A Two-Mode Network Analysis of Issues Areas Linked to Climate Change and International Organizations in Geneva

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Abstract

In this thesis, the interrelations between Geneva-based international organizations and the issue areas that they link to climate change are analyzed using a 2-mode Social Network Analysis. Two are the main goals of the analysis. The first one is to assess the strength of the issue-linkages that organizations produce by addressing climate change together with other global issues, where the strength depends on the number of different organizations that acknowledge and promote the link. The second goal is to assess fragmentation in the network of Geneva-based organizations participating in climate change governance, on the assumption that they are connected if they link the same issue area to climate change. The findings indicate that there are twenty-two diverse issues that are linked to climate change by organizations. Between this large number of issue areas, the strongest linkages are found between climate change and energy issues, as well as with water issues, disaster risk and agriculture. On the other hand, the issues with the weakest link to climate change are children issues and labor issues. Furthermore, the analysis of the network's structure shows that climate governance in Geneva across these issues is fragmented. However there are certain organizations that occupy a highly central position, both in terms of the ties that they have with other organizations, and the way in which they can connect distinct parts of the network. These organizations are the IPCC, and the UNDP. This position gives them an important role in regard to the cross-issue cohesiveness of international climate governance.

Contents

Acronyms

APP	Asia Pacific Partnership on Clean Development and Climate
CIEL	Center for International Environmental Law
CO2	Carbon dioxide
COP	Conference of the Parties
CSO	Civil Society Organization
CVF	Climate Vulnerable Forum
ETS	Emission Trading System
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FOEN	Federal Office for the Environment (Swiss)
GCF	Green Climate Fund
GDP	Gross Domesti Product
GEN	Geneva Environment Network
GHG	Greenhouse Gas
ICMHD	International Contre for Migration, Health and Development
ICTSD	International Cenre for Trade and Sustainable Development
IELRC	International Environmental Law Reasearch Center
IETA	International Emissions Trading Association
IGO	International Governmental Organization
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IO	International Organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IPF	International Polar Foundation
IR	International relations
ISO	International Organization for Standardization
ITC	International Trade Centre
IUCN	International Union for Conservation of Nature
NGO	Non-Governmental Organization
OHCHR	United Nations High Commissioner for Human Rights
PCP	Perception Change Project
SDG	Sustainable Development Goal
SNA	Social Network Analysis
UN	United States
UN-Habitat	United Nations Human Settlements Pogramme

UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Convention on ClimateChange
UNICEF	United Nations International Children's Fund
UNIGE / ISE	Université de Genève / Institut des Sciences de l'Environnement
UNISDR	United Nations Office for Disaster Risk Reduction
US	United States of America
WBCSD	World Business Council for Sustainable Development
WEF	Wordl Economic Forum
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
WTO	Wordl Trade Organization
WWF	World Wide Fund for Nature

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Chapter 1: Introduction

1.1 Context and research question

A globalized and interconnected world has brought new challenges and large-scale problems that are extremely difficult to solve: refugee crisis; terrorism; biodiversity loss; climate change and its multiple consequences; as well as rising economic inequalities and persistent human right violations. In policy research, these complex, and interdependent problems are known as "wicked problems"[1], because of the features that make them resist any simple solution: they do not have a clear definition and their magnitude is hard to estimate; they are multi-causal, multi-scalar, and every wicked problem can be the symptom of other problems (Rittel and Webber 1973, 161–65). Given the increased level of interdependence of these problems, international organizations can no longer address one issue without also targeting many others. This is particularly true when considering climate governance.

In fact, climate change cuts across a great number of issue areas and affects various policy sectors. Other than being an environmental problem, climate change is also creating social problems, by impacting health security, food security, migration and economic activities (IPCC 2014). From its emergence on the international political agenda, climate change has not stopped to be redefined and linked to a growing number of other policy domains, such as development, trade, and migration, just to name a few. While the United Nation Framework Convention on Climate Change (UNFCCC) has for long been the core international organization addressing climate change and setting global climate policies, the work of this single organization is not anymore sufficient to deal with the entire international climate agenda (Michonski and Levi 2010: 1), and it is now complemented by other organizations (public and private, governmental and non-governmental) from different levels (international, national, regional and local). Indeed, climate change policies are both been promoted by a growing number of international governmental organizations from other issue areas (Hall 2016), as well as by non-state actors such as sub-national governments, non-governmental organizations, and businesses. Climate change governance has in this way acquired a multi-level dimension made of vertical and horizontal interactions.

Consequently, we can think of climate governance as a network made of horizontal

[1]The term wicked is used in this concept, not in the sense of evil, but rather as resistant to any simple solution, in contrast to « tame problems » (e.g. chess or puzzle), which can be challenging, but have a clear solution and ending point (Australian Public Service Commission 2012; Rittel and Webber 1973).

interactions (Paterson, in Stavins & Stowe, 2016, pp. 83-86) that connects organizations of different type, and facilitates issue-linkages. Issue-linkages to climate change are an increasing phenomenon that has not being ignored by political scientist, and in particular, international relations scholars. However, these links have thus far only been studied with a focus on specific organizations (on IGOs, in Hall (2015, 2016); on NGOs in Muñoz Cabré (2011)), or are centered on the concept of regimes (Jinnah 2011). Therefore, this phenomenon lacks an analysis that considers its multi-level and networked dimension. The intent of this Master thesis is to respond to this gap, by mapping the network of organizations and issue areas linked to climate change governance. The research question that we want to answer is: *In the international climate governance, to what extent are organizations and issue areas interrelated?*

Elements of the literature on the multi-level governance of climate change, its governance architecture and fragmentation, as well as the literature on issue-linkages constitute the conceptual framework that underpins the analysis. The multi-level governance literature is interested in the interdependencies between multiple organizations at different levels: across scales, actor types and issue areas. It conceptualizes vertical, and horizontal interactions between actors, and uses the concept of networks as metaphor of these non-hierarchical and interdependent relationships (M. M. Betsill and Bulkeley 2006). Fragmentation is another important concept that characterizes climate governance, and is considered to influence issue-linkages (Biermann et al. 2009). Scholars have proposed different maps of the climate governance architecture – the institutional structure made of organizations, norms, principles, regimes and decision-making processes in the climate change issue area (Biermann et al. 2009)–to map, and analyze fragmentation. These include the Climate Change Regime Complex of Keohane and Victor (2011), the (transnational-) Climate Governance Triangle of Abbott (2012), as well as the combined version of these two models proposed by Pattberg (2014). Finally, the literature on issue-linkages, concerned with the causes and characteristics of new linkages between issues (see Betts (2010) for the linkages between development and migration; Shepherd (2013) for gender and security; Esty (2001) for trade and environment; Hall (2016) for displacement, development and climate), provides important empirical findings on how organizations can influence linkages between issue areas.

From an empirical point of view, the analysis focuses on the web organizations of the International Geneva, which is one of the biggest center for international diplomacy, but also a hub for environmental and climate governance. This local reality is particularly interesting because it clusters organizations of various type, is very dynamic in term of discussion and production of policy material, and provides collaboration opportunities between organizations. As such, it represents an ideal case for the understanding of how climate change interlinks with other issues, and the interactions that this policy domain creates between organizations of different type.

More concretely, a Two-mode Network Analysis is used to research the interrelations between international organizations (mode 1), and issue areas (mode 2) in the International Geneva. This method belongs to the tradition of Social Network Anaylsis, which assumes that relationships among interacting units are important (Wasserman and Faust 1994), and is designed to study the ways in which particular networks are structured. As discussed above, climate change governance can be seen as a network characterized by horizontal interactions which connect different issue areas. The links between issue areas are created by organizations through policy and advocacy material about the issue-linkage (Hall 2016).

To construct the network for the analysis, data about who, from Geneva-based organizations, is engaged with the climate change policy domain (mode 1), and which issue areas do they link to climate change (mode 2) was gathered through a website examination of the organizations listed and described in the Geneva Green Guide[2], a tool created in order to facilitate information sharing an partnerships among organizations working on environmental and development issues in Geneva. From the large list, only the organizations with a web-page, projects or publications directly connected to climate change were retained as selected as nodes of the network. The second step consisted in analyzing the selected organizations, their climate related web-pages, projects and main publications, to collect data about the issues that these organizations link to climate change (e.g. migration, if they have a web-page that addresses climate migration). Finally, the issue areas selected as node for mode 2 were combined with the data of mode 1 (organizations) in a 2-mode matrix indicating the relationship between the two set of nodes.

This primarily descriptive analysis is organized on two goals. The first one is to identify the issue-linkages to climate change promoted by organizations, as well as to assess the strength of these issue-linkages, based on the number of organizations that recognize them and engage with them. The second goal is to evaluate the horizontal fragmentation in the climate change governance structure in Geneva, so to better understand the extent to which issue areas and organizations are interrelated.

1.2 Why this matters

From 2012 to 2016 international climate policy has witnessed a period of great evolution. Most importantly, this period marked the transition between the Kyoto protocol and a new and innovative climate agreement, the Paris Agreement on Climate Change. This new climate agreement, that entered into force on November 4, 2016, is a good, but insufficient step in the right direction (Klein 2016). In order to reach the Agreement's goal of holding global warming below 2°C above preindustrial levels[3], and

[2] Geneva Green Guide is linked to the Geneva Environment Network, and accessible on : www.genevaenvironmentnetwork.org/?q=en/genevas-green-guide

[3]The Paris Agreement does not provide a definition of "pre-industrial". The baseline for global temperature comparison commonly used by researchers, and described as pre-industrial is relative

possibly limit it to 1.5°C – levels that will prevent catastrophic consequences of climate change for our planet – increased ambition and clarity over the problem is needed.

The hard task of nation states and specialized international organizations to create policies that help us reach these goals, could become easier with the increased participation of organizations from other issues areas, and strengthened horizontal interactions. In fact, horizontal interactions, if coordinated, can increase ambition and catalyze action to meet the Paris Agreement goals (Paterson, in Stavins & Stowe, 2016).

However, climate change governance is today not all about UNFCCC's agreements. The governance architecture (the system of institutions, organizations and decision making-processes), of climate change is made of multiple and non-coordinated organizations, and for this reason, is described by scholars as fragmented (Zelli and Van Asselt 2017). This fragmentation causes coordination gaps (Biermann, Pattberg, and Zelli 2010) and gives even more reasons to call climate change a wicked problem (Levin et al. 2012).

In this context, issue-linkages may be a way to bring clarity to the climate change problem, identify new opportunities for solutions, and gain necessary social support for the issue (Downing, Olsthoorn, and Tol 2002). Considering that, a map of interrelation between organizations and issues linked to climate change under the lens of Social Network Analysis can provide a better understanding of these horizontal interactions, and suggest new ways to coordinate them.

1.2 Structure

The remainder of this Master thesis is structured as follows. In a first contextual part, I describe the evolution of the climate change regime and the growing linkages that have emerged between climate change and other issues. I then elaborate on the conceptual framework that focuses on the multi-level governance of climate change; the climate governance architecture, and its fragmentation; as well as the issue-linkages made by organizations. A presentation of the research design, case choice (International Geneva), and method choice follows. Subsequently, results are presented with network visualizations, and description of the visual and numerical results for the two goals: assess the strength of issue-linkages, and evaluate vertical fragmentation. In the discussion, results are considered in relation to the literature and the history of climate change governance. Finally, I draw conclusion on the interrelations between issue areas and organizations in climate governance, and make recommendation for how future research directions.

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to the period 1850-1900, but there are also other interpretations of this baseline (see Hawkins (2017))

Chapter 2: Context: The Evolution of Climate Change Governance

Overview
This chapter provides an overview of the climate change issue, from a scientific and historical point of view. It presents the main steps that lead to the scientific discovery of climate change, and its recognition as a problem of global scale requiring global collective action. In addition, it highlights the factors that contributed to an increased complexity of its governance.

2.1 The Scientific Discovery of Climate Change

The first scientific discoveries about climate change date from the 19th century. Researches made at that time contributed to the discovery of the greenhouse effect, and lead to first intuitions about the impact that human emissions of carbon dioxide might bring about global warming (Bolin 2007, 7). The "grandfathers of climate science" Jean Baptiste Joseph Fourier (1768-1830), John Tyndall (1820-1893) and Svante Arrhenius (1859-1927) initiated atmospheric and climate science research by describing atmosphere's contribution to planetary temperature, and observing the "heat-trapping" role of gases such as carbon dioxide and water vapor (Mason 2013). The Swedish chemist Arrhenius is perhaps the most famous of them, as he was the first scientist to outline the theory of the greenhouse gas effect, and hypothesize that humans could cause an increase of atmospheric temperature with growing carbon dioxide emissions from their activities, such those involving coal burning (Sample 2005).

However, it was only after the half of the 20th century, that the scientific community understood the implication of Arrhenius findings. After the Second World War, the emergence of new studies, increased funding and technological advancement allowed to further expand the knowledge of global climate, as well as to start building a multi-disciplinary scientific networks for a better understanding of the behavior of the atmosphere, and the variations of global climate (Bolin 2007, 19–27; Weart 2017). Computer models, paleoclimate evidence, temperature records and carbon dioxide measurements all contributed in convincing the scientific community that increasing concentration of greenhouse gases (such as carbon dioxide and methane) in the atmosphere might indeed produce measurable and perhaps marked changes in climate that could appear already by the year 2000 (President's Science Advisory Committee 1965).

In the late sixties and during the seventies especially - in a climate of high sensitivity to environmental issues - scientist increased their warnings for the public and the policy

makers about the threat posed by human-driven climate change. At the same time, the prediction of dangerous impacts coming from a few degree of warming (sea level rise, droughts, storms, etc.) brought some first politicians to suspects about the emergence of a new public issue (Weart 2017). However, the complexity of the issue and the uncertainty characterizing predictions and models, together with skepticism and public confusion fueled for example by difficulties in explaining the cooling episode between 1940-1975 in the Northern Hemisphere[4], have represented for long time a limit for political recognition of the climate change issue (Mason 2013). For many years, the only political response to climate change during the 20th century has been to facilitate and accelerate research with more funding (Weart 2017).

Despite the limits, from 1970 and in the late eighties in particular, scientist's and environmentalists' appeal to take action before severe changes in climate occur produced the first important reactions of governments and international bodies, and eventually brought the climate change issue on the international political agenda, with gradual linking of climate change to other global problems, as it will be presented in the next section of this chapter.

2.2 The rise of climate change as international issue requiring international cooperation

After being discussed and recognized by the scientific community, the issue of climate change reached the international climate agenda through the first environmental conferences. See Figure 1 for a timeline of the milestones in International Climate Policy that will be described in this and the following sections of Chapter 2.

In 1972, under the influence of Sweden and rising environmentalism, the UN decided to organize a conference on the human environment in Stockholm. While the focus of the conference was on environmental problems linked to water and air pollution, climate change was also discussed as an environmental issue, and identified as a problem requiring new capacity for global decisions and attention, as well as coordinated efforts for research (Bolin 2007, 27–29; B. Ward et al. 1974).

[4] During the 20th century, temperature records in the Northen Hemisphere show three distinct trends: warming at the beginning of the century, cooling from about 1940 to 1975, then again a warming trend that continued until today. The mid-century cooling episode is explained by scientists as the consequence of increased sulphate aerosols in the athmosphere, which reflect incoming solar energy back into space and lead to cooling. During that period, the forcing of carbon dioxide (wich causes global warming) was masked by the impact of aerosols on solar radiation. The increase in aerosols was most-likely the result of uncontrolled post-war pollution from industrial activity (Cook 2015).

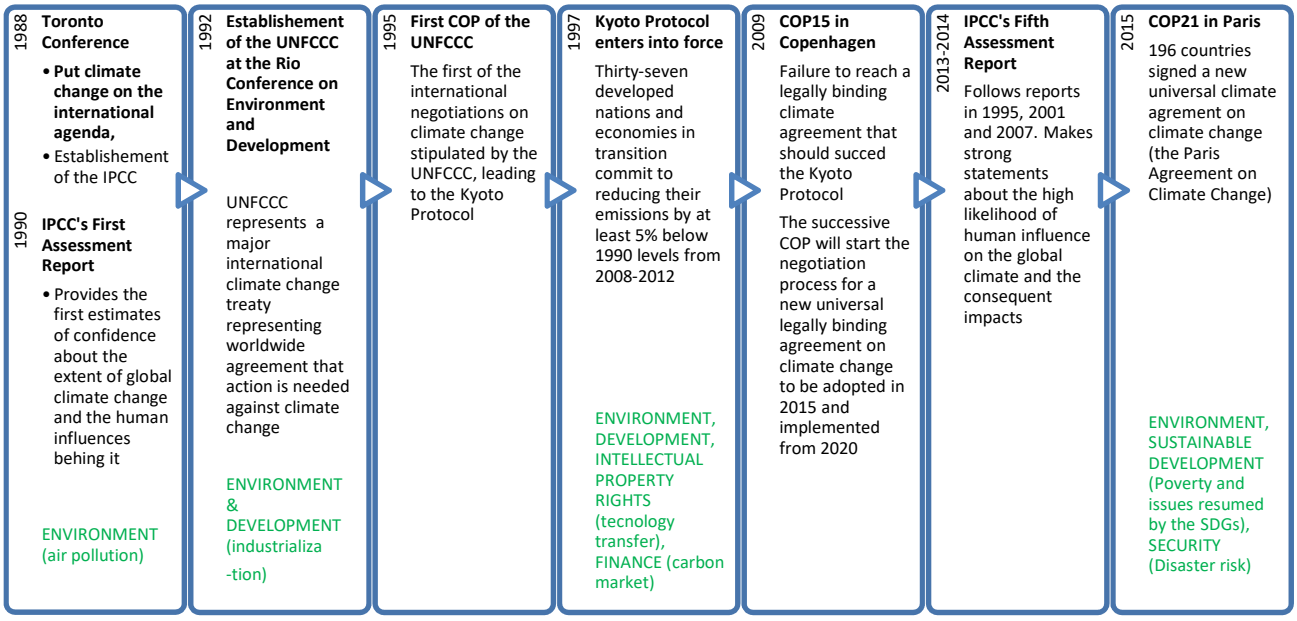

Figure 1: Milestones in International Climate Policy. The figure resumes the evolution of climate change as international issue. It takes into account the most important decisions taken on the issue during international conferences and the main conclusions of the IPCC reports. The principal issue areas to which climate change was linked during the different steps are indicated in green. Adapted from Kelman **(2015)**

However, it is only in 1988 that climate change emerged as a veritable political issue, decoupled from the general issue of air pollution. 1988 corresponds with the year of the Toronto Conference on the Changing Atmosphere, which brought together international scientists and policy makers. For the first time from the discovery of climate change, an international conference called for global emissions of carbon dioxide to be reduced by a specific target: 20% below 1988 levels by 2005 (Bodansky 2001, 27; Gupta 2010, 636–37). The same conference brought to the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The IPCC acts as a bridge between climate scientists and policy makers. In fact, through the IPCC, climate experts from all around the world participate every five to seven years in the synthesis of the most recent climate science findings and present the report with their results and assessment to world's political leaders. The first report is from 1990, while the last IPCC Assessment report (the Fifth Assessment Report (AR5)) was finalized in 2014[5].

After a first period of problem framing and political recognition of climate change at the international level (1972-1990), which culminated with the establishment of the IPCC,

[5] AR5 makes strong statements about the role of humans in the climate change process, and the fact that climate change has impact both on human and natural systems (IPCC 2014, 2, 4).

the focus shifted towards the definition of principles that could guide international action in responding to global warming (Gupta 2010, 639–42). At that stage, climate change was seen as an environmental rather than a development problem, and governments - almost exclusively developed countries - were concerned about the economic and technological challenges of climate change mitigation (Gupta 2010, 642). Nevertheless, development - in form of industrialization - was seen as primary cause of anthropogenic climate change (Hall 2016, 47).

In this context, the United Nations Conference on Environment and Development (UNCED) took place in Rio de Janeiro in 1992. Also known as the Rio Conference or Earth Summit, UNCED lead, inter alia, to the adoption of the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC helped in formalizing global climate governance, and in setting the framework for a cooperative response to climate change, with the objective to obtain a "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC 1992, 9). The Convention entered into force in 1994 and from 1995 the parties to the convention met annually in Conferences of the Parties (COP) to discuss climate change. Already at COP1 in Berlin, parties to the Convention realized that the commitments in the Convention were inadequate for meeting the objectives and agreed to establish a process to negotiate strengthened climate commitments for developed countries (UNFCCC 2014). They launched negotiations to reinforce the global response to climate change, and in 1997 adopted the Kyoto Protocol. The Protocol set legally binding emission targets for developed country parties for the six major greenhouse gases (GHG), which ware to be reached through national measures by the period 2008-2012. To lower the costs of achieving emission targets, the UNFCCC created flexibility mechanisms that include market-based solutions, such as the Emission Trading System of the European Union (EU ETS). For this reason, the Kyoto Protocol created strong interlinks between the climate change regime, the financial regime, and the trade regime.

2.3 Climate change in the new millennium: changes in definition and political response

In the years following the adoption of the Kyoto Protocol (1997), the climate change regime encountered a growing number of challenges. First, "by 1996 the post-cold war optimism had faded away and it had become clear that it would not be very easy to decouple economic growth from GHG emissions" (Gupta 2010, 643). This fear was confirmed by the realization that the environmental Kuznets curve[6] does not hold for

[6]The environmental Kuznets curve illustrates the hypothetical relationship between environmental degradation (e.g. air pollution from sulfur dioxide) and economic development (GDP per capita). Kuznets's hypothesis is that as the economy develops and society industrializes, environmental degradation increases

GHG emissions (Stern 2004). In fact, pollution is not simply a function of income, and countries with the highest GDP per capita (e.g. US, EU) have continued emitting high levels of carbon dioxide emissions despite their economic development. Second, the decision of the United States (US) and Australia to not ratify the Kyoto Protocol opened discussions about the leadership of developed countries on the issue, and lowered the incentive to reduce GHGs emissions, producing a gradual slowdown in the implementation processes of the Kyoto Protocol. In the end, most of the countries failed in reaching the objectives of the protocol. However, the Kyoto protocol opened the way for a more comprehensive international response to the climate change issue. Yet, negotiations for a successor to the Kyoto Protocol lead to a disappointing conclusion at COP15 in Copenhagen (Dimitrov 2010).

Even so, new climate initiative started to emerge from national and sub-national governments, especially in the non-participating countries. For instance, the US launched the Asia Pacific Partnership on Clean Development and Climate (APP). In addition to new multilateral initiatives, new climate initiatives appeared in the US at the state and municipal-level and entailed a new wave of local level climate initiatives all over the world (Depledge 2005, 26). At the same time, a growing interest for the issue from the part of the social science community brought to increased debates over who is responsible for addressing climate change, and "how responsibility is diffused across scales, social groups, sectors, countries and generations"(Bulkeley et al. 2014, 9). Therefore, the focus was not anymore only centered on states' actions to limit climate change. Scholars started to study also the ways in which climate change issue is tacked beyond the state, by sub-national authorities (M. M. Betsill and Bulkeley 2006), and private forms of climate governance (Pinkse and Kolk 2009).

The definition of climate change also began to shift, mainly because of new linkages with other issues. In the first decade of the new millennium (2000-2009) new discussions about the need to integrate climate change into development and development cooperation emerged (Gupta 2009; Kok et al. 2008). This in turn originated new linkages between climate change and other development issues, such as for instance climate and biodiversity or climate and disaster risks (Heller and Zavaleta 2009; Rosendal 2001b, 2001a; Schipper and Pelling 2006; Thomalla et al. 2006). Lastly, climate change adaptation began to be a more central part of climate change negotiations, a change that enabled a range of new international organizations to engage with the UNFCCC, even though they were not environmental or climate change orientated (Hall 2016, 44–47). The issue of technology transfer from developed to developing countries for climate change mitigation and adaptation also came into the equation. Because of the issue of protected technologies, new links with the intellectual

until pre-industrial economies reach the status of industrial economies, and decreases with the reach of post-industrial economies based on services and cleaner technologies. For this reason, the Kuznets curve is shaped as an inverted U-shape curve.

property right emerged (Orsini 2017). Figure 2 illustrates the four main links that the climate regime under the Kyoto protocol developed with other regimes.

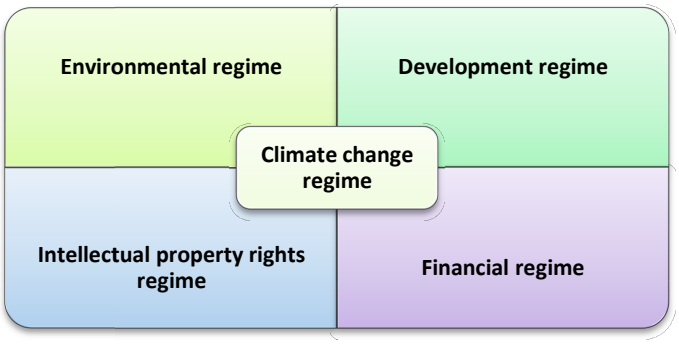

Figure 2: Links between the climate change regime and other international regimes.

2.4 The Present Situation

In 2015, 195 countries adopted in Paris a new legally binding agreement on Climate Change under the UNFCCC. Compared with the previous climate international agreements, what is new in the Paris Agreement is that developing and developed countries alike are required to reduce their GHGs emissions in order to limit global warming to relatively safe levels: below 2°C with an aspiration of 1.5°C above pre-industrial levels. The top-down approach for emission reduction of the 1997 Kyoto Protocol was complemented by a bottom-up approach that allows each country to determine its own contribution. In addition, for the first time in the history of international climate negotiations, climate adaptation has its own article in a climate agreement (Smith 2016).

Moreover, the adoption of Sendai Framework for Disaster Risk Reduction (Sendai Framework), and the United Nations 2030 Agenda for Sustainable Development, with its Sustainable Development Goals (SDGs), in the same year of the Paris Agreement (2015), allowed conceiving these frameworks dealing with different but interlinked issue areas (climate change, disaster risk reduction, sustainable development) in a way that they could mutually reinforce their goals and promote coherence.

In particular, climate change has been included in the set of seventeen SDGs (illustrated in Figure 3), which represent the reference goals for the international development community for the period 2015-2020 (UN n.d.). SDGs are meant to be implemented in an integrated way, and linkages among SDGs should enhance policy coherence and partnerships (Jungcurt 2016). According to a scientific assessment of the SDGs, climate change (represented by Goal n. 13: Climate Action) constitutes a risk to many dimensions of sustainable development and links with all the other SDGs (ICSU and ISSC 2015).

Figure 3: UN Sustainable Development Goals (SDGs). The figure shows the 17 SDGs adopted on September 25 2015 by the Member States of the UN as part of the 2030 Agenda for Sustainable Development. Source: www.un.org7

Climate change is not only spreading across issue areas, but also across different types of organizations that interact in a complex way. In general, more and more actors such as IGOs and NGOs from different policy domains have been developing interest for climate change policy. As visible in Figure 4, the participation of IGOs and NGOs as observers in UNFCCC conferences has not stopped to increase since COP1 in Berlin.

[7]Retrieved from : www.un.org/sustainabledevelopment/news/communications-material/ Date accessed 03.11.2017

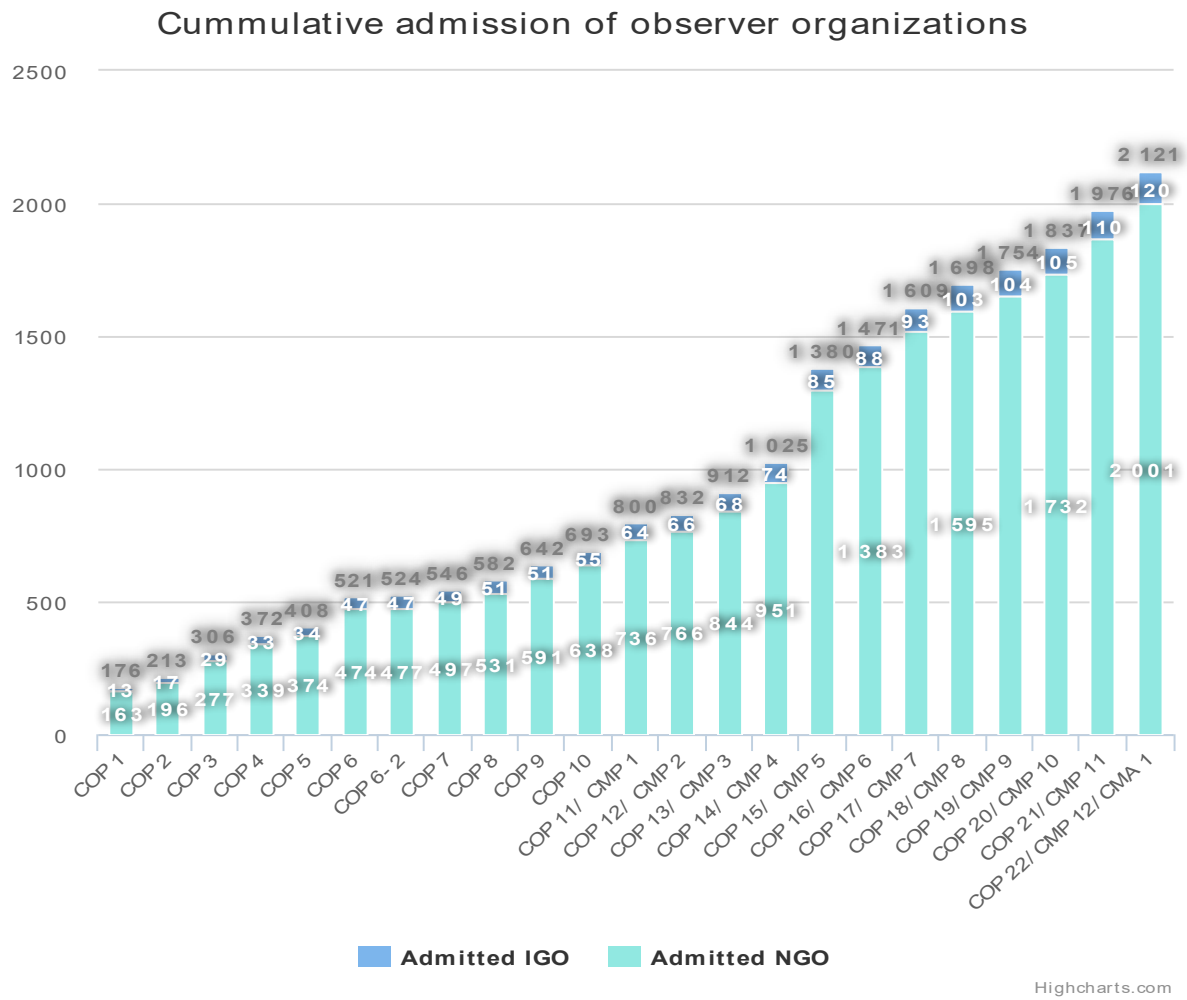

Figure 4: Cumulative Admission of Observer Organizations in the UNFCCC Process. The chart depicts the cumulative numbers of admitted observer organizations by COP. Non-governmental organizations (NGOs) and intergovernmental organizations (IGOs) have to be admitted by the Conference of the Parties (COP) as observer organizations to the UNFCCC process before they can send representatives to attend any sessions or meetings of the UNFCCC. Source: (UNFCCC 2016)

But perhaps more importantly, new climate initiatives have emerged on the side of the ones proposed by states and the UNFCCC. These come in form of partnerships, networks or clubs that are constituted, at least in part, by non-state or sub-state stakeholders such as NGOs, cities, and businesses. The global response to climate change is today largely shaped also by these initiatives, that scholars call "transnational climate governance" initiatives (Abbott 2012; Bulkeley et al. 2014).

2.5 Summary

Overall, through the last chapter, we saw how climate change was discovered and described by scientists; slowly recognized as a public issue and institutionalized by policy makers; and also how it evolved from being an environmental problem per se to

becoming a complex issue of international policy. An international regime has been developed for the issue of climate change, and it has mainly been coordinated by the UNFCCC. This regime interlinks with other regimes from different issue areas, and like the definition of climate change, continues to evolve. The UNFCCC is now complemented by a large number of initiatives to govern climate change that are not state-centered, but driven by other actors than states or governmental organizations, which often times interact in form of partnerships or networks.

Hence, to understand the complex interactions between climate change and other issues areas of international governance, an approach that considers these new forms of global response to climate change is needed. The next chapters explain how a conceptual framework that looks at climate change under the lens of governance, and a method that looks at network structures (Social Network Analysis) can best contribute to the understanding of interactions between organizations and issue areas linked to climate change in this sense.

Chapter 3: Conceptual Framework and Literature

Overview

This chapter presents the literature and concepts that underpin the analysis. The first part clarifies and defines central concepts for this thesis: issue areas, and organizations. This part is followed by considerations about the concept of governance, and on the conceptual approaches that are used by scholars to analyze it. In particular, I discuss the governance architecture, and the multi-level governance approach. Lastly, the concept of issue-linkage is considered, by distinguishing between different types of issue-linkages, and specifying the role of organizations in their creation. As a conclusion, I summarize, and connect the discussed concepts between them.

3.1 Issue Area, and Organization

This research is based on concepts that come from different literature fields of political science, including international relations (IR); public policy; policy analysis and public administration. Scholars from these different fields give different interpretations to certain concepts. To avoid confusion, as starting point of this chapter, I define the main concepts of this research.

3.1.1 Issue area

The concept of issue area has mainly been used by scholars interested in regime analysis, which associate issue areas with the delimitation of regimes (Young 1997). In fact, even the definition of regimes includes this concept: regimes are "set of implicit and explicit principles, norms, rules, and procedures around which actors' expectations converge in a particular issue area" (Krasner 1982, 185). Following this line, Keohane (1984, 61) defines issue areas as sets of issues that are "dealt with in common negotiation and by the same, or closely coordinated bureaucracies". However, as explained in chapter 2, the climate change issue is not relative to only one regime, neither it is fully coordinated. For this reason, a broader interpretation of issue area is preferred. Like it is done by Widerberg et al. (2016), this thesis considers issue areas as constituent parts of a policy domain. In turn, a policy domain is a "socially constructed component of a political system that is organized around substantive issues" (Pattberg et al. 2014, 15). For example, climate change mitigation is an issue area of the climate change policy domain. As issues are not objective or predefined, but constructed through social and political processes (Hilgartner and Bosk 1988), issue areas are also variable, and their origin, mutation or disappearance depend on actor's interests and perceptions (Keohane 1984; Pattberg et al. 2014).

3.1.2 Organization

Used in some cases as interchangeable terms, in the field of political science organization and institution actually have distinct meanings.

According to Crawford and Ostrom (1995), an institution is a "widely understood norm, rule or strategy that creates incentives for behavior in repetitive situations" (Polski and Ostrom 1999, 3). The concept of institution is "highly abstract" and "fundamentally invisible" (Polski and Ostrom 1999, 3). Indeed, institutions can appear in a formal way: written as law, policy, or procedure; but they can also be informal, such as in the case of some norms, habits or unspoken practices (Ibid.).

Instead, with respect to organizations, Polski & Ostrom (Polski and Ostrom 1999, 4) say the following :

> "An organization can be thought of as a set of institutional arrangements and participants who have a common set of goals and purposes, and who must interact across multiple action situations at different levels of activity. Like institutions, organizations may be formally or informally constructed. […] All organizations (and many institutions) are formed subject to existing higher-level institutions."

Defined in such way, the term organizations can be used to indicate, for example, governments and their agencies, multi-lateral organizations like the UN or the World Bank, NGOs, universities, private companies, clubs and networks. Organizations are also understood as social and political actors that work together towards common goals and purposes, as mentioned in the above cited definition. By working on a common policy issue, organizations form an actor constellation around the issue (Pattberg et al. 2014, 20). In addition, organizations may simultaneously deal with multiple issues, and constellations of actors (Brandenberger et al. 2015). In turn, this can create a web of actor constellations, with overlapping memberships, and goals (Pattberg et al. 2014).

At the global level, distinctions can be made between the following organizations:

1) **Intergovernmental Organizations (IGOs):** IGOs are organizations established by an agreement, and primarily composed by states, or of other intergovernmental organizations. Examples include the UN, WMO, EU, World Bank. They are constructed by states to facilitate cooperation, negotiate conflicts and enhance their response to global issues.
2) **Non-governmental Organizations (NGOs):** NGOs are private and non-profit organizations that seek to affect changes in policy. They are organized around specific issues, such as health, environment or human rights, and can operate at the local, national or international level (INGOs). Examples: WWF, Amnesty International.

3) **Transnational organizations:** these are organizations that operate across national boundaries with limited or no involvement of governments (Friedman 2008). Following this definition, INGOs, scientific communities, and multilateral corporation can be considered transnational organizations. Similarly, cross-border networks of different configurations of actors (where at least one actors is independent from the state), addressing a public goal can also be categorized as transnational organizations (Andonova, Betsill, and Bulkeley 2009). They might develop their own norms and regulations and create transnational institutions that complement international institutions in particular issue areas (Bulkeley et al. 2014; Chan, Brandi, and Bauer 2016).

Scholars from the realist school of thought, following a state-centered approach, argue that international relations consist of the relationships between states, and consider non-state organizations of secondary importance (Willetts 2001). However, as showed by the evolution of climate change governance described in chapter 2, in some policy domains the influence of non-state actors, and interactions among different organizations can be very important for political processes. This is acknowledged by the Pluralist approach, which assumes that all types of organizations can affect political outcomes, and that global politics cannot be reduced to interstate relations (Willetts 2001).

3.2 Governance

Governance has become a key concept in many academic disciplines, including political science and IR (Bevir 2011, 1). Generally, it denotes "processes through which collective goals are defined and pursued in which the state (or government) is not necessary the only or most important actor" (M. M. Betsill and Bulkeley 2006, 144). However, this terms can have many shifting meanings (Breakey, Cadman, and Sampford 2016).

In the context of climate change, the concept of governance has been used in relation to its institutional[8] structure or architecture (Biermann et al. 2009); certain policy mechanisms, such as flexible non-state instruments (A. Jordan, Wurzel, and Zito 2005); and in a larger sense, to all aspects of steering and regulation of the climate issue, mainly by organizations different than national governments, such as cities (M. M. Betsill and Bulkeley 2006), or transnational organizations (Bulkeley et al. 2014).

Consequently, different conceptual approaches exist to analyze climate change governance. In this thesis, I focus in particular on the climate governance architecture,

[8] Here the authors use institutions as generic term that comprises international regimes, international organisations and implicit norms and principles (see (Biermann et al. 2009, 15)

the multi-level governance, and its links with policy networks. These approaches all provide interpretations of policy domains' structure, their complexity, and the way in which issue areas are shaped. The next sections of this chapter consider the literature, and the promises on which these approaches build.

3.2.1 Governance architecture

The governance architecture of climate change conceptualizes the "overarching system of public and private institutions that are valid or active in a given issue area of world politics [in this case, climate change]", encompassing "organizations, regimes, and other forms of principles, norms, regulations, and decision-making procedures" (Biermann et al. 2009, 15). This concept is of particular interest to IR scholars, given that the global system is deprived by a world government, instead, it is governed though particular institutional settings, that can form complex structures (metaphorically viewed as architectures) for specific issue areas (Biermann, Pattberg, and Zelli 2010). In particular, IR scholars use the governance architecture framework to map organizations, as well as to explain the fragmentation of climate change governance (van Asselt 2007; Pattberg 2015; Zelli and Van Asselt 2017). Fragmentation denotes in this case the existence of many different organizations that regulate climate change, opposed to issue areas that have one dominant international regime for their regulation.

A governance architecture builds around a specific policy domain, and includes the institutions and organizations that are responsible for applying and monitoring rules and regulations in that domain. However, the governance architecture of a given policy domain can also encompass organizations, norms, regulations and procedures addressing other issues beside the main subject area (Isailovic, Widerberg, and Pattberg 2013, 14). This is particularly true for the climate change governance architecture, which builds on interplays, interlinkages, and overlaps between different institutional arrangements, and between issue areas (van Asselt 2007; Rosendal 2001b, 2001a; Young 2002). To account for that, scholars have proposed different maps of the climate change governance architecture.

3.2.1.1 Mapping the climate change governance architecture

The architecture of climate governance has been mapped in different ways. A very simple map is the "onion model" of Biermann and colleagues, with the UN climate regime as central element of the governance architecture, surrounded by three layers representing multilateral forums, environmental institutions and organizations, and non-environmental institutions and organizations (Pattberg et al., 2014, p. 7).

Another well known representation is proposed by Keohane and Victor (2011), in their map of the "climate change regime complex". This map (see Figure 5) takes into account the multiple regimes, forms of governance (i.e. multilateral, bilateral, clubs)

and issue areas (climate adaptation, nuclear energy, ozone, etc.) that relate to climate change. Complexity is due to the coexistence of several regimes in the same issue area without clear hierarchy (Keohane & Victor, 2011). This lack of hierarchy between regimes in an issue area is considered to be particular for international policy, where it is often difficult to resolve where political authority over an issue resides (Alter & Meunier, 2009, p. 13). This is indeed true for climate governance, for which the initial unique regime on climate change institutionalized under the UNFCCC has become a "regime complex" because of the growing number of regimes that today interact with the issue of climate change, such as the development regime, the intellectual property right regime, and the financial regime, just to name a few (Orsini, 2017).

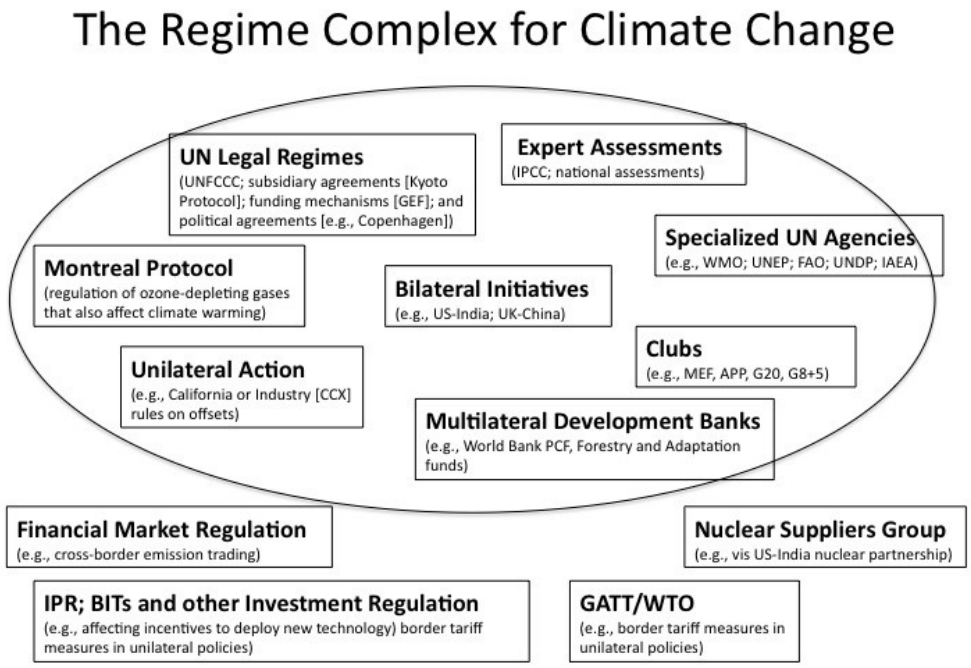

Figure 5: The Regime Complex for Climate Change Source: "Boxes show the main institutional elements and initiatives that comprise the climate change regime complex. Elements inside the oval represent forums where substantial rule making has occurred, focused on one or more of the tasks needed to manage climate change; elements outside are areas where climate rule making has required additional, supporting rules." Souce: (Keohane and Victor 2011, 10)

The onion model and the climate change regime complex account for state and interstate organizations linked to climate institutions, but exclude transnational organizations. The advent of transnational organizations in climate governance has bought a new level of complexity that the state and interstate-centered approach typical of regime theorists such as Keohane and Victor does not take into consideration.

In response to that, Abbott (2012) proposes a mapping of the transnational climate regime complex with a governance triangle. Institutions are situated in the triangle according to the identity of their funding members that can be of three types: state, firm,

and civil society organization (CSO). “The grater the role played by actors of particular type, the closer the scheme is located to that actor group vertex” (Abbott, 2012, pp. 574–575). Combinations of actor types are also possible. In the triangle, seven different zones distinguish them. Finally, the triangle also distinguishes governance function of each transnational institution. However, a comprehensive mapping of climate change governance needs to consider both international regimes and transnational arrangements (Pattberg, Sanderink, & Widerberg, 2017). Figure 6 shows how Pattberg et al. (2017) combined the institutions from the Regime Complex of Keohane & Victor (2011) with the Transnational Climate Climate Governance Triangle of Abbott (2012).

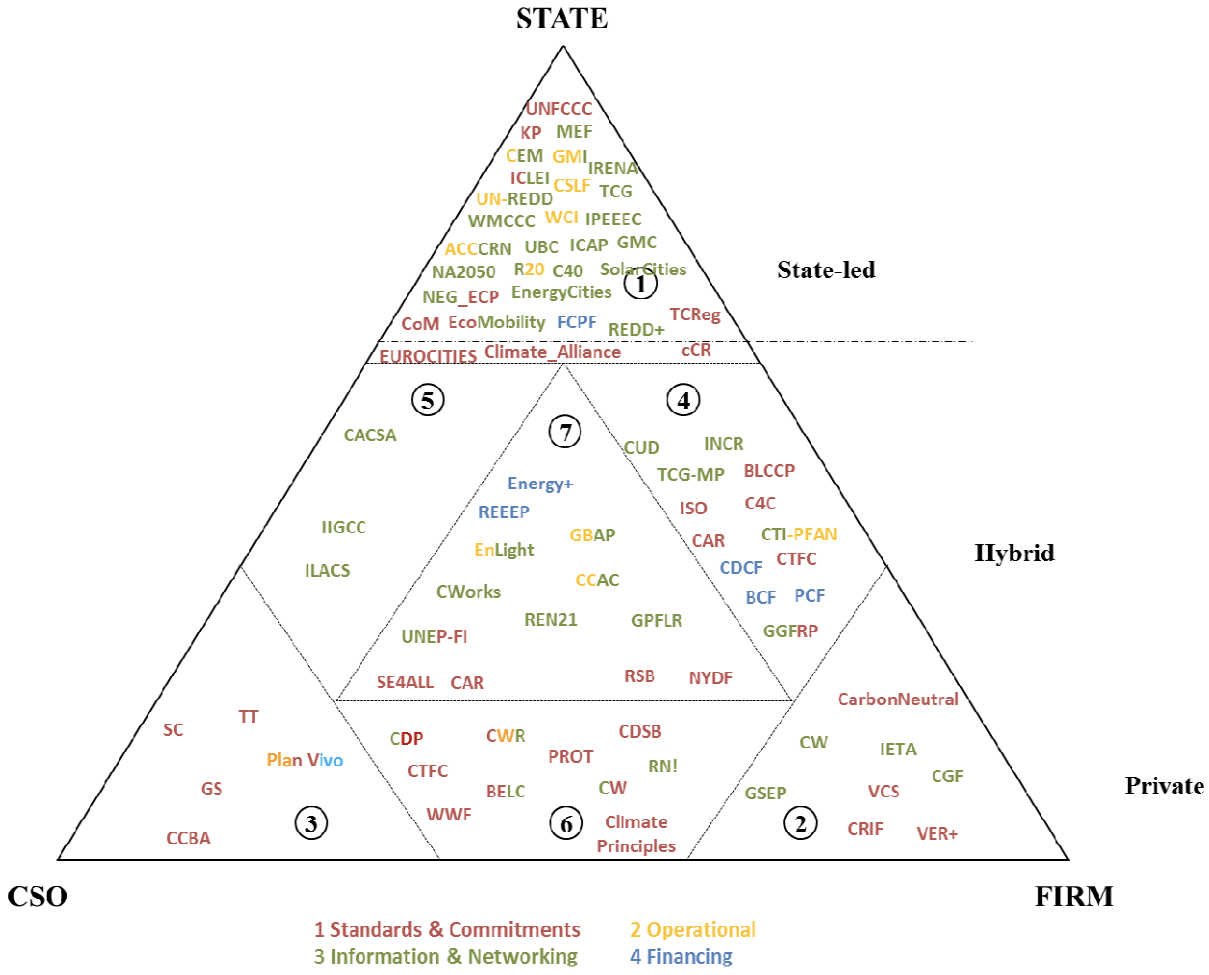

Figure 6: Climate Governance Triangle Institutions are situated in the triangle according to the identity of their funding members that can be of three types: state, firm, and civil society organization (CSO). Source: (Pattberg 2015)

Organizations are seen by Pattberg as participants in the mapped institutions. They can be sub-national actors (cities and regions), companies, NGOs, and IGOs (Pattberg, Sanderink, and Widerberg 2017, 25).

3.2.1.2 Fragmentation of the climate change governance architecture

The maps of the climate change architecture presented in the previous section (3.1.1), show how policy domains - and the climate change in particular - can actually be

> "marked by a patchwork of international institutions that are different in their character (organizations, regimes, and implicit norms), their constituencies (public and private), their spatial scope (from bilateral to global), and their subject matter (from specific policy fields to universal concerns)." (Biermann et al. 2009, 16)

Scholars refer to this phenomena with the concept of fragmentation, which they see as structural characteristic of governance architectures (van Asselt 2007; Biermann et al. 2009; Isailovic, Widerberg, and Pattberg 2013; Pattberg et al. 2014). Biermann and colleagues distinguish between three typologies of fragmentation: synergistic, cooperative, and conflictive. Synergistic fragmentation happens when there is one core institution that is integrated with all other institutions relative to the issue area, and is supported by all relevant actors. Cooperative fragmentation is found when an issue area has loosely integrated institutions, from which some actors remain outside, but maintain cooperation. In the last case, conflictive fragmentation, institutions are unrelated, and major actors support different institutions. These three degrees of fragmentation have different consequences on governance efficiency.

Biermann et al. (2009) identify the following negative, and positive consequences of fragmentation. Negative ones include increased costs of regulation, and a race-to the bottom effect[9]. On the other side, because of the diversity of policies approaches, ideas and technologies that a fragmented system can produce, fragmentation can also have positive consequences, such as increased innovation, and ambition. Furthermore, fragmentation may facilitate the inclusion of more organizations thanks to lower entry costs, and the linking with more issue areas. However, these positive consequences are related to synergistic, and cooperative fragmentation. Conflictive fragmentation is generally seen as bringing more harm than benefits.

Other authors (see Pattberg et al., 2014) treat fragmentation as a measure of coherence within a governance architecture: for them, fragmentation can be assessed by analyzing the proliferation, specialization and diversification of institutions, actor-constellations, norms or discourses active in an issue area. In this sense, fragmentation is used as a

[9] This expression is used to describe a downward spiral in action, ambition or regulation, generally motivated by the fear of becoming less attractive in a competitive system.

relative concept, as governance architectures can all be fragmented to some degree, and their distinct parts are hardly ever fully interlinked and integrated (Isailovic et al., 2013, p. 14).

3.2.1.3 Advantages and disadvantages of this approach

The concept of climate governance architecture provides a framework for the analysis of complex governance systems. Taking inspiration from architectural structures, this framework is used by IR to map governance structures in particular issue areas. It allows to get a sense of the patchwork of institutions, norms or organizations that regulate issue areas. It also provides a conceptual basis for measures of fragmentation, which can be used to compare structures over time, or across issue areas (Biermann et al. 2009, 20). However, we can also identify some limitations of this framework. In particular, this framework has generally being used with a state-centered perspective and top-down ontology, which collides with the diverse, polycentric or multi-leveled dimension of climate change governance (A. J. Jordan et al. 2015). Indeed, there are non-hierarchical vertical and horizontal interactions between organizations participating in climate change governance that the literature on governance architectures does not consider for the mapping of climate change governance. This gap is addressed by the multi-level governance, and policy network literature. In fact, as we will see in the next sections of this chapter, these literatures are based on assumptions and concepts that allow for a more comprehensive mapping of climate change governance, and its fragmentation.

3.2.2 Multi-level governance

The multi-level governance framework focuses on the vertical and horizontal interrelations that occur between different levels (sub-national, national, international, transnational), intended as jurisdictional levels or spatial scales. The original formulation of multi-level governance comes in relation to the EU and its cohesion policy (Hooghe and Marks 2001; Marks, Hooghe, and Blank 1996). This literature argues that the role of national governments is being eroded by collective decision-making, as well as by the influence of supranational, and sub-national organizations.

Lisbeth Hooghe and Gary Marks build their argument on three major promises: first, decision-making competences are shared by organizations at different levels of governance, where supranational organizations have independent influence over policy-making processes; second, and as consequence of the first point, collective decision-making for complex problems leads to a significant loss of individual governmental control; third, supranational, national and sub-national political domains are interconnected through policy networks, which allow transnational associations by blurring borders between domestic and international politics, as well as between public and private divides (M. M. Betsill and Bulkeley 2006, 149–51). Briefly, the multi-level

governance framework prioritizes the interdependence of multiple organizations at different levels (across scales, actor types and issue areas); it highlights non-hierarchical interactions; it focuses on networks as the main feature of organizational and institutional relationships; and can be applied to different contexts.

Climate change governance is one of them. In fact, decision-making in the context of climate change policy is shared between organizations operating at different levels of governance, and for this reason, it is today subject to increased vertical and horizontal interactions (Rabe 2007) that come in form of policy networks. These interactions take place between organizations from different spatial scales, but also between different types of organizations (public, private, hybrid), and various sectors or issue areas. For instance, sub-national authorities, and non-state actors, such as cities, regions, NGOs and business organizations have become active players in the climate change policy domain, and interact with each in form of actor constellations around policy issues.

3.2.1 Policy networks & multi-level governance

The multi-level governance framework goes hand in hand with the concept of "policy networks" (Warleigh 2006). This analytical concept (also considered as metaphor, tool or method) characterizes non-hierarchical and interdependent relationships that link a variety of public and private organizations that share common interests with regard to a specific policy or issue area (Börzel 1998). Multi-level governance and policy networks make a solid couple because of their actor-centered focus, and the importance they give to interactions among actors.

Network structures and processes are considered important because of various reasons. In public policy analysis it is considered that organizations' attributes and network configurations can both influence policy dynamics and outcomes (Ingold and Leifeld 2016). For global climate governance scholars (Stavins and Stowe 2016, 83–86), networks matter for climate governance because they build trust, spread ideas and knowledge, and generate authority for particular actors and organizations.

Formally, networks are composed of nodes ties. In climate change governance organizations (nodes) are connected via relationships (ties) that can form through direct collaboration, as well as indirectly, for instance, because of shared membership in an institution (Pattberg, Sanderink, and Widerberg 2017), participation in the same meeting, or in the same policy sector or issue area (Brandenberger et al. 2015).

3.3 Issue-linkages within the context of climate change governance

The previous sections of this chapter, in line with the history, and context in which climate change governance has evolved discussed in chapter two, reveal that climate change governance is a patchwork of institutions, organizations, and issue areas that can

interact and evolve. Following the multi-level governance and network literature, and to grasp this fragmented, although interlinked climate architecture, we focus on the vertical level, where fragmentation takes place across issues. In fact, the climate change issue has increasingly become interdependent with other issues. To account for this phenomenon, we consider the literature on issue-linkages.

The issue-linkage literature emerged in the 1980s (McGinnis 1986; Stein 1980), and has recently regained attention in IR literature. The main reason for this, is that globalization, regime complexity and institutional proliferation have made it increasingly difficult to understand the politics of any given issue area in isolation (Betts 2010). In particular, there is a growing literature on emerging issue-linkages, such as between development and migration (Betts 2010); gender and security (Shepherd 2013); trade and environment (Esty 2001); displacement, development and climate (Hall 2016).

In this thesis, we understand issue-linkages as the connection of two or more issues which previously where dealt in separate policy domains. Consequently, we conceive issue-linkages as a network made of issues (nodes) tied with each other because of tactical, substantive or strategic reasons. In fact, scholar distinguish between three types of issue-linkages. These are:

a) Tactical issue-linkage

"A tactical issue-linkage is the way in which issues are combined in inter-state bargains through conditionality" (Betts 2010, 87). The aim of these linkages is to create a balance during negotiations, in a way that both sides gain enough to accept the cost of an agreement. The link between climate mitigation and development aid is an example of tactical issue-linkage in the context of climate negotiations: "developing states may make their pledges to reduce greenhouse gas emissions dependent on whether donor states provide climate financing" (Hall 2016, 24).

b) Substantive issue-linkage

Substantive issue-linkage is a "real or perceived-to-be-real causal relationship between two discrete issue areas" (Betts 2010, 88). For instance, migration and climate change are two distinct issues; however, strong causal claims have been made about the impact that global warming will have on migration (Reuveny 2007). This has produced in the last years a linkage between the two issues, as well as rearrangement of global governance around them (Betts 2010; Hall 2016). Nevertheless, causal relationships across issues can be difficult to prove, as they are often characterized by ambiguity and imperfect information (Betts 2010, 88). Hence, issue-linkages are often based on perceived ideational relationship between issues rather than on scientific evidence. In turn, this suggests that discourse and persuasion can play an important role in shaping consensus on issue-linkages (Betts 2010; Hall 2016).

c) Strategic issue-linkage

Strategic issue-linkage corresponds to the "discursive re-framing of issues in a way that foregrounds the climate beneath of the original/source issue." (Jinnah 2011, 3). The growing phenomenon of political actors strategically linking their regime to climate change politics is also known as "climate change bandwagoning". Climate change bandwagoning is deliberate, and it is not the result of coincidental overlapping interests between regimes. In this case, linkages are framed and forged by actors seeking to meet specific ends, which oftentimes consist in pursuing their own agenda regardless of the consequences for the common problem (Jinnah 2011, 4; Young 2002, 133).

In practice, these three types of issue-linkage are oftentimes difficult to separate. However they are analytically different. As we are interested in the interrelations between organizations and issues, we focus on substantive and strategic issue-linkages, which can directly be promoted by organizations, and do not imply a negotiation process, like is the case for tactical issue-linkages. Reasons and modalities of organizational engagement in issue-linkages are explained in the following section.

3.3.1 Organizational Engagement

Issue-linkages are shaped and promoted by actors such as, inter alia, international governmental organizations and international NGOs . They can shape linkages by publishing reports, organizing side events at conferences, making speeches and developing projects that promote links between their own regime or issue area (e.g. development) and a target regime or issue area (e.g. climate change) (Hall 2016; Muñoz Cabré 2011). Like it was done by Hall (2015, 79), we can groups these activities under the term organizational engagement. This type of engagement differs from cooperation since it does not necessarily produce symmetrical relationships that benefit both areas (Ibid.).

The motives for organizations to engage and expand (usually unilaterally) in other issue areas are only broadly identified by scholars. Generally, they might want to seek new resources, such as finance, information, but also prestige and legitimacy (as in the case of climate bandwagoning, see Jinnah (2011)), or a causal relationship might have been discovered between issues, giving a rational for new organizations to engage in a new issue area, and in this way, contribute to the strengthening of the substantive linkage of the two issues (See chapter 3.3.b)

When organizations see a reason for linking two issue areas, this will be expressed in their discourse. Discourse and persuasion can be very important for issue-linkage as they allow to strengthen substantial links, and justify strategic links (Hall 2016; Jinnah 2011, 3). Yet, and especially for substantive issue-linkages, "a single organizational report or speech is not sufficient to change the overall strength of an issue-linkage: the

linkage is intersubjective", meaning that "there must be a number of actors creating, advocating for, and maintaining the issue-linkage" (Hall 2016, 40–41).

Hall (2016) uses four indicators to assess the strength of issue-linkages: a significant number of international NGOs and international organizations elaborating policy or advocacy material about an issue-linkage; high citations and circulation of literature substantiating the issue-linkage; presence of interagency working groups dedicated to the issue-linkage; and senior politicians who endorse the link.

If we conceive this in form of a network, we then have the interlinkage of issues, and organizations. This results in a two-mode network of issue-linkages, from which we can see which organizations link which issue to climate change.

3.4 Summary

To sum up this chapter, we can start by noting that governance is a central concept for analyzing global climate change policy, and the interactions beneath it, such as those between organizations and issue areas. Most importantly, it allows to consider not only state-driven policies, but focuses on governance structures and processes formed and promoted by wider set of actors, which include public and private organizations, such as IGOs, NGOs, business organizations, universities, etc.

To understand the link between issue areas and organizations, we can consider two conceptual approaches that relate to governance. The fist one is the governance architecture approach, used by IR scholars to map institutions, and organizations in different issue areas. From this literature we learn that the governance architecture of climate change is complex and fragmented. There is not one climate change regime, rather a regime complex with many regimes, institutions, and organizations that interlink with the climate change policy domain. Fragmentation occurs because of multiple actor constellations in the same policy domain. Organizations are part of these constellations and they can be involved in more than one issue area. This is a phenomenon that is facilitated in fragmented governance architectures.

The second approach is the multi-level governance approach. This approach considers vertical and horizontal interactions between organizations that deal with a common issue. According to this view, supranational, national and sub-national organizations from different issue areas, as well as from both the public and private sphere interact in a non-hierarchical way through policy networks in order to achieve public goals. Instead of starting from the institutional level of analysis like it is generally done with the governance architecture approach, the multi-level governance is more focused on bottom-up interactions among organizations.

In this thesis, I am interested in the interactions between organizations and issue areas, or more broadly, in the horizontal fragmentation of climate change governance. For this reason, I consider the literature on issue-linkages, and conceive issue-linkages as a network made of issues, and organizations – a two-mode network. The literature on issue-linkages has tried to explain motives, and modalities of direct engagement of organizations in linking issue areas. In fact, actors like IGOs and NGOs may have specific motives to promote issue-linkages. To engage with the climate change issue could be for them an opportunity to access new resources, and therefore they will try to strategically link their issue area to climate change. In other cases, they might simply perceive a causal relationship between their issue area and climate change, and want to propose their solution to the problem. To promote issue-linkages, they will do activities like writing reports, make speeches, organize and participate in events with the topic of climate change. Discourse and persuasion will serve as means to get consensus on the link between issues and make issue-linkages stronger. These aspects are important for the determination of ties between issue areas and organizations, as it is explained in the following chapter.

Finally, understanding how organizations and issues are interrelated is an important step in order to get a sense of the mechanisms behind the complexity of climate change governance. In chapter 4 we expose the research design based on the presented conceptual framework.

Chapter 4: Research design and methods

Overview

In order to answer the research question of this thesis, *"In the international climate regime, to what extent are organizations and issue areas interrelated?"* an empirical analysis of the interrelations between organizations and issue areas was performed.

Two were the goals of this analysis. The first one was to identify the issues that organizations link to climate change, and evaluate the strength of these issue-linkages. In fact, as explained in the previous chapter, issue-linkages are shaped by organizations, and most importantly, they are intersubjective, meaning that they have to be perceived and promoted by various organizations.

The second goal is to assess interrelations between organizations and issue areas in climate change governance by looking at the fragmentation of the governance structure made of multiple organizations and issue areas. In other terms, I looked at how connected is the network made of organizations and issue areas.

The analysis was done by applying models and methods of Social Network Analysis (SNA). As written in the previous chapter, networks are an analytical concept that suits multi-level governance structures such as climate change governance. As the focus is on the interrelations between two different set of objects, organizations and issue areas, a 2-mode network approach is used.

Furthermore, a specific geographical case was used for the analysis: International Geneva. The region around the city of Geneva, which is clustering a great number of organizations active at the international level, and from this perspective it is also named "International Geneva"[10], represents an ideal case for the analysis because of the following reasons. First, the diversity of organizations based in Geneva is high both in terms of type (IGO, NGO, Academia, National, and Subnational authorities and transnational initiatives), and policy domain (environmental, humanitarian, economic, etc.), creating opportunities for multi-level interactions. Second, International Geneva counts some of the most important organizations for international climate policy and climate science. For instance, between them there is the IPCC, which provides policy makers with regular assessment of the scientific basis of climate change, but also organizations that work on major climate change mitigation and adaptation projects (e.g. UN-REDD), such as the UNDP and UNEP. Additionally, local initiatives like

[10] International Geneva is also represented by an office at the Republic and State of Geneva. For the purpose of this thesis, when mentioning International Geneva without specification, I refer to the ensemble of intergovernmental organizations (IGOs), non-governmental organizations (NGOs) and academia based in Geneva.

networks and information-sharing platforms have been created to catalyze partnerships and discussions around environmental and climate change issues, providing opportunities of issue-linkages creation and promotion. Finally, to choose a specific case for the analysis was important because it allowed to set the boundary for the network analysis, as well as to set a starting point for the data gathering.

The first section of chapter 4 provides a description of International Geneva, explaining in more detail the motivations for the choice of this case. This is followed by the presentation of Social Network Analysis and its application in this thesis. Finally, the data gathering and data treatment process are explained in the last section of the chapter.

4.1 Case: The International Geneva

The Swiss city of Geneva is hosting a large number of IOs working on a large variety of issues, including climate change. Since the founding of the Red Cross in 1863, and the creation of the League of Nations in 1920 (subsequently replaced by the United Nations in 1946) in Geneva, the city has become a worldwide center for diplomacy. Today, the city of Geneva itself is host to 34 international organizations (IOs), bodies as well as a secretariat established under a treaty, approximately 250 NGOs and the permanent representations of 174 member states of the United Nations (FDFA n.d.). Furthermore, Geneva is clustering expertise coming from different fields, which often crosscut with climate change. In Geneva we can find experts in the field of peace, security and disarmament; humanitarian action and humanitarian law, human rights and migration; labor, economics, trade, science and telecommunications; health; and the environment and sustainable development.

Geneva is also one of the most prolific cities in term of discussions, production of policy papers, and establishment of formal and informal collaboration networks around global issues. In terms of networks, a number of initiatives have been created in Geneva in order to facilitate exchange of information, and partnerships between organizations. For example, tools such as the website of International Geneva[11] or the Perception Change Project (PCP)[12] have been created for these purposes. These and other initiatives are promoted by Swiss authorities from different levels (the Swiss government, the state of Geneva and the city of Geneva), as well as by organizations of various type based in the region. Thus, the first thing that can be observed, is the multi-level reality of International Geneva, and the opportunities of interactions that it offers between organizations from various level, type, and policy domains. This is important if

[11] International Geneva : www.geneve-int.ch. date accessed 04.10.2017

[12]PerceptionChange Project: www.geneve-int.ch/perception-change-project-pcp. date accessed 04.10.2017

we want to analyze climate governance through the lens of the multi-level governance framework, as it is the case for this thesis. The following sections describe how the issue of climate change is placed in this context, starting from the important role of the environmental domain for International Geneva, and the opportunities for interactions created around this policy domain.

4.1.1 Geneva, a hub for environmental policy?

Nairobi, in Kenya, is considered as the main center for international environmental policy as it hosts the global base of UNEP. However, authorities of Geneva and the Swiss Federal Office for the Environment (FOEN) have demonstrated to be keen in developing a second hub for environmental policy in Geneva.

For instance, the FOEN is the main promoter of the Geneva Environment Network (GEN), created and led by UNEP from 1999. The members of GEN are environment and sustainable development organizations based in Geneva, including intergovernmental agencies (35%), NGOs and business organizations (38%), academic institutions (9%), local authorities (6%) and other special members (3%) (GENetwork and Workastic 2015; UNEP/GEN n.d.). The aim of this network is to facilitate the contact between organizations, so to enhance cooperation and synergies. At the same time, it is also an information-sharing platform, in charge of the organization and promotion of environment-related meetings, roundtables, briefings and international workshops (S. P. Borgatti, Everett, and Johnson 2013). GEN is a network that groups six different environmental sub-hubs. As illustrated in figure 6, these are: 1) Trade & green economy/jobs; 2) Climate change; 3) Disaster management emergencies; 4) Chemicals & hazardous substances; 5) Water; and 6) Human rights. These six sub-hubs represent the issue areas of international environmental policy that are treated by the main international environmental organizations based in Geneva.

Figure 7: GEN and Six Major International Environmental Hubs. The figure shows the environmental hubs to which belong the members of the Geneva Environment Network (GEN). The six environmental hubs are: 1) Trade & green economy/jobs; 2) Climate change; 3) Disaster management emergencies; 4) Chemicals & hazardous substances; 5) Water; and 6) Human rights. Source: (GENetwork and Workastic 2015)

In 2012, an event opened the debate on the importance of Geneva for environmental governance. In fact, that year Switzerland announced its candidacy to host the Green Climate Fund (GCF), a financial mechanism of the UNFCCC designed to channel up to US$100 billion of aid annually to climate vulnerable countries by 2020 for climate mitigation and adaptation projects. The presence of a network of diplomatic missions and lots of specialized environmental organizations, as well a strong financial sector in Geneva was the main arguments of the Swiss candidacy, which competed against those of five other countries (Bradley 2012). At the end, the fund's board chose to base the GFC in the South Korean city of Songdo. Nevertheless, this has been an opportunity to think over the Geneva's potential to be a global climate hub.

4.1.2 The climate change issue area in Geneva

Even without the Green Climate Fund, Geneva counts many important organizations working directly on climate change. First of all, the members of GEN that belong to the climate change hub according to the GEN website (UNEP/GEN n.d.) are: the WMO, the IPCC, the Climate Vulnerable Forum (CVF), and the Working Group on Human Rights and Climate. However, there are other organizations based in Geneva that work principally on the climate change related issues, such as the Global Framework for

Climate Services of the WMO, the Climate Change and Disaster Risk Reduction cluster of UNDP, and the International Emission Trading Association (IATA). Additionally, expertise in the climate change field is also present in Geneva's academic organizations, and particularly at the University of Geneva (UniGe), and the Graduate Institute of International and Development Studies (IHEID).

4.1.3 Methodological importance of the selected case

From a methodological point of view, the selected case (International Geneva) defines the boundaries for the network analysis. Boundary specification is an issue of central importance for the design of network studies (Laumann, Marsden, and Prensky 1989). The boundary of a network refers to the set of all actors under consideration, and network boundaries may include or exclude actors depending on their attributes, linkages that occur in the context of a specific issue and defined geographic areas (Henry and Vollan 2014, 591). The climate issue is addressed by organizations from all over the world, and while a two-mode network analysis of organizations and issues linked to climate change could be done at the global level, it would be difficult if not impossible to determine the boundary of that large set of nodes. The choice of Geneva as a boundary for the analysis is motivated the possibility of a close look into multi-level interactions (due to the clustering of various organizations from different levels and issue areas), while being able to determine which organizations and issue areas belong to the network.

The following section explain in further details the specific type of network analysis used for this thesis: a two-mode network analysis.

4.2 Two-Mode Network

Social network analysis refers to the study of links between nodes see (Borgatti et al. (2013) for a detailed introduction to the theoretical concepts of network analysis). Nodes can be anything from individuals, organizations, and states. A tie is any type of relationship between the nodes. "The network connecting nodes via links (or ties) thus represents patterns of relations among social or political actors, and can be understood as a type of structure" (M. D. Ward, Stovel, and Sacks 2011, 246). Political scientists have widely used Social Network Analysis (SNA) on the assumption that "policy processes take place within networks of actors that are mutually dependent on each other" (Miyakawa 2000, 415).

Most social networks are defined as one-mode networks with one set of nodes that are similar to each other, and therefore represented as a 1-mode matrix (S. Borgatti 2009). For example, data on who is collaborating with whom between a set of organizations. However, the goal of this thesis is to analyze the relations between organizations and issue areas; two different sets of nodes. This requires a two-mode network analysis (also

known as affiliation or bipartite networks), where ties exist only between nodes belonging to different sets.

4.2.1 Definition of the modes and ties of the network under analysis

SNA requires as first step a clear definition of the modes, and the meaning of ties of the network under analysis. Modes refer to the kind of object in a network, while ties – as noted at the beginning of this chapter – denote a relationship between nodes of the network.

Mode 1*: International Organizations (IOs)*

Organizations based in Geneva are the first mode of my network analysis. To account for the diversity of organizations that are present in Geneva, nodes of this mode include Intergovernmental Organizations, Non-Governmental organizations, United Nations agencies, academic institutes and research groups, funds, and transnational organizations that consider the climate change issue in their activities (e.g. publications, projects, events) or main work areas.

Mode 2: *Issues areas*

Issue areas linked to climate change are the second mode. Examples of issues areas are: health, migration, human rights, and gender. These are issues areas that organizations link to climate change through their activities

Ties

As seen from the literature on issue-linkages in chapter 3, organizations might have motives to promote and advocate for the linkage of issue areas to climate change, and they can do so by publishing advocacy material, organizing events, or by creating working groups dedicated to the issue. Therefore, a network tie between an organization and an issue means that the organization perceives and promotes a link between a certain issue area and climate change.

The sources and the type of data that were used to build this 2-mode network are described in detail is sections 4.5 “Data and Methodology”. Before that section, I explain how SNA is applied to my empirical analysis of interrelations between organizations and issue areas in climate change governance.

4.2.2 Application of SNA for Goal 1: Analysis of Issue-linkages

As written in chapter 2, climate change has become a complex issue of international policy, and a growing number of IOs is today engaged in climate governance. This engagement is also what contributes to a growing number of issue-linkages to climate change, as presented in chapter 3. In fact, trough their activities, IOs promote a wide range of issue-linkages depending of their interest or perception of the problem. For instance, a project of the World Health Organization on the impacts of climate change on health supports the linkage between climate and health.

Therefore, the two-mode network of organizations and issue areas, whose elements are described in the previous section, represents a map of the issue-linkages promoted by organizations. From previous research on issue-linkages, we know that one requisite for an issue-linkage to be strong and relevant is that these must be a multiplicity of IOs promoting it (Hall 2016). The fact that an IO promotes an issue-linkage is represented by a tie in the two-mode network. Hence, the nodes representing issue areas that have the most of ties with organizations can be seen as being linked to climate change in a stronger way than the issue areas that are tied to (thus promoted by) only few organizations. In SNA, this can be measured by calculating the centrality of nodes, which depending on the parameters on which is measured, provides information on the importance of nodes in the network (Wasserman and Faust 1994). As the strength of issue-linkages depends on the number of organizations promoting the link, I used the degree centrality of the issue areas nodes to evaluate the strength of issue-linkages. In SNA, the degree represents the number of links that one node has with other nodes (S. P. Borgatti, Everett, and Johnson 2013). Therefore, the node with the highest centrality degree is in this case the issue area that is linked to climate change in the strongest way, while issue areas whit low centrality degree are weakly linked to climate change.

4.2.3 Application of SNA for Goal 2: Network Fragmentation

Two-mode network analysis has been used by IR scholars to study the architecture of the climate governance regime complex, which as explained in chapter 3, is a central concept for IR. In particular, Pattberg et al. (2017) used a two-mode network analysis to map climate change related institutions (mode 1) and participants in these institutions (mode 2). Based on this network, they analyzed the level of fragmentation of climate change governance.

In SNA, fragmentation is one of the many ways to measure cohesion, which symbolizes an idea of connectedness and "knittedness" in a network or within groups (S. P. Borgatti, Everett, and Johnson 2013). A value of 0 indicates a cohesive network where all nodes from the first mode are linked to all nodes of the second mode. On the other hand, a value of 1 indicates the absence of links and a complete disconnection between nodes, making them all isolates.

However, as recognized by Pattberg and colleagues (2014), fragmentation of a governance network is also dependent on the distribution of ties within the network (e.g. if the links are centralized to one node or few nodes). For this reason, their measure of fragmentation takes into account both the density and the centrality of actors in the network. In particular, they measured the average degree and the centralization of the network. These two measures are defined as follows.

Average degree

The average degree of a network is the weighted degree of nodes, where the degree of a node is the number of connections it has to other nodes (S. P. Borgatti, Everett, and Johnson 2013). In simple words, it indicates the average number of links per node. When normalized, it gives a measure of network density (Wasserman and Faust 1994).

Centralization

Centralization allows taking into account the distribution of ties in the network. A high centralization means that the ties are unequally distributed across the network (Pattberg et al. 2014). The case of maximum centralization happens when all ties are centralized to one node and result in a start graph (Wasserman and Faust 1994). The measure accounts for the differences of node centralities, and varies depending on the type of centrality chosen for the calculation (e.g. degree, closeness, betweenness). The degree centrality indicates the node with most ties, while the betweenness centrality measures to what extent a node lies between other nodes and connects different parts of the network (Ibid.). Centralization is measured as a proportion, where a network with a centrality equal to 1 indicates that all ties are directed to one node (Prell 2012). For the centralization based on nodes' degree, the centralization score will be higher if there are both very central and very peripheral organizations (Ibid).

Following these considerations, I analyzed the fragmentation of the climate change policy domain in Geneva. In particular, I looked at the horizontal fragmentation of climate governance. Based on the literature on multi-level governance an organizational engagement presented in chapter 3, I assume that organizations engage in multiple issue areas, and interact in a non-hierarchical way through policy networks in order to achieve policy goals. It is also assumed that engaging in the same issue area creates collaboration opportunities, and likelihood of sharing resources and knowledge, contributing, with interdependent knowledge, to deal with complex problems such as climate change (Brandenberger et al. 2015). Therefore, I analyzed fragmentation in the network of organizations than can be obtained by projecting the two-mode network of organizations and issue areas into a 1-mode network of organizations that are connected if they engage in the same issue area. For the resulting network, I assessed fragmentation by measuring the network average degree and density, as well as two node centrality measures: degree centrality and betweenness centrality. Finally, the presence of particular community structures in the network was analyzed with a hierarchical cluster analysis, which partitions organizations into subgroups whose members are structurally similar - in this case, if they share similar issue areas. (Knoke and Yang 2008, 80–82).

4.5 Data & Methodology

The starting point to construct the 2-mode network was to select the Geneva-based organizations that work on climate change. To do that, I relied on the list of

organizations of the Geneva Green Guide[13], a tool created by the GEN network. This guide provides practical information for and about Geneva-based organization involved in environmental and sustainable development issues. The updated version of the guide is integrated in the website of GEN[14]. The fact that it is linked to an official network makes it a reliable source of information on Geneva-based organization. On the other hand, its connection to the environmental domain may suggest that only environmental organizations are listed. However, this is not the case. In fact, the list is inclusive for all sorts of organizations, from faith organizations to economic and humanitarian ones. For this analysis, this diversity is an advantage, given the fact that linkages to other issue areas are researched.

Starting from the Green Guide's descriptions of IOs, and by checked their websites, I was able to identify Geneva-based IOs that work on climate change. Those that have climate change in their focus areas, have written reports on the issue, or run projects that deal with climate change have been selected and defined as nodes of mode 1.

The set of issue areas of mode 2 has been defined inductively by looking at the issue-linkages made by IOs in their activity. As an example, if UNDP published a report on the links between climate change and migration, then the report links climate change to migration, therefore migration is a node of the issue area mode. In total, from the 112 organizations listed in the Geneva Green Guide 38 were found as working on the climate change issue and selected as nodes of mode 1: Organizations (see Appendix 1 for a full list of organizations).

The website pages, reports and projects of these organizations allowed identifying 22 issue areas that are death with or mentioned as relevant in relation to climate change. To have a picture of the recent work of organizations, based on the common knowledge on climate change as provided by the IPCC, project and documents published prior to 2014 - the year when the IPCC 5th Assessment Report (IPCC 2014) was published - were not considered.

Similar issue areas were combined in one category, such as for example energy efficiency and renewable energy, which were grouped under a unique energy issue area. Categorizations were done on the base of other researches that looked at issue areas and issue-linkages in the climate change policy domain (Aerts et al. 2004; van Asselt, Gupta, and Biermann 2005; Bulkeley et al. 2014).

By combining the two modes in a network, I obtained a two-mode network of organizations and issue areas that relate to climate change in the International Geneva. The collected data was organized in two forms:

[13]Geneva Green Guide: www.genevaenvironmentnetwork.org/?q=en/genevas-green-guide date accessed 17.01.2018
[14] Ibid.

- 2-mode data-set: a rectangular binary data matrix of organizations (rows) and issues (columns). Ties between organizations and issues were coded as dummy variables, with 1 denoting a tie being present, and 0 denoting the absence of tie.
- 1-mode data-set or co-occurrence matrix: a squared matrix of organizations by organizations indicating the strength of ties based on co-occurrence, or in other words, the number of times organizations are involved in the same issue and vice versa.

These two types of matrixes are both useful for the analysis of two-mode networks. Indeed, the analysis is based on two approaches: unimodal and bimodal.

Unimodal approach

A common approach to analyze two-mode network data is to convert it into 1-mode data sets, and examine relations within each mode separately. The advantage is that the resulting networks can easily be analyzed with any of the methods for 1-mode network analysis (Parker 2015).

Bimodal approach

Another approach is to analyze both modes simultaneously and use 2-mode data. However, a problem with the analysis of 2-mode networks is that the most common methods for the analysis of network developed by scholars until now require square matrixes, while 2-mode networks are generally rectangular (S. Borgatti 2009). According to Borgatti (2009), a solution to this issue is to store 2-mode data in bipartite network, a square bipartite adjacency matrix where rows and columns represent both modes (organizations and issues), and use this matrix for specific measures and techniques requiting square matrixes, such as for example, Multi Dimensional Scaling (MDS).

The software used to make transformations of matrixes and to analyze them with SNA measures is UCINET (Borgatti et al. 2002).

4.5.1 Visualization

To analyze the general interconnection between organizations and issue areas, visualization techniques were employed. In fact, the structure of the network can be observed through graphs methods (S. P. Borgatti, Everett, and Johnson 2013; Wasserman and Faust 1994). Visualizing the 2-mode network of organizations and issues linked to climate change can provide insight into the multi-level structure of climate governance. For example, a visualization of the two-mode network of organizations and issues can help identifying actor constellations around specific policy issues (Pattberg et al. 2014). To create graphs for this thesis, I relied on NetDraw in UCINET. Graphic tools such as colors and size have been used to distinguish between

modes. A Multi-dimensional scaling (MDS) plot was created to analyze particular relations between nodes. In a MDS plot, organizations that share similar issue areas are located close to each other (S. Borgatti 2009).

4.5.2 Data and Methods for Goal 1: Analysis of Issue-linkages

To analyze the strength of issue-linkages, the degree centrality of issue areas was calculated. In order to account for the fact that links occur between different sets of nodes, the measure was done after transforming the rectangular binary matrix of the 2-mode network into a square bipartite matrix, and then calculating the degree centrality with UCINET.

In addition, a circle plot of the 2-mode network was created in order to visualize the differences in centrality degree between nodes. In NetDraw, nodes of the two modes were colored with two different colors and shapes, and the size was made proportional to the degree centrality.

4.5.3 Data and Methods for Goal 2: Network Fragmentation

To measure fragmentation of climate governance in Geneva across issues, I used the unimodal approach to analyze social networks data. Therefore, the 2-mode network of organizations and issue areas was converted into a 1-mode network with organizations as nodes. The values of the diagonal were set to 0 in order to avoid self-linkages. Furthermore, the density and centrality measures (degree-centrality and betweenness centrality) were calculated for the 1-mode network. To compare the two centrality measures, a plot of the combined results was created with Microsoft Excel. For a visual analysis, the 1- mode network was plotted with a Gower metric scaling layout. This layout places nodes close to each other in the graph if the nodes have intense relations either directly or indirectly (McCaffrey and Smith 2007).

Chapter 5: Results

Overview

This chapter presents the results obtained for the two main goals of the analysis. Before that, the 2-mode network at the centre of this thesis is described and visualized.

5.1 Network visualization & descriptive statistics

The 2-mode network of 38 organizations (nodes of mode 1) and 22 issue areas (nodes of mode 2) in Geneva counts 151 ties, and has a density of 0.085. Figure 8 shows which organizations (red) link which issue area (blue) to climate change. Because it is a MDS plot, similar nodes are positioned close to each other. From a visual inspection, cluster of organizations can be identified on the right of the plot (ICTSD, ITC, WBCSD, ISO, WTO) and in the low part at the centre of the plot (Gold Standard Foundation, WWF, UN-Habitat, World Bank, FAO, IISD, UNECE, UNICEF, Helvetas). Some issue areas are also positioned close to each other (Low carbon infrastructure, Climate finance, Air pollution, Urbanization); (Gender, Health, South-South cooperation, Labor); (Forests, Agriculture, Ecosystem services and biodiversity). The nodes with most ties are placed in the centre of the plot, while those with only one or few ties are peripheral.

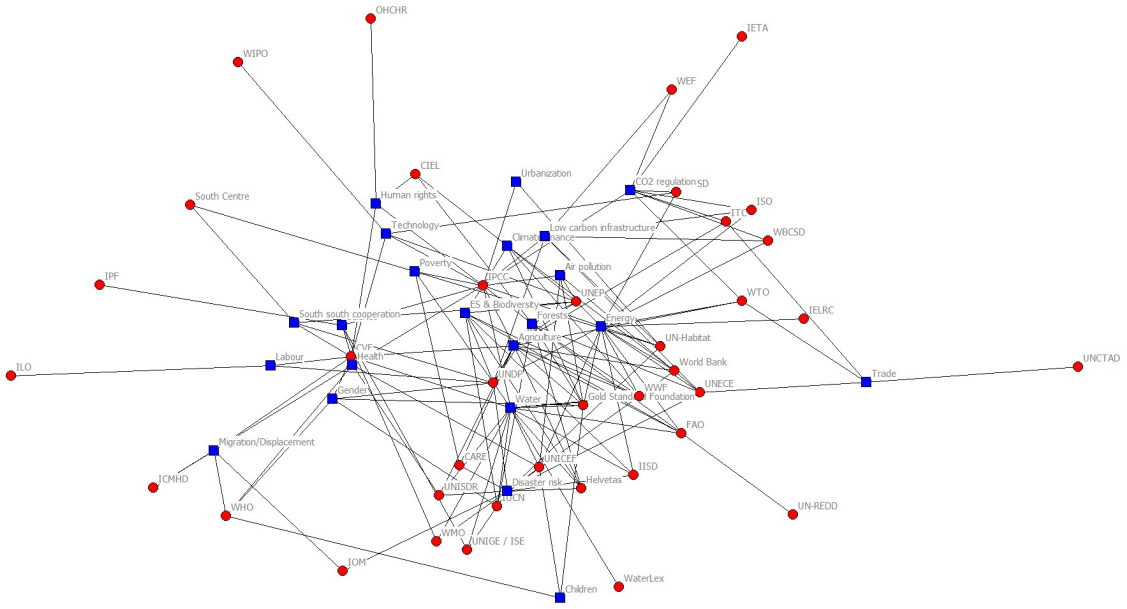

Figure 8: MDS plot of the 2-mode network of organizations and issue areas linked to climate change governance in Geneva. The network is made by two sets of nodes, the first one (red circles) has Geneva-based organizations as nodes, the second one (blue squares) has issues areas as nodes. The ties between nodes indicate that organizations link the issue area to climate change in their activities, thus promote an issue-linkage between climate change and the issue area.

5.2 Results for goal 1: Issue-linkages

Table1 shows the results of the centrality degree calculation for issue areas. Looking at the degree of each node, it appears that the most central issue area in the network is "Energy ", followed by "Water", "Agriculture", "Disaster risk", "Forests", "CO_2 regulation", Ecosystem services & Biodiversity". These are the seven strongest issue-linkages to climate change. More than half of the climate-work done by IOs based in Geneva is linked to these seven issue areas (15% of the total issues). The proportion of ties directed to these issue areas is 55% of the total number of ties.

On the other hand, "Urbanization", "Children" and "Labor" have low centrality degree; therefore the link between these issues and climate change is weak. In fact, as visible in Figure 9, only few organizations address the link between climate change and these three issue areas.

Table 1: Degree centrality of Issue Areas. The table resumes the degree centrality for each issue area. Highlighted in bold are the issue areas with highest centrality, therefore strongly linked to climate change.

Issue Area	Node Degree	nDegree*
Agriculture	**13**	0.342
ES & Biodiversity	8	0.211
Climate finance	6	0.158
CO_2 regulation	8	0.211
Disaster risk	**13**	0.342
Energy	**16**	0.421
Forests	**10**	0.263
Gender	5	0.132
Health	6	0.158
Human rights	4	0.105
Labor	3	0.079
Migration/Displacement	4	0.105
Air pollution	5	0.132
Poverty	5	0.132
Science	5	0.132
South-South cooperation	4	0.105
Technology	5	0.132
Trade	4	0.105
Low carbon infrastructure	7	0.184
Urbanization	2	0.053
Water	**15**	0.395
Children	3	0.079

*nDegree is the degree normalized by the tot. number of node alters, i.e. the number of nodes in mode 1(Organizations) .

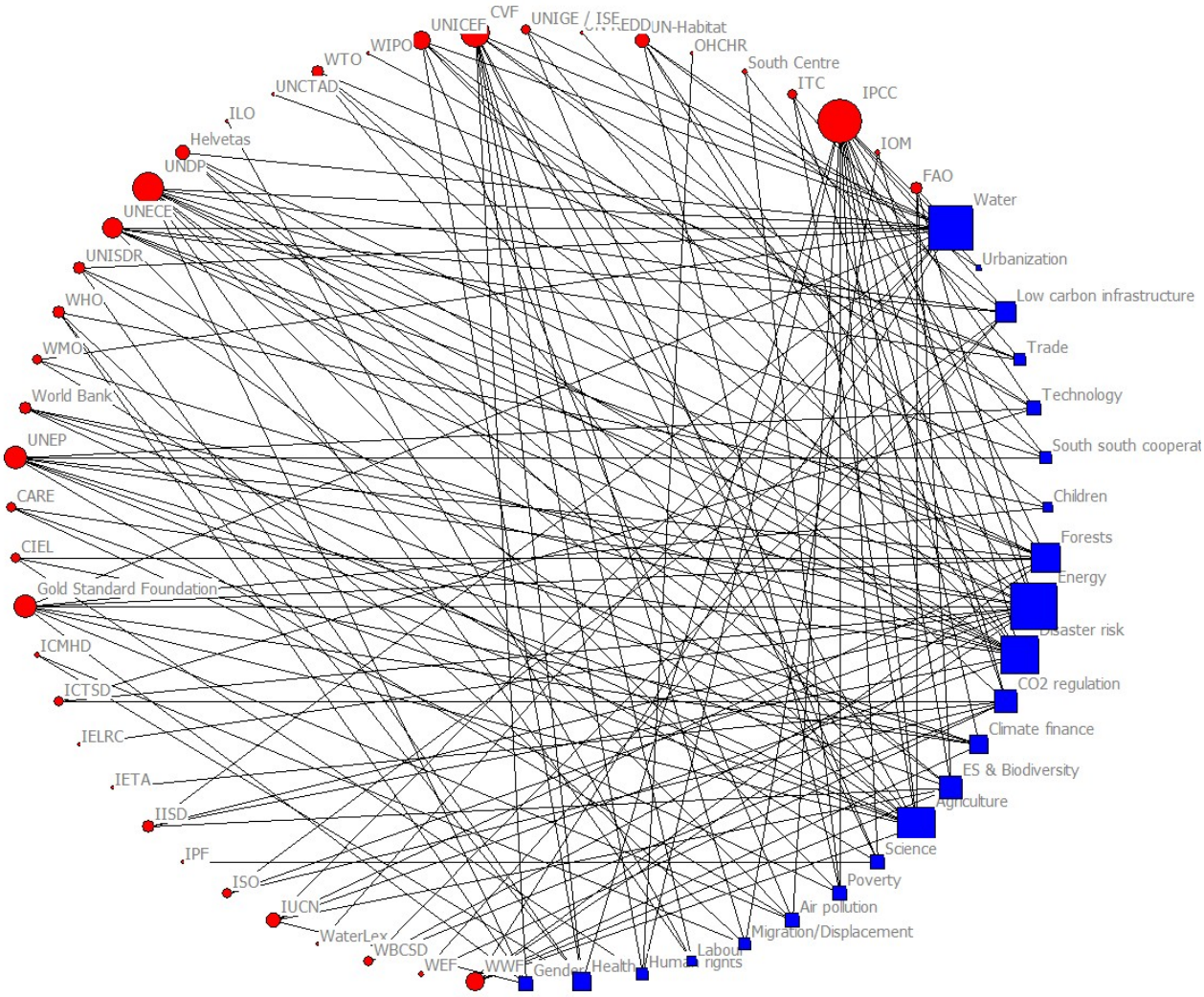

Figure 9: Circle plot of the 2-mode network showing the most central nodes. The plot shows the connections between nodes placed at equal distances around the circle. Red circles represent organizations, blue squares represent issue areas. The size of nodes is proportional to node's degree, therefore the number of links to nodes of the opposite mode.

5.3 Results for goal 2: Fragmentation

The 1-mode network of organizations obtained from the projection of the 2-mode network of organizations and issue area has 38 nodes, an average degree of 17.579 density of 0.475. Following this parameters, the network appears quite cohesive, with 47.5% of all possible edges present. However, Figure 10 shows that the distribution of ties in the network is not uniform. In fact, it shows a tendency of clustering around trade and business related organizations (IETA, ITC, WTO, ICTSD, IELRC, WBCSD, WEF), mixed organizations with low centrality degree (WIPO, South Centre, OHCHR, IPF, ILO, WHO, ICMHD) and mixed organizations with high degree (see top part of the network in Figure 10). IPCC shares ties with all the three clusters, but not with

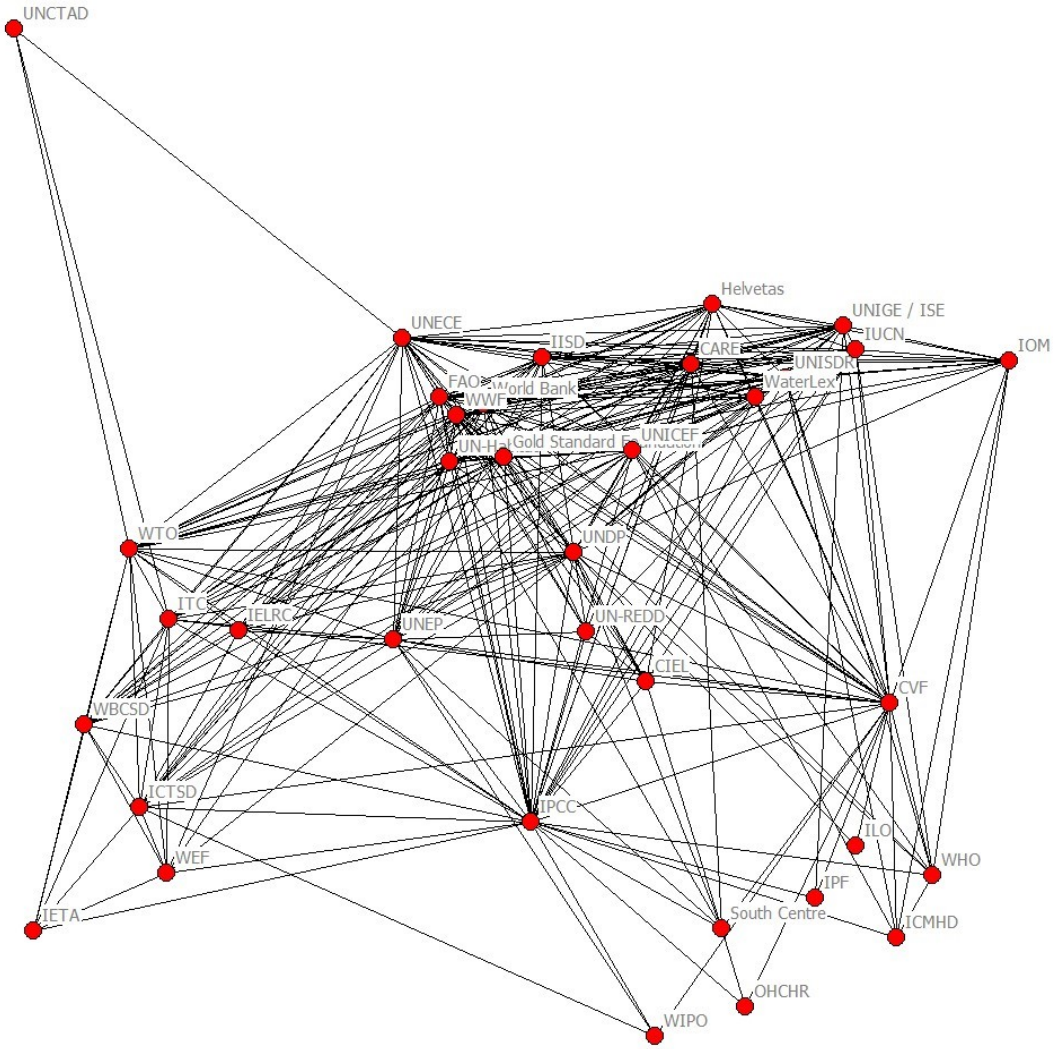

Figure 10: Cross-issue climate governance network in Geneva. The network shows organizations as nodes. Ties between nodes indicate that the organizations are engaged in the same climate-related issue area. Layout: Gower metric scaling

UNCTAD, which is the less connected node of the network. Organizations such as IPCC, CVF, UN-REDD appear as being those that connect the different clusters of the network.

This is confirmed by their high betweenness centrality (see Figure 11). However, this is not valid for UN-REDD, which has a low centrality degree compared to IPCC and CVF. Figure 11 displays a plot of organization's degree centrality and betweenness centrality. UNDP and IPCC have both high degree and betweenness. The betweenness of CVF is also high compared to the rest of organizations. The majority of organizations have a medium to low centrality degree. Among the organizations with low centrality

we find specialized organizations (e.g. ILO, Waterlex), that participate in climate governance, but only in relation to specific issues (e.g. climate risks for labor, water management). Finally, the degree centralization of the network is 0.468, hence, slightly low.

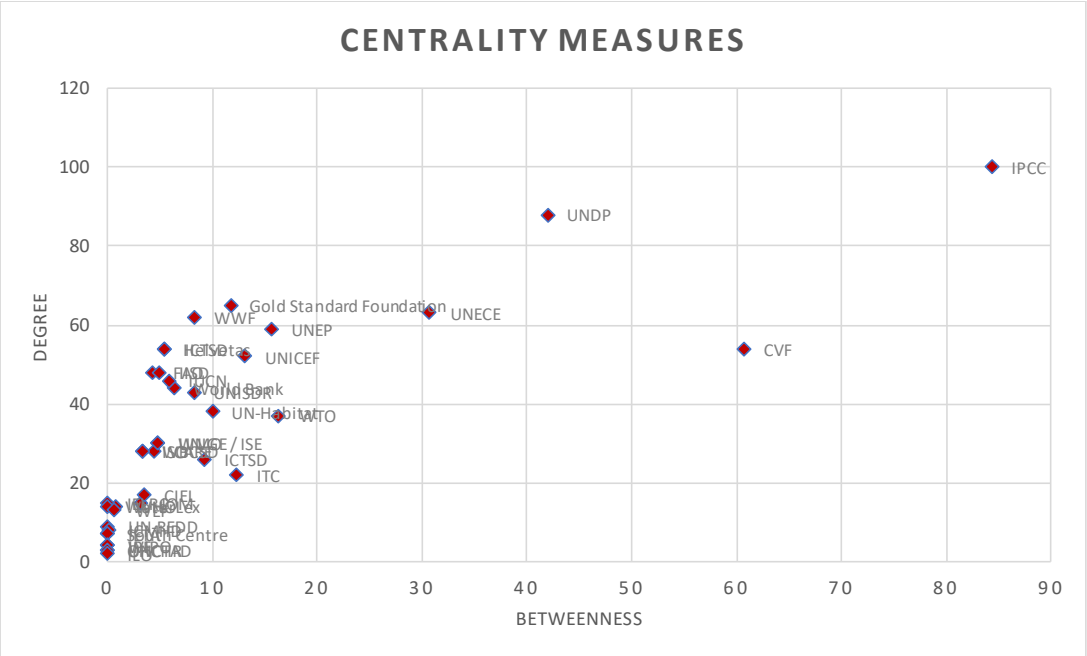

Figure 11: Centrality Measures. Betweenness centrality and degree centrality of organizations working on climate change in Geneva

Chapter 6: Discussion

Overview

This chapter reflects on the main findings of the analysis presented in the previous chapter in relation to: the history of international climate governance (as presented in chapter 2), the literature on climate change governance and issue-linkages (chapter 3), and the methodology of SNA applied to the selected case (chapter 4).

6.1 Issue-linkages

The 2-mode network characterizing interactions between organizations and issue areas linked to climate change has been analyzed with the intent to assess the strength of issue-linkages to climate change.

According to the findings, the issues areas that have a strong link to climate change are: Energy, Water, Disaster risk, Agriculture and Forests, CO2 regulation, Ecosystem service & Biodiversity, Low carbon infrastructure. Both aspects of climate mitigation and climate adaptation are expressed by these issue areas. Indeed, energy consumption, agriculture, and deforestation are some of the principal anthropogenic activities causing GHG emissions in the atmosphere (IPCC 2014). At the same time, agriculture and food security, ecosystem services & biodiversity, and water resources are all vulnerable to the impacts climate change. Their management, together with the reduction of disaster risk, are central issues for climate adaptation (Ibid.). Therefore we can recognize that there is a substantial link between climate change and these issues, which I assume, is the reason for their strong linkage to climate change.

On the contrary, urbanization, labor, and children issues are weakly connected to climate change. The fact that urbanization appears a weakly linked to climate change is surprising if we consider that cities are today actors of growing importance for climate governance. In fact, an important part of climate change governance literature looks at this phenomenon (M. Betsill and Bulkeley 2007). In addition, the impacts of climate change on cities and vice versa have also been confirmed by scientific studies (Corburn 2009; Dodman 2009). Most likely, the result of my analysis is influenced by the fact that some of the issues pertaining to urbanization are captured by other issue areas, and particularly by “Low carbon infrastructure”, which includes transports, waste and constructions. Therefore, I consider this result as not valid. However, from this result we can note that categorization of issue areas is an important methodological choice for the study of issue-linkages with SNA.

As for the climate-labor issue link, and the climate-children issue link, the results show they are only relevant for few organizations, which suggests that the nature of the link is

strategic rather than substantive. The absence of the IPCC in endorsing these two issue-linkages goes to highlight that the substantial link is weak. However, we cannot exclude that labor or children are indirectly linked to climate. For example, as both the WHO and UNICEF link climate change to children issues, it may be that the impacts of climate change on health are of particular intensity for children, thus children and climate are indirectly linked by health.

These indirect linkages are an aspect that could be further analyzed with the means of SNA. In this thesis, the use of this method has shown to be a good way to disentangle the complexity and wickedness of climate change governance, and to analyze the social interactions that bring different issues under the climate policy domain. However, it has not provided consistent explanations for the differences in strength between issue-linkages. A suggestion for this task would be to perform a
Dynamic Network Analysis that could take into account the changes of issue-linkages over time.

Finally, in line with the evolution of the climate change definition in international relations presented in chapter 2, the result show that the issues that organizations link to climate change are all captured by the Sustainable Development Goals of the United Nations 2030 Agenda for Sustainable Development. This strengthens the evidence that development cooperation is linked to climate change.

6.2 Fragmentation in the climate change governance across issue areas in Geneva

From a first look, the network of organizations engaged in climate change governance in Geneva shows cohesive structure in terms of direct and indirect connections between organizations. This is not surprising, since there were many issue areas in the original 2-mode network that could link organizations, and especially those who work on multiple issues, such as sustainable development organizations (e.g. UNDP) or environmental organizations (e.g. UNEP).

Another predictable result is that organizations that have been created to deal specifically with climate change (IPCC, CVF and Gold Standard Foundation) are between the most central, hence important, organizations in the network. In fact, these are the organizations that are interested in most of the issues pertaining climate change. Other organizations, originally created for different issues, like health or trade, are less central. The same is true for specialized organizations like UN-REDD, which deals with climate change, but predominantly in relation to forests. Overall, the results tell us that there are few highly central organizations, and many organizations that have medium to low centrality. Given that there are organizations with medium degree centrality, there

is not a real core-periphery structure that would allow saying that the network is not fragmented.

However, the high centrality (both in terms of degree and betweenness) of the IPCC and the UNDP shows their importance for connecting the different organizations around the issue of climate change. Indeed, this is reflected in their activities. The IPCC does that by providing a common knowledge instrument on climate change through the IPCC Assessment Report. The UNDP instead, through its cross-issue development programs and projects, as well as with advocacy, has the opportunity to partner with a large range of organizations. Moreover, UNDP's centrality, compared to other organizations of different policy domains, comes to highlight the importance that the link between sustainable development and climate change has taken in the last years.

Chapter 7: Conclusion

The objective of this thesis was to map and analyze the interrelations between Geneva-based international organizations, and the issue areas that they link to climate change, so to measure the strength of issue-linkages to climate change, and assess the horizontal fragmentation of climate governance at the scale of International Geneva. Therefore, interactions were mapped in a network that considers both organizations and issue areas as different, but interlinked set of nodes. Ultimately, this network was analyzed with the method of Social Network Analysis. The underlying assumption was that policy processes take place within this network of interdependent organizations and issue areas.

Based on the ties between the two set of nodes, SNA showed that some issue areas are linked to climate change in a stronger way than others, and thus appear to be more important for international climate policy. In particular, the analysis shows that there is a recognized and strong link between climate change and energy issues, as well as with water issues, disaster risk and agriculture. On the other hand, there are issue areas that are only tied to few organizations, such as children issues and labor issues. The weak linkage of these issues to climate change may be due to the absence of a direct causal relationship between them.

Furthermore, the analysis of the network's structure shows that climate governance in Geneva is fragmented. Yet, there are organizations that occupy highly central positions, both in terms of the ties that they have with other organizations, and the way in which they can connect distinct parts of the network. These organizations are the IPCC, and the UNDP.

In general, the broad policy domain of sustainable development, encompassing most of the issue linked to climate change identified in this thesis, together with the energy issue area, are the areas through which interrelations between organizations and issue areas are the most intense.

Nevertheless, it should be noted that the approach used to map climate change governance in this thesis presents some limitations. First of all, International Geneva is a small case compared to the global network of organizations that are engaged in the climate change policy domain. Another limitation is that the results do not say anything about the extent to which organizations are really connected; it is only assumed that they could have opportunities to collaborate and share resources if they are tied to similar issue areas. Therefore, an idea for future research would be to compare the analyzed 2-mode network whit a network analysis at a different scale or on a network based on other types of ties, such as the participation in the same project, or the co-linking in organizations' websites.

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Appendix I: List of organizations

Acronym	Full Name
CARE	Care Climate Change and Resilience Information Center
CIEL	Center for International Environmental Law
CVF	Climate Vulnerable Forum
FAO	Food and Agriculture Organization of the United Nations
Gold Standard Foundation	The Gold Standrard Foundation
Helvetas	Helvetas Swiss Intercooperation
ICMHD	International Contre for Migration, Health and Development
ICTSD	International Cenre for Trade and Sustainable Development
IELRC	International Environmental Law Reasearch Center
IETA	International Emissions Trading Association
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IPF	International Polar Foundation
ISO	International Organization for Standardization
ITC	International Trade Centre
IUCN	International Union for Conservation of Nature
OHCHR	United Nations High Commissioner for Human Rights
South Centre	South Centre
UN-Habitat	United Nations Human Settlements Pogramme
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children's Fund
UNIGE / ISE	Université de Genève / Institut des Sciences de l'Environnement
UNISDR	United Nations Office for Disaster Risk Reduction
WaterLex	WaterLex
WBCSD	World Business Council for Sustainable Development
WEF	Wordl Economic Forum
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
World Bank	The World Bank
WTO	Wordl Trade Organization
WWF	World Wide Fund for Nature

Declaration

under Art. 28 Para. 2 RSL 05

Last, first name: Amanda Lebic

Matriculation number: 11-421-682

Programme: Master in Climate Sciences

Bachelor ☐ Master ☐ Dissertation ☐

Thesis title: A Two-Mode Network Analysis of Issues Areas Linked to Climate Change and International Organizations in Geneva

Thesis supervisor: Prof. Dr. Karin Ingold

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due acknowledgement has been made in the text. In accordance with academic rules and ethical conduct, I have fully cited and referenced all material and results that are not original to this work. I am well aware of the fact that, on the basis of Article 36 Paragraph 1 Letter o of the University Law of 5 September 1996, the Senate is entitled to deny the title awarded on the basis of this work if proven otherwise. I grant inspection of my thesis.

.....

Place, date

.....

Signature