

**Mapping and measuring fragmentation in
global governance architectures**

A framework for analysis

Philipp Pattberg

Oscar Widerberg

Maria Isailovic

Flávia Dias Guerra

This report was internally reviewed by: Dr Agni Kalfagianni

IVM

Institute for Environmental Studies
VU University Amsterdam
De Boelelaan 1087
1081 HV AMSTERDAM
The Netherlands
T +31-20-598 9555
F +31-20-598 9553
E info.ivm@vu.nl

Copyright © 2014, Institute for Environmental Studies

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the copyright holder

Contents

1	Introduction	5
2	Concepts and definitions	7
2.1	Governance architecture	7
2.2	Issue areas and policy domains	7
2.3	Fragmentation	9
3	Mapping Global Governance Architectures	11
4	Measuring degrees of fragmentation	15
4.1	Institutional constellations	15
4.2	Norm constellations	18
4.3	Actor constellations	20
4.4	Discourse constellations	23
5	Conclusions	27
	References	29

1 Introduction

Over the past 20 years, world politics has become increasingly complex due to a proliferation of institutions, actors, norms, and discourses in global affairs. Lacking overarching organization and hierarchy, governance architectures, i.e. the “overarching system of public and private institutions that are valid or active in a given issue area of world politics” (Biermann *et al.* 2009, 15), have turned into a patchwork of institutions marked by diversity in terms of character, constituencies, scope, and subject matter resulting in institutional overlaps and gaps, contestation and synergy, integration and fragmentation. While scholars have started to study the dyadic relations among international institutions (Oberthür and Stokke 2011; Oberthür and Gehring 2006) as well as the complex interactions that occur within what Keohane and Victor (2011) have termed “regime complexes”, we currently lack a detailed understanding of the degree of fragmentation across different policy domains.¹ Hence, to understand the contemporary architecture of global governance, improved mappings of governance structures and appropriate indicators and metrics for measuring degrees of fragmentation are urgently needed. This paper outlines a conceptual and methodological framework for mapping and measuring fragmentation in global governance architectures based on a 2-step approach. First, global governance architectures are mapped to include the key governance arrangements of an issue area. Criteria for inclusion/exclusion of governance arrangements are (a) international and transnational scope, (b) intentionality to steer the behaviour of members, (c) explicit mentioning of governance goal, and (d) identifiable governance functions. Second, four indicators are applied to measure fragmentation: institutional constellations, actor constellations, norm constellations and discourse constellations.² The framework can be used to examine the structural properties of global governance architectures and thereby aid further studies on the fundamental drivers and explanatory factors underlying fragmentation of governance.

The paper is structured as follows. After this short introduction, section 2 provides a conceptualization of three central concepts, namely *governance architectures*, *issue areas*, and *fragmentation*. Section 3 elaborates how global governance architectures can be mapped using the idea of a governance triangle. Section 4 subsequently outlines our operationalization of indicators in more detail, specifying appropriate methodologies to measure each indicator in empirical research. Section 5 includes an overview of the framework in table format.

¹ For a detailed discussion of the evolution of the fragmentation concept in political science, law and International Relations, see: Isailovic, Widerberg, and Pattberg 2013.

² Mapping and measuring the overall structure of governance architectures constitutes the first work package of the four-year research project CONNECT - Coping with Fragmentation: Assessing and Reforming the Current Architecture of Global Environmental Governance (NWO Research Incentives Scheme VIDI). The four themes have been identified in a literature review (Isailovic, Widerberg and Pattberg 2013) and two international workshops. One organized by the German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), together with the Environmental Change Institute (ECI) of the University of Oxford, held in Bonn, Germany, August 29–30, 2011, and another organized by the Institute for Environmental Studies (IVM), VU University Amsterdam together with Stockholm Environment Institute (SEI), held in Wassenaar, the Netherlands, 12–13 May 2013. See also www.fragmentation.eu.

2 Concepts and definitions

To map governance architectures and measure their respective degree of fragmentation we need to (a) define the concept of governance architecture, (b) discuss how we conceptualize an issue area/policy domain (e.g. climate change) and (c) explain what we refer to as “fragmentation”.

2.1 Governance architecture

The term *governance architecture* is subject to a number of alternative conceptualizations. For instance, instead of using *governance architecture*, Raustiala and Victor instead refer to a *regime complex* defined as “an array of partially overlapping and non-hierarchical institutions governing a particular issue-area that are marked by the existence of several partly overlapping and non-hierarchical agreements created and maintained in distinct forums with participation of different actors” (2004, 274) which to a certain degree is interchangeable to Biermann and colleagues definition of a global governance architecture as the “overarching system of public and private institutions that are valid or active in a given issue area of world politics” (Biermann *et al.* 2009, 15). Applying these broad conceptions to global climate governance, Biermann and colleagues propose an “onion model”, wherein the UN climate regime is situated at the architecture’s core, surrounded by additional layers of multilateral climate and energy institutions, other international environmental institutions, and international non-environmental institutions. Another interpretation is found in Keohane and Victor’s (2011) mapping of the regime complex for climate change, which includes both international multilateral agreements but also expert assessments (IPCC), clubs (e.g. Major Economies Forum, G8), bilateral Initiatives and geo-engineering governance (2011). The different interpretations of global climate change governance highlight the difficulty in drawing the borders of a governance architecture. Orsini, Morin and Young (2013b) have tried to improve the conceptualization by arguing that a regime complex is “a network of three or more international regimes that relate to a common subject matter; exhibit overlapping membership; and, generate substantive, normative, or operative interactions recognized as potentially problematic whether or not they are managed effectively” (p.29). Others have questioned the connotations emerging from both architectures, implying an architect, and complex, implying an apolitical and even complex structure. Using the metaphor of a landscape rather than that of a building (architecture), Shkaruba and Kireyeu (2013) refer to overlapping and interlinked governance arrangements as the “institutional landscape”. While we acknowledge the usefulness of these alternative conceptualizations, for the purpose of this study, we use the definition of governance architecture as suggested by Biermann and colleagues (2009), as it is aligned with general usage of the term governance architecture in the international Earth System Governance Project (Biermann 2007).

2.2 Issue areas and policy domains

Connected to the delineation-problems that arise from using governance architectures is the concept of “issue area”. Issue areas are inherently difficult to define, as issues are not predefined but constructed through social and political processes. What constitutes an issue area is therefore dependent on actors, their interests and perceptions and thus always malleable. Orsini and colleagues argue that regime

complexes focus on a specific subject matter that is narrower in scope than an issue area (2013). In contrast to this reading, Keohane defines issue areas as sets of issues that are “dealt with in common negotiations and by the same, or closely coordinated, bureaucracies.” (Keohane 1984, 61). On this account, issue areas are associated with the delimitation of an individual regime, for example the UNFCCC in the issue area of climate change. In our view, governance architectures are broader than individual, issue-area specific international institutions. To distinguish ourselves from this rather narrow understanding, we prefer the term *policy domain*, understood as a “component of a political system that is organized around substantive issues” (Burstein 1991, 328). Policy domains evolve around a set of substantive problems and the concrete issues that define a domain “are seen as sharing inherent substantive characteristics which influence how they are framed and dealt with” (ibid). What is central for our attempt to scrutinize governance architectures is the understanding that arrangements that fall within specific architecture have an identifiable governance goal (e.g. mitigating climate change; halting biodiversity loss; halting forest degradation and deforestation).

In our empirical work on global environmental governance architectures, we delineate six policy domains: three broad and inclusive domains that gravitate around international political agreements (i.e. international regimes) – Biodiversity, Oceans and Climate Change -, and three narrow and exclusive domains that currently lack a political centre and can be considered economic sectors – Forests, Fisheries and Energy, and are outlined in the following section.

The criteria for selection of subject matters within each issue area are summarized in Table 1.

Table 1 Issue-specific criteria for mapping a governance architecture

BIODIVERSITY	Exclude health, agriculture (animal production for farming purposes), food, fertilizers, international transport of animals, minerals
	Include forest management, fisheries, aquaculture, species, trade, ecosystem, habitat, cultural heritage, desertification
OCEANS	Exclude freshwater agreements
	Include deep sea bed and mining area, shipping, pollution, land-based pollution affecting the ocean, species
CLIMATE CHANGE	Include Vienna Convention, Montreal protocol, LRTAP, REDD+
FISHERIES	Include freshwater fisheries and whaling
ENERGY	Exclude disaster/catastrophe reduction, energy (nuclear) waste
	Include nuclear issues and hydropower
FORESTS	Include climate change (e.g. REDD+)

For each issue area we have identified the following broad governance goals:

- For biodiversity the governance goal is spelled out in the Convention on Biological Diversity (CBD) whose purpose is to “effectively halt the loss of biodiversity so as to secure the continuity of its beneficial uses through the *conservation and sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources*”. Based on the policy goal, our mapping includes arrangements concerning species (animal and plant; along with fisheries and aquaculture), habitats (terrestrial and marine; including cultural heritage), trade, and ecosystems (forests, wetlands, desertification); on the other hand, it shall exclude commodities and ecosystem services such as food, raw materials (fertilizers), genetic resources for crop improvement or health care, medicinal

resources, pest and disease control, water, minerals, energy, waste, and cultural services.

- For Oceans, the governance goal is to promote *conservation and sustainable use of the marine environment* (deep seabed included) *and its resources* (living and non-living marine resources), which includes mining activities, pollution and shipping regulation.
- The *(long-term) conservation and management of fish* stocks, specially straddling and highly migratory fish stocks, represent the key goal of a large number of regional multilateral arrangements and institutions specifically aimed at governing the Fisheries' sector, including freshwater fisheries.
- Climate governance intends *prevent, mitigate and adapt to the risks posed by climate change*. Several Multilateral Environmental Agreements (MEAs) are important for combatting climate change, in particular the United Nations Framework Convention on Climate Change (UNFCCC), but also the Vienna Convention for the Protection of the Ozone Layer, its Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on Long-range Transboundary Air Pollution, and the United Nations' mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD+).
- The Forestry sector revolves around sustainable forest management, conservation or restoration.

Finally, we recognize governance goals for the Energy domain to include *energy security and affordability* (including nuclear and hydropower), and we pay particularly attention to the governance goals of *clean energy* (renewables) and *energy efficiency*. Disaster reduction and energy waste are not considered part of this issue area.

These criteria are taken into consideration in our mapping of governance architectures. By highlighting multiple forms of governance, and the role of different actors, some overlap between issue areas is expected.

2.3 Fragmentation

Despite being a widely-used term in international law and International Relations, the precise meaning of fragmentation continues to be debated.³ We perceive fragmentation as an effect of an ongoing proliferation, specialization and diversification of institutions, actor-constellations, norms and discourses active in an issue-area, resulting in what Biermann and colleagues call "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 specify policy fields to universal concerns)" (2009, 16). Fragmentation implies a lack of coherence within a governance architecture. While a fully integrated architecture is theoretically possible, all real-life architectures are always fragmented to some extent (Biermann *et al.* 2009). It is a structural quality of governance architecture rather than a normative proposition. Some scholars perceive "full integration" as a global solution to a policy problem with a "single integrated legal agreement" (Keohane and Victor 2011, 7), whereas others

³ For an elaborate discussions on different perspectives on fragmentation, see: Isailovic, M., O. Widerberg and P. Pattberg (2013) Fragmentation of Global Environmental Governance Architectures: A Literature Review. Institute for Environmental Studies, Report W-13/09; and, Van Asselt, H. (2013) The fragmentation of global climate governance: Consequences and management of regime interaction. PhD thesis, VU University Amsterdam.

emphasize that fragmentation can also mean self-organization leading to polycentric governance (Galaz *et al.* 2011; Ostrom 2012). In contrast to authors that are positive or negative about fragmentation we treat it as a descriptive term.

Consequently, fragmentation represents a specific quality of a governance architecture and is best conceptualized along a continuum ranging from low to high (where high is termed integrated or coherent). To adequately describe and measure this quality, we have developed a multi-dimensional conceptualization of fragmentation/integration based on four indicators. The most commonly studied type of fragmentation among international relations scholars is institutional fragmentation. For instance, work by Young describes how there is both horizontal and vertical interplay (2002) and that institutional interlinkages can lead to embedded, nested, clustered, and overlapping institutions (1996). Besides institutions, fragmentation of actor-constellations accommodates the observation that number and type of actors have increased. Selin and VanDeveer (2003) for example, emphasize actors' importance in shaping global governance processes in both formal and informal ways. More recently, Hollway has argues for a relational perspective for measuring fragmentation among actors (Hollway 2011). Studying norms and (by extension also rules) come from the legal perspective on fragmentation (Brown Weiss 1993; Rosendal 2001). Finally, discursive fragmentation arises when there is contesting framings of the problem. Discourses are perhaps the least explored indicator in fragmentation literature but have been used by several authors to study issues relevant to fragmentation and related to Oberthür and Gehring's description of "cognitive interaction" where actors change order of preferences due to new information, or framing, of a policy problem (e.g. Eckersley 2009; Gehring and Oberthür 2009, 133). Figure 1 captures our conceptual map of fragmentation. The outermost dotted line is the global governance architecture of an issue area, the three rings inside represents the overlapping institutions and their normative frameworks, the institutions are filled with actors constellations, and finally, the cloud illustrates a discourse (out of many) present in that architecture and crossing institutions.

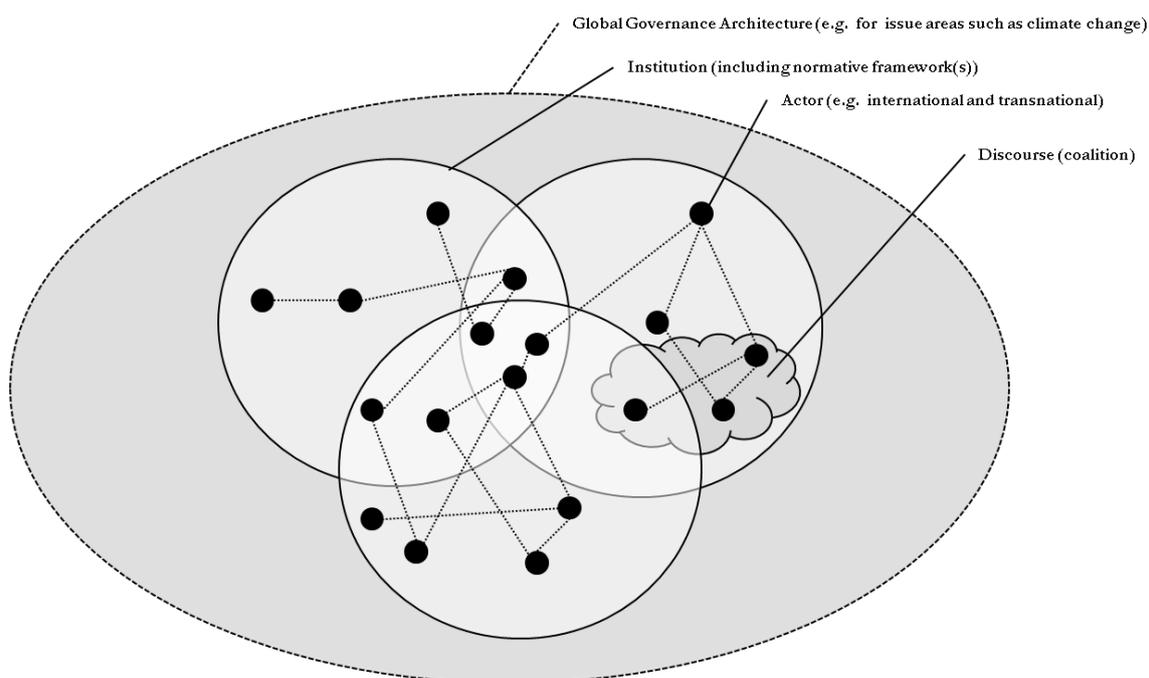


Figure 1 Conceptual map of fragmentation

3 Mapping Global Governance Architectures

Mapping a global governance architecture involves two steps: first, compiling a database that includes the majority of empirical governance arrangements; and second, a visualization of the overall architecture.

The first step, compiling a database, requires clear and unambiguous criteria. We apply the following: an (1) international or transnational institution, which not only has (2) intentionality to steer the behaviour of members, but also explicitly mentions a (3) governance goal and (4) displays significant governance functions. It might be challenging to determine whether an institution is involved in governing a given issue area, since 'governing' may be more central in some of them. Nonetheless, considering governance as an intentional activity can also be a critical problem, as we are focusing on the process through which governing is achieved (functions that it is thought to perform) (Bulkeley *et al.* 2012). Much of the controversy surrounding how such functions are determined and the extent to which they are regarded as a form of 'governing' stems from deep-rooted differences in theoretical perspective (e.g. grey area concerning agenda-setting and knowledge-sharing activities as: forms of governance vs. traditional roles assigned to transnational coalitions and advocacy groups of seeking to influence others). In all cases, the starting point for an examination of such influences is a focus first on purposeful efforts of institutions and actors, by whatever means or mechanisms, to steer policy and behaviour; and second, on some claim of authority, exercised either directly or indirectly by actors or institutions that draw on soft law or international norms recognized by targeted actors as having a significant basis in legitimacy (Bernstein and Cashore 2012). Additionally, governance actors' agendas must include a common *governance goal* for the issue area; which materializes the intention to steer their members or a broader community towards conservation of the Earth's natural heritage and biological resources, in the face of growing threats of degradation and extinction.

As a second step in mapping, we visualize the extent and nature of a governance architecture in a specific issue area by using the form of a governance triangle similar to the *Transnational Climate Change Governance Triangle* established by Abbott (2011) (Figure 2).

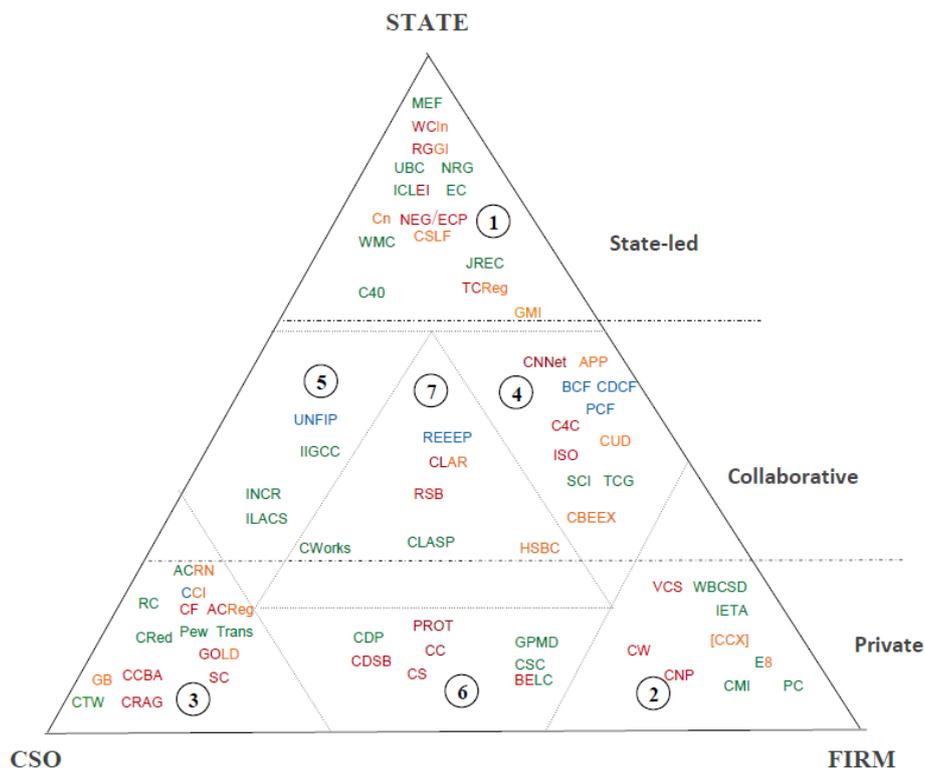


Figure 2
The Transnational Climate Change Governance Triangle

Standards & Commitments Operational
Information & Networking Financing

Figure 2 The Transnational Climate Change Governance Triangle (Abbott, 2011)

The institutions are situated in the triangle in accordance with the identity of their constituent actors, more specifically, according to the roles played by actors from three major categories – State, Firm and Civil Society Organization (CSO) (the three vertices of the triangle) – in founding and governing⁴ a scheme. The placement of an institution is determined by judging each actor group’s approximate “share” in the governance of the scheme: the greater the governance role played by actors of a particular type, the closer the scheme is located to that actor group’s vertex. The distance between each vertex and the opposite side of the triangle is a continuum, reflecting the level of involvement by the respective actor type. In principle, the State category includes individual states and collections of states or international organizations (IOs). Similarly, the Firm category includes individual business firms, groups of firms and industry associations; and ultimately, the CSO category includes individual CSOs as well as CSO coalitions and networks. All three actor groups are defined broadly, so that among them they encompass virtually all participants in transnational governance. According to Abbott (2011), firms contribute with material resources, important business expertise, and managerial capabilities; however, their self-interest character tends to produce relatively lax (self-) regulation and limits the

⁴ We focus on members with decision-making power within a scheme, not all of the actors that participate in a scheme’s programs.

credibility of organizations they dominate. CSOs, in contrast, typically contribute independence from business, value-based motivations that enhance public credibility, and normative and social expertise; they normally contribute fewer material resources and operational capacities.

The triangle is divided into seven zones, which represent the major combinations of *actor types*. Institutions in the vertex zones (1-3) are dominated by a single type of actor; those in the quadrilateral zones (4-6) involve two types of actors; and those in the central zone (7) involve actors of all three types. Additionally, the two dashed horizontal lines divide the triangle into three “tiers”, defined by the nature of government involvement – “state-led” (public institutions are dominant), “private-led” (Firms and CSOs are dominant), and “collaborative” (government bodies share governance with firms and/or CSOs in public-private partnerships). Instead of Abbott’s term “collaborative”, we use “hybrid”, as suggested by Bulkeley *et al.* (2012).

Finally, the governance triangle also highlights the *role*, or governance function⁵, of each institution by means of color-coding – “standards & commitments” (red), “operational” activities (orange), “information & networking” (green), and “financing” (blue). These functions are not necessarily undertaken on an either/or basis as many governance schemes, both international and transnational, may engage in several activities at once. Rule-making and implementation schemes (standards & commitments) comprise mandatory compliance, standards for measurement and disclosure of activities, and voluntary commitments or RSS standards which govern the quality of projects. Operational schemes focus on, for example, technology research and development, pilot projects, demonstration and deployment activities, skills enhancement, and best practice dissemination (which may require some incidental standard-setting). Financing is a type of operational activity. Finally, forums for information-sharing and networking (information & networking) tend to provide technical consulting, training, and information services to build capacity, share knowledge, and support local government.

3.1.1 Data collection

To arrive at a comprehensive mapping of global governance architectures, we include both transnational and international institutions. While for the former no database or accepted repository exists (and therefore research will have to rely on previous case studies and desk research), the international institutional landscape has been mapped with some accuracy. In fact, the concept of a “regime complex” as introduced by Keohane and Victor (2011) takes the international state-based governance for the overall architecture. To overcome this shortcoming, we integrate the international regime complex (see Figure 2) into our governance triangle.

⁵ Figure 1 depicts the primary activity (or in some cases two primary activities) of a scheme, relatively to the way they pursue the governance goal of an issue area.

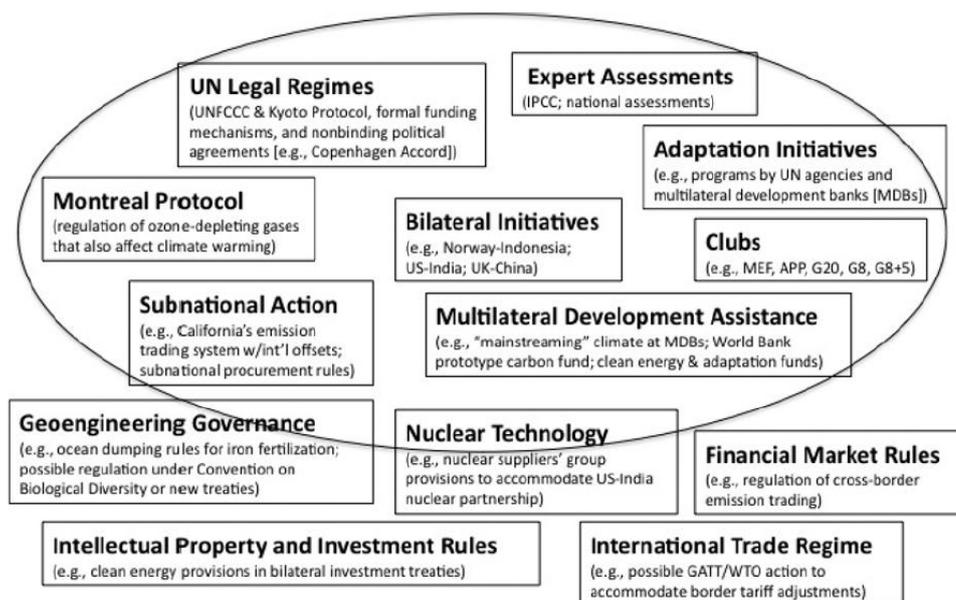


Figure 3 The Regime Complex for Managing Climate Change (Keohane & Victor, 2011)

Therefore, data collection on inter-state legal regimes is a prerequisite. For this purpose, we worked on the International Environmental Agreements (IEA) Database Project provided by Dr Ronald Mitchell⁶. First, the complete IEAs list was condensed according to general criteria: exclude what is currently not in force⁷, along with amendments, bilateral agreements, and agreements that establish organizations or research institutions; and including relevant agreements without secretariat, original protocols⁸, and regional agreements. Treaties on cooperation between countries were included if explicitly mentioned the issue area's governance goal.

⁶ Available at: <http://iea.uoregon.edu/> (last accessed on March 24th 2014).

⁷ E.g. "Secretariat went out of existence/ceased to exist".

⁸ Do not include updates (e.g. protocols of the International Whaling Commission).

4 Measuring degrees of fragmentation

This chapter describes the indicators for measuring fragmentation of global governance architectures: institutional constellations, norm constellations, actor constellations and discourse constellations. Each section starts with a definition of the indicator, followed by an operationalization and a brief discussion of the methods used. Rather than understanding these indicators for fragmentation as separate and additional measurements, we conceive them to be alternative and partially overlapping diagnostic approaches that in sum provide a general direction (fragmented/integrated) rather than a simple number.⁹

4.1 Institutional constellations

Institutional fragmentation has occupied scholars of world politics since the early 1990s (Brown Weiss 1993; Young 1996; Isailovic, Widerberg, and Pattberg 2013). Building on these theoretical insights, the coming sections present a framework for measuring institutional fragmentation.

4.1.1 Definitions

In line with International Relations tradition, we understand institutions as relatively stable sets of norms, rules and decision-making procedures that guide social practices of actors in the international system (Young 1994, 3; Duffield 2007). We use the generic term institution to refer to both (a) public international institutions (i.e. international regimes) and (b) private transnational governance (i.e. transnational institutions).

- a. In the international system, institutions are often organized around a multilaterally negotiated intergovernmental treaty, involving a bureaucracy, and having explicit norms and rules guiding members (i.e. states). These international institutions primarily engage nation states and represent the traditional way of approaching global governance. We refer to them as international regimes (see also above, section 2.1).
- b. Increasingly, non-state actors such as cities, NGOs, companies, and international organizations organize themselves internationally in transnational institutions and take up various governance functions such as standard-setting, monitoring, and capacity building (Risse-Kappen 1995; Pattberg 2005; Bulkeley *et al.* 2012). Non-state actors often engage in different forms of cooperation with states, blurring the line between the private and public (Pattberg and Stripple 2008) and thereby increasing the density of the governance architecture. We refer to this mix of public and private governance as transnational institutions (see also above section 2.1). In our mapping, both types of institutions (transnational and international) are part of the governance architecture of an issue area.

⁹ Similar to medical diagnosis, we think of our four indicators as different but complementary views on the same target phenomenon. X-rays, MRI and ultrasonography for example are different technical tools that are applied to diagnose a disease. The robustness of our diagnosis will therefore improve with the number of indicators applied.

4.1.2 Operationalization

We focus on “negotiated” institutions where the participants have agreed upon a normative framework guiding behaviour, expressed explicit consent to adhere to the norms, and established procedural rules for making and implementing decisions (Young 1980; Gehring and Oberthür 2009). “Spontaneous regimes” which arise from practice and interaction between participants, without a coordinating force or their explicit consent, are thereby excluded (Young 1982). Oberthür and Stokke attribute two characteristics to these type of institutions: they should have substantive rules that guides socially acceptable behaviour; and, stipulate procedural rules for how to take of implement decisions and change rules (2011, 2). “Negotiated” should here be understood in the broadest sense of the terms to avoid limiting the analysis to formally negotiated regimes between nation states such as the UNFCCC or the Montreal Protocol. For instance, the Global Reporting Initiative (GRI) and the Forest Stewardship Council (FSC) are also examples or negotiated institutions. Our definition thereby expands on Oberthür and Stokke’s use of negotiated institutions to include transnational institutions.

For something to be identified as an institution the following should be present:

1. A normative framework to which actors ought to abide;
2. Decision-making procedures to create, implement and change provisions under the normative framework; and,
3. Actors that adhere to the normative framework that together have the intention, potential and capacity to carry out governance functions in a global issue area.

Moreover, many international and transnational institutions have an administrative apparatus, a bureaucracy or secretariat, to carry out procedural tasks and provide administrative support. Sometimes these bureaucracies take up important roles such as knowledge creators or chairing meetings which has led recent research to shown that these “managers” of institutions can have autonomous influence on policy processes and in some cases be considered actors in their own right (c.f. Biermann and Siebenhüner 2009).

Empirical analysis of fragmentation in institutional constellations has generally focused on dyadic relations between two institutions. Gehring and Oberthür, for example, provide a detailed analysis of “source” and “target” institution to understand how they interact on both micro and macro levels (2009). However, a higher level of abstraction is needed when measuring degree of fragmentation over the entire architecture. A suitable scale is proposed by Young (1996) who has introduced four archetypes of institutional constellation: embedded, nested, clustered and overlapping. Issue-specific regimes, he argues, are often embedded in overarching institutional arrangements with exclusive authority and sovereignty over decision making and membership. Smaller institutional arrangements can also be nested into broader institutional frameworks dealing with the same issue area but are narrower in scope. Clustering occurs when several specific arrangements form more generic framework based on a common concern for a problem issue. Finally, overlapping happens when individual arrangements formed independently of each other intersect on a de facto basis thus having a significant and often but not always unintended impact on each other (Young 1996, 7). The four levels can be used to devise a scale for high, medium, and low levels of fragmentation.

Low level of fragmentation is best represented by embedded regimes, which signifies a coherent architecture where the goals, norms, rules and decision-making procedures of the institutions are clearly aligned. This is the case when issue specific regimes are

deeply embedded in the broader principles and practices of the international society as a whole (Young 1996, 2–3). A slightly lower level of integration occurs in situations of nesting when institutions that are limited in function, scope or geographical reach are part of an architecture that address the same general issue but provide less detailed principles and rules for behaviour (Young 1996, 3). Clustering occurs when the creators and operators of different governance initiatives combine their efforts into an institutional package (Young 1996, 4). Finally, the most fragmented state is when regimes overlap due to unintended or intended impacts on each other’s governance functions but without the proper linkages and references to each other (Young 1996, 6). The scale is visualized below:

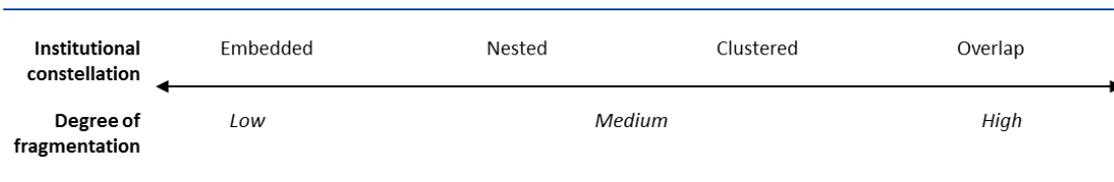


Figure 4 Institutional constellation and degree of fragmentation

Moreover, different institutions may be involved at different stages in the policy process. For example, while goal-setting could be centred to one institution, implementation and monitoring could be spread across a number of institutions. To analyse this phenomenon, we use a simplified version of the policy cycle including agenda-setting, goal-setting and policy formulation, implementation, monitoring and evaluation (Jann and Wegrich 2007). The policy cycle is a stylized model of political processes, yet it provides a powerful heuristic tool for structuring fragmentation into discrete segments. While it may be challenging to clearly identify and isolate institutions at each step, table 2 provides an overview of guiding questions to help in this process.

Table 2 Guiding questions to elicit degree of fragmentation from the policy cycle

Policy cycle stage	Guiding questions
1. Goals & Agenda setting	Are there global governance goals for the issue area? If yes, where are these goals set? Where is future policy on an issue discussed and established?
2. Implementation	Where are standards and design of implementation measures established? Are there common mechanisms for punishing deviant behaviour? If yes, where are these mechanisms discussed and established?
3. Monitoring	Where are standards and mechanisms for monitoring and data-collection established?
4. Evaluation	Who evaluates the outcomes of the policy?

The degree of fragmentation at each stage in the policy cycle has an impact on the degree of the overall fragmentation. Generally, fragmentation at early stages in the policy cycle is more severe than later stages since the policy cycle, ideally, follows a chronological chain of events. Since goal- and agenda-setting come first, they are the most important function in this framework followed by, in a descending order, implementation, monitoring and evaluation. For example, if there is one primary goal-setting institution but a range of implementation institution, then fragmentation is lower than if a range of institutions are involved in goal-setting but implementation is centralized to one. Consequently, the lowest degree of fragmentation occurs when

(CCBA) on the evaluation of land-based carbon mitigation projects in forestry (a business-NGO partnership) follow the normative framework on land use, land use change and forestry section of the Kyoto Protocol rather than establishing completely new norms (Pattberg and Stripple 2008). Therefore, in some cases the institutionalization of private norms in the public sphere takes place while in others there is no public adoption of private norms (Bäckstrand 2008). It is here where fragmentation might occur.

4.2.1 Definitions

For the political analyst norms are unruly animals and even if typologies of norms “abound” (Raymond 1997), they remain difficult to conceptualize and operationalize. In the literature on institutional interaction, norms have generally been treated without much elaboration on the exact definitions and operationalizations. The science plan of the Earth System Governance Project, for example, identifies norms as a cross-cutting theme and mentions about “legal, moral and other” norms but stops short of elaborating what constitutes a norm and what not (Biermann 2009). Consequently, to reflect the current normative structure of global governance as discussed above, but also to overcome conceptual problems of norm identification and operationalization of the degree of norm divergence, we use the definition of norms as developed by Bernstein (2002). Norms are shared conceptions of appropriate behaviour or action that in the context of global governance define, regulate, and legitimate state (and other key actors’) identities, interests and behaviour (Bernstein 2002). As a fragmented governance architecture will exhibit a certain degree of divergence regarding norms, principles, rules or procedures (Orsini, Morin, and Young 2013a), it is important to assess to what degree a particular issue area exhibits fragmentation in normative constellations. High degrees of fragmentation occur when norms are not coherent across the institutions in the governance architecture of an issue area, while low degrees occur when norms can be found evenly spread out across an institutional landscape.

4.2.2 Operationalization

First and foremost, we distinguish between norms, legal norms or rules and principles. First, contrary to a norm, the violation of a legal rule is followed by sanctions. Second, following rules does not necessarily imply shared meanings, because obedience here can be based on the fear of sanctions. Rules are therefore not always constitutive. Finally, legal norms are equal to and produced by (international) law (2001). In this sense, the line between formal rules and norms is blurred, and “a host of specific rules”, argue Hasenclever and colleagues, “converts the regime norms into concrete proscriptions and prescriptions, whereby the rule-density (i.e. the number of rules that concretizes a given norm) varies considerably by regime norms” (1997, 9–10). Rules can then be seen as an embodiment of existing norms. This means that a first step towards detecting the norms that informs single institutions is to look at the formal rules that guide members of the regime thus looking at sources of law. Yet, while these are a first source of information, not all norms that are part of an issue area are codified into rules. Transnational rule-making and standard-setting is for example acknowledged as increasingly important parts of global governance architectures (Clapp 1998; Pattberg 2005) and if our inquiry only include legal texts, this could be overlooked. Moreover, it is important to make a distinction between norms and principles or criteria that may or may not develop into a norm depending on whether they are shared by a certain community of actors. The development of a certain norm

is a result of interaction between different participants and the possibility that the principle/criteria might develop into a norm reflects the norms underlying them (Palmujoki 2009). Therefore, in addition to legal texts, we also analyse criteria developed by different actors in order to identify the broader norms on which they are based. The overlapping criteria among different groups of actors can be regarded as a norm.

To capture and establish the degree of fragmentation in normative constellations, we combine expert-based assessment of key norms with computer assisted qualitative data analysis software (QDA Miner). We expect to find evidence of norms, in addition to legal texts, in policy documents, reports, communications, strategy papers, and other possible (non-legal) relevant texts.

4.3 Actor constellations

Global environmental governance architectures involve a large number of actors such as states, NGOs, corporations, academia, philanthropic organizations and sub-state government actors such as cities and regions (Avant, Finnemore, and Sell 2010; Dellas, Pattberg, and Betsill 2011). These actors form different types of constellations around policy issues, creating a web of actor-constellations often with overlapping memberships, functions, types and goals. While previous mapping attempts mainly used surveys and expert assessments to create lists of institutions and organizations active in an issue area (Keohane and Victor 2011; Abbott 2011; Bulkeley *et al.* 2012; Hoffmann 2011), we aim to move beyond merely listing actors towards mapping actor-constellation and measuring the level of fragmentation between them.

4.3.1 Definitions

To this end, a useful way of thinking of actors-constellations is in terms of social networks consisting of actors that in one way or another are related to each other. Using a network perspective opens up for a host of analytical tools for social network analysis, which is gaining traction in political science, International Relations and global environmental governance (Wasserman and Faust 1994; Hafner-Burton, Kahler, and Montgomery 2009; Green 2013). Research on local natural resource management, for example, has identified the existence of social networks as an important variable for solving common pool resource problems (Bodin and Crona 2009; Ostrom 1990). At the international level, some scholars have begun to explore the applicability of concepts derived from research on the local level (such as polycentrism) to an international level (Galaz *et al.* 2011). Nevertheless, the use of SNA for our purposes is uncharted waters.

4.3.2 Operationalization

To identify actor-constellations, we start with the institutions identified in the governance triangles created in the mapping phase (see section 3). We assume that actors within an issue area form a network consisting of actors and their relations, represented by nodes (actors) and edges (relations) in a graph. Using network analysis requires two decisions: first, on what edge to look at; and second, how to establish degree of fragmentation. The choice of edge is crucial for what the map will show and has ramifications for the data-gathering method. A relation can for example be kinship, an email contact, membership in the same partnership, financial flows, participation in forums, or hyperlinks via the web. In our case, the governance triangle can be used to identify memberships or adherence to organizations or institutions or

links between homepages of the institutions and organizations. To elicit the ties researchers use both quantitative methods such as surveys, qualitative methods such as interviews, or, increasingly, a mix between qualitative and quantitative analysis (Edwards 2010).

Moving towards a measure of fragmentation, social network analysts and in particular sociologists have looked at what intuitively could be considered the antonym to fragmentation, namely cohesion (Nooy, Mrvar, and Batagelj 2005). To understand cohesion we have to look at the size of the network and how connected they are. First, size of the network is important since, in social networks, larger structures tend to require more resources and capacity from the individual nodes for building and maintaining ties (Hanneman and Riddle 2005). The size of the network is generally indexed by number of nodes. In any given network there are potentially $k * k - 1$ uniquely ordered pairs of actors where k is the number of actors (ibid. p.6). It means that the potential number of connections between actors increases exponentially as more nodes are added. The amount of actors also limits the maximum number of connections an actor can have ($k-1$) and in any network, very few nodes reach this limit (Hanneman and Riddle 2005). Consequently, any analysis should carefully weigh the results and degree of fragmentation against the size of the network by starting with a thorough mapping of the basic demographics of the network.

Since the aim is to compare networks of different sizes, we need measure that control for network size. Accordingly, two structural network properties are selected: average degree and centralization. Average degree measures how connected actors are on average. Most real world networks, however, have a tendency to divide into communities and groups (Newman 2006). Assume that most connections are concentrated to a small number of nodes and the edges are not equally shared among all nodes, in our view, then the network cannot be described as coherent. Therefore we assess the spread of connections in the network by measuring centralization which can be understood as the inequality (or variance) of a network as a percentage of that of a perfect star network of the same size (Hanneman and Riddle 2005).¹⁰ A high centralization number means that the edges are unequally distributed across the network. Since calculating centralization includes finding the node with the highest centrality, one needs to decide on what measure of centrality to use (Freeman 1979; Freeman 1977; Bonacich 1987), i.e. there are different measures for centralization. Centralization is expressed in percentage where 100 % indicates that all edges are centralized to one node.

Once the average degree and centralization measures have been established one can move towards establishing the degree of fragmentation. The two measures create four possible situations depicted in Figure 5 below.

¹⁰ Not to be confused with centrality which is a micro-level property.

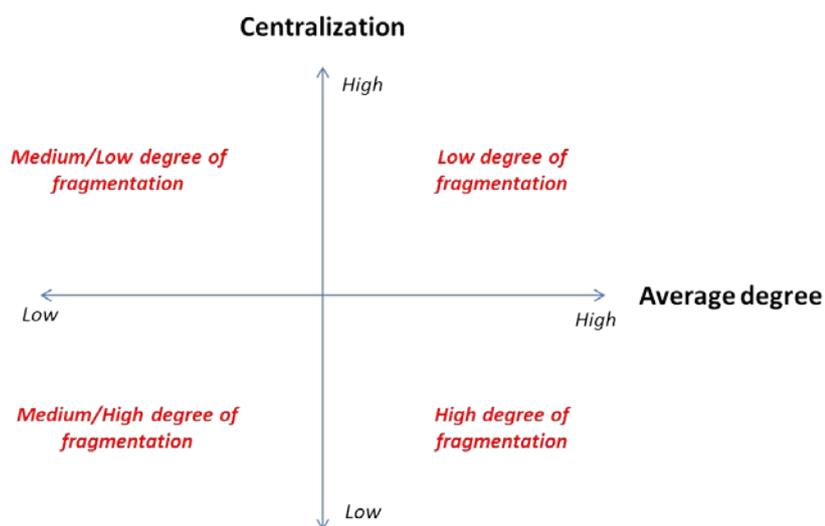


Figure 5 Centralization and average degree of actor network and degree of fragmentation

In the upper-right corner, average degree and centralizations is high. This means that the network is densely populated and there is a core actor-constellation leading to low fragmentation. In the lower-right corner, when average degree is low and centralization is high, there is a dense network but it lacks a centre which leads to high fragmentation. On the lower-left corner, both average degree and centralization are low which creates a sparsely populated and disperse actor-constellation network leading to a medium/high fragmented network. Finally, when average degree is low but centralization is high, then actors-constellations are not very well connected but there is a clear core constellation in the network, leading to a medium/low fragmented network.

To measure level of fragmentation in actors and actor constellations by analysing the structure of the network is not without problems. First, the accuracy of the results will hinge on the quality and quantity of the data collected. If one, for example endeavour to map fragmentation in global governance for climate change, the data collection effort required is immense. We can only acknowledge this short-coming, be transparent with our assumptions and honest about how representative our sub-set of the total population is. Second, the result of our research is highly dependent on what relations we decide to look at. Are we for example interested in memberships in formal agreements, connections between actor types in different constellations, or just number of actors active in an issue area? Similar to the first problem, the only way to address the challenge is to be open and honest about the choices made and the limitations to the approach. Third, an analysis of the social network within an issue area will not provide answers on the effects of a particular structure. Whether a certain number of constellations are moving actors towards solving problems in an issue area is beyond the scope of the mapping exercise. It would be interesting to revisit network structures however, if and when further research is done on the effectiveness of a given architecture in an issue area. Fourth and finally, the existence of hubs and fragmentation do not tell us much about the quality of network components or reasons of the fragmentation. Why do actors choose to adhere to a constellation? Do they share norms with other members of the constellation and what discourses are prevalent? What is the relationship between constellations and institutions?

4.4 Discourse constellations

Some global environmental problems such as climate change have been called “wicked” meaning that besides the ambiguity of the problem derived exclusively from the underlying scientific uncertainty and readily observable objective solutions, others are derived more immediately from human nature and the nature of decision-making institutions (Lazarus 2008). In the same line many concluded that the definition of a problem and its recognition by policymakers are intrinsically political actions where its causes and solutions are often interpreted differently by different actors. (Vlassopoulos 2012; Hajer 2006). Whether for example climate change is an environmental, security, migration or economic problem, depends on who one talks to and scholars have identified competing and overlapping discourses on its causes and solutions in media, science, policy makers and advocacy groups (Lövbrand and Bäckstrand 2006; Boykoff 2008; Weingart, Engels, and Pansegrau 2000; Carvalho 2007; Vlassopoulos 2012). Moreover, an often cited example is the struggle between competing discourses in the acid rain debate during 1980’s where Hajer convincingly showed how policy was shaped rather by narratives created by strategizing actors than the “objective” facts produced by hard science (Hajer 1997). More recent and highly public debates on for example the validity of the Planetary Boundaries and the Anthropocene concepts (Rockström *et al.* 2009; Crutzen and Schwägerl 2011) or the use of GMOs in food production, are examples of wicked problems where scientific expertise used in large scale environmental problems is constantly negotiated rather than accepted (Hajer 2003; Pettenger 2007; Rayner 2013; Storr 2013). Such increased understanding of the significance of language and its capacity to make politics has contributed to a “discursive turn” in social sciences meaning that particular concepts, such as sustainable development or precautionary principle, are continuously contested in a struggle over overlapping discourses about their meaning, interpretation and implementation (Schmidt 2009; Alvesson and Kärreman 2000; Hajer and Versteeg 2005). Environmental politics thus becomes an argumentative struggle in discursive structure of global environmental governance in which actors not only try to make others see the problems according to their views but also seek to position other actors in a specific way (Hajer 1997).

4.4.1 Definitions

Moving towards measuring the degree of fragmentation, the work on discourses implies that the level of competition or overlap in discourses, or rather the fragmentation of discourse clusters within an issue area could play an important role in explaining the outcome and effectiveness of governance arrangements. To examine and measure the degree of fragmentation in discursive structure of global environmental governance, we use Argumentative Discourse Analysis (ADA) developed by Maarten Hajer (1997), and the concept of dominant discourses and narratives. Discourse is defined as “a specific ensemble of ideas, concepts, and categorizations that are produced, and transformed in a particular set of practices and through which meaning is given to physical and social realities” (Hajer 1997, p.45). Narratives allow actors to draw upon various discursive clusters to give meaning to specific physical and social phenomena on social reality (Hajer 1997, p.57-63). This approach assumes that discourses manifest themselves by the presence or absence of certain narratives. Moreover, we assume that that certain narratives will cluster to denote the presence of a higher order discourse or discourse cluster. Based on extensive literature review and theoretical foundations in environmental politics, four discourse clusters have been found to dominate global environmental politics, namely green governmentality,

ecological modernization, civic environmentalism and radical environmentalism (Lövbrand and Bäckstrand 2006; Bernstein 2002; McGee and Taplin 2009; Hajer 1997).

Green governmentality is equated with a science-driven and centralized multilateral negotiation order, associated with top-down climate monitoring and mitigation techniques implemented on global scales. Ecological modernization represents a decentralized liberal market order that aims to provide flexible and cost-optimal solutions to the climate problem. Civic environmentalism advocates a fundamental transformation of Northern consumption patterns and abandonment of capitalism and state-centric sovereignty to realize a more eco-centric and just world order. Key concepts are equity and burden sharing. Finally, Radical civic environmentalism is equated with a strong advocacy for a fundamental transformation of consumption patterns and a structural reorientation to eco-centric value systems.

Narratives detected in the data should be evidently keyed to or clustered into these four dominant discourses, while entirely novel narratives would require a strong theoretical and empirical justification in order to form a new dominant discourse cluster. The more particular discourse cluster exhibits a higher set of narratives, the more dominant it is. When there are several discourses active and no dominant discourse present, a particular issue area exhibits a higher degree of fragmentation than if there is one prevailing or dominant discourse cluster around which narratives converge.

4.4.2 Operationalization

To assess the presence of dominant discourses and detect the occurrence of narratives that build up a particular discourse and subsequently measure the degree of fragmentation, we used computer assisted qualitative data analysis software QDA Miner. QDA Miner is a mixed-model software that integrates qualitative and quantitative data management and analysis approaches for identifying potentially important data patterns. QDA Miner offers integration with the quantitative content analysis programs WordStat (text mining) and Simstat (statistical analysis). Wordstat enables the construction of keyword dictionaries, while Simstat allows for statistical analysis of text content, e.g. statistical tests including chi-square and Pearson's r to assess relationship between codes and variables. In order to measure the degree of fragmentation of discourse clusters in a given global environmental governance architecture, we follow a 4-step methodology presented below. We use agreements, legal reports and mission statements of the institutions from the governance triangle described under section 2 as our data for analysis.

Measuring narratives on a sample of data: Based on the pre-defined discourse clusters that serve as a theoretical guidance for the construction of narratives, namely green governmentality, ecological modernization, civic environmentalism and radical environmentalism, a representative sample of data comprising of documents produced by each of the institutions from different zones of the triangle is analysed. In the initial coding process, the distinctive aspects of each of the four discourses are described and they characterize each coded passage. They help identify repeating ideas and emergent themes in the sample of data. Finally, by employing interpretative approaches we identify narratives that form and are clustered into the dominant discourse clusters.

Identifying narratives on the whole sample: Alongside qualitative identification of narratives and their clustering into dominant discourses, we employ keyword measurement from the WordStat to identify narratives on the whole dataset as it allows for greater reproducibility and faster coding of large dataset. Although the keyword

approach may be fairly rigid and least interpretative, since we already used interpretative techniques in the first step of the analysis, we adopted it. Afterwards, we examine to what extent the maps confirm, extend, or contradict the narratives and the discourse clusters model obtained through interpretative analysis. If it does alter the results of the first step, it is advisable to re-examine the interpretation of the original sample and to analyse some additional documents (Koenig, 2006).

Coding: After a discourse cluster model has been established in the first two steps, the full data set is then coded for the presence or absence of the identified narratives. The coding is performed with the help of keywords that represent narratives selected by the judgment of the analyst in the previous step. These keywords are used as search strings in computer-assisted qualitative data analysis software (QDA Miner) and are subsequently coded. Based on keyword coding, it allows for quantitative validation of narratives identified before. Consequently, we create coding categories that are refined to reveal a particular discourse cluster, resulting in a number of key narratives that cluster into 4 higher order discourses. The coded passages are re-read and the comments that have been made in initial coding are carefully reviewed. New emerging categories might be noted. In a next step, QDA Miner is used to check possible data trends across our sample. In addition to standard coding, we investigate co-occurrence of codes within the entire text, which can be further investigated in the form of similarity among cases to plot the results in the form of a cluster diagram, or a multidimensional scaling plot or proximity to any selected code.

Validation of clusters and reliability: After the data has been coded with carefully selected keywords, the final step is the validation of the discourse cluster model through a statistical analysis of the coding matrices. Currently, hierarchical cluster analysis is the most popular method for statistical validation (Koenig, 2006).

5 Conclusions

This paper presents an integrated framework to map and measure fragmentation in global environmental governance architectures. It proposes four clusters of indicators to measure fragmentation in issue areas such as biodiversity, climate change, or marine governance. By combining the institutional properties with actor networks, norms and discourses, a comprehensive mapping of a global environmental governance architecture can make complex structures visible to gain further knowledge on the causes, effects and responses to fragmentation.

While we believe our framework to be a feasible approximation of reality, there are a number of caveats. First, one should acknowledge that to some extent all global environmental governance architectures are fragmented to some degree. The perfectly coherent architecture is an ideal type rather than something that exists, and even less so on a global level. Second, fragmentation is at this point of our research not good or bad, it merely is. Finally, it is also important to control for scale. A more aggregate level of scale for example is likely to exhibit more fragmentation due to the share size in geography, membership and issue area that the institutional landscape tries to cover. Normative frameworks, actor constellations and discourses are clusters of indicators to determine the degree of fragmentation.

To sum up, the table 4 provides an overview of the key concepts and expected directions of fragmentation in our research framework.

Table 4 Indicators for measuring fragmentation of global governance architectures

Indicator	Explanation	Expected direction of fragmentation	Method for inquiry
Institutions	A catch-all word for clusters or collection of rights, rules and, decision-making procedures that give rise to social practices, assign roles to the participants in these practices, and guide interaction among the participants. They are part of a global governance architecture of a policy domain.	The more overlap and collision between institutions dealing with early steps in the policy cycle, the more fragmentation.	Qualitative analysis of overlap.
Norms	Norms cover normative frameworks including legal norms and rules. They can be separated into constitutive and regulative where constitutive bears more weight than regulative.	When constitutive norms and rule overlap or collide, there is more fragmentation than if regulative norms overlap or collide.	Textual analysis of key documents.
Actors	Governance architectures consist of a myriad of actors and their relations forming actor constellations. These constellations can be international and transnational.	High centrality and low level of average degree indicates more fragmentation than low centrality and high level of degree.	Social Network Analysis

Indicator	Explanation	Expected direction of fragmentation	Method for inquiry
Discourses	Within global governance architectures we expect several discourses to be present and some discourses to be dominant. Based on interests and beliefs, actors use narratives to frame their perceptions of “the problem” and its solutions at hand. The narratives make up discourses that can be more or less dominant which are expected to be found across four worldviews.	When there are several discourses active and no dominant discourse present, then there is more fragmentation than if there is one prevailing discourse around which actors and norms converge.	Textual analysis of key documents.

References

- Abbott, K.W. (2011). The transnational regime complex for climate change. *Environment & Planning C: Government & Policy*.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1813198.
- Alvesson, M. & Kärreman, D. (2000). Varieties of discourse: on the study of organizations through discourse analysis. *Human Relations*, 53(9), 1125–49.
 doi:10.1177/0018726700539002.
- Avant, D.D., Finnemore, M. & Sell, S.K. (2010). *Who governs the globe?* Cambridge: Cambridge University Press.
http://elliott.gwu.edu/~igis/assets/docs/who_rules_the_globe/Avant_Finnemore_Sell_1GIS.doc.
- Bäckstrand, K. (2008). Accountability of networked climate governance: the rise of transnational climate partnerships. *Global Environmental Politics*, 8(3), 74–102.
 doi:10.1162/glep.(2008).8.3.74.
- Bastos Lima, M.G. & Gupta, J. (2013). The policy context of biofuels: a case of non-governance at the global level? *Global Environmental Politics*, 13(2), 46–64.
- Bernstein, S. (2002). Liberal environmentalism and global environmental governance. *Global Environmental Politics*, 2(3), 1–16.
- Bernstein, S. & Cashore, B. (2012). Complex global governance and domestic policies: four pathways of influence. *International Affairs*, 88(3), 585–604.
- Biermann, F. (2007). 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change*, 17(3–4), 326–37.
 doi:10.1016/j.gloenvcha.(2006).11.010.
- Biermann, F. (2009). *Earth system governance: people, places, and the planet: science and implementation plan of the Earth System Governance Project*. IDEP, The Earth System Governance Project.
- Biermann, F., Pattberg, P., van Asselt, H. & Zelli, F. (2009). The fragmentation of global governance architectures: a framework for analysis. *Global Environmental Politics*, 9(4), 14–40. doi:10.1162/glep.2009.9.4.14.
- Biermann, F. & Siebenhuener, B. (Eds) (2009). *Managers of global change: the influence of international environmental bureaucracies*. Cambridge, MA: MIT Press.
- Bodin, Ö. & Crona, B.I. (2009). The role of social networks in natural resource governance: what relational patterns make a difference? *Global Environmental Change*, 19(3), 366–74.
- Bonacich, P. (1987). Power and centrality: a family of measures. *American Journal of Sociology*, 92(5), 1170–82. doi:10.2307/2780000.
- Boykoff, M.T. (2008). The cultural politics of climate change discourse in UK tabloids. *Political Geography*, 27(5), 549–69.
- Brown Weiss, E. (1993). International environmental law: contemporary issues and the emergence of a new world order. *Georgetown Law Journal*, 81, 675.
- Bulkeley, H., Andonova, L.B., Bäckstrand, K., Betsill, M., Compagnon, D., Duffy, R., Kolk, A. et al. (2012). Governing climate change transnationally: assessing the evidence from a database of sixty initiatives. *Environment and Planning-Part C*, 30(4), 591.
 doi:10.1068/c11126.
- Burstein, P. (1991). Policy domains: organization, culture, and policy outcomes. *Annual Review of Sociology*, 17, 327–350.

- Carvalho, A. (2007). Ideological cultures and media discourses on scientific knowledge: re-reading news on climate change. *Public Understanding of Science*, 16(2), 223–43. doi:10.1177/0963662506066775.
- Clapp, J. (1998). The privatization of global environmental governance: ISO 14000 and the developing world. *Global Governance*, 4(3), 295–316.
- Crutzen, P.J. & Schwägerl, C. (2011). Living in the Anthropocene: toward a new global ethos. *YALE Environment*, 360. http://e360.yale.edu/feature/living_in_the_anthropocene_toward_a_new_global_ethos/2363/.
- Dellas, E., Pattberg, P. & Betsill, M. (2011). Agency in earth system governance: refining a research agenda. *International Environmental Agreements: Politics, Law and Economics*, 11(1), 85–98.
- Dingwerth, K. (2011). *North-South parity in global governance: the affirmative procedures of the Forest Stewardship Council*. Research-article. Lynne Rienner Publishers. <http://journals.rienner.com/doi/abs/10.5555/ggov.2008.14.1.53>.
- Dingwerth, K. & Pattberg, P. (2009). World politics and organizational fields: the case of transnational sustainability governance. *European Journal of International Relations*, 15(4), 707–43.
- Duffield, J. (2007). What are international institutions? *International Studies Review*, 9(1), 1–22.
- Eckersley, R. (2009). Understanding the Interplay between the climate and trade regimes. *Climate and Trade*, 11.
- Edwards, G. (2010). *Mixed-method approaches to social network analysis*. <http://eprints.ncrm.ac.uk/842/>.
- Freeman, L.C. (1977). A set of measures of centrality based on betweenness. *Sociometry*, 40(1), 35–41.
- Freeman, L.C. (1979). Centrality in social networks conceptual clarification. *Social Networks*, 1(3), 215–39.
- Galaz, V., Crona, B., Österblom, H., Olsson, P. & Folke, C. (2011). Polycentric systems and interacting planetary boundaries—emerging governance of climate change—ocean acidification—marine biodiversity. *Ecological Economics*, 81, 21–32.
- Gehring, T. & Oberthür, S. (2009). The causal mechanisms of interaction between international institutions. *European Journal of International Relations*, 15(1), 125–56. doi:10.1177/1354066108100055.
- Green, J.F. (2013). Order out of chaos: public and private rules for managing carbon. *Global Environmental Politics*, 13(2), 1–25. doi:10.1162/GLEP_a_00164.
- Hafner-Burton, E.M., Kahler, M. & Montgomery, A.H. (2009). Network analysis for international relations. *International Organization*, 63(3), 559–92. doi:10.1017/S0020818309090195.
- Hajer, M.A. (1997). *The politics of environmental discourse: ecological modernization and the policy process*. Oxford: Oxford University Press. <http://www.subarukk.co.jp/001.pdf>.
- Hajer, M.A. (2003). Policy without polity? Policy analysis and the institutional void. *Policy Sciences*, 36(2), 175–95.
- Hajer, M.A. (2006). Doing discourse analysis: coalitions, practices, meaning. *Words Matter in Policy and Planning-Discourse Theory and Method in the Social Sciences*, 344, 65–74.

- Hajer, M.A. & Versteeg, W. (2005). A decade of discourse analysis of environmental politics: achievements, challenges, perspectives. *Journal of Environmental Policy & Planning*, 7(3), 175–84.
- Hanneman, R.A. & Riddle, M. (2005). *Introduction to social network methods*. <http://www.citeulike.org/group/1840/article/1192030>.
- Hasenclever, A., Mayer, P. & Rittberger, V. (1997). *Theories of international regimes*. Cambridge University Press.
- Hoffmann, M. (2011). *Climate governance at the crossroads: experimenting with a global response after Kyoto*. Oxford University Press.
- Hollway, J. (2011). *Taking stock of the fragmentation of the global fisheries governance architecture*. In German Development Institute, Bonn, Germany.
- Isailovic, M., Widerberg, O. & Pattberg, P. (2013). *Fragmentation of global environmental governance architectures: a literature review*. IVM Report (W-13/09). Institute for Environmental Studies, VU University Amsterdam.
- Jann, W. & Wegrich, K. (2007). Theories of the policy cycle. *Handbook of Public Policy Analysis*, 43.
- Keohane, R.O. & Victor, D.G. (2011). The regime complex for climate change. *Perspectives on Politics*, 9(1), 7–23.
- Kolk, A., Levy, D. & Jonatan Pinkse. (2008). Corporate responses in an emerging climate regime: the institutionalization and commensuration of carbon disclosure. *European Accounting Review*, 17(4), 719–45.
- Lazarus, R.J. (2008). Super wicked problems and climate change: restraining the present to liberate the future. *Cornell L. Rev.*, 94, 1153.
- Lövbrand, E. & Bäckstrand, K. (2006). Planting trees to mitigate climate change: contested discourses of ecological modernization, green governmentality and civic environmentalism. *Global Environmental Politics*, 6(1), 50–75.
- McGee, J. & Taplin, R. (2009). The role of the Asia Pacific partnership in discursive contestation of the international climate regime. *International Environmental Agreements: Politics, Law and Economics*, 9(3), 213–38.
- Newman, M.E.J. (2006). Modularity and community structure in networks. *Proceedings of the National Academy of Sciences*, 103(23), 8577–82. doi:10.1073/pnas.0601602103.
- de Nooy, W., Mrvar, A. & Batagelj, V. (2005). *Exploratory social network analysis with Pajek*. Cambridge University Press.
- Oberthür, S. & Gehring, T. (2006). *Institutional interaction in global environmental governance: synergy and conflict among international and EU policies*. MIT Press.
- Oberthür, S. & Stokke, O.S. (2011). *Managing institutional complexity: regime interplay and global environmental change*. MIT Press.
- Orsini, A., Morin, J.F. & Young, O.R. (2013a). *Regime complexes: a buzz, a boom, or a boost for global governance?* Research-article. Lynne Rienner Publishers. <http://journals.rienner.com/doi/abs/10.5555/1075-2846-19.1.27>.
- Orsini, A., Morin, J.F. & Young, O.R. (2013b). Regime complexes: a buzz, a boom, or a boost for global governance? *Global Governance: A Review of Multilateralism and International Organizations*, 19(1), 27–39.
- Ostrom, E. (1990). *Governing the commons: the evolution of institutions for collective action*. Cambridge: Cambridge University Press. <http://www.scopus.com/inward/record.url?eid=2-s2.0-0025584437&partnerID=40>.

- Ostrom, E. (2012). Nested externalities and polycentric institutions: must we wait for global solutions to climate change before taking actions at other scales? *Economic Theory*, 49(2), 353–69.
- Palmujoki, E. (2009). Global principles for sustainable biofuel production and trade. *International Environmental Agreements: Politics, Law and Economics*, 9(2), 135–51.
- Pattberg, P. (2005). What role for private rule-making in global environmental governance? Analysing the Forest Stewardship Council (FSC). *International Environmental Agreements: Politics, Law and Economics*, 5(2), 175–89.
- Pattberg, P. & Stripple, J. (2008). Beyond the public and private divide: remapping transnational climate governance in the 21st century. *International Environmental Agreements: Politics, Law and Economics*, 8(4), 367–88.
- Pauwelyn, J. (2001). *Conflict of norms in public international law*. Cambridge University Press.
- Pettenger, M.E. (2007). *The social construction of climate change: power, knowledge, norms, discourses*. Ashgate Publishing Company.
http://books.google.nl/books?hl=en&lr=&id=8c7Bcat_b9oC&oi=fnd&pg=PR7&dq=the+social+construction+norms+discourses&ots=KmlI4s8tgb&sig=M_De5ly7spX83MQ2z1z9nP7khwc.
- Raustiala, K. & Victor, D.G. (2004). The regime complex for plant genetic resources. *International Organization*, 58 (2), 277–309. doi:10.1017/S0020818304582036.
- Raymond, G.A. (1997). Problems and prospects in the study of international norms. *Mershon International Studies Review*, 41(2), 205–45. doi:10.1111/1521-9488.701997070.
- Rayner, S. (2013). Planetary boundaries as millenarian prophesies: a guest post by Steve Rayner. *Roger Pielke Jr.'s Blog*. <http://rogerpielkejr.blogspot.nl/>.
- Risse-Kappen, T. (1995). *Bringing transnational relations back in: non-state actors, domestic structures and international institutions*. Vol. 42. Cambridge University Press.
http://books.google.nl/books?hl=en&lr=&id=rk2urp4AdScC&oi=fnd&pg=PR4&dq=transnational+governance+risse&ots=EV2831_of1&sig=IX5sWf8wilUBaQBjQs8-4-66MKI.
- Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin III, F.S., Lambin, E., Lenton, T.M., Scheffer, M., Folke, C. & Schellnhuber, H. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society*, 14(2), 32.
- Rosendal, G.K. (2001). Impacts of overlapping international regimes: the case of biodiversity. *Global Governance*, 7, 95.
- Schmidt, V.A. (2009). Putting the political back into political economy by bringing the state back in yet again. *World Politics*, 61(3), 516–46.
- Selin, H. & VanDeveer, S.D. (2003). Mapping institutional linkages in European air pollution politics. *Global Environmental Politics*, 3(3), 14–46.
- Shkaruba, A. & Kireyeu, V. (2013). Recognising ecological and institutional landscapes in adaptive governance of natural resources. *Forest Policy and Economics*, 36, 87–97.
- Storr, W. (2013). Mark Lynas: Truth, treachery and GM food. *The Guardian*, March 9, sec. Environment. <http://www.guardian.co.uk/environment/2013/mar/09/mark-lynas-truth-treachery-gm>.
- van Asselt, H. (2010). *Managing the fragmentation of international environmental law: forests at the intersection of the climate and biodiversity regimes*. SSRN Scholarly Paper ID 1703186. Rochester, NY: Social Science Research Network.
<http://papers.ssrn.com/abstract=1703186>.

- Vlassopoulos, C.A. (2012). Competing definition of climate change and the post-Kyoto negotiations. *International Journal of Climate Change Strategies and Management*, 4(1), 104–18.
- Wasserman, S. & Faust, K. (1994). *Social network analysis: methods and applications*. Vol. 8. Cambridge University Press.
<http://books.google.nl/books?hl=en&lr=&id=CAm2DplqRUIC&oi=fnd&pg=PR21&dq=wasserman+and+faust&ots=HuMIAeXFRI&sig=9gzzVR1hOZM8AA9cnvyZTgU1A>.
- Weingart, P., Engels, A. & Pansegrau, P. (2000). Risks of communication: discourses on climate change in science, politics, and the mass media. *Public Understanding of Science*, 9(3), 261–83.
- Young, O.R. (1980). International regimes: problems of concept formation. *World Politics*, 32(3), 331–56. doi:10.2307/2010108.
- Young, O.R. (1982). Regime dynamics: the rise and fall of international regimes. *International Organization*, 36(2), 277–97.
- Young, O.R. (1994). *International governance: protecting the environment in a stateless society*. Cornell University Press.
- Young, O.R. (1996). Institutional linkages in international society: polar perspectives. *Global Governance*, 2, 1.
- Young, O.R. (2002). *The institutional dimensions of environmental change: fit, interplay, and scale*. Cambridge, MA: the MIT press.