a threshold, political intractability can be a significant cause for overhaul of governance arrangements. The crucial example in this respect from Chapter 2 is CITES where feelings of politicization of information finally led to the Ft. Lauderdale Criteria and significant transformation of the governance arrangement itself. The conditions which determine whether political intractability results in learning as opposed to leading to further political intractability or collapse is a key area for future analysis from the findings in this research.

Environmental shocks can similarly come from a wide variety of different contexts. If the problem the governance arrangement is designed to manage suffers a clearly deteriorating condition or a new impact of the problem arises that was not fully understood before either of these conditions can cause actors to believe a change in governance is necessary. Natural disasters serve as a crucial case where environmental degradation becomes significantly important. As will be seen below, with the multiple natural disasters in El Salvador in the 1990s and early 2000s, the problem of soil erosion became important as a result of a number of landslides. Similarly, the loss of a key species or the sudden decline or disease of a species can be similar environmental conditions which would cause the problems to become more clearly apparent.

Despite the severity or the lessons which could be drawn from shocks, they are neither guaranteed to be understood as shocks nor to necessarily lead to adaptation.

The modular theory argues that the network structure that exists throughout the governance arrangement explains when shocks lead to certain types of learning. Two alternative causations would contend that the type of learning is based on the shape of the shock (Smith 2009) or the accessible scientific knowledge (Lidskog and Sundqvist 2011, The Social Learning Group 2001, Jasanoff 2004, Haas 2004a, Lidskog and Sundqvist 2002). The analysis below will attempt to dismiss the former and provide an explanation to the latter. It will be clear that accessible and trusted scientific knowledge is necessary for leading to adaptation; however, the argument is that the network structure underlies this process.

Shocks in Central America and the Caribbean

Biodiversity governance in Central America and the Caribbean have experienced a number of shocks to the governance arrangements. The main focus of this analysis will be on the post-1995 shocks that happened and the next sections will explore the pathways of learning that occurred after these shocks.

Political transfers of power have been very important in the biodiversity governance approaches in both cases. As explained above, the transfer of power in the Dominican Republic from Balaguer to Fernandez became a shock to the elite network in the country. While it is not clear when this became a shock to the participants, it is clear that the network viewed this unfavorably in many instances (this despite the fact that many supported the transition and the Fernandez administration). Similarly, in Central America, the closure of the MBC Coordinating office in 2006 was a key political transfer of power. The coordinating functions moved to the CCAD office in San Salvador, but the

networks and the major international supporters (World Bank and NASA) did not appear to move to this new arrangement. This was not viewed as a shock throughout the network, but a number of actors in the network did began to entertain ways to restart the corridor project after this closure. Domestically, in El Salvador the rise of the FMLN as a significant political party meant that there had to be some transformation of the policy environment to account for this change. Although this transfer of power from the ARENA to FMLN happened relatively late in the development, it will be crucial in the next chapter.

Political intractability was a similarly important driving force in the contexts. In Central America, the *Paseo Pantera* was largely abandoned as a project when the state leaders refused to push the program forward. Similarly the 1997 MBC saw the creation of some large conservation areas, but some surprising political intractability. In Costa Rica, with the most developed biodiversity system in the region, local park managers found the expansion and incorporation of buffer zones to be a difficult proposal in implementation (Kaiser 2001). The intractability increased with the program following the 1997-2001 period with much of the enthusiasm being replaced by local resistance to the project in Nicaragua and elsewhere. The recognition of this intractability differed based upon the actor but the closure of the office in 2006 can be best understood as the culmination of this intractability resulting in the organization abandoning the office.

In terms of environmental shocks, one of the most common in the regions is the regular occurrence of natural disasters. While causing significant disruption to the political and economic systems, these similarly highlighted problems of environmental

degradation and the vulnerability of ecological systems. They often serve as key markers in discussion with biodiversity policy makers in the different countries with references to the natural disasters serving as critical junctures, as will be discussed below. In the Dominican context, Hurricane Jeane (2004), Georges (1998) and Hortense (1996) all impacted the country and caused significant disruption. In addition, the 2010 Haitian earthquake resulted in significant refugee problem and a wide perception of pressure and destruction of the protected areas of the country as a result. It is certainly being considered a shock to the system and appeared universally in interviews as the most significant problem the Dominican Republic conservation is facing. El Salvador similarly has Hurricane Mitch (1998), Hurricane Stan (2005) combined with the 2001 twin earthquakes as pivotal natural disasters. As will be explored below, one of the crucial aspects of these natural disasters is that they were viewed as causing significant landslides requiring some land use transformation.

Species loss and deforestation appear to be key driving features amongst some part of governance arrangements. Although reports of deforestation and a species declining in health were mentioned repeatedly in interviews in both cases, they were rarely provided or considered as key catalyzing forces for governance arrangement transformation. The amount of domestic and professional studies of beach erosion in the Dominican Republic, for instance, has produced little focus on the issue. Although these reports and understandings are important following other shocks, in the cases here they appear to not generate perceptions of shock throughout the governance arrangement as a whole.

The most important shock in the Central American context were the natural disasters. As will be shown below, these started a host of different learning in the governance arrangements because of how they brought in new actors and brought existing actors to think differently about problems. Biodiversity and the corridor idea arose through a series of trial and error experimentations at the local and international levels. In the Dominican Republic, the most important shock was political transition of power. This changed the domestic political situation and resulted in learning largely through competition and restricted membership. When considering alternative causations, the important aspects of these shocks is that they both occur largely separate from the biodiversity networks that. Although certainly connected with the network structure of the governance arrangements, neither was a shock primarily internal to that structure.

Learning proceeded in the cases through three main pathways of learning: Trial and error experimentation, network expansion, and broadcasting. These are not exclusive pathways to learning, but are simply the most relevant for the cases of study in these empirical cases. Other potential pathways will be discussed briefly in the conclusion.

Learning through trial and error

Trial and error experimentation in governance involves actors learning generalizable lessons from early experiences. The key aspect that separates trial and error experimentation from centralized instruction or broadcasting is that it involves actors trying to solve small tractable problems but then using the lesson from those

attempts to generalize heuristic guides for future events. Trial and error experimentation can include lessons about causal connections between governance rules and outcomes (Stein 1994, Levitt and March 1988), lessons about coordination strategies and institutional design (Sugiyama 2008, Meseguer 2004), or even lessons on forum shopping (regarding what actors are potential partners for future interactions) (Steinberg 2001, Sabatier 1988).

Polycentric governance studies have worked significantly with the concept of trial and error experimentation as one of the main advantages of polycentric arrangements (Ostrom 2005, Weible, Pattison, and Sabatier 2010). The main advantage highlighted in this literature is that trial and error experimentation for learning allows quick and relatively tight lessons to be quickly applied by the actors. Ostrom explains that one of the advantages of polycentric systems is that "feedback about how the resource system responds to changes in actions of appropriators is provided in a disaggregated way. Fishers are quite aware, for example, if the size and species distribution of their catch is changing over time. Irrigators learn whether a particular rotation system allows most farmers to grow the crops they most prefer by examining the resulting productivity of specific fields" (Ostrom 2005). However, the main limitation of this learning is that it relies relatively little on sustained comparison and the generation of lessons applicable throughout the governance arrangement. The relevance of these findings to multilevel and international settings will be explored below.

Trial and error experimentation in El Salvador started primarily after Hurricane Mitch in 1998 and involved trials with different biodiversity projects in local communities and trials to find alliances and projects which could find sustainability from outside the community, mainly with funding from external sources.

Prior to 1998, the biodiversity projects in El Salvador included the SalvaNatura protected area *El Imposible* and the other protected area in the northwest corner of the country. There is little evidence of communities engaged in practices towards the end of the civil war or in the immediate years following. Local development organizations, ADESCOs, had been largely assisted in their early development by UNDP as part of the end of the civil war process. These communities had very limited financial resources and thus had begun work with one another on some environmental issues at the end of the civil war (1992 until 1998) largely on solid waste management and freshwater resources. There is limited evidence of biodiversity trials by local communities before 1997, but some claimed to have started projects prior to Hurricane Mitch in 1998 with some initial, small-scale efforts.

This situation changed with a rapid increase in the number of trial and error experimentations in local communities with different biodiversity projects after 1998 with Hurricane Mitch. Mitch delivered significant destruction in Honduras and Nicaragua and caused widespread but less destruction in El Salvador and Guatemala. The slow moving storm provided significant destruction in terms rainfall causing flooding and landslides. Landslides do not appear to be triggering events for learning in

the region (Restrepo and Alvarez 2006), but in the situation of El Salvador they were crucial in bringing a host of projects to the fore.

The initial experimentations varied significantly based upon the particular context of the community involved. In communities with some connection to the SalvaNatura shade coffee project, these projects involved small conservation areas connected within shade coffee plantations (these were mostly located in Ahuachapan). In communities resettled as part of the land reform during and after the civil war, these included some small conservation areas on areas which had become significantly degraded or which were crucial to water resources (many examples around Suchitlan reservoir). In the eastern part of the country, biodiversity strategies were largely integrated into fishing and agricultural practices. No medium or large conservation areas were created and the shade coffee or small mangrove protections worked into larger land use decisions, often as part of the land reform administration of the PTT.

An example of this early trial could be the city of Cinquera in Cabañas. The city saw significant violence during the civil war and environmental destruction as people fled the violence into the hills. Surrounding the town is a very steep hillside. With resettlement of the town following the civil war, largely from ex-FMLN supporters, the local ADESCO (ARDM) soon began experimenting with biodiversity efforts in order to conserve the land and the forest on the hill. They started with a small scale effort to protect the forest on the mountain and included community efforts to ensure the protection of the area (Valencia et al. 2011). This was done experimentally with little guidance from outside of the community in the early period.

The trial and error also extended to experiments with other communities, national NGOs, and other actors to maximize support for the project during the period after Mitch. The government of El Salvador still lacked clear guidance for communities regarding land erosion or biodiversity protection and the environmental ministry largely lacked capability to implement multi-site biodiversity projects. In the words of one ADESCO leader: "We were not getting any assistance, and so we just had to try something." ADESCOs then began the process of forum and ally shopping to find support for their biodiversity policy experiments. Many of these early efforts were with one another in a series of trial and error experiments. These built from some of the *mancommunidades* alliances that linked various communities together to deal with solid waste management and freshwater resources. But also built along the FMLN linked communities and the PTT linked communities to bring communities together.

Not all of these early alliances worked or worked effectively. The first few years see a number of cooperative biodiversity efforts that split apart after a few years. The documents and memory of these early projects is largely incomplete, but the alliances which worked appear to be proximity based and worked by getting some shared funding early on in the project. The crucial example here is the Usulutan and Lake Suchitlan projects. When there is separation between different communities and the linkage is based on future ecotourism earning potential, then the collaboration is often times of limited duration. One person who knew about the history of an ADESCO project explained the early operations with another community, not proximate, through shared connection with a national NGO. The national development NGO had worked with both

communities and connected them because they believed there was a shared problem faced by both communities. The ADESCO started hesitantly and worked in workshops and attempts to increase collaboration, but would not formally join with the other community for significant projects. This trial and error shopping accelerated significantly with the international funders that began more significant local biodiversity support gradually until 2005.

International funders similarly engaged in a series of trial and error experimentation following Hurricane Mitch. After initial humanitarian assistance following the hurricane, international funders were organized by UNDP in November 1998 to discuss plans for projects in the region to be funded by the international funders. Environmental degradation played a prominent role in the discussions; the UNDP report on mobilizing relief begins "The impact of Hurricane Mitch on Honduras, Nicaragua, El Salvador, Guatemala and Belize is of an unprecedented magnitude. The impact was compounded by large-scale deforestation and the cultivation of marginal lands without soil conservation" (UN Office for the Coordination of Humanitarian Affairs 1998).

This UN coordinated effort was followed with a set of meetings organized by the Inter-American Development Bank, started in December 1998 but formally finished in March 1999, and included the UN offices, countries of the region, and large international funders from the EU and United States. At the meetings, the states of Central America made clear that they intended to "rebuild" after the disaster of Mitch and further the reforms made early in the 1990s regarding "peace, freely elected

Governments, rule of law, poverty alleviation, modernization of the state, and steadily improving economic growth, as well as regional integration needs to be deepened and accelerated" (Consultative Group for the Reconstruction and Transformation of Central America 1999). The Donors pressed and got agreement for a reconstruction plan that included inclusion of civil society, transparency in funding, decentralization provision of services, and reduction of ecological vulnerabilities. El Salvador's government plan for reconstruction did not emphasize ecological vulnerabilities or environmental conservation as a cornerstone of their strategy. The plan resulted in $9 billion was mobilized for reconstructive efforts in Central America.

This arrangement and many of the early efforts worked through the government of El Salvador. Mitch did introduce a number of new European funding agencies, organizations who had been largely absent in El Salvador during the civil war. During the civil war, USAID was the primary funder in the country and, as seen last chapter, was very deeply connected throughout the different networks. USAID had a long history of working with the government of El Salvador and thus was not in any significant alliance shopping during this period. New funders, in contrast, were largely working in a new environment following Mitch. New funders included many of the large European aid foundations, such as: GTZ (Germany), Heinrich Boll Foundation (German Green Party Foundation), AECI (Spain), JICA (Japan), CIDA (Canada), SIDA (Swedish), and others.

The government of El Salvador, at this point under the control of the ARENA party quickly proved to be an unlikely ally for many of the international funders. Initially, although they had agreed to decentralize policies and provide more funding to

local communities in the UNDP post-Mitch agreement, ARENA blocked the implementation or passing of these efforts (Wisner 2001). Second, although land degradation and biodiversity were pushed in the UNDP process and were a major global focus of some of the newer aid foundations (notably GTZ), the government did not meet this emphasis and kept biodiversity on a low level of priority. One international funder noted that this was the inability to pursue the projects they wanted to pursue was a major reason for a major issue of dissatisfaction with the government. Finally, and possibly most significant, there were repeated reports that ARENA misused the funds, sometimes for political gain. There were reports of ARENA only sending aid to communities which supported them, attaching party logos to disaster relief supplies, and directly using the funding to rig elections. This led to a series of official and unofficial reassessments of channeling aid primarily through the government, most notably this even extended to USAID (United States General Accounting Office 2003).

These somewhat separate experimentations largely coalesced after the 2001 earthquakes and dramatically so after the 2005 Hurricane Stan. The major lesson learned by both international funders and local actors was that the strategy to pursue was the biological corridor connected with local projects. This came about as a result of trial and error learning following Mitch by the different actors. Both tried to work through the government of El Salvador, but found that approach to be largely unsatisfactory. Alliances which worked best were those with geographical proximity or which had additional network connections. The modular network that had developed in

El Salvador prior to 2005 shaped this learning significantly in the adoption of corridor projects in the period around 2001

Trial and error experimentation in multiple communities and international funders accomplishes little without some linkage between the different experiments. Although there was some shared ideas between the various members of the network (notably through already existing networks like the PTT program or the FMLN municipalities), this initial generation of multiple experiments connected little with the corridor project and did not extend beyond largely local efforts. To understand the extension it is necessary to turn toward a second pathway of learning: network expansion.

Network Expansion

Actors often learn through expanding networks and fitting policy to support the new actors or simply being exposed to new ideas and information. Studies from organization theory have generally found that entities learn most from the organizations they are proximate to in networks (Kraatz 1998, Uzzi 1997). Similarly both polycentric governance studies and resilience studies have emphasized that expanding networks can increase the feedbacks for actors in a governance arrangement (Bodin and Crona 2009, Crona and Bodin 2006). The development of the Man and Biosphere network shows how this expansion of a network can contribute to the adoption and learning of new approaches to a governance project. Network expansion can thus be one pathway for learning for actors.

In El Salvador and the Dominican Republic, both networks saw some network expansion. Learning resulted in the El Salvadorian case and did not in the Dominican Republic. This distinction provides significant support to the argument that network structure matters in shaping the learning.

In the El Salvador case, network expansion started before 2005 but became largely a self-reinforcing process as international funding increased after this. The MBC network had done very little in El Salvador prior to 2005 and the country was largely absent in the considerations of that network in its early development. By the 2010 relaunch of the MBC, the country was included in multiple facets of the project and included many of the local experiments which had begun in the 1998-2005 period across El Salvador. This brought together communities linked in many of the other important national networks (such as the PTT and FMLN municipalities) with other communities linked in the environmental politics network and with those communities which had small scale activities but nothing particularly connected. There are three mechanisms of network expansion that occurred in the El Salvador case: recruitment, shared benefits, and network transmission.

All the different actors learned to apply the corridor idea throughout the country based upon small projects, but they each came to that point differently. Communities learned that they could secure stable funding for corridor projects and that they may lessen the landslide danger. The national government and MBC project both learned to shift the focus of the corridor from large scale conservation projects to small-scale projects with varied forms of protection. Finally, international funders learned

processes of linking multiple communities together to develop regional and cross-national projects in multiple countries. Deciding to focus on these small projects was crucial to the improved effectiveness of the MBC project as will be seen next chapter.

The process of network expansion was crucial throughout this process as the various actors began to interact with one another and adjust their projects in response. Recruitment and expanded benefits of policies worked closely with one another in the empirical context of El Salvador. Recruitment involves the deliberate linking of one network with another network (Fung 2006). In contrast, expanded benefits involves processes like demonstration effects and capacity building which increase the benefits to network partners as a result of your policies (Huber and Stephens 2001, 23-24). In El Salvador, international donors recruited local communities who had been experimenting with biodiversity and increased the benefits available to them.

International funders had experimented with the national government and had found the results disappointing and so they began to work with a number of local communities. However, one problem is that the ADESCOs has some very limited capacity at the beginning. Many were tied to small-scale NGOs who provided most of the bureaucratic aspects necessary for international funding. The result was that there were some problems with working with ADESCOs despite preference for doing so. One international funder explained "Our central office requires some oversight to make sure the money is used to help the people. After the hurricane, none of the local organizations had the experience working with us to meet these requirements. Few had an organization, lots have stopped existing since then. They were there one day and

then no longer there the next day." As a result, both international funders and national funders like FIAES began to develop small scale projects with minimal necessary paperwork in order to get more communities involved. The result was a gradual increase of the size of grants that communities could get.

In addition to recruitment, expanding benefits of projects became a key way to include more communities into biodiversity policy generally. FIAES, GEF Small Grants Program, and expanding international funder interest in corridors all coalesced in 2005-2010 to provide significant funding for local projects throughout the country. To return to the example of Cinquera, small grants from GEF and FIAES grew to larger and larger amounts to support the protected area they had created. Small grants grew to larger and larger grants as a result of local activism and expanding resources (Valencia et al. 2011). In addition, these were able to link communities together to larger projects connected with one another. The trial and error experiments and alliance testing from the earlier period were met with expanded benefits to produce expanded networks of actors.

Further evidence is indicated in the large number of PTT communities which began being active in the MBC project. Usulutan being one of the most significant areas for PTT projects also became a crucial state for MBC projects. What is significant is that these corridor projects are not easily explained without seeing it as a connection between the PTT and MBC activity. National NGOs were focused significantly in the west of the country, international funders had begun efforts in the east of the country, but Usulutan was largely learning through trial and error with communities sharing

examples through the PTT network. The inclusion of this is one of many ways in which the different clusters of the network developed different linkages.

While local governments were connecting with international actors and seeing expanded benefits, the government of El Salvador and the MBC arrangement began getting involved in the projects. The environmental ministry began its efforts in 2005 with a large-scale effort to redesign the biodiversity strategy of the country. The 2005 GEF project for USD $13,000,000 (the largest biodiversity project in El Salvador's history) specifically aimed at deepening and expanding the protected areas of the country in order to fit with the MBC corridor idea. Unlike GEF 466, the coffee network project, this project included a much wider network of actors including many ADESCOs and smaller NGOs than were included in the 466 project (GEF 2011, #2635). This was the beginning of a shift in learning by the ministry of the environment which would continue over the next few years and lead to significant change. The government of El Salvador thus began work in expanding their network in 2005.

It is difficult to precisely analyze the development of the MBC during this period because the Coordinating office closed in 2006. Although the corridor project was not being centrally coordinated, the actual projects linking with the corridor show a slow incline in local government projects throughout the network. Evidence for network expansion being core to the project though is seen in the 2010 relaunch of the project which crucially included significant more projects and extended into El Salvador. This change meant a reprioritization of the project from state-led management to

community led management and the inclusion in the project of a host of different biodiversity projects.

The 1997 MBC did include the Lago Guija-San Diego-La Barra protected area in the Northwest corner of the country in the project; however, little change in its management or connections in the country of El Salvador were planned. By 2010, El Salvador represented one of the most significant areas for expansion of the project. This point became clear during field work when I had been staring at a map of the MBC for weeks in documents and the offices of the CCAD. The map included little in El Salvador at all and so it was quite shocking to see the map of the same project hanging in the Environmental Ministry of El Salvador that included significant projects in El Salvador. There does not appear to be significant international pressure to encourage the project to include outside of the areas already included in 1997 so this expansion should be seen as a result of bottom-up learning. Second, the inclusion of local communities, as opposed to just national NGOs, should be seen as a clear sign of bottom-up learning. The forum shopping combined with recruitment and the policy ratchet mechanisms to create a situation where local communities became the most preferred actor. In El Salvador, this impact is quite clear. National protected areas, which primarily were started in the 1990s in El Salvador are primarily led by the state (49%) and large national NGOs (32%). ADESCOs only provide governance of 7% of protected areas. When the view expands to include corridor efforts, buffer zones, and other biodiversity projects, ADESCOs provide 39% of the governance agents and the state only provides 26%.

Network expansion can also result in centralized learning when it works through gatekeeping by a centralized set of actors. In the Dominican context, the incorporation of The Nature Conservancy in the national elite network shows this process of network expansion. Holmes has explained that prior to 2008, the domestic elite network detailed in the last chapter was able to restrain TNC from entering significantly into the network (Holmes 2010). Indeed, it participated in very little of the network despite significant efforts to do so. This changed with the development of the Caribbean Challenge, a project of TNC that brought them in closer connection with the environmental ministry and broke down some of the limitations on them. However, this inclusion was a very limited and the result was that they did not fundamentally transform he network but more fit in with the network that already existed. Learning was limited in this situation and the network did not need to transform its focus on conservation. Instead, TNC brought tremendous resources and experience to the network and provided an additional alliance for support in the efforts of the central network in regards to conservation. Similarly, while the network has extended to include some ecotourism operations in the project, this is limited largely to the ecotourist operations with the clearest connection with conservation. The result is that network expansion is much more limited and contributes to less learning in the Dominican context.

Network expansion can be a powerful learning pathway when connected with expanding networks and expanding benefits to all parties. The El Salvador case shows that when these mechanisms are active, the result can be the spread of new strategies

and efforts to further expand these processes. Gatekeeping, or the process of limited expansion to actors that offer benefits to a central organization, tends to result in little learning and often for very limited political gains.

Learning through broadcasting

Broadcasting is a key part of learning in international environmental politics that involves the gathering of comparative and systematic ideas in a single area of the network which then transmit the information to other actors. It is distinct from trial and error experimentation because of its focus on systemic and comparative lessons. The Dominican case shows that broadcasting can result in very centralized learning; however, the conclusion will reflect on the conditions under which this pathway can lead to bottom-up learning. However, there is a risk in the context that learning becomes very limited in its approach as a result of proceeding through this pathway.

The Dominican case responded to the continuing and slowly developing problem of failed earlier efforts. The regional governance arrangement, SPAW, created a number of paper parks but with limited impact or management. In the Dominican case, the significant protected area system had become increasingly pressured by the increasing tourism sector. The problem was a weak regional biodiversity platform and a competitive domestic sphere and the result was centralized learning.

SPAW had started with a plan for action, but quickly got weighed down by the problem of political intractability pretty much from the start. The agreement took significant time to be approved by member states and largely came into force without significant changes to any member governments' policies. Initial enthusiasm about the

protocol was lost as efforts shifted to ratification and implementation of the Convention on Biological Diversity (CBD) after 1992 and the weak CEP secretariat was unable to support the protocol (Barker 2002). According to the CEP ratification website, only two members, St. Vincent/Grenadines and the Netherlands, had ratified the agreement in SPAW's first five years being open for ratification. With an energized secretariat in the mid-1990s, there were 6 more ratifications in the 1996-1999 period. This included the Dominican Republic which acceded to the agreement in 1998 (at the same time that it ratified the CEP and the Oil Spill Protocol). After a decade of being open, the agreement was one member shy of entry into force which came later that year with the ratification by St. Lucia.

In addition to having little authority, SPAW also required very little action from states. Although there is not exact overlap between SPAW and the CBD, states seem to find SPAW requirements relatively easy after they have developed a national strategy for biodiversity under the CBD and can access the funding mechanisms available under SPAW to help them with CBD efforts. During its long time entering into force, activity was conducted under interim committees which could not implement decisions but which met and developed some updates on the annexes and other procedures. When the agreement came into force significant updating of the agreement began to occur (Barker 2002); however, most of this updating was devising procedures for amending the annexes and did not change the protocol significantly. Other than sea turtle management, which does appear to be relatively well implemented with some

significant regional coordination, SPAW has seen little effort beyond the creation of some limited protected areas in the countries of the Caribbean.

Most significantly, SPAW has not altered its 1990s goals or procedures significantly to account for changed research in conservation biology over the past two decades which encourage increased public participation, a richer ecosystem perspective, and accounting for, not halting, human modification of the environment (Chazdon et al. 2009). On the ground efforts under SPAW have pushed for the creation of conservation areas and protected reserves, but not developed more advanced management strategies regarding the inclusion of surrounding communities or areas. One review of the efforts in St. Lucia concluded that "In many respects, then, the SPAW Protocol is the product of a bygone era when conservation was approached in a very narrow way, with little consideration for livelihood and development issues" (Krishnarayan, Renard, and John 2006). SPAW's efforts to push an ecosystem perspective in conservation management have not materialized in post entry adaptations which have largely focused solely on individual species, nor in the on the ground efforts which have instead been limited exclusively to the creation of conservation areas.

This problem of ineffective regional effort gradually became a more important problem highlighted by the USAID-TNC project "parks in peril" that began studying the problem in the 1990s and expanded in the 2000s. This program aimed to understand the level of management in the region and began a plan of operations to deal with the problem of weak conservation. This culminated in the 2008 development of the

Caribbean Challenge, a TNC-spearheaded effort to get improved conservation throughout the region. It is the second largest biodiversity governance arrangement ever in the region, next to SPAW, and commits the countries of the group to creating protected areas over 20-25% of their territory. Most importantly, it targets both terrestrial and marine biodiversity.

The immediate background for the project was the development of a similar project in the Pacific. The Micronesian Challenge started in 2005 and was one of the most significant regional marine biodiversity programs ever in scope. Five countries joined together to protect upwards of 20% of their territory and over 30% of key coastal zones. Although significantly influenced by regional TNC organizers, the program became largely spearheaded by Japan International Cooperation Agency (JICA) who pushed the program further. Although significant funding has been pledged toward The Micronesian Challenge, not all of it has materialized, particularly for some of the sustainable development components of the project (The Micronesia Challenge 2011, 2010).

In 2008, at COP 9 of the CBD, the Caribbean Challenge was announced and five countries in the region agreed to the challenge immediately, including the Dominican Republic. According to the program their three core goals are: 1. creating networks of marine protected areas expanding across 21 million acres of territorial coasts and waters, 2. establishing protected area trust funds to generate permanent, dedicated and sustainable funding sources for the effective management, expansion and scientific monitoring of all parks and protected areas, 3. developing national level demonstrations

projects for climate change adaptation. Regionally, efforts on the first two have been extremely active, while the third has lagged somewhat.

The Caribbean Challenge has been able to secure substantial financial contributions. Following on the Parks in Peril program between TNC and USAID in Latin America and the Caribbean, the program aimed to address lack of adequate funding at a number of protected areas in the hemisphere. Struggling with the problem of what Parks in Peril called "Paper Parks", where boundaries of protected areas and management strategies established but not with any significant impact, stable funding that would be beyond the budgetary whims of governments was seen as vital. Multiple individual reported chronic shortfalls in funding. For example, interview with a national NGO head explained that members of the environmental ministry have to pay for any site visits out of their own pockets. In 2008, this resulted in pledges of $20 million from TNC, $9 million from GEF, and $12 million from KfW banking group as part of German government sponsored development assistance. As part of the coordination aspect, TCC fostered a series of GEF Grants in each of the original members to alter their protected area systems to achieve financial sustainability and increase in marine protection. Over $20 million was provided by GEF in these different grants to the countries to fulfill these reassessments of their protected area systems.

The Dominican Republic's GEF grant, although it begun years prior to TCC, does specifically aim at creating a diverse, financial source for its protected areas. Their GEF Grant explains that "The first barrier to the effectiveness of the NPAS [National Protected Area System] is the inability of SEMARENA [Secretariat of Environment] to

generate and channel adequate financial flows in support of their management. Funding needs for the NPAS over the period 2006-2015 are estimated at US$42,876,571 (an average of US$4.3 million per year), while the budgetary allocation for 2008 is only 70% of that figure ($3.02 million), leaving a shortfall of almost US$1.3 million per year" (Global Environment Facility 2008). The grant proposes to help the government develop a protected area system that relies upon communities, NGOs and other actors to complement the management of the protected area system and get additional funding from NGOs, granting organizations, and visitors to protected areas.

One year after the launch of the Caribbean Challenge, the Dominican Republic agreed to expand their protected area system significantly. As the TNC's press release reads: "The Nature Conservancy applauds a recent Presidential decree in the Dominican Republic, which will add 31 new protected areas into its national protected areas system. The new protected areas encompass a total of 1,321,024 hectares—just over 3.2 million acres—of terrestrial and marine habitat. The decree acknowledged the need to reinforce the Dominican Republic's existing National System of Protected Areas" (The Nature Conservancy 2009). The Dominican Republic then became the first country in the challenge to meet the requirement of having 20% of their marine territory protected and protected significant amount of territory. However, these declarations followed closely the pattern of conservation politics in the Dominican Republic previously: Expansion of old protected areas, creation of new protected areas without full management plans for those sites, done by Presidential decree.

In terms of financial sustainability, interviews with NGO representatives, managers of protected areas, and environmental ministry officials in August 2010 all expressed that the gap in funding remains and that the environmental ministry is chronically underfunded. Although the GEF project is still ongoing and much of the money has not been delivered, the initial strategy to charge visitors a nominal fee at protected areas appears not to have improved financial situation in the early years of the program. Some co-management happens in the Dominican Republic, key examples including management in the Bay of Samana and Parque Nacional Jaragua; however, much of the efforts since 2008 have emphasized solely ecotourism operations as co-management partners and largely ignored other possible actors. However, ecotourism funding may not be as sustainable as expected and relying upon tourism to fill the funding gap for protected areas may not create financial sustainability as desired as it does not fully diversify funding.

As new actors were brought into the domestic Dominican conservation network, the influencing forces were largely that that centralized network that channeled much of the efforts towards its conservation efforts. As a result, new actors are brought into forums by these actors for centralized planning and engagement. The reason is because of two different issues: domestic-elite bargaining as a primary means of politics and forum membership as the main way to get the elite organized.

Domestic-elite bargaining is a major form of environmental politics in the country largely as a result of competition between the tourist sector and the conservation elite. The government plays a key role mediating these different forces.

Many individuals from outside the Dominican government could list the different proposals they made to the government to improve the management within parks: from education of local communities, to not using foreign species for replanting after hurricanes, to more ecosystem wide perspectives that were not taken seriously by the ministry. The blame was widely spread around specific members in the government. Leonel Fernandez was seen by some as particularly closed to conservation options that conflicted with the tourism ministry. Particular high ranking members in the environmental ministry were also seen as committed to very closed paths toward conservation areas. The environmental ministry as a whole was seen as well-intentioned but lacking in the funding and support to develop different visions. As one NGO head explained, the Environmental Ministry "needs to evolve much more to make it an effective branch of government." International funders and governance actors similarly found the ministry, and its lack of financial stability and standing in the government, as limiting in its ability to create and implement new programs.

However, more than simply the ministry, the constraints do seem to be spread throughout the coalition of key conservation actors more generally. Holmes writes that "Amongst the civil servants, NGOs, oligarchs and experts in Dominican conservation, there is an undisputed acceptance that protected areas should be at the heart of environmental policy, while other issues such as pollution and urban ecology have been neglected by both government and the environmental movement" (Holmes 2010, 637). Indeed, interviews with NGO heads and other elite conservation members revealed that much of their work is spent on supporting the protected area system that exists in the

country against other actors, usually the tourist sector. The contentious politics between tourist sector and conservationists has been partially mediated through ecotourist operations; however, this has further supported the existence of conservation areas as a key policy foundation, while any deepening of conservation is not seen as particularly necessary to either side.

Domestic elite bargaining occurs between the government, various NGOs, and other members of the elite as earlier defined. Governance structures are built to a large extent in the bargaining between these units: as exemplified in the 1997 *Los Haitises* military action. When this elite can coalesce on a policy, typically the default position of protecting conservation areas, they can effectively impact the government, as exemplified in the mid-2000 mobilization against privatization of beaches in conservation areas. The mechanism then typically privileges default positions, not necessarily least common denominator positions, but the position shared by all actors, which in this cases is the status quo.

Institutional embedding is key in governance to the extent that actors are able to embed policies throughout the infrastructure and then operate from that position. Declared creation of protected areas is particularly useful here in that it creates a negotiating point that is quite stable. In terms of national politics, one NGO head noted that "starting in the 1990s we started agreeing on a lot. In the 1980s it was not clear what was happening, but in the 1990s, agreement between a lot of us were stable." In contrast, deepening protected areas or developing extensive management schemes does not push particular institutional embedding in contexts of underfunding or possible

political shifts, instead these are potential costs that can be overturned. One national-level NGO manager explained that the attempts to integrate social or economic responsibilities into conservation plans is difficult because of the limited realm of discussions. One ecotourism operator commented that although there is significant potential in the protected area system, the struggles with pure economic extraction limits that potential. An NGO head expressed that the competitive situation in the post-Balaguer era made it so that everyone wanted to secure clear control over institutional pieces. Institutional embedding was thus a mechanism that developed in a post-authoritarian conservation politics that preferred conservation but not deepening of that policy.

Finally, forum membership is a key means of governance in the Dominican case. Forums have arisen as a key component of biodiversity governance worldwide and are seen as a key in many governance arrangements in bringing various stakeholders together. However, in the Dominican Republic, forum membership is often a key procedure in governance which brings in certain actors and excludes others. A key example is the distancing and limitations of TNC (Holmes 2010) before recent events have increased their profile. Forums organized by Helvetas, GTZ, and USAID have all proved key to governance making in the country. These forums, however, result in limiting options and ideas that are deemed already out of the agenda. Since most forums have their goal in strengthening conservation area politically and in their standing, other issues fail to get on the agenda.

The centralized network structure in the Dominican Republic case had a significant impact on limiting the possibilities for external learning in the network. The competitive domestic political situation resulted in domestic-elite bargaining and forum membership as crucial means of channeling the lessons to a set of centralized learning.

Hypothesis Analysis

Hypothesis 1 expects that if a governance arrangement has a modular structure then they will see bottom-up learning following a shock. This hypothesis in the cases compared here expects that El Salvador will see bottom-up learning following shocks. Following the natural disasters that occurred from 1997 until 2005 in the country, trial and error experimentation began by both communities and international funders. These started in a host of different communities and beyond the initial trials were shaped significantly by the network connections described in the last chapter. Findings from communities involved in these initial efforts were largely shared along network connections that preexists the experiment: namely the PTT network, the FMLN municipal network, and communities that worked on earlier projects with one another. The modular network structure in this case directly shaped the process of learning. This was similarly shown with the network expansion that happened largely between 2002-2006 following the political shock in the MBC with the political problems of the early project. In this case, the modular structure offered the possibility for multiple connections to be formed with new networks. However, in order to do this, the approach had to change to tie in the new networks. As the approach changed from

conservation areas and buffer zones to a complex patchwork of biodiversity actions, this was directly the result of the network expansion.

Although the next chapter will more fully show the changed perspective by actors at the international level, a single example can illustrate this process fully. Although biodiversity in an agricultural landscape had been started with the coffee pilot project in 1997 in El Salvador, there was no significant planning that operated based upon integrating biodiversity into agriculture in the early development of the MBC. In the initial MBC project, agriculture played a small role and the idea was often to create buffer zones to reduce agricultural pressure on protected areas. This approach led one NGO member in El Salvador to dismiss the project as "completely wrong." The 2011 World Bank analysis of their part of the project similarly evaluated the project largely based upon how much it restrained agricultural use in areas. However, this approach offered little ability to connect with the heavily farmed country of El Salvador. The result was trial and error learning by communities that allowed some inventive linking in with the project for agriculture. The MBC relaunch in 2010 thus included agriculture and agricultural zones as a significant aspect of the project, the El Salvadorian environmental ministry had switched significantly to this changed focus by 2009, and all of the corridor projects in the period after 2007 involved agricultural interactions as crucial parts of the project.

Hypothesis 2 expects that centralized networks will result primarily in top-down learning processes. In the Dominican Republic case, this would be expected to largely involve learning from the domestic elite network. Aside from the absence of any

evidence of bottom-up learning, it is also clear that the network structure largely ensured that learning through broadcasting would be the most dominant in this situation. Learning was largely limited to political learning in the new competitive environment created with the end of authoritarian support for conservation. The result is that actors were brought into the network, but that they were included in ways which limited the incorporation of new ideas. Most importantly is that there does not appear to be original change of ideas throughout the network, but that the limited context constrains the ability of these to have an impact. The priority becomes about consolidating networks rather than changing governance. As one environmental NGO leader explained ""It isn't just what we are doing…it is about consolidating different parties. In terms of NGOs, we need to consolidate and keep them involved. Not all NGOs are involved—not all are in the alignment."

A counterfactual consideration may provide additional evidence for rejecting the null condition of Hypothesis 2. If the conservation network would have retained its prominence in the early 2000s with the government and not entered into competition with the tourist sector, would the learning have still been limited in this case? In this counterfactual situation, if the answer is affirmed then this supports rejection of the null because it supports the impact of network structure on the learning context. It seems plausible that even without the competitive domestic political context, the learning would have been limited to political learning. The best evidence of this is in the forum organizing between members of the environmental body. These started in the 1990s when the competitive context had not fully formed and involved a number of the key

actors who would remain lead the forums later on. The network linking the government scientific bodies with the active NGOs also provides additional evidence for provisionally supporting this counterfactual condition.

Network Structure Conclusion

Network structure has an impact on the learning dynamics that exist in the different governance arrangements. The modular structure mediates against broadcasting because of different conceptions of authority and biodiversity governance that exist in the different structures. Trial and error experimentation and network expansion are two methods by which actors can acquire new ideas about biodiversity governance or methods of cooperation.

To assess learning in the two agreements, it is useful to divide learning between policy learning (lessons about the processes of political implementation), environmental learning (lessons about the causal processes that policies have on environmental outcomes), and social learning (learning how to learn in the future) (Argyris and Schon 1978, Levitt and March 1988, May 1992, Hall 1993, Haas and Haas 1995, The Social Learning Group 2001). Policy learning during this period was highest in the case of El Salvador because of the new actors interacting in a new environment. Trial and error contributed to network expansion and the result was broadened understandings of policy options. In contrast the Dominican environmental network had some initial problems discerning the post-authoritarian competitive political environment. Policy learning thus deviated in only small amounts from the earlier policies attempted.

Environmental learning in the two cases saw similar dynamics play out. Crucial in the case of El Salvador is that the local biodiversity experimentation resulted in significant attention to it from key intellectual entrepreneurs. In El Salvador this role was played by PRISMA and in the entire region the main leader was CATIE. Both organizations began publishing findings which supported the local efforts of the various communities and thus improved the environmental learning of the governance arrangements. In addition, because many of the local communities saw biodiversity issues as rooted in a larger resource system, including water and agricultural use, significant learning was done in regards to developing these multi-focal efforts. The Dominican Republic experienced much more limited learning that largely sought to augment the conservation system in place. This should not be interpreted as meaning that there was no environmental learning during this period, because it was significant in the Dominican Republic. However, the learning was more focused on supporting the status quo approach rather than any altered approach. Environmental learning was thus not of different degrees, but different focuses with the learning in El Salvador being defined largely by exploration and the learning in the Dominican Republic being done to support the approaches decided upon earlier.

Finally, social learning is the most difficult assessment in the different approaches and there are not clear indicators for either governance arrangement. What may be most significant is to analyze the learning that is done in informal but sustained manner. For the Dominican case, there appears to be significant learning within forums. Forums organized at the national level or at the international level

provide the most significant times for learning in the arrangement. In the El Salvador case, in contrast, forums are important but learning appears to occur outside of these activities as well. The way that learning occurred in non-biodiversity networks, like the PTT and FMLN municipalities, demonstrates some social learning extending outside of official forums.

In conclusion, network structure directly and significantly had an impact on the learning dynamics in the different governance arrangements. However, what both cases also show is that this impact is not constant but dynamically related to shocks and earlier learning efforts. The impact of network structure on learning processes is thus a dynamic relationship. This may explain some aberrant cases where network structure produced a different outcome at this stage. It would be expected from the discussion above that if early lessons fail to address problems or generate benefits for actors that the impact of network structure will grow increasingly fragile. These cases thus highlight both that network structure is significantly important and the possible limitations that this importance has on learning dynamics.

CHAPTER 6

RESILIENT GOVERNANCE

Network structure, mediated through the post-shock learning dynamics, shapes the eventual outcomes of governance arrangements in terms of resilience. Modular network structures will likely result in resilient governance because they have a wider range of information about how to respond to shocks and because the governance adaptations are more applicable to the various clusters of actors. Centralized networks, in contrast, are likely to result in governance which does not adapt to the situation because idea generation is channeled by one cluster in the network or where the ideas have low applicability.

In El Salvador, the modular network structure resulted in decentralized learning through trial and error experimentation, exchange of information, and network expansion. In the Dominican Republic, the centralized national level elite networks channeled learning to continue their preference in a competitive context. However, the lessons in Chapter 2 have shown that generation of ideas and bottom-up learning is insufficient to foster resilient governance. In many cases of biodiversity governance the generation of ideas leads to outcomes of arrested development where the information is unable to be implemented (as was the case of Ramsar). Conversely, early learning through bottom-up methods could fail to ever form into a coherent whole resulting in equilibrium outcome (as was the case of CBD).

To test the crucial Hypothesis 4 and Hypothesis 5, this chapter studies the resulting impacts in terms of adaptive capacity and authoritative capability in the two

key cases of El Salvador and the Dominican Republic. Hypothesis 4 expects that if there the bottom-up learning in El Salvador will result in resilient governance. Hypothesis 5 contends the opposite result for the top-down learning in the Dominican Republic. To evaluate these considerations, this chapter will focus on transformations to the network structure, the governance approach, and the impact on the environment.

Network Transformations

If the metaphor of the adaptive cycle from resilient ecosystem studies has significant salience, it is in the development and transformation of networks through the stages. Network connections are formed, sometimes they become stale or of limited use to actors, then they go through a cycle of reorganization before once again forming in a network structure. A crucial basis for Hypothesis 4, Hypothesis 5, and Hypothesis 6 is that network structures tend to replicate their forms. If network structures were to change dramatically through the process, then the system has moved to another state and, most importantly, probably had a limited causal impact on the outcome. In contrast, the evidence below will demonstrate quite clearly that network structures tend to reorganize in similar structure to the preexisting one.

In the El Salvador situation, the modular network experienced significant bottom-up learning during and after the shocks experienced around 2005. The primary approach adopted by a number of actors at various levels emphasizes small biodiversity projects and focusing on projects that integrated with lived environments. This approach was crucial in contributing to future network evolution. The result is that the network became increasingly dense, but retained a number of modular structures.

When understanding the different modules of the network, the coordination for the project at the regional level largely subsided after the initial enthusiasm and permanently ended largely with the 2006 closure of the coordinating office. However, corridor activities during this period increased significantly on the local level, and particularly so in El Salvador, as described in the last section. In 2010, the relaunch of the project thus did not initiate local initiatives as much it recognized the changed situation.

Looking at the 2006-2010 corridor projects in El Salvador demonstrates this transformation and the network effects that it had. First, FIAES plays a key mediating role for many of the local level actors and NGOs. While GEF and FIAES make up a large bulk of the cases for the network, it is interesting that while FIAES plays a role as a bridge, the GEF attached projects tend to be less isolated and more connected with other actors. This partially may be a result of FIAES providing easier granting criteria and processes that allows more one shot projects; but it may also be a point of larger relevance about what local level actors and national NGOs improve their centrality. Second key aspect about the network is that the dense area of the network has a host of different actors in the most dense area. Local level actors, business sector actors, national NGOs and the U.S. government are all active. However, the highest number of actors in the core are various international funders. In the dense area still there are two clusters to the top and bottom of various national NGOs and local level actors. Regardless, it is apparent from the visualization of the networks that international funders have significantly increased their relevance in the Corridor network from the

earlier manifestations. One final key aspect about the dense section of the graph is that it is highly redundant in terms of linkages. There is not a single unit that would break the graph apart and separate out the different areas: at least five organizations would have to be removed in order for the network to be split from its current set of connections.

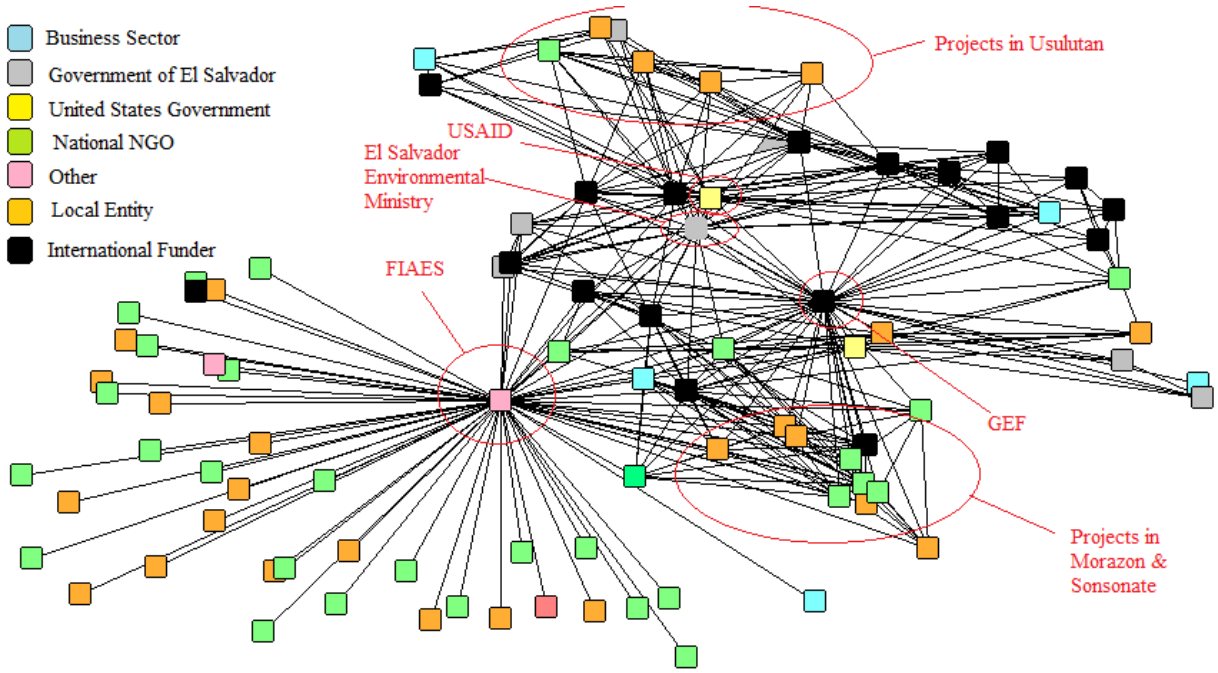


Figure 6.1- Labeled Social Network Graph of El Salvador Corridor projects.

Some of the crucial nodes are the key actors that would be expected to be prominent: FIAES, GEF, the Environmental Ministry, etc. However, within the network, other actors are similarly important in connection with these actors. The visualization appears to support contentions that while the centrality of the state may have sustained, its role as a linking actor in the network seems to have given way to a denser set of connections for most of the actors involved in the network.

Quantitative indicators of the network support this general conclusion with FIAES and GEF retaining significant centrality and, in the case of FIAES, betweeness. FIAES, a combined effort between USAID and the El Salvador Ministry of the Environment, is the key linking organization for a host of actors. GEF is the center of the more dense web of connections with a number of linkages to multiple other actors. Although important, the centrality of these actors should not be overemphasized because the sheer number of projects by both organizations when compared to other actors elevates them up to a higher level of centrality. The conclusion to draw is that FIAES and GEF are the key central actors in the network, but that this may not be as great as depicted in centrality scores.

In terms of type of actors, U.S. government actors (USAID and the Peace Corp), the government of El Salvador, and international funders are those with the most significant centrality in the network. Since there are only two 'Other' actors, that score is exceedingly inflated by FIAES' very high score. National NGOs, local actors, and businesses are far less central in the network in terms of Centrality and Betweeness. Some conditions have to be added to the discussion in order to fully understand the situation. Local governments did not exist at all in the network earlier and so any increase is significant. In addition, when focusing on the dense area of the network only, the centrality, betweeness and eigenvector scores of local governments increase significantly. Similar conclusion can be seen with international funders, other than USAID, that have significantly increased their centrality. However, National NGOs

appear to have not significantly improved their centrality in the Corridor network from earlier articulations.

	Average Centrality	**Average Betweeness Score**	**Average Eigenvector**
Business Sector	1.11	0	3.3416
Government of El Salvador	13.0535	1.4505	20.3635
U.S. Actors	17.222	3.814	22.4385
National NGO	4.6703	.0206	7.9442
Other	38.33	36.2705	25.9625
Local Level Actor	4.2033	.04853	7.1846
International Funder	14.25	1.7954	19.0081
Overall Network Average	7.692	1.323	11.04
Network Centralization Index	23.269%	72.01%	8.56%

Table 6.1- Social Network Analysis Measures of El Salvador Corridor Network.

This evidence shows significant clustering in the network with groups connected together and then having less strong connections to other actors. The shock did change significantly the members of the network and of the 92 actors included in the network map above, fewer than a third were engaged in the clear biodiversity networks discussed in Chapter 4. However, the network structure stayed consistent with a number of clusters of actors interacting primarily with one another.

In contrast, in the Dominican Republic, the network retained a largely centralized structure through the transformation did include integrating in the tourist network and some actors who were marginal before (namely TNC). More actors though did not change the general structure of the governance arrangement. In other national contexts the Caribbean Challenge may have responded differently, but in the Dominican case the result was largely in supporting the centralized network before.

Figure 6.2 shows the Caribbean Challenge network, which did include new actors but which kept a largely consistent network structure. Business and international funders get integrated into the network with the Caribbean Challenge; however, they were integrated into the network that retained the centrality of other actors. While they were dispersed and not connected greatly with the core of the network in the earlier network depictions, business actors have taken over prominent positions and are significantly embedded in the dense part of the network. In addition, the central positions for the network is provided by three fairly redundant organizations: the Dominican Ministry of the Environment, USAID, and The Nature Conservancy. Particularly the Ministry of the Environment has a prominent location as a bridging node providing the most significant connections between the actors below the dense part of the network with the dense part. The visualization supports that the Ministry of the Environment, USAID, and TNC all have seen the greatest increase in their prominence in the network and business organizations have connected far more centrally in the network.

Measures of the network similarly bolster this with clear increased centrality for business and the state actors in this network. Business actors, in particular, moved from being largely outside of the network to prominent positions. Although their betweeness score did not become highly relevant within the network, their centrality and eigenvector scores became crucially important. Similarly, the state did not improve dramatically any of the particular scores, but did see increases on all measures of prominence in networks collected here. International Funders and the U.S. government, centered now around USAID and not bringing in the Fish and Wildlife Service significantly, also increased their prominence in the network significantly. In terms of betweeness though the impact on the network is clear as the United States government entities and the government of the Dominican Republic became crucial actors in terms of betweeness and no other group of actors did. Table 6.2 shows the changes in eigenvector averages between groups in the original network construction from 1999-2009 and the Challenge network construction.

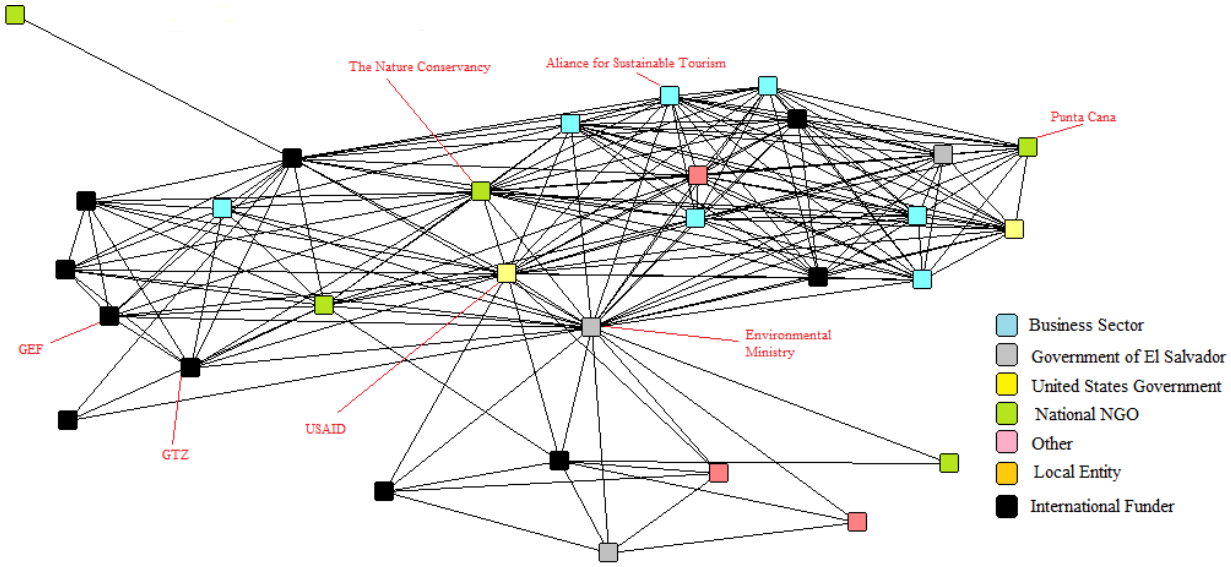


Figure 6.2- Labeled Social Network Graph of Dominican Republic Caribbean Challenge Network.

	Average Centrality	Average Betweeness	Average Eigenvector
Business	49.75371	0.422571	30.69686
Government of the Dominican Republic	53.44825	8.2275	27.4305
International Funder	29.655	1.1299	15.4852
Local			
National NGO	35.1726	1.4508	19.0904
Other	36.2065	0.388	20.365
U.S. Govt	63.793	5.4065	34.8555
Average Network Score	41.149	2.2	22.512
Network Centrality Index	23.01%	31.21%	26.73%

Table 6.2- Social Network Analysis indicators for Dominican Republic Caribbean Challenge Network.

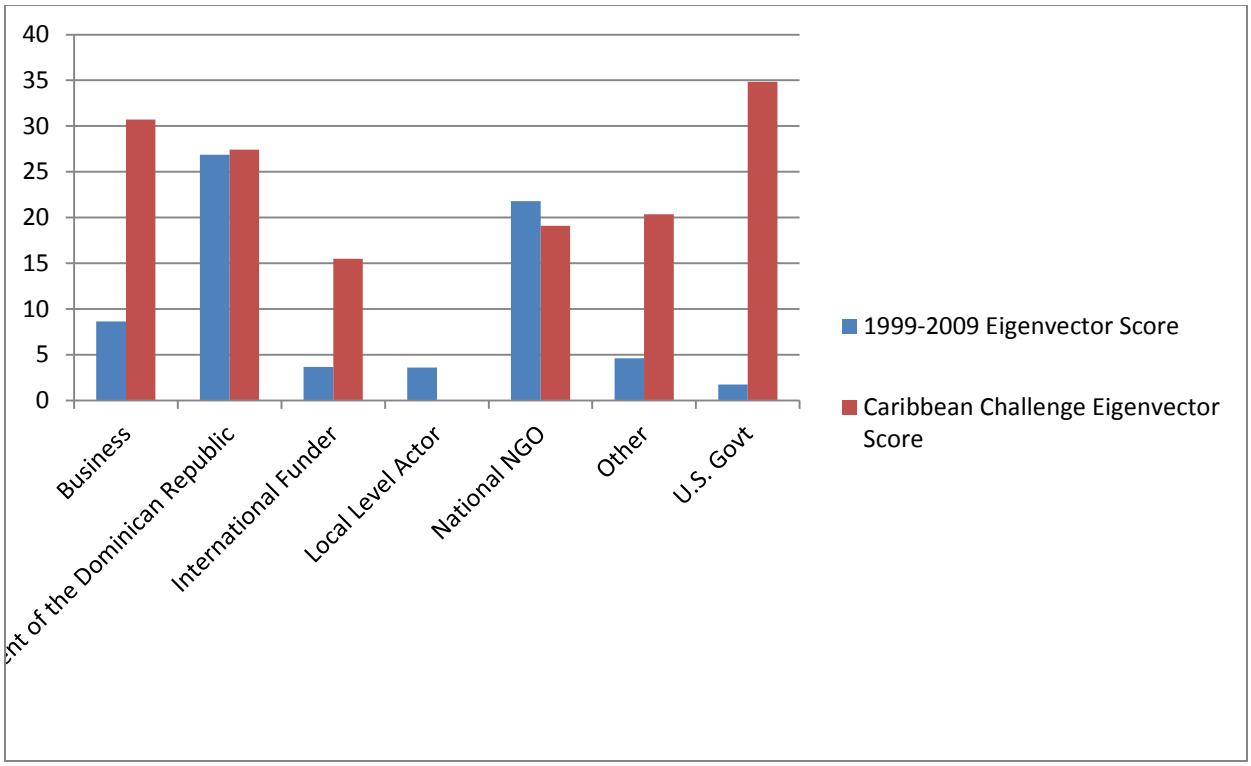


Figure 6.3- Difference in Eigenvector scores by Sector in Dominican Republic Networks.

Governance Transformation

The MBC saw significantly transformed network strategy and the 2010 project differs from significantly from the 1997 project. In contrast, the significant updating which was planned for in the Caribbean Challenge was largely scuttled and instead resulted in the same style of governance as had existed before in the Dominican Republic. While there was some learning in the Caribbean Challenge, this was not possible to integrate into the governance arrangement. Exploring these differences will clarify the core aspects of the transformation.

The Mesoamerican Biological Corridor (MBC) has changed significantly from the early years until the later stages of the project. The 1997 launching of the project, funded primarily by the World Bank and NASA, aimed to regionally organize and

connect protected areas throughout the region and monitor progress using aerial mapping. Efforts for the project from 2000 until 2006 were organized out of an office in Managua, Nicaragua separated from other organs of the regional integration institutions. Some new creation of protected areas did occur and there was some initial monetary and technical assistance. The project was a centralized project with funding from a few sources and projects were largely undertaken through national coordination of policies.

In contrast, the 2010 relaunch of the Corridor project (Comision Centroamericana de Ambiente y Desarrollo (CCAD) 2009) was distinct in a number of key respects. The scope of the project was largely about integration of a variety of issues as part of the corridor project (including clean energy, water, and adaptation to climate change), participation of local communities was embedded as the core actors of the project, exchange of information throughout the project was of utmost priority, and the coordination was to be a series of regular exchanges rather than central organization. The focus had shifted in a variety of ways from large scale coordination efforts to a number of small scale efforts. Participation of local governments was a core focus of the project and monitoring was to be done with various approaches.

One dramatic difference between 2000 and 2010 was that the Corridor had moved to the country of El Salvador. A lengthy history of extensive cultivation throughout the country (the extensive settlement and landuse in the country was present long prior to Spanish settlement Dull 2007), the long civil war in the 1980s, the lack of any significant protected areas in the country, and perception of irreversible land

degradation in the country had largely kept El Salvador out of the initial MBC project. The 2000 strategy for the MBC did include the Lago Guija-San Diego-La Barra protected area in the Northwest corner of the country in the project; however, little change in its management or connection in the country of El Salvador was planned. By the latter half of the decade, El Salvador had a number of projects linking in with the regional corridor concept and began to be a significant part of the extension of the MBC and much of its activity. The maps of project aspects changed, the approach of the project had adapted, and the support for the Corridor was enough to drive for its continuation even after the formal institution had faded.

In direct comparison with this, the Caribbean system largely generated the same response as had happened in prior agreements. In 1990, the Caribbean Environment Programme (CEP) negotiated and opened for ratification the Protocol Concerning Specially Protected Areas and Wildlife (SPAW). The most significant regional biodiversity governance attempt in terms of membership and scope at the time, SPAW's broad goals were to increase protected areas in the Caribbean region, particularly marine protected areas, utilize an ecosystem perspective and not to focus solely on individual species, and create a permanent fund to support these efforts. To comply with SPAW, the Dominican Republic created some new protected areas in the country and expanded previous areas. In 2008, The Nature Conservancy (TNC) announced five countries had agreed to the Caribbean Challenge (TCC). It was the most significant regional biodiversity governance project led by an NGO and its broad goals were to increase protected areas in the Caribbean region, particularly marine protected areas,

utilize an ecosystem perspective which focuses on wider environmental issues, and create a permanent fund to support these efforts.

One year after the launch of the Caribbean Challenge, the Dominican Republic agreed to expand their protected area system significantly. As the TNC's press release reads: "The Nature Conservancy applauds a recent Presidential decree in the Dominican Republic, which will add 31 new protected areas into its national protected areas system. The new protected areas encompass a total of 1,321,024 hectares—just over 3.2 million acres—of terrestrial and marine habitat. The decree acknowledged the need to reinforce the Dominican Republic's existing National System of Protected Areas" (The Nature Conservancy 2009). The Dominican Republic then became the first country in the challenge to meet the requirement of having 20% of their marine territory protected and protected significant amount of territory. However, these declarations followed closely the pattern of conservation politics in the Dominican Republic previously: Expansion of old protected areas, creation of new protected areas without full management plans for those sites, done by Presidential decree.

In terms of financial sustainability, interviews with NGO representatives, managers of protected areas, and environmental ministry officials in August 2010 all expressed that the gap in funding remains and that the environmental ministry is chronically underfunded. Although the GEF project is still ongoing and much of the money has not been delivered, the initial strategy to charge visitors a nominal fee at protected areas appears not to have improved financial situation in the early years of the program. Some co-management happens in the Dominican Republic, key examples

including management in the Bay of Samana and Parque Nacional Jaragua; however, much of the efforts since 2008 have emphasized solely ecotourism operations as co-management partners and largely ignored other possible actors. However, ecotourism funding may not be as sustainable as expected and relying upon tourism to fill the funding gap for protected areas may not create financial sustainability as desired as it does not fully diversify funding.

The Caribbean Challenge in the Dominican Republic then has largely repeated policies tried earlier which have failed to substantially improve the biodiversity of the country. Although it is popular to compare to Haiti as the other half of the island shared (Diamond 2005) and such disparity is starkly evident. Although there has been some significant slowing of loss, deforestation around parks continues, there are not management plans at 60% of protected areas in the country, and endangered species numbers continue to fall (EarthTrends 2003, Global Environment Facility 2008, International Resources Group 2001). According to one NGO head, "the protected area system in the Dominican Republic is not very good, it is just that they keep people out" so the rapid decline does not occur. Ecosystem perspectives, although the goal in both SPAW and TCC, have not been introduced into the governance of biodiversity in the country significantly.

Environmental Resilience

The crucial question remains about whether this has any impact on the environment or on the ecosystem services provided to the population. There is sufficient evidence for some initial answers to this question. El Salvador has shown

some significantly positive outcomes in terms of biodiversity, some of which can be linked to the corridor projects in the country. In contrast, the Dominican Republic has shown limited improvement and there are no clear signs of improving biodiversity in the country.

In terms of ecosystem fragmentation, various indicators suggest that the governance agreement is assisting in dealing with fragmentation. First, Hecht and Saatchi show that between 1990 and 2000 there was significant growth of forest cover throughout El Salvador and that significant reforestation had occurred (Hecht and Saatchi 2007). Other contributing factors are the primary cause for this aspect of the findings, such as depopulation of the rural countryside, disruption of large export agriculture, etc. However, crucial in the discussion is local communities taking control over the resources. Cinquera, the key example highlighted above, is a crucial case in this respect. Their efforts at management of their natural environment has resulted in significantly improved forest cover and habitat coverage (Valencia et al. 2011). This is an illustrative but not an extreme example, and other communities elsewhere have seen significant progress in terms of ecosystem fragmentation. The MBC is thus part of other processes, but deserves to be seen as a governance intervention that appears to be improving forest fragmentation.

In terms of ecosystem service vulnerability, it is relevant that the natural disasters in El Salvador did not end and one of the best cases for analysis is comparing Hurricane Mitch with Hurricane Ida in 2009. Hurricane Ida produced dramatic rains for a number of days throughout El Salvador dumping rain comparable with Hurricane

Mitch in 1998. There were once again significant landslides throughout the country; however, the level was significantly less than Hurricane Mitch, the earthquakes, or Hurricane Stan. In addition, the same processes highlighted as contributing to biodiversity governance above, the local-local network primarily, was seen as a crucial means of responses to Hurricane Ida (Tellman 2010). The networks and efforts in El Salvador have shown significant reduction in vulnerability to natural disasters and improved community resilience to such disasters.

The environmental impact of these expansions will not be seen clearly for years; however, the early evidence shows significant ability to reduce fragmentation and to reduce vulnerability. Some initial projects have become permanent programs run by local communities or the national government itself so the political effectiveness is very high in the case of El Salvador. This is most surprising considering the significant political barriers to the program in the early parts in other countries. In addition, the evidence shows that these local-local efforts have reduced fragmentation and improved some key aspects of ecosystem health. In general then the study finds that there has been significant effectiveness as a result of the governance arrangement.

The Dominican Republic has not produced a resilient ecosystem. Initially, there are no studies that demonstrate sustained improvement in species health or ecosystems throughout the country. More dramatically for the assessment of socio-ecological resilience is the continued negative recovery after natural disasters. Tropical storm Noel in 2007 generated significant rainfall in the Dominican Republic with numerous impacts. The regeneration after this storm has been significantly limited

largely as a result of any management outside of protected areas. Izzo, et. al. summarize the results of Noel and the evidence it provides about the resilience of the socio-ecological system:

On October 29th 2007, the Dominican Republic was hit by the Tropical Storm Noel, which caused huge precipitation all over the country and strong winds in the South West of the national territory. The storm can be considered as an exceptional event as to the persistence of rainfall in the considered 6-day period, for which recurrence periods of 50 to over 200 years could be calculated in various provinces. The collected data evidence that the main impacts on the population were provoked by landslides and flooding, which accompanied the storm event. The hugest socio-economic consequences involved rural communities, which were affected very strongly by the interruption or destruction of communication infrastructures and by the loss of a lot of foodstuffs and agricultural products…Zones where recuperation appears the most critic are those affected by landslides. In particular, the complete removal of the vegetation cover makes very difficult, at least in the short to medium-term period, the rehabilitation of agricultural parcels. (Izzo et al. 2009, 156)

Indeed, demands for speedier recovery after these hurricanes in protected areas has led to introduction of foreign species which will grow faster than native plants further degrading the resilience of the ecological system. Despite a significant protected area network that is used as a model for other countries (Diamond 2005), the top down, nonadaptive governance system has not produced resilient socio-ecological system.

In general then, the Dominican Republic provides a core limiting case in the argument. The competitive domestic system with a coordinated elite conservation group limits the ability for adaptation or other resilient moves. There are no signs of emergent processes operating and the result is an ecosystem that seems to mirror the governance in neither improving nor devolving. This may have changed recently as a result of increasing democratization in the country, a broad based environmental movement, and additional changes; however, it has not significantly transformed the structure of the governance order so far. The limited resilient governance in the Dominican Republic highlights crucially some of the mechanisms which work against adaptation and improved authority of the arrangement.

Resilience Hypothesis Analysis

The learning procedures appear to have significantly shaped the governance outcomes of the arrangements discussed here. El Salvador has seen policy adaptation and implementation of the new approaches. Although there are some creative actors in the Dominican context, policy adaptation and implementation have been negligible. The Caribbean Challenge at the regional level is a different approach to the earlier efforts attempted in the Dominican Republic, but still did not contribute to significant adaptation.

Hypothesis 4 and Hypothesis 5 expect that the learning dynamics will directly contribute to the resilience or lack of the arrangements. Bottom-up learning from modular structures is expected to result in adaptation throughout the governance arrangement. In contrast, top-down learning from centralized structures is expected to

lead to status quo implementation and lack of adaptation. These hypotheses find significant support in the case studies.

The El Salvador case, with the broad learning produced in the post-natural disaster phase, resulted in significantly changed governance outcomes. Adaptation happened in two different ways. First, policy adaptation happened and the corridor project changed significantly. The evidence is clear in the inclusion of El Salvador in the project. As noted many times, the initial project included El Salvador in only a limited fashion; however, the project gradually began to include the country in efforts largely recognizing projects which had already been built by local communities and international funders. This expansion is not random or simple policy drift, but rather is the result of learning happening at multiple stages during the 2000s. As local actors became more important and international funders began to support their activity, the result was that governance arrangements finally caught up. The modular network structure shaped the learning dynamics of the governance arrangement which then had a direct impact on the governance and networks of the later governance program.

Most significantly is that this has created a system which appear to have significant adaptive capacity and authoritative capability going forward. Projects have not remained as merely projects but have reached a more stable form of governance with regular and long-term funding from international sources. For one example, despite political change in 2009 in El Salvador, projects have continued to a large extent and with support from the environmental ministry have expanded. Similarly, the MBC, the national environmental ministries, and other actors appear to be willing to support

the multifaceted process. These are becoming a more prominent driver of governance strategy at a number of levels as time goes on.

The Dominican Republic presents an alternative case where the top-down learning secured the interests of the centralized network but which did not support adaptation at all. One thing apparent in multiple interviews is that ideas for adaptation are rampant but are shelved in most cases because of a feeling of a persistent challenge to the governance arrangement. Political consolidation, strengthening the core network, and protecting the key policies are considered the key objectives and adaptation is sidelined. The evidence of the connection between learning and policy is quite clear in the Dominican Republic. New actors brought new ideas into the conservation network, but that network used its strength to channel these activities to status quo governance solutions which served their political interests. As argued in Chapter 3, this should not be read as the complete dominance of national political context, but rather as the lack of coherent rival networks in that case. The network structure shapes the interaction from the initial formation through to the outcome.

Hypothesis 4 and Hypothesis 5 find support in the political development in these cases. Resilience resulted from a generation of ideas from multiple actors and a governance arrangement with the capacity to support this transformation. In contrast, arrested development resulted largely from a centralized network that could shape idea generation and transfusion. The theoretical finding then sees significant support across the cases.

CHAPTER 7

CONCLUSION: TAKING DYNAMIC GOVERNANCE SERIOUSLY

The main finding from the study of international biodiversity governance is that network structure matters for adaptation. Modular network structures generate a number of diverse ideas which provide adaptive response for governance arrangements following shocks. Centralized networks, in contrast tend to have limited adaptation and respond by supporting status quo governance rules. Those governance arrangements with limited networks tend to see little to no response to shocks. Network structure, mediated by learning dynamics, is crucial for effectiveness to continue.

The argument is dynamic to the extent that early transformations can have lasting and cumulative impacts, but surprise remains possible. Governance shocks can trigger creative destruction, doubling down on the current governance approach, or collapse and abandonment of the project. If early trial and error learning in El Salvador was disrupted in the process, it is quite plausible that the process would have been disrupted entirely. Similarly, those early political shopping trials proved absolutely pivotal in paving the future efforts. Similarly, the forum formations in the Dominican Republic shaped future efforts much larger than they shaped policy at the time. The network structure theory thus introduces a dynamic argument into studies of effectiveness. In addition, the cases have demonstrated that although there is general impact by network structure, the process has complex causal pathways detailed by different mechanisms. While identifying general conditions and learning pathways, the network structure theory works through a variety of different mechanisms.

The dynamism in this theory goes beyond the limited dynamics in theory of fit in explaining institution development (Young 2010) or institutional interplay in explaining effectiveness (Oberthur and Gehring 2006, Raustiala and Victor 2004, Young 2002, Kim 2004, Jinnah 2011). Both approaches are dynamic in that they include complex causal pathways, but this approach differs in that it includes lasting effects from earlier developments (path dependency) and shock and surprise directly in the development processes. Adding the issue of emergence into international environmental politics has significant impacts on the study and future work in the field. This conclusion will reflect on the impacts this can have on methodologies, institutions, science, and national context.

Methodological concerns

A primary methodological concern is how to study and capture emergent processes. As shown in the case studies, network structure are simultaneously actor-created and have downward pressure on actors (Sawyer 2004, 2005). These emergent phenomenon require a different epistemological approach than linear dynamics and have impacts on the methodologies used to study international environmental politics. The challenge confronting research is how to maintain a coherent argument for empirical evaluation that is simultaneously mainly about agents and structures (Hedstrom and Swedberg 1998).

Direct or linear causal stories, of the type X causes Y or an increase in X increases the probability of Y, focus primarily upon simultaneous changes in variable conditions. Aggregate causation, where X does not cause Y until the level of X reaches a certain

point, similarly focuses upon changes in variable conditions, albeit with time and tipping points playing crucial roles. However, if it is contended that an outcome results from emergent processes, such relationships between variable conditions may be misleading. The problem of confounders becomes highly problematic if it is possible that there is an emergent process at work. For example, although supporting national constituencies or strong international institutions may correlate greatly with resilient governance, it could be caused by other dynamics that are not captured in the correlation story.

Emergent causation involves two different processes working in close real connection. First, there is an uncoordinated action by units that are analytically independent from one another. This is the bottom-up aspect of emergent causation. Second, the decisions made by these agents creates a structure that impacts future actions by those individuals. This can be conceptualized either as the feedback loop (in unstructured forms) or as the structural effects (Sawyer 2005, Davies 2006). The self-fulfilling prophecy of bank collapse is a clear example of this. Many individuals, possibly for very different reasons, form a belief in the weakness of a bank and express the belief that it might fail. These individual level actions can form a result where people begin withdrawing their funds, weakening the bank, and possibly leading to the prophesized end (Merton 1948). The bottom-up aspect and the feedback loop need not be of the same form and all that is necessary for emergent causation is that both the bottom-up, uncoordinated processes and the feedback loop operate actively and often simultaneously. Emergent causal stories need to have both aspects or it is different type of causation happening; so if the bank is making poor investments and that is what

impacts its health rather than individual perceptions, that would undermine any emergent causal story.

There are some unique challenges to empirically evaluating emergent causation. A first problem is the difference between strong and weak emergence which relates to the amount of coordination between units at the lower levels (Chalmers 2006). Weak emergence can involve unstructured interactions between social agents that is not purposefully guiding the outcome. Back to the bank example, if account holders talk to one another about their belief in the strength or weakness of the bank they are not intending to produce the outcome of bank collapse but nor is the process completely uncoordinated. Strong emergence involves exactly those situations in which uncoordinated interactions where individuals make their own small decisions which are not communicated directly to other actors. For example, if account holders in the bank reduce their investment in the bank on their own, this will restrain the bank's ability to lend which may then cause other individuals to make their own beliefs about the weakness of the bank further restraining the bank's activities. Weak emergence is far more likely in the social world (Clemens 2007), but the distinction between it and directed action may not always be clear.

This leads to the second problem which is how to identify and assess the strength of emergent processes in complex social environments. One popular approach is agent based modeling or the use of computer programs to test the ability for limited logic agents to create complex environments (Johnson 2001, Axelrod 1997, Holland 1992). These computer aided approaches are unique in their ability to test if units

operating with simple logics can create social patterns of interest without directing their behavior. Like all laboratory findings, the limitation is on connecting these findings to real world settings in useful ways. It is also possible to do direct empirical assessment of the emergent propositions, but it is important to refine the analysis to the actual processes of production rather than variables or structures.

The focus on mechanisms then allows clear empirical support or disconfirmation of emergent causation and allows comparison with other possible systems. Mechanisms are the direct generative processes that produce key outcomes or steps in the eventual outcome of interest. They allow excellent views for evaluation of outcomes in that they can quickly disconfirm emergent arguments. If processes were generated through directed, hierarchical action, or if the feedback loops are not operative in a meaningful sense, then the empirical argument is fundamentally weakened. However, at the same time, if the bottom-up processes occur through undirected action and if there is an effective feedback mechanism for all agents, then there is good evidence of the emergent argument.

Agent based modeling and other tools can be used to provide evaluation of the logical impact of emergent mechanisms (Axelrod 1997, Janssen and Ostrom 2006). Coupled with empirical analysis of network structures and the processes that produce, hold together, and make those networks important, these methods can be used to focus more significantly on emergent phenomena. Multilevel ethnographic analysis may also offer unique perspectives that need to engage in the work at multiple levels (Ong and Collier 2008, Tsing 2005, Gille and Riain 2002). Focusing on environmental politics at

any single level would appear to miss crucial aspects of governance that are relevant. How agents understand these processes and organize emergent patterns is a crucial question in further capturing dynamic processes.

Creative Destruction

One of the key issues to consider based upon the case is the existence in international governance institutions of a process of creative destruction: whereby severe political shocks serve to create political openings and opportunities which did not exist prior to the shock (Gunderson, Folke, and Lee 2010). Although, in governance terms, destruction is often seen as a severe situation of collective action failure, does it allow progressive political opportunities? To focus on the case studies and the particular political development in the two countries, did the civil war and the radical democratization which followed create a situation where the MBC could see significant local expansion into the country? In contrast, in the Dominican Republic, the authoritarian leadership was able to maintain power and authority and guide the transition to democracy. Without ever prescribing civil war in order to change governance contexts, does this significant disruption it caused to political alignments allow us to reexamine cases of limited and failed statehood (Risse 2011).

The history of biodiversity politics certainly requires additional thought into the dynamics of creative destruction in governance politics. One of the key questions revolves around how to maintain authoritative capability and the legitimacy of the arrangement while simultaneously going back to the drawing board. The MAB World Network of Biosphere Reserves, CITES, and even the MBC example in El Salvador show that this is difficult to achieve in practice. MAB and CITES both maintained many of the key parties as they refined procedures and selection of members in order to get the most out of these actors. The MBC, in contrast, shows large replacement of networks in the adaptive process. The risks are apparent and seen

in a number of the limiting cases in biodiversity politics. The Amazonian biodiversity efforts show that changing constituencies and networks can end creating no deep network structure at all. Conversely, ITTO and many of the other cases show that keeping the access procedures the same can lock governance arrangements in place despite any disruptions. Creative destruction then may be found to be one particularly path towards resilience, but a particularly risky procedure which is shaped by international institutions, the role of scientists, and national context. The El Salvador case of course includes guidance from UNDP, a national context which facilitated the gradual work toward democracy, and a changing scientific basis (emphasized with key actors like Prisma at the local level and CATIE at the regional level). These issues are central in the study of global environmental politics and it is to them which this conclusion now turns.

Institutions

The findings from this study do not call into question the finding in international environmental politics that international institutions matter. However, according to the argument in Chapter 3, the conditions that give rise to resilience may be distinguished from the features that create effectiveness. Strong institutions have been shown consistently to be crucial in positive environmental outcome, but this study shows that those strong institutions need to have a broad and modular structure in order to have an impact. Issues of institutional strength (Keohane and Martin 1995, Simmons and Martin 2002, Young 2002, Young, King, and Schroeder 2008) and leadership (Ivanova 2010, Skodvin and Andresen 2006, Young 1991) are not supported as being relevant factors for the resilience of organizations.

Regime complex studies are a definite step in this direction in trying to capture the networks around a governance arrangement. However, the expansion of analysis

should continue to include a range of relevant network connections for regimes and institutions. Importantly, in many governance arrangements this will include a diverse set of actors at various levels. Local level actors are increasingly connecting in regular networks with international and global actors. These network connections can have significant effects on the institutional design and adaptation processes. Developing deeper understandings for understanding network connections of institutions in a systemic manner should be a primary focus for future work.

Additionally, more work on governance shocks and problem type on institutions can be a focus for future work. An important agenda for future research is to see if the problem type or structure matters in this finding (Mitchell 2006). Complex problems may be particularly unresponsive, or even negatively responsive, to attempts at managing them while simpler, decomposable problems may be easier to manage in a variety of ways. Discerning this aspect may be crucial for environmental governance in the future and the various ongoing institution-building approaches.

The Role of Scientists

The network structure theory of resilient governance adds an important corollary hypothesis to both the epistemic community argument (Haas 1992, 2001) and the reflexive mechanism argument (Siebenhuner 2002, 2008). The network structure theory largely confirms these arguments, but explains some important aspects about the operation of transnational scientific groups or environmental assessment. The corollary is that these organizations are expected to have the most significant impact on adaptation and social learning when they are a coherent cluster of actors augmenting

political clusters. When there is a centralized network and scientists are either too separate from the central network or have no insulation, these communities have less impact.

The argument of the dissertation is particularly significant with the current proliferation of assessments around a host of environmental problems (Farrell, VanDeveer, and Jager 2001, Hasselman and Barker 2008, Millennium Ecosystem Assessment 2005, Mooney, Cropper, and Reid 2004, Siebenhuner 2003, Sutton et al. 2011, Global International Waters Assessment 2006). Assessments are key reflective mechanisms, as exemplified in many of the cases, that can be crucial in producing adaptation or improve the procedures of the governance arrangement. However, they are highly conditional upon the overall networks of connections that exist in an arrangement and how these are aligned. The Millennium Ecosystem Assessment, has spurred changes in the weak institutional context of the Ramsar Convention but has been fairly limited in terms of impact in the Convention on Biological Diversity. The spread of the epistemic community and their connections with other communities, as exemplified by the MAB ratcheting up, is additionally important in the ability to create positive conditions for resilient governance.

The implications on the Intergovernmental Panel on Climate Change are crucial in that its efforts to clarify the findings and broaden the base of contributors with thousands of authors and readers seem unlikely to improve the connections of the network with other sub-networks. Efforts of the panel on a coherent set of findings and then connections with other actors in an independent and translatable effort may be far

more valuable than is including hundreds of listed authors and attempting to create an acceptable consensus. This is very speculative at this point, but the findings from biodiversity governance and resilience seem to suggest that attention on the connections between expert communities may be more valuable than the scope of inclusion of any single expert community. Future work could examine assessments like the Millennium Ecosystem Assessment and environmental reporting like the IPCC in terms of expert community interactions.

National context

While the network structure theory complements theories about institutions and scientific communities, it draws contrasts with theories that emphasize the shaping role of national context on international inputs. The study finds significant reason for questioning this simplified argument. Aside from increased resources, there appear to be little reason that centralized networks at the national level would have any more significant an impact on governance than centralized networks at other levels. This condition would be necessary broadly for support of the national context argument.

However, there are some avenues for future research which develop out of this study. Comparative studies between the differences between states with different capacity and economic resources could help augment studies of the network structure theory. In addition, party change in El Salvador appears to have been important in ensuring the increased recognition of the projects which had developed within the country. Political change introduced the competitive dynamics in the Dominican Republic that resulted in limiting adaptation in the conservation strategy of the country.

Understanding political change will be a crucial part of future research understanding the dynamic impacts and how sudden shifts of network structures will change the regime.

For Future Research

Global biodiversity governance has a host of precarious projects and programs which are going to need resilience to prevent the global collapse of wildlife biodiversity. Some biodiversity governance arrangements have been able to deal with the problems of shocks and develop into highly resilient arrangements and this study has emphasized the mechanisms which have produced that outcome.

This lesson offers some unique aspects for extensions of the research and future study. It is possible to extend work to other areas of global environmental governance like climate change, deforestation, desertification, etc. Empirical work should assess whether the findings in this work apply to areas with more basic transboundary pollution problems like acid rain, shared water resources, and others. More significant for future study is exploring the conditions in areas the operate differently than biodiversity governance.

One key example would be climate change which for many years involved negotiations and decisions in a centralized process, the United Nations Framework Convention on Climate Change (UNFCCC). This arrangement is far more centralized than the big tent of the CBD and the governance arrangements that developed long before the CBD even came into force. Until possibly recently with the collapse of the Kyoto process and the start of alternative processes, it would be difficult to describe the

arrangement as disaggregated. The emergent argument could be used to evaluate the climate structure by starting with an understanding of what emergent processes may exist in systems that are not disaggregated. The mechanisms of decision-making and learning though could be studied to see if they are emergent or operate in a different manner. The major scientific body of the arrangement, the IPCC, has developed a series of smaller groups to deal with specific problems. Whether this is leading to emergent learning or whether aspects like politicization lead to different outcomes could be a productive way to assess the emergent argument in different situations. Other aspects of the governance arrangement could be analyzed in this aspect and yield fruitful study to understand why climate change has not seen significant increase in authoritative capability or adaptive capacity.

In addition, the findings touch on many ongoing discussions and debates in global environmental politics to allow additional study. The contribution to the issues of effectiveness have been explained significantly above. In addition, understanding resilience offers unique insights to the study of interactions between institutions and the role of national governments. The emergent process of governance, as highlighted above in the discussion of institutional strength, offers a unique understanding of interaction between institutions. For future study, interaction can be analyzed not simply in terms of nesting or coordination but in terms of how decisions and ideas move between the institutions. This offers an exciting trajectory to study complex interactions between institutions. The role of national governments in environmental governance remains a persistent question in global environmental politics. Whether

national bureaucrats constrain, guide, direct, interpret strategically, or embody norms is crucial for understanding how environmental governance is shaped. Resilience contributes to this debate by adding in local level actors who can, in certain circumstances, circumvent the state but also in emphasizing state-level decision making and learning as opportunities for resilience. The emergent argument does not see the state as an unimportant factor in global environmental politics, but emphasizes the ways in which the states interact in processes of emergence or hierarchical control. The argument of this study then offers unique understandings for future study in global environmental politics.

APPENDIX I

METHODOLOGY

Studying multilevel processes of governance is not an easy task because decisions can be made at multiple levels and this complicates the ability to understand dynamics. There are a number of different approaches to understanding multilevel dynamics, but each comes with a number of tradeoffs. To deal with these problems, this dissertation focuses on the junctions between levels for the most detailed analysis. This appendix will discuss how resilience was measured, the case study procedure, and the basic social network indicators.

Measuring Resilience

There are a number of problems with measuring resilience in governance arrangements and the dynamic nature of the relationships makes it often difficult to identify. As noted above, resilience of governance is not always an apparent or readily available outcome for study. The problem is that lasting governance arrangements are not necessarily resilient governance arrangements; institutions may be quite brittle and last simply from a lack of appropriate shocks to the governance system. The major indicators for resilience differ from context-specific assessments to holistic processes. In contrast, this dissertation uses a different measure of resilience which allows it to capture many of the features of resilience, comparison across cases, and a holistic view of the issues.

As noted above, the two main indicators appear to be context-specific assessment of resilient governance or a holistic approach which includes a significant

number of features. The context-specific assessment of resilience has been used in a number of case studies in order to develop heuristic guides for understanding what contributes to resilience (Pahl-Wostl 2009a, Booher and Innes 2010, Gunderson and Light 2006, Olsson et al. 2006, Anderies, Walker, and Kinzig 2006). The strength of these approaches is that they identify specific conditions and have been very able to identify the complex dynamics that produce resilient governance. The limitation is that these approaches may be limited in terms of comparative insights. In contrast, some have begun to use multi-component indicators for measuring resilience. The most clear example is the adaptive capacity wheel (Gupta et al. 2010) which develops multiple indicators to understand resilience of institutions. While holistic indicators are useful in observing ideal types, I did not find it particularly useful in explaining the imperfect institutions that are discussed in this dissertation.

Combining both approaches allows an indicator that maximizes analytic leverage and comparative ability. The result is a multi-indicator system which analyzes the responses to shock of governance arrangements and the preceding conditions which indicate capability for response. Governance arrangements with many of the similar regular procedures of other resilient governance arrangements (i.e. regular ecosystem monitoring, use of multiple indicators, diverse funding streams, etc.) can be seen to be high in adaptive capacity and authoritative capability. Table Appendix.1 collects the findings from a series of comparative case studies about resilient governance arrangements into clear procedures integrated into those with high adaptive capacity and authoritative capability and those with low dimensions on those levels.

Low Adaptive Capacity	**High Adaptive Capacity**	**Low Authoritative Capability**	**High Authoritative Capability**
If environmental systems begin shifting, the governance arrangement does not adjust management procedures.	If environmental systems begin shifting, the governance arrangement adjusts management procedures.	If the political context becomes more difficult, the governance arrangement does not develop new rules.	If the political context becomes more difficult, the governance arrangement develops new rules.
Without this shock, low adaptive capacity is seen with:	**Without this shock, high adaptive capacity is seen with:**	**Without this shock, low authoritative capability is seen with:**	**Without this shock, high authoritative capability is seen with:**
Minor shocks do not adjust management procedures	Minor shocks adjust management procedures	Minor shocks do not result in development of new rules	Minor shocks result in development of new rules.
No regular ecosystem monitoring	Regular ecosystem monitoring	Management becomes an issue dividing large political parties	Formal agreements with local managers
Ecosystem monitoring on single indicators	Ecosystem monitoring on multiple indicators	Low public involvement	Extensive public involvement
No integration of ecosystem monitoring into management	Regular assessments on management lessons	Main contributors to the problem do not participate	Main contributors to the problem and scientists participate in forums
No connections between scientific communities and policymakers	Understanding of nested systems of environmental problems	Rules are imposed upon stakeholders	Rules are developed collectively by stakeholders
		Significant expansion of veto	Management redundencies

		points outside of the governance system	
			Scale of governance is appropriate to defined problem
			Diverse funding streams

Table Appendix.1- Collection of Indicators Highlighted from Case Studies of Governance Arrangements on Adaptive Capacity and Authoritative Capability. Based largely upon cases in: (Lebel et al. 2006, Abel, Cumming, and Anderies 2006, Walker and Salt 2006)

This approach then can provide a very careful assessment of the existence or lack of resilience within a governance arrangement. Combining evaluations of the governance procedures based upon response to major shocks, response to minor shocks, and regular actions allows a fuller assessment of the resilience of the arrangement than if relying only on response to major shocks. The operationalization of resilience as high adaptive capacity and high authoritative capability as evaluated in Table Appendix.1 provides a conservative measure of resilience that is unlikely to provide a false positive.

Case Study Research

One of the key issues in both the Dominican Republic and El Salvador cases is that action happened at multiple levels and with a variety of different actors. To deal with this problem, the case studies focused on identifying a number of conditions at the various levels and interviews with people at the key junctions. This offers an insightful

set of indicators for understanding the contexts in the cases and with social network indicators and archival work it provides an approach for developing understanding.

In both cases, archive data was gathered in the national environmental ministries. In El Salvador, the agricultural ministry and election ministry were also visited for select data retrieval. In the Dominican Republic, the tourism ministry document service was used for similar access to key select data. Other documents were requested from specific organizations and used in the analysis, but unless noted archival work was not conducted. In both cases, interview participants were selected as crucial individuals in the multilevel governance system. In both countries, this includes local governance planners, national level NGOs and members of the Environmental ministry, international funders, and technicians of CCAD and TNC depending on the case. Participants were selected based on elite sampling techniques aiming for individuals active in multiple levels of governance. These interviews yielded 14 interviews in El Salvador and 17 in the Dominican Republic using this selection technique. However, in order to get a fuller view of the situations in both countries, other individuals were interviewed informally in both countries for insights about particular issues. This included practitioners like ecotourist operators or protected area guards (included in multiple site visits in both contexts) and also interviews with National level NGOs that were not part of the multilevel governance arrangement to include alternative perspectives. These additional interviews will not be quoted or used for key analysis but will be referred to as necessary.

The following people were interviewed for the project:

El Salvador

Nelson Cuellar, PRISMA

Susan Kandal, PRISMA

Hector Navarro, CESTA

Álvaro Moisés Calderón, SalvaNATURA

Jorge Alberto Oviedo, FIAES

Dr. Jorge Ernesto Quezada, Ministry of the Environment

Patricia de Reinosa, GTZ

Mary Rodriguez, USAID

Dr. Herman Rosa, Ministry of the Environment

Anonymously: 3 ADESCO leaders, 1 NGO member, 2 CCAD Officials.

Dominican Republic

Yvonne Arias, Grupo Jaragua

Yuri Duran, RENAEPA

Juan José Espinal, CEDA

Dr. Duty Green, USAID

Jake Kheel, Grupo Punta Cana

Francisco Nunez, TNC

Sesar Rodriguez , Consorcio Ambiental Dominicano

Anonymously: 3 workers Ministry of the Environment, 4 NGO workers, 2 local government leaders.

In addition to the formal interviews, conversations and data were gathered in an ad hoc manner from a variety of people involved in environmental politics. This included workers at the environmental ministries, NGO workers, students, ecotourism guides, park guards, and others. Because of the longer time spend in El Salvador for field work (7 months compared to 3 months), the number of these informal interactions is far higher for El Salvador. In that case, 72 different people contributed to the project while in the Dominican Republic the number was only 24. Finally, some people listed above provided additional email clarifications after field work and contacts at the Man and Biosphere project and CITES also clarified key points over email.

Finally, in each case, communities involved in the project were directly visited and interviews as well as informal data collection took place. In El Salvador, this included four communities, three of which are involved in the corridor projects and another not involved. In the Dominican Republic, this involved three different communities all involved in biodiversity politics directly.

Social Network Analysis

Social network analysis (SNA) is one of many methods of developing and deploying unit and system indicators. All indicators have a problem regarding the possibility of false positive indicators that ascribe the existence of some factor where it does not actually exist. The false positive problem can be dealt with through

triangulation and validity checks that build confidence in the indicators of use (Wolf 2010). In contrast, the false negative problem is a more severe problem where indicator triangulation may not provide an appropriate validity check. The false negative problem is a problem where a indicator's absence is falsely ascribed it distorts other measures in the dataset. While other indicators have this problem also, the problem is particular pernicious in social network analysis and can seriously weaken the ability to draw inferences from the indicators. This appendix is going to briefly detail the precise procedures and inferences that can be drawn from social network analysis. It will then highlight the particular problem of false negatives in the analysis and discuss how the dissertation study deals with this problem.

Social Network Analysis provides measures of two different aspects: 1. The connections that a unit has and the importance of those connections and 2. The sum of connections within the entire population of units. The distinction from qualitative network analysis is that it aims to provide quantitative representations of the connections. This section aims to provide a brief background about how these data are collected and used to generate these indicators.

The basis of SNA is that the connections between units is the primary focus for analysis. Unit-level characteristics (income level, gender, political affiliation, etc.) are not a primary focus for the development of social network indicators (Knoke and Yang 2008). Instead, the sum and strength of connections between different actors is the crucial aspect to developing indicators. For the development of SNA indicators then all units are treated as a similar type of actors with no initial distinctions based upon the

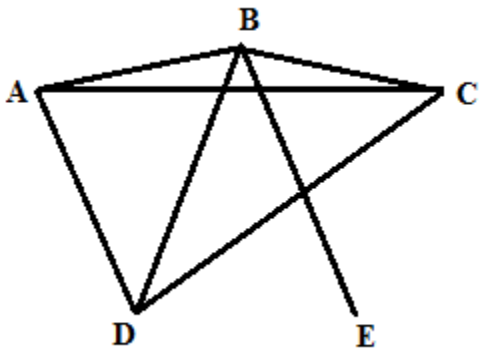
characteristics of the units. Later analysis can integrate these characteristics to compare with network position; however, for the initial development it is important to not include these factors.

With this goal for analysis, social network analysis develops a measure of connections between different units. These connections should be clear indications of interactions between units and relevant to the actual network. Although there are lots of connections in the social world, not every connection should be assumed to be a network connection (Ward, Stovel, and Sacks 2011). However, when relevant indicators are available it is possible to develop sustained evidence of linkages that are standard across the set of actors. For a quick example, if there is a relevant universe of 5 different actors and they have regular interactions with one another (in 1 on 1 meetings, for instance), we can produce a rough network articulation. In this basic example, we might find the creation of this network matrix:

	A	B	C	D	E
A		1	1	1	0
B	1		1	1	1
C	1	1		1	0
D	1	1	1		0
E	0	1	0	0	

Using simple 0 and 1 coding, with 1 signifying a connection and zero signifying the lack of a connection, the matrix shows the existence of connections between the different actors. All the units are connected to one another except for 'E' which is only connected with 'B'.

With the simple relationship matrix it is possible to develop both graphical and quantitative representations of the network. A simple, non-length graphical representation of the network would appear like this:



In addition, it would be quite easy to develop a range of quantitative measures of the network members and their centrality in the network. For a simple network like the one above, the scores are fairly simple and clearly show the high centrality and betweenness of Agent B, an equal centrality and betweenness for Agent A, C, and D and a low centrality and betweeness for Agent E.

Unit	Centrality	Eigenvector	Betweenness	BonPwr	ARD	Farness
A	1	.682	0	2.409	.875	5
B	1.250	.741	.5	2.619	1	4
C	1	.682	0	2.409	.875	5
D	1	.682	0	2.409	.875	5
E	.5	.240	0	.851	.625	7

All measurements have the risk of a false positive, but the risk of a false negative is significantly larger for Social Network Measurements because it impacts multiple

other units. To demonstrate this problem, we can look at the basic 0-1, 5 unit matrix from above. However, this time we are going to show the impact of A-E having a connection.

	A	B	C	D	E
A		1	1	1	1
B	1		1	1	1
C	1	1		1	0
D	1	1	1		0
E	1	1	0	0	

If we assume that was a false negative in the earlier articulation, how does it change the articulation of the social network scores. Although some measures only show changes on the relevant agents (A & E), Eigenvector, BonPwr, and ARD all show how a false negative between two units has wide ranging impacts on the network as a whole. A missing link in social network analysis then can greatly impact a measure and transform its entire arrangement. The result is that missing linkages can have large-scale impacts on the scores of relationships which are definitively established and measured. This simplistic example of a basic network shows how one small false negative can drastically change the measures of all cases within the network.

Unit	Centrality	Eigenvector	Betweenness	BonPwr	ARD	Farness
A	1.250	.721	.167	2.551	1	4
B	1.250	.721	.167	2.551	1	4
C	1	.621	0	2.195	.875	5
D	1	.621	0	2.195	.875	5
E	.750	.434	0	1.535	.750	6

# Scores Change from Above	2	5	1	5	2	2

This problem of social network analysis is precisely why Ward, Stovel, and Sacks caution against application of social network analysis to datasets without the sufficient conditions to prevent false negatives (Ward, Stovel, and Sacks 2011). One solution is to use very small networks with multiple, non-interacting linkages between units. Another strategy involves interviews with all members of the network and theoretical bounding of the limits of the network (Wasserman and Faust 1994). However, both of these solutions are ill-fit to governance dynamics which typically have large networks with multiple singular linkages and without clear boundaries of the network. For questions about network interactions, it may be possible to do such limited studies, but to use social network analysis to understand overall governance dynamics needs to understand the wider network.

There are a number of different measures of modularity, a central concept in the analysis. Three of the most useful are the clustering coefficient, Freeman's Segregation measure and Newman and Girvan's Q measure. These provide excellent support for visual representations of network graphs to establish more formal measures of modularity (Newman 2006). All three measures were used to provide additional data for assertions of modularity or centrality about the networks. Clustering coefficient measures simply the clustering of the nodes in the network without expectation on any shape of connections. 0-1 scale with 1 being high clustering and 0 being low

connections between different units. Newman and Girvan's Q measures the clustering that happens compared to if network connections were random. Positive measures here show centralizing networks, negative measures show fractured networks. Freeman's S measure analyzes the number of redundant connections that nodes throughout the network have to one another. The scale is 0-1 with zero being a completely random network and 1 being full segregation of all clusters. The figure below uses these measures to describe the different networks showing multiple indicators of modularity in the El Salvador networks and centrality or less modularity in the Dominican Republic networks.

	Name	Nodes	Links	Connection range	Clustering Coefficient	NG-Q	Freeman's S
Figure 4.1	ES-Environmental Policy Network	Individuals	Participation in forums	1-16	.868	-.007	.942
Figure 4.6	DR-Domestic Conservation Network	Organizations	Cooperative Grants	1-6	.881	.012	.624
Figure 6.1	ES-Corridor Network	Organizations	Cooperative Grants and other projects	1-14	.464	-.001	.994
Figure 6.3	DR-Challenge Network	Organizations	Project involvement	1-3	.844	.008	.550

Table Appendix.2- Various modularity measures of the networks in the dissertation.

Network data has a significant risk of false negatives which can significantly distort all measures for all agents. The two methods deployed in this dissertation to deal with this problem are: 1. Qualitative leads from the case studies and 2. Clearly defined networks. False negatives does not prove insurmountable for network analysis but it is a risk that requires significant attention. The persistent limitation on analysis is that the risk of a false negative means that the data should be considered most significant in deepening the case study analysis and not providing an independent basis for drawing conclusions. However, as a secondary measure to support the process tracing in the case studies, the social network data of repeated engagement by organizations in projects provides an outstanding opportunity to further understand processes giving rise to resilience.

APPENDIX II

COOKING WITH MECHANISMS

Causal mechanisms are necessary in any explanation; however, in practice they are often treated as secondary features to be filled-in with plausible explanations and not subjected to full analytic weight. When the focus is on linear relationships between variables, such focus on variables and secondary emphasis on mechanisms can be sufficient for understanding political and social processes; however, when the focus is on dynamic processes which involve surprising conditions a stronger focus on mechanisms is necessary for evaluation and analysis. For example, in Darwin's argument in *The Origin of Species* for an emergent process of biodiversity, much of the focus is not on different environmental conditions but instead on the mechanism of natural selection. This study has focused significantly on the mechanisms in order to produce a more complete understanding of the features of resilience. This brief appendix will analyze the epistemological ground for the particular treatment of mechanisms in the study.

The study of global environmental politics has generally emphasized the broad relationship between variables with progressive research agendas developed around the causal impacts that groups of scientists (Haas 1990b, 1992, 2004b, Litfin 1994b, Lidskog and Sundqvist 2002, Sundqvist 2003, Gough and Shackley 2001), international regimes and institutions (Young 1997, 1989a, b, 1999b, Bragdon 1996, Haas 2000, Levy, Haas, and Keohane 1992, Paavola 2007), nongovernmental organizations and politically mobilized citizens (Wapner 1995, Arts and Mack 2002, Breitmeier and Rittberger 2000,

Humphreys 2004, Princen 1994, Sell and Prakash 2004, Lipschutz 1996), national elites (Holmes 2010), and leaders, both individuals and institutions (Ivanova 2010, Skodvin and Andresen 2006, Young 1991, Young and Osherenko 1993). These various studies have often proceeded in a similar manner: identification of an X-Y relationship through key case studies or small-n analysis and then discussion of mechanisms is given short attention.

The approach of this study aims to pursue an analytically eclectic approach to causal processes with a focus on the mechanisms tested in comparative and counterfactual analysis. To use a metaphor which will be used a few times, the study focuses on cooking techniques primarily and explores whether finished dishes would come out differently with different cooking methods. Paul Pierson argues that throughout political science and political sociology "traditional cooks have stressed how important the cooking process itself is, including the sequence, pace, and specific manner in which ingredients are combined," while many current practitioners act like "as long as you have the correct ingredients and they are properly measured…, in what order, and for how long they are combined makes no difference" (Pierson 2004, 1). Refocusing on the cooking techniques may serve as particularly essential in understanding many of the diverse outcomes experienced in global environmental politics.

The variable-prioritized approach has provided significant insights into the processes in global environmental politics; however, its approach to mechanisms will be unsatisfactory and will have sustained problems regarding its limited nature, the

possibility for infinite regress of concepts, and its exhaustiveness in explanation (Gerring 2010). Although these problems can never be fully addressed, a mechanism-prioritized approach controls for these problems in a more sustained manner.

There have been more definitions and conceptualizations of mechanisms than there have been authors writing explicitly on the topic (Mahoney 2001). The first section will then provide an articulation of mechanisms which is particularly tractable in social science contexts as was developed by Faletti and Lynch (Falleti and Lynch 2009). The conceptualization emphasizes mechanisms as social, generative concepts that can be portable across contexts. The analogy of cooking techniques emphasizes these key aspects of mechanisms. The problems of its limited nature, infinite regress, and exhaustiveness will be demonstrated to be key problems in efforts to understand mechanisms. The next section will highlight the two approaches to studying mechanisms, the variable-prioritized and mechanism-prioritized approaches. It will be shown that the problems of mechanisms are dramatically acute in variable-prioritized approaches that attempt to have full causal relationships between independent variables and dependent variables hypothesized, and even confirmed by evidence, before engaging in mechanism analysis. Finally, the section will use the approach to emphasize the problem that has seen significant attention in the recent years regarding the differences between the ozone efforts and climate change.

Cooking with Mechanisms

I was fortunate enough to receive a simple tortilla cooking class while conducting fieldwork that highlights this aspect. Our outcome of interest for understanding is the

finished tortilla. Ingredients simply involve ground corn, salt, and water to make a simple dough. Balls of the dough are collected and flattened by switching it between hands. The flattened dough is then cooked on a hot, flat surface until the tortilla can be turned by hand to the other side and then cooked briefly on that side producing the perfect tortilla. The initial variables involve the particular type of ingredients and their amounts (and the existence of a knowledgeable cook and hot surface). Two relevant intervening variables involve the simple dough produced and the flattened dough to be cooked on the stove. Even the knowledge and measurement of these variables does not fully explain the outcome of interest: instead the hand-switching patting of the ball of dough and the cooking process are essential for it. Without either of these the outcome will not be generated in the same way. These mechanisms which involve some social aspect between different levels of variables (the knowledgeable cook and the ingredients) and directly generates, in at least certain stages, the outcome of interest. However, the processes are also portable and, for example, following the same procedures with ground beef is pretty much the manner in which my great grandmother made hamburgers (a little additional cooking). The cooking processes then tell us something important in the specific outcome in which we are interested, involves aspects that cannot be captured in a variable sense, and is portable to other contexts.

Similarly, social mechanisms are here defined as *socially relative concepts, that are portable across contexts, which produce certain outcomes of interest.* This definition from Faletti and Lynch is distinct from other articulations in its ease of operationalization and its distinction from intervening variables (Falleti and Lynch 2009,

and for the philosophy of science distinction between mechanisms and intervening variables see, Mayntz 2004). The distinction from intervening variables is not shared by all conceptions of mechanisms (see: Opp 2005, Gerring 2010); however, it seems essential for the unique, potential theoretical impact of mechanisms and for their empirical tractability to be maximized. The cooking analogy serves to clarify the importance of the distinction. In a recipe, the ingredients are the variables to be combined to produce the dish desired. The mechanisms are the cooking processes applied to those ingredients, but which could be applied to other ingredients, that actually generate the dish desired. Intervening variables would be secondary combinations of the ingredients (for example, dough), but is not a process that generates an outcome. The definition has three components essential for understanding the practical and epistemic impacts of studying mechanisms: 1. Socially relative, 2. Portability, 3. Generation.

Socially relative is a unique component of social mechanisms but which provides it the tractable practical lens. Falleti and Lynch argue that mechanisms are distinct from variables in that they are primarily about social relations while variables are primarily about the qualities of the units of study (Falleti and Lynch 2009). They write:

> Whereas variables are observable attributes of the units of analysis—with values (nominal, ordinal, or numerical) and with sample and population distributions—mechanisms are relational concepts. They reside above and outside the units in question, and they explain the link between inputs and outputs. Mechanisms describe the relationships or the actions among the units of analysis or in the

> cases of study. Mechanisms tell us how things happen: how actors relate, how individuals come to believe what they do or what they draw from past experiences, how policies and institutions endure or change, how outcomes that are inefficient become hard to reverse, and so on. (Falleti and Lynch 2009, 1147)

The socially relative aspect then highlights that mechanisms are primarily about processes of interaction between the units. Policy diffusion literature, for one example, highlights completion between actors, persuasion between actors, coercion from one actor to another, and emulation of one actor to another (Simmons, Dobbin, and Garrett 2006). Similarly, Falleti and Lynch highlight rational utility maximization, brokerage, coordinated action, framing, increasing returns, etc. as key mechanisms highlighted in recent literature (Falleti and Lynch 2009, 1150).

As processes of interaction between different units, mechanisms present specific difficulty in measuring them on anything but a binary system (0 for its absence, 1 for its presence). Even fuzzy set coding presents a host of intractable problems for measuring the existence of the mechanism (Ragin 2008). This has caused some to criticize much mechanism talk as simply a way for researchers to account for intractable variables in their studies (Gerring 2010). Although this is certainly the way it manifests itself at many points, this criticism fails to understand what makes social mechanisms intractable: their socially relative aspect.

Second, mechanisms must be portable across different contexts. Highlighting the socially relative processes that occur in the political world is sometimes accused of getting bogged down in historical details without producing information applicable to

other contexts (Clemens 2007). Mechanisms serve as a way of crossing contexts to understand similar processes and hone analysis to processes that can be portable. This entails organization of the mechanism into its basic features, differentiation from other mechanisms, and rigorous understanding of its hypotheses and component parts. Hedström and Ylikoski explain that "What separates proper mechanism-based explanations from mere mechanism-based storytelling is this kind of rigorous checking of the assumptions upon which the mechanism schemes rest" (Hedström and Ylikoski 2010). Although the details will of course be specific, attempts to make mechanisms portable are key to its explanatory utility. This is also one of the main problems with mechanisms, little attention to their portability.

Finally, mechanisms are the path that directly generate the outcome of interest (Bunge 2004b). They may not generate the full process, but they at least push toward the completed outcome that is of interest. As descriptions of the process, mechanisms can deal with the problems of confounding and equifinality. Confounders are when observed correlational relationships between variables do not involve causation as a result of other forces which causes the correlation to happen. Rigorous mechanism analysis deals with confounders by describing the process of generation itself (Hedström and Ylikoski 2010). Similarly, equifinality is a problem in many political situations where a set of similar initial starting points in two cases can result in different end situations. Probabilistic statistical loosening of Hempel's covering law-type positivism can adjust for these occurrences; however, it still poses a problem for variable-prioritized analysis. Mechanisms as pathways that generate outcomes can detail the processes by which

cases with similar initial conditions become radically different (George and Bennett 2004). This need not necessarily be linear in their progression, but should plausibly generate the outcome.

Aside from these three general points, there is significant disagreement about the composition of mechanisms. For one example, there is an active disagreement among both scholars focused on empirical use of mechanisms and those concerned with its epistemological issues about the observability or unobservability of mechanisms. While some find the unobservability to be a critical component of mechanisms (Mahoney 2001, Weber 2007), others find this to be not necessarily the case (Hedström and Ylikoski 2010, Mayntz 2004). Similarly, some, primarily emphasizing rational choice theorizing, argue that mechanisms are micro-level phenomenon (Elster 1989, Hedstrom and Swedberg 1998), while other authors would find this limitation problematic (Sawyer 2004, Falleti and Lynch 2009). On these and the other key issues of disagreement between different authors, a pragmatic, empirical-based approach seems the most adequate to the task (Gross 2009). Some key mechanisms may be directly observable in the social sciences (for example, violent coercion) while others may be only observable by their impact (persuasion, etc.). The three components above, socially relative, portable, and generative, provide an adequate conceptualization of social mechanisms which distinguishes them from variables and other causal components in a tractable manner.

From this conceptualization, it should be clear that mechanisms are an essential component to explanation and understanding. Without paying attention to

mechanisms, relationships could very well be random or caused by other forces (Bunge 2004b). To return to the analogy, a list of ingredients and intervening variables provides little in the way of understanding what produced the final product. Mechanisms can provide three progressive additions. First, a full understanding is provided when the mechanisms are provided. Bunge provides one of the best examples, "the hypothesis of continental drift, proposed by Alfred Wegener in 1915, was resisted for nearly half a century because no mechanism for that movement was known. The plate-tectonic theory vindicated that hypothesis and explained earthquakes, mainly as an effect of the collision of plates" (Bunge 2004b, 186). Mechanism study can be essential to providing full understanding. Second, mechanisms can highlight new variables that are not fully established or further confirm those variables that are supported in other studies. Mechanistic confirmation, especially when coupled with lack of confirmation for rival mechanisms, offers significant support to a theory of an outcome. Finally, starting with a focused study of mechanisms can provide guidance to set up the independent variables in the first place. The fact remains that many outcomes do not have correlated independent variables that have been operationalized, studied, and supported with significant evidence. Causal reconstruction with mechanisms can help lead to the discovery of independent variables.

However, there are some pernicious risks when studying mechanism which limit its ability to help us understand and explain phenomenon and which may lead to limited inferences. Initially, it should be always kept in mind that mechanisms do not offer an easy panacea in explaining or understanding phenomena and that the rigor needed for

mechanistic analysis is similar to that of variables (Bunge 2004b, Bullock, Green, and Ha 2010). However, three particular risks of mechanism analysis are: 1. Its limited scope, 2. Infinite regression, and 3. Exhaustiveness.

Studying mechanisms may often highlight relatively little of the overall situation and highly important mechanisms may be very limited in the overall causal story. Reiss, for example, criticizes the search for mechanisms because although it may fill in causal analysis, it serves limited purposes in description, control and prediction (Reiss 2007). In addition, operationalization problems in conceptualizing and differentiating such small components of the causal story may make them of limited value in falsification of hypotheses (Bullock, Green, and Ha 2010, Gerring 2010). Certainly, when mechanisms are added to correlaitonal studies, they are often of a limited nature and not fully theorized, without counterfactuals and unique hypotheses.

Infinite regress of mechanisms is a similar problem that results from A) the fractured study of mechanisms without a common vocabulary and B) the second-order use of mechanisms in many studies. Infinite regress is a problem of mechanisms continually being taken apart, both temporally and in terms of unit disaggregation, and multiplication of mechanisms in each new study (Opp 2005, Gerring 2010, McAdam, Tarrow, and Tilly 2008). Social-level processes, become group-level processes, then intergroup-level processes, then individual-level processes, and then psychological-level processes, and a host of other combinations and recombinations around this. The result is that pragmatic or specific empirical standards may be the only ones applicable. As Hedström and Ylikoski write “Only by knowing the nature of the explanatory task at

hand can one determine which details of a mechanism are relevant to include and the appropriate degree of abstraction" (Hedström and Ylikoski 2010). Gerring does mention that the infinite regress problem might be a problem of the sociology of scientific development and that sustained engagement with mechanisms may help to address this issue (Gerring 2010); however, for our purposes the question is whether there is one approach which best controls for this.

The criticism of exclusiveness is the most serious limitation of any study of mechanisms and finds that since there is no epistemological process to A) tease apart different mechanisms and B) identify what interrelationships between mechanisms are causally sufficient and which are simply additional parts of the relationship (Gerring 2010). Mechanistic analysis thus has difficulty establishing when it has produced an exhaustive analysis understanding the outcome of interest. It remains a key limitation of the mechanism approach that clear ability to separate and identify vital interrelationships. This limitation is not absolutely constraining and a sustained, robust argument can overcome it. Once again, though, the question is whether the variable-prioritized approach or the mechanism-prioritized approach can control this limitation in a more adequate manner.

Focused study on the mechanisms

The effervescent epistemological debate about mechanisms in various venues has been notably limited in identifying the implications of their arguments on how to proceed with study. There are a number of different ways to approach the study of mechanisms and attempting to identify their impacts. Three common different

approaches to studying mechanisms are modeling, variable-prioritized and mechanism-prioritized. Modeling, particularly agent-based modeling, may offer an approach with different specific procedures from either of the other approaches (Hedström and Ylikoski 2010, Sawyer 2004, 2005, Axelrod 1997). Although modeling allows insights into the procedures of mechanisms and whether specific small-scale interactions can produce society-wide impacts, the focus of this section is on procedures of understanding empirical processes of generating outcomes and thus will not focus on modeling significantly. For lack of a better term, variable-prioritized approaches focus the largest part of their analysis on the variable conditions and then piece together possible mechanisms from the correlations observed. Mechanism-prioritized approaches, in contrast, pursue an eclectic relationship to identifying, disentangling, and identifying the primary mechanisms. Mechanism-prioritized approaches do not require such relationships to be firmly established but instead engage in causal reconstruction from outcomes of interest backward.

Variable-prioritized Approaches

Variable-prioritized approached involve some preexisting knowledge about a causal relationship between variables and then believes mechanisms can provide the key generative steps between the relationship. Establishing the correlation between variables is the first step in the research process followed by adding additional research into mechanisms to *detail* the relationship (Opp 2005). When done rigorously, the variable-prioritized approach can highlight key processes and control for confounders. Gerring provided an excellent example with the tobacco smoking-cancer linkage:

> Suppose we wish to test the hypothesis that smoking causes cancer—until recently, a much debated proposition. Although the correlation between these two factors is high, there are of course many possible confounders. Perhaps people who smoke are also prone to other risky actions that expose them to a greater risk of cancer, perhaps the same genetic predisposition that leads them into addiction also causes them to contract cancer at a later age, and so forth. As such, the question is unproven, and perhaps unprovable, because we are at present unable to measure these genetic predispositions or the health-averse behavior patterns that might serve to enhance the risk of cancer (independent of smoking). And, for obvious reasons, we are unable to randomize the treatment (smoking). Yet if it is the case that smoking causes a buildup of tar in the lungs and tar is a proximate cause of cancer (insofar as cancer might be caused by tobacco), we may be able to estimate the enhanced risk of cancer that comes with smoking by targeting this causal mechanism. This would be a simple two-stage analysis, allowing us to disregard any confounding effects (Gerring 2010, 15-16)

Starting with a strong correlational relationship, turning to mechanisms highlighted the process in a significant manner. Study added to correlational variable relationships can add deeper understandings: deal with confounding forces, equifinality, and even causal direction. However, the risk is that starting with correlational relationships or theoretically hypothesized relationships and then proceeding to mechanism analysis is a

good approach; however, in terms of the limitations of mechanisms identified above, it does not adequately address them.

There are two general procedures used in variable-prioritized approaches: mixed methods which based mechanisms analysis from empirically observed correlational analysis and pattern matching which adds mechanism analysis into clearly theorized variable relationships. Both are powerful procedures and can yield robust results; however, neither addresses the limitations and may have limited applicability in the study of global environmental politics. Putting mechanisms second in both procedures means keeping mechanisms limited.

Mixed methods is one of the main procedures recommended for identifying mechanisms. Correlational information between different variables, typically quantitative, is combined with other methods to fill-in the processes that lead to that correlation, hopefully causation. Gross writes that the project of discovering mechanisms will "necessarily be multi methodological." While, "Quantitative research is required to establish the variable associations that lead us to inquire into cause effect relationships in the first place" and then afterward "Qualitative research—ethnographic, interview-based, and historical—is necessary to identify mechanisms, the habits they are composed of, and the kinds of problem situations in which those habits tend to be deployed" (Gross 2009). This approach can be particularly insightful when correlations between variables are supported in multiple different studies and the mechanisms can be easily separated and studied; however, in newer research trajectories or more

complex situations, the approach may add-in mechanisms without providing exhaustive and engaged analysis.

Global environmental politics has developed in a manner that makes mixed methods limited for a full understanding of mechanisms. First, the complex nature of independent variables means that the type of clear correlational analysis which is key may not be available. For one clear example, in the epistemic community-effective regimes relationship that has been empirically supported in a number of different contexts. However, in the European acid rain context, the variable of epistemic communities has vacillated widely based upon different agreements, the type of pollution dealt with, and even sometimes the time. Other key variables in the study of global environmental politics also lend themselves to this variation which may make the focused quantitative first approach problematic. Second, mixed methods approaches do not address adequately the confounding problem that mechanisms are ideal to confront. Having a variable association in hand and then filling it in with mechanisms does not control for possible confounding variables. For example, the institutional strength-effective regime relationship (Haas, Keohane, and Levy 1993) may have a confounding variable of organized political coalitions that simultaneously creates strong international institutions and positive environmental outcomes. Mixed method analysis with firm variable beliefs has no intrinsic or internal assurance of identifying the existence of confounding variables. Finally, the mixed method solution fails to fundamentally address the problems of infinite regress and exhaustiveness that were highlighted earlier. Mixed methods approaches to mechanisms may actually make

these problems more acute as mechanisms are searched for to connect variable relationships in a manner consistent with empirical data, but not in a complete manner. This certainly seems to be a prominent approach to mechanisms when a relationship between variables is found to exist, mechanisms that are partially supported (by either empirics or theory) are postulated as an addendum rather than as a coherent argument of their own.

Pattern matching is an alternative, albeit not exclusive, procedure to mixed methods which similarly prioritizes variables and then moves to mechanisms. Pattern matching is primarily a deductive approach which begins with parsimonious, clear theoretical conjectures and then searches for the best available evidence to disconfirm the theory (Bitektine 2007). The theoretical relationship between variables creates a theoretical pattern of things that would hold if the theory were correct and then matches this up with the actually existing pattern (Trochim 1989). Stated simply be Gerring, this approach proceeds by starting with the question "If Theory A is true (false), what about the world ought to be true (false)?" (Gerring 2010, 1512). The first step then is to develop a theorized relationship between variables and then trace the possible real-world implications if this theory held. Importantly, this method does allow researchers to use best possible data and information, rather than not delving deeper into relationships because of poor data opportunities. Pattern matching can be a useful tool in terms of both theory development and establishing causal relationships when other, direct methods of studying are not available (Gerring 2010).

Pattern matching can often involve mechanism study in that mechanisms can provide key pattern details that can then be matched. If, for example, theory A expects mechanism M to be essential in the causal process and theory B expects mechanism N to be the essential mechanism, studying of these mechanisms can provide matching support for one theory and matching disconfirmation of the other. The existence of a mechanism may not disconfirm a theoretical relationship as the complex social world often has many different types of mechanisms operating; however, it can provide some key support to theories if done in a rigorous manner.

However, similarly to mixed methods, pattern matching study of mechanisms puts mechanisms second and as a result deals only partially with confounding and exhaustiveness problems. In terms of confounders, with strong theories that can only produce a set of mechanisms (and distinct from other theoretical set of mechanisms), pattern matching may be able to provide crucial support and rule out confounders. However, these conditions are rarely met in the political world, as Gerring explains that "In the absence of a strong set of theoretical expectations it is impossible to ascertain whether the theory is true or not simply by observing causal mechanisms. As it happens, many social science theories are rather flaccid, that is, open to multiple interpretations, and highly probabilistic" (Gerring 2010, 1515). Similarly, Trochim argues that without the ability to rule out alternative theories from one another, pattern matching may be an unhelpful method (Trochim 1989). It is difficult to imagine any but the most extreme violent coercive mechanisms in global environmental politics of being exclusive to some theories and not others. For example, if persuasion from nongovernmental

organizations to state leaders leads those leaders to negotiate a more significant agreement, this could support a number of theories in international environmental politics and it would be surprising if it disconfirmed any. Pattern matching is also extremely insensitive to the exhaustiveness problem highlighted above. Missing mechanisms that do not confirm or disconfirm any rival explanations may be highlighted only briefly or may not be studied at all. Pattern matching as an approach to studying mechanisms will be of limited use to studies of global environmental politics.

Variable-prioritized approaches are very capable of detailing mechanisms, they are less adequate to the task of discerning what mechanisms, and what interrelationships, are causally sufficient or necessary. In addition, study of mechanisms may not address the problems the researcher is attempting to solve by mobilizing them: namely direction of causation and confounders problems. Both of these problems may remain pernicious despite the researcher turning secondarily to mechanisms. As stated in the introduction, this is not a criticism of the variable-prioritized approach in favor of an alternative approach at all times. Variable-prioritized approaches can highlight general relationships, can provide instructive macro-level processes, can highlight new actors and contexts, etc. However, when these approaches turn to mechanisms, the results are often going to be less than robust and the problem of confounders, exhaustiveness, and infinite regress will prove severely constraining. Shifting the focus may provide extensive ability to analyze mechanisms much more fully and develop significant findings on this level of analysis.

Mechanism-Priority

The mechanism-prioritized approach treats the generative mechanisms as first order phenomena and does not start from a presumed understanding of a variable relationship. Instead, it begins from an outcome of interest and then proceeds through a process of "causal reconstruction" (Mayntz 2004) that identifies the processes that generated that outcome. Although the inferential impacts of the work may be limited from scaling down the approach (Merton 1957), the process can yield important insights and, most importantly, most adequate approach to getting an engaged view of the mechanism level.

This approach does not get rid of variable relationships, indeed they may end being some of the most significant findings of the study. However, the approach does mean that independent variable situations may be kept complex and multivariate while the generative processes are investigated significantly. Faletti and Lynch explain "that a causal explanation requires the analyst to specify the operative causal mechanism and to delineate the relevant aspects of the surroundings—that is, those that allow the mechanism to produce the outcome" (Falleti and Lynch 2009, 1152). Mario Bunge's system-ontology basis for understanding mechanism highlights a similar point about the importance of understanding the context and preceding conditions that allow mechanisms to operate (Bunge 2004b, a). A full causal argument should include some discussion of independent variables, the mechanism-prioritized approach simply proceeds backward toward independent variables.

It also follows that such an approach does not proceed without theories or prior understandings. Mechanism-prioritization should be as rigorous and built around good practices as variable-prioritized studies are (Bunge 2004b). Hall, for example, in his systematized process analysis does explain that the first two steps in the procedure are 1. Developing theories and 2. Deriving expectation from those theories (Hall 2006). The distinction is that the theories and expectations will be about the generative mechanisms for study first. Although this can take part of an overall hypothesized X causes Y relationship, one hypothesis to take prominence will by that M generates outcome Y. Prior empirical work, leads from informants, and theories can all aid in generating these mechanism hypotheses. Although the nets may be the same for both variable-prioritized and mechanism-prioritized approaches, they are cast at different depths and for different purposes.

Finally, the cases relevant to the approach may be distinct from cases relevant to the variable-prioritized approach. Variable-prioritized approaches may emphasize selection of cases around Millean types of similarity and difference (Skocpol 1984). This is because the search for mechanisms should fit in the larger search for variable relationships. In contrast, mechanism-prioritized approaches will emphasize outcome as the primary selection criteria (Riley 2005); while it should also emphasize cases where the outcome occurs and where it does not (Hall 2006). In addition, to understand the interrelationship between different mechanisms and their portability, attention to wider populations can provide richer understandings of the situation.

Causal reconstruction is an ideal procedure to follow in order to control for some of the pernicious problems of mechanisms. Confounding causes can be controlled through process tracing with emphasis on the mechanisms that generate the specific outcome of interest (George and Bennett 2004, Gross 2009, Pierson 2004). In-depth case study with robust study can detail the causes and control for other possible causes when done effectively.

The other three problems of mechanisms can also be best addressed through a mechanism-prioritized approach. The limited nature of mechanisms and getting lost in historical details is a problem of the sociology of scholarship, the neglect of mechanisms and prioritization of variables, and the lack of developed mechanism hypotheses in significant amount of work. Putting mechanisms first can both alter the academic reasons that mechanism analysis can overemphasize unique nature of case aspects and can force researchers to develop sustained hypotheses about the mechanisms prior to case evaluation. The infinite regress problem can similarly be best approached by prioritizing mechanisms to a primary level. Although there will always be the challenge of infinite regress and division, prioritizing mechanisms in analysis can allow academic debates about mechanisms to develop certain levels of analysis for certain mechanisms that are seen to be the most relevant.

Finally, the exhaustiveness problem with mechanistic analysis can be dealt with much better in a mechanism-prioritized approach. The problem in a variable-prioritized approach is that there is no control or procedure that can ensure exhaustiveness of mechanisms; interrelationship of mechanisms may be the essential causal process and

there is little way of separating this. A mechanism-prioritized approach, in contrast, goes searching for exhaustiveness and the interrelationships that exist. The process gets refined continually as some mechanisms are excluded and relationships are considered valuable findings. Working back in time and either emphasizing critical junctures or general processes can be key in creating exhaustive understanding of the mechanisms that generate a particular outcome (Pierson 2004, Falleti and Lynch 2009). Exhaustiveness is of course a result of each individual piece of research; however, a mechanism-prioritized approach offers a far more tractable approach than a variable-prioritized approach.

Resilience and the study of mechanisms

Resilience, as specified in Chapter 1, is a dynamic outcome which can proceed in a process of sudden changes in the outcome rather than a gradual increase. Generative mechanisms for a dynamic outcome require taking seriously the epistemological basis of the study of mechanisms in the analysis. This study of resilience pursued and focused on the different mechanisms which specifically gave rise to resilient governance utilized comparative analysis and process-tracing in the case of the two case studies.

Simple existence of a mechanism in any causal process does not necessarily establish the causal power of the mechanism. Instead, it is necessary to pull apart and provide robust tests of the different mechanisms. This study relies upon two different methods to identify whether the mechanisms are necessary in the causal process of specific mechanisms: small number of case comparison and process tracing within cases. These procedures rely upon an epistemology which focuses primarily on middle

level knowledge rather than theoretical parsimony or lab-based reconstruction. While the latter can capture complex dynamics, the former is unsuited to this task but instead aims to distill knowledge in a formal manner.

Chapter 3 pursues a comparison of ten different biodiversity cases to provide a wide ranging comparison of cases. While this sample is not the entire population of biodiversity governance arrangements, the cases were selected based largely upon the cases with sufficient evidence for analysis and consideration. While this excludes one major governance effort (the Convention on Migratory Species which is too fractured to be considered a single effort), the cases selected provide a significant look into the issue of international biodiversity governance focusing on a large proportion of the efforts which have had any effect on policymaking around the world. The comparison involves brief histories of the different cases attuned to the proxy measures of resilience (significant rule change and integration of the ecosystem perspective) and the relevant political contexts which gave rise to those conditions. The limitation of this procedure is that because it selects cases based upon general accessibility, there may be other mechanisms and mechanism relationships which are pivotal in the cases with large gaps in information for compiling a history. However, this limitation does not fully constrain the analysis which relies upon a number of cases to attempt and identify the relevant mechanism relationships which are key in the process. The second method which is used to focus on the mechanisms specifically is in-depth process tracing of the cases in Central America and the Caribbean. This method attempts to identify the exact mechanisms which generated part or the end result of resilient governance.

Complementing the comparative analysis, these in-depth studies provide a surgical view of the mechanisms that exist and allow the rejection of potential irrelevant mechanisms which are key to ascertaining the network structure theory versus the other potential arguments.

Putting mechanism central in the analysis is an issue which requires attention to the specific methods being used to ascertain the context and relevance of the mechanisms at play. Some may have specific triggering situations, some may only generate the observed outcome when combined with other mechanisms in a particular way, and others may appear to be theoretically coherent mechanisms but may play little role in the actual political practices. Using an eclectic approach, without having theoretical parsimony as an overriding goal, introduces additional problems in that there is not a clear answer for deciding these various issues. However, combining comparative analysis with in-depth case studies provides one potentially useful method for understanding mechanisms and studying their impacts on the political world.

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