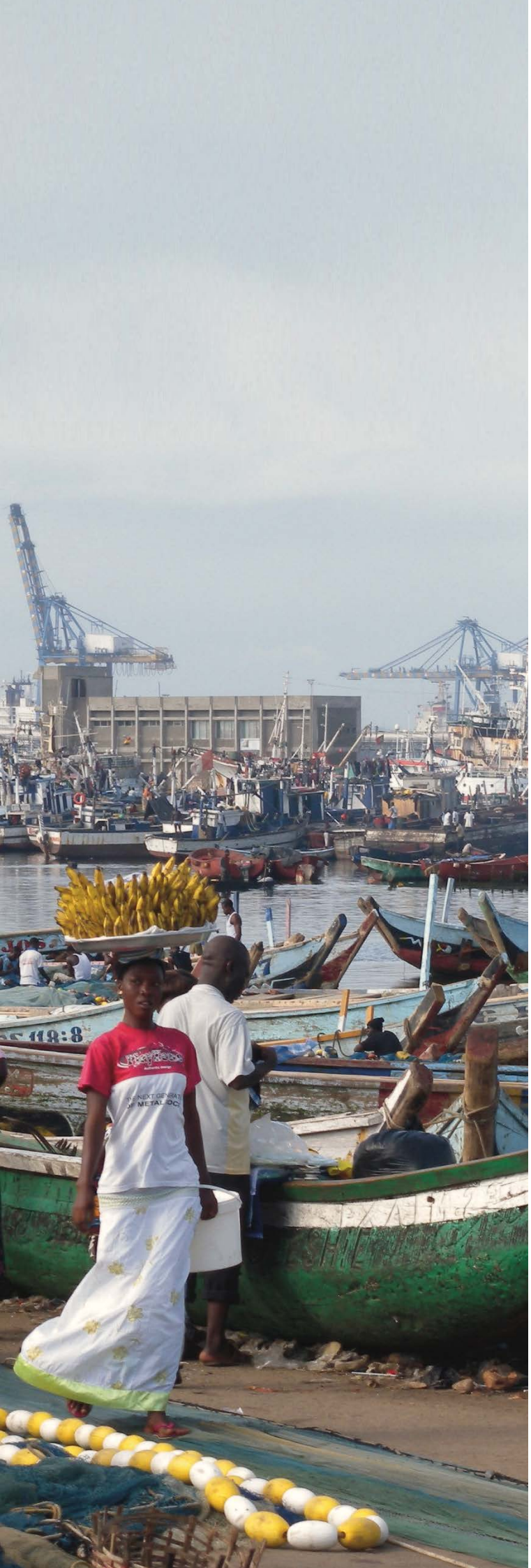

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Transition Pathways towards Sustainability and Hydro-Social Arrangements in Global Environmental Governance:

An Analysis of the Sustainable Development Goals (SDGs)

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Abstract

In a first step, this paper analyses the emergence of the UN Sustainable Development Goals (SDGs) as new global development framework with regard to key actors, social learning cycles, innovation platforms, fundamental policy changes and transition dynamics towards sustainability. In a second step, it traces the convolution of social, political and environmental dimensions, social power relations and governance paradigms embedded in the drafting process and final framework of the water related SDG 6. This research concludes that the SDGs induced important paradigm and policy changes in addition to re-arranging existing power relations.

Transition Pathways towards Sustainability and Hydro-Social Arrangements in Global Environmental Governance:

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1 Introduction

Since the Second World War, socio-economic development has rapidly accelerated, resulting in large-scale environmental degradation of global dimensions (Falkenmark & Rockström, 2004). With humans nowadays presenting a dominant planetary force, only a small fraction of the earth's surface is left unaffected by anthropogenic activities and there remains little that has not been transformed, altered, or metabolised by society or culture (Swyngedouw, 2004). Consequently, increasing impacts of global environmental change resulted in the proclamation of the 'Anthropocene' as a new and human dominated geological era (Crutzen & Stoermer, 2000). As of yet, the Anthropocene has not been officially confirmed, however, it has become clear that nature and society can no longer be analysed as separate entities but instead must be considered co-evolving systems. To account for this intertwined nature of societal and natural components, the term 'socio-ecological' system was introduced by Berkes et al. (2008) emphasizing that humans and nature are integrated and affected by "powerful reciprocal feedbacks" (Folke et al., 2005, p. 443). Although the conventional and dualistic approach to environmental problems in terms of 'social' and 'natural' aspects is being revised (e.g. Budds, 2009; Latour, 1993; Swyngedouw, 2004), much more research is needed to thoroughly understand the entangled nature of social power, political and material dimensions within socio-ecological systems.

Overall, this research aims at contributing to the understanding of socio-ecological systems by analysing global environmental governance processes. Global environmental change and societal transformation towards sustainability present overarching issues that cannot be addressed by national states alone. Therefore, an urgent call for multi-level governance structures providing effective management of the Earth System stretches through the literature (Biermann, 2007b; Jasanoff, 2004; Kreibich & Simonis, 2000; Reid et al., 2010; Schellnhuber et al., 2005; Steffen et al., 2011). To date, however, coherent environmental governance architectures linking global to local levels are still missing.

The United Nations consist of 193 member states (United Nations, 2015a) and represent the only major political organisation of truly global extent. As such, the UN are taking an increasingly important role in addressing environmental issues and are clearly involved in global environmental governance. The recently adopted UN Sustainable Development Goals (SDGs), for example, act as critical reference point for sustainable development (Clémençon, 2012). This research therefore analyses the emergence of the SDGs as international resource regime and examines whether they can be interpreted as fundamental paradigm change and transition in international governance arrangements. The first part of this study is therefore placed in the realms of transition theory and policy change research, which contributes to the understanding of system transformations and societal change towards sustainable development (Meadowcroft, 2011). Although transition research disposes of different perspectives and scientific traditions, little attention is paid

to the political dimensions of sustainability transitions. By tracing the course of events leading to the establishment of SDGs, this study aims at providing an understanding of such processes to guide future sustainability transitions in global environmental governance more effectively. Following research questions are central to this objective:

- How did the SDGs emerge as the new global development framework and is this a fundamental departure from traditional approaches - if so what where causal factors?
- Who took leadership roles and advocacy for the SDG process? Can certain events or structural changes be identified as 'windows of opportunity' that changed cultural values in favour of the SDGs?
- Can the SDGs be interpreted as baseline agenda to induce societal transformation towards sustainability?

In order to understand the relation between humans and nature in more detail, researchers have often analysed the connection between water and society as one key aspect (Bakker, 2009; Barnes & Alatout, 2012; Linton & Budds, 2014; Molle, 2007; Swyngedouw, 1999, 2004). The second part of this study therefore focuses on the establishment of the water-related SDG 6: 'Ensure Availability and Sustainable Management of Water and Sanitation for All'. Water plays an essential role in sustainable development by intrinsically linking human, environmental and economic dimensions. Through its multidimensional significance for poverty alleviation, political stability, human and ecosystem health, social and economic development, water resources management becomes increasingly important (Bakker, 2009, 2012; Batchelor, 2007; Falkenmark & Rockström, 2004; Pahl-Wostl et al., 2013a; UN-Water, 2015). In recent decades, water problems have become increasingly globalised through global environmental change, accumulation of local drivers, and increasing demands from cities, agriculture and industry (Swyngedouw, 2004; Vörösmarty et al., 2015). To date, around 748 million people still lack access to improved sources of drinking water (UN-Water, 2015).

As the basis of life, water links humans intrinsically to the non-human world (Bakker, 2012), which is why water embodies social and natural aspects of human-environmental systems in an exemplary manner (Bakker, 2009; Budds, 2009; Falkenmark & Rockström, 2004; Loftus, 2007; Swyngedouw, 1999, 2004). Swyngedouw (1999, 2004) conceptualises water and social power as 'hybrids' that are internally related and cannot be categorised as either natural or social. The framing of water as a hybrid illustrates the socio-nature of water, which therefore becomes a means of investigating material, social and political processes integrally. However, the co-evolution of society and water's materiality is not yet understood completely. To contribute to the research on hydro-sociology, SDG 6 is analysed to answer following research questions:

- How did the formulation process of SDG 6 evolve and how was the current framework established?
- What were the roles of different actors during the drafting process of SDG 6 and how did different actors interact?

- Does the SDG 6 framework represent a paradigm shift in global water governance?
- How is water as a hybrid thing (political, social and material) spelled out in terms of water internalising social power relations and politics with regard to the SDG 6 drafting process and final framework?

To answer the posed research questions, this study is separated into different parts. The SDG framework is introduced and embedded in a broader analytical context in Section 2. Sections 3 to 5 elaborate the theoretical frame of this study by presenting the notion of global environmental governance, multi-level and multi-actor coordination processes, prevailing paradigms in water governance, transition theory and the hydrosocial cycle through which society and water can be analysed as inherently related. Section 6 illustrates the methodological focus and overall research design, while transition and policy change dynamics embedded in the establishment of SDGs are presented and discussed in Section 7. Section 8 focusses on the negotiation of SDG 6, associated paradigm shifts in water governance and changing power relations. Section 9 provides a critical synthesis by reflecting on the overall research design, transition and policy change dynamics, changes in water-related paradigms and power relations embedded in SDG 6. Finally, Section 10 provides a conclusive outlook.

2 A Contextualisation of the SDG Framework

After a lengthy negotiation process, the SDGs were adopted on 25th September, 2015 by the UN General Assembly and present the 2030 sustainable development agenda of the United Nations. The SDGs address a broad range of human-environmental relations, guide human use of natural resources in addition to reducing negative anthropogenic impacts on biophysical systems. Furthermore, they present an overarching goal setting governance framework responding to global and transboundary challenges with the ultimate objection of achieving sustainable development, resilience and social justice (Fig. 1).

Figure 1: The Sustainable Development Goals (SDGs) were adopted on 25th September , 2015 and present the 2030 sustainable development agenda of the United Nations (United Nations, 2015b).

Civil society plays an increasingly important role in the establishment of international environmental agreements. Non-state actors such as private corporations, NGOs and other stakeholder groups are integrated into the definition and implementation of environmental goals. These cooperative governance forms are often characterised by social learning processes, result in voluntary agreements and build international institutional regimes beyond the nation state (Biermann, 2007a). As elaborated further in Sections 7 and 8, this is also true for the establishment of the SDGs and this study therefore conceptualises the SDGs as a policy instrument established in a multi-level and complex governance network where many actors (non-state actors, private corporate actors and networks) participated with a wide range of diverting interests. Following Young (2013), the SDGs can be interpreted as a constitutive international resource regime that is to be expanded by operational regimes in the course of implementation. Implementation in this case involves the interlinkage of foreign and domestic politics across multiple levels of jurisdiction.

To analyse the establishment of SDGs and to put this research into a broader theoretical context, the following sections introduce the notion of global environmental governance, international resource regimes, policy change and transition theory. As this study also analyses the establishment of SDG 6 (Tab.

1), paradigms in water governance and the concept of the hydrosocial cycle are elaborated in Section 3 and 5.

Table 1: The SDG 6 framework contains eight targets on water, sanitation and on the means of implementation (own illustration following UN-Water, 2015).

SDG 6: Ensure Availability and Sustainable Management of Water and Sanitation for all
6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and increasing recycling and safe reuse globally
6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suff-ering from water scarcity
6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a: By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b: Support and strengthen the participation of local communities in improving water and sanitation management

3 Global Environmental Governance and International Resource Regimes

3.1 The Notion of Governance

This research aims at contributing to the understanding of socio-ecological systems by analysing global environmental governance processes. However, multiple meanings of governance are found in the scientific literature, which makes it difficult to provide a clear description. For the purpose of this study the perspective that will be used is that from political sciences, which often describes governance as 'counterpoint' to the state-centred control of society (Benz et al., 2007), or as reversal of the trend towards hierarchic government control (Jonas & Bridge, 2003). In this context, governance may be used as analytical lens to investigate the extended spectrum of coordination and regulatory mechanisms guiding collective behaviour besides governments. The shift from government to governance accounts for the increasing involvement of more diverse institutional arrangements and actor groups including market forces, non-governmental organisations (NGOs), business groups and other stakeholders in decision making processes (Benz et al., 2007; Jonas & Bridge, 2003; Pahl-Wostl, 2009; Rhodes, 1997). Governance research aims to analyse the structures and mechanisms of collective political actions, explain their functionalities and solve associated challenges. The notion of governance is also used to describe the causal relationships between institutional arrangements, diverting interests and social power relations. Central to this usage of governance is therefore the analysis of interdependencies between actors to reconstruct their interplay in the context of institutional arrangements and coordination structures (Benz et al., 2007).

Governance as counterpoint to government initially emerged in the international context, which is described as 'governance without government' (Benz et al., 2007; Young, 2013). The international political space under investigation lacks a supranational government and the description of global environmental governance in the absence of government remains challenging. Following Behrens and Reichwein (2007), the notion of international politics mainly refers to coordination and steering mechanisms between national states, while global governance goes beyond this conception of states as the central actors. Firstly, global governance accounts for the changing relations between state and non-state actors and political involvement of various stakeholder groups (Behrens & Reichwein, 2007; Strange, 1982). Secondly, global governance emerged to account for the increasingly complex and multi-level perspective on political processes beyond the interaction of national states. The notion of global governance therefore entails a multi-actor and multi-level perspective on international political coordination by recognising an increasing share of public groups and additional regulation mechanisms beyond intergovernmental relations (Behrens & Reichwein, 2007).

Following Treib et al. (2007), governance can be divided into the three dimensions of politics, policy and polity. The politics aspect of governance focusses on the process of policy making in terms of translating different interests into unitary action by emphasising actor networks and power constellations (Kohler-Koch, 1999). The polity approach expresses governance with regard to existing institutional frameworks and rules (Rosenau, 1995), while the policy dimension relates to modes of political steeling (Ostrom, 2005). According to Pahl-Wostl (2009) these distinctions may be useful from an analytical point of view but do not do justice to the complexity of real-world governance regimes. Despite the fact that a separation of the three approaches appears somewhat artificial, this study focusses on the establishment of the SDGs as global policy instrument and can therefore be associated with the politics dimension of governance. This is highlighted by the fact that an important part of this study analyses actor networks in order to identify ways through which different interests are translated into effective policy choices and unitary action.

3.2 Multi-Level Governance of Environmental Systems

As mentioned in Section 2, this study conceptualises the SDGs as a policy instrument established in a multi-level and complex governance network, where many actors (non-state actors, private corporate actors and networks) participated with a wide range of diverting interests. Although this study focuses on the 'global' as scale of activity regarding the establishment and applicability of SDGs, sustainability challenges cannot be unilaterally framed on 'global' or 'local' levels (Cash et al., 2006). The fact that environmental challenges span multiple levels has been acknowledged throughout the literature and an increasing emphasis is put on understanding cross-scale and cross-level linkages of human-environmental system components (Cash et al., 2006). For the purpose of this research, scale is defined as "spatial, temporal, quantitative, or analytical dimension used to measure and study any phenomenon, and 'levels' as the units of analysis that are located at different positions on a scale" (Cash et al., 2006, p. 2; Gibson et al., 2000).

In the international context, the term 'multi-level governance' has been mainly characterised by the cross-level interlinkages between foreign and domestic politics. The distribution of authority across different political levels and away from the model of the central state as most powerful actor is central to multi-level governance modes (Cash et al., 2006; Hooghe & Marks, 2001). In these multi-level and complex governance networks, many non-state actors, private corporate and networks participate in the formulation and implementation of policy instruments that co-exist with existing government processes (Pahl-Wostl, 2009; Rhodes, 1997; Rosenau, 1995). This notion of multi-level complex governance systems proves especially useful when analysing socio-ecological systems and international resource regimes playing out at a variety of political levels and through various actor groups.

3.3 International Environmental Regimes: Governance without Governments

Governance is becoming increasingly important with regard to global environmental politics, which is often conceptualised as taking place through international environmental regimes such as the SDGs (Bulkeley, 2005). According to Young (2013), governance regimes are defined as "institutions specialised to addressing functionally defined topics" (Young, 1982; Young, 2013, p. 89). Institutions present prominent features of governance systems and are in turn defined as "collections of rights, rules, and decision-making procedures that give rise to social practices, assign roles to the participants in these practices, and guide interactions among the participants" (Young, 2013, p. 89). Young (2013) conceptualises environmental resource regimes as institutions addressing matters of governance in relation to human-environmental interactions, human uses of natural resources and anthropogenic effects on natural systems. Ultimately, environmental resource regimes aim at establishing sustainable and resilient systems characterised by increasing efficiency and equity. When these resource regimes address international or transboundary environmental matters lying beyond the jurisdiction of nation states, Young (2013) refers to them as 'international environmental regimes'. Implementation of international regimes often occurs through multi-level governance from local to global level (Bache & Flinders, 2004).

Environmental resource regimes may be divided into constitutive and operational frameworks. On the one hand, 'constitutive regimes' present overarching and goal setting frameworks while 'operational regimes' on the other hand comprise regulatory measures and decision-making procedures. Constitutive arrangements "often provide the foundation for the development of a number of operational regimes" (Young, 2013, p. 89), while operational regimes are typically "nested into the broader frameworks provided by constitutive arrangements" (Young, 2013, p. 89).

3.4 Water Governance and Prevailing Paradigms

The second part of this research aims to explore the SDG 6 framework in terms of shifts in prevailing water governance frameworks and changing power relations. This section therefore introduces the notion of water governance and outlines historic or recent changes in water paradigms.

The importance of water governance has been increasingly recognised in the scientific literature but, similar to governance, the concept is often charged with ambiguous and competing meanings. This study is based on the frequently cited definition of water governance provided by Rogers and Hall (2003) referring to "the range of political, social, economic and administrative systems that are in place to regulate development and management of water resources and provisions of water services at different levels of society" (Rogers & Hall, 2003, p. 16).

As explained in this section, governance as the task of a single government has been expanded to account for the complex multi-level, multi-stakeholder and cross-linking nature of water. Water politics has experienced a fundamental shift from 'government' to 'governance', which is characterised by the interaction between governments, large businesses, civil and other organisations representing sectoral interests, international agencies, NGOs and other relevant powerholders (Bakker et al., 2008; Castro, 2007; Edelnbos et al., 2013; Lautze et al., 2011; Pahl-Wostl, 2015).

In this study, water governance is to be understood as a political process through which decisions are made (Batchelor, 2007; Castro, 2007). In other words, instead of using the term water governance instrumentally as means to achieve certain objectives of water experts, water governance is to be understood as "a complex process of democratic dialogue, negotiation, and citizen participation that includes the discussion about what objectives must be pursued by society" (Castro, 2007, p. 103).

Next to defining the notion of water governance, it is also vital to differentiate between resources management and governance, terms that are often used interchangeably. Essentially, water governance describes the processes and institutions through which management goals are defined and aims at connecting different actors and institutions from different sectors to face water problems jointly (Edelnbos et al., 2013; Lautze et al., 2011). In other words, management activities entail the implementation of practical measures to achieve previously defined goals (Lautze et al., 2011). 'Good water governance' in this respect is therefore associated with participation, rule of law, integrity and transparency (Lautze et al., 2011).

This research investigates water governance in the inter- and transnational context but no generally accepted description of global water governance exists to date (Newton, 2014). The only definition currently provided describes global water governance as "the development and implementation of norms, principles, rules, incentives, informative tools and infrastructures to promote a change in behaviour of actors at the global level in the area of water governance" (Pahl-Wostl et al. 2008, p. 422).

Global water governance is a relatively new concept that emerged from the acknowledgement that "local water problems may not be as local as they seem" (Vörösmarty et al., 2015, p. 478). Local and regional water challenges are influenced by global processes and in turn accumulate to global significance (Vörösmarty et al., 2015). Accelerating climate change impacting local water resources and the globalised economy promoting virtual water trade are only two reasons for recognising the importance of a more global governance context for water (Newton, 2014; Vörösmarty et al., 2015). However, to date global water governance as such does not exist but comprises "a mix of formal and informal forms, which include public and private actors and exists in an ad hoc manner" (Newton, 2014, p. 201). Global water governance aims at developing common norms and a common understanding of water management, cumulative impacts and global drivers to enhance the effectiveness of water policy measures (Gupta & Pahl-Wostl, 2013).

As described by Newton (2014), main reasons for the absence of a more formal global governance framework are challenges related to institutional obstacles, state sovereignty, competition, fragmentation and the siloed approach prevalent in the international water community. Global water governance cannot be seen in isolation and has to occur through multi-level governance from local to global levels (Bache & Flinders, 2004).

Throughout history water governance has been characterised by various paradigms. The term 'paradigm' was first introduced by Kuhn (1962) and has since been used describe the underlying set of values, agreed ways of thinking, theories and methodologies shared by an epistemic community (Cortner & Moote, 1994; Kuhn, 1962; Pahl-Wostl et al., 2010, 2011). A prevalent paradigm is taken as a given and changes only in response to "the accumulation of a significant body of knowledge or information that is contradictory to, or unexplained by, the accepted paradigm" (Cortner & Moote, 1994, p. 168).

Scholars working in the area of water governance provide important indications for past and current paradigm shifts. Descriptions of 'traditional water paradigms' are characterised by similar and reoccurring elements. Cortner and Moote (1994) for example describe traditional approaches as hierarchical, expert dominated and with a distinct utilitarian orientation aimed at maximising production for human consumption. Gleick (2000, 2002) refers to traditional management in terms of 'hard path' measures defined by centralised infrastructures to capture, treat and deliver supplies, physical solutions dominated by a traditional planning approach, ethnics of growth and a primary technical approach. Ward (1995) relates past efforts to the division of water management activities into distinct areas of expertise resulting in the inability to manage water holistically. To summarise, traditional water management approaches of the 20th century were guided by the aim to control and predict water flows and to keep the water system in a, for humans, optimal state (Pahl-Wostl et al., 2006).

Overall, this approach failed "to understand the connections between water and ecological health, and the links between the health of natural ecosystems and human wellbeing" (Gleick, 2000, p. 132). Environmental concerns emerging in the 1970s and 1980s, growing uncertainty related to global environmental change and the interpretation of the 'water crisis' as 'crisis of governance' induced changes in prevailing water paradigms (Pahl-Wostl et al., 2006). In addition, people were no longer willing to leave decisions about water to experts and managers (Cortner & Moote, 1994).

As early as 1994 Cortner and Moote identified a paradigm shift towards ecosystem management and collaborative decision making. Gleick (2000, 2002) associates fundamental changes in the way humans think about water with 'soft path' measures through which water related needs are to be met for humans and ecosystems by collaborative decision making. Soft path measure are also characterised by a conscious break between economic growth and water use, opposition to physical solutions and shifts towards efficiency improvements, re-allocations and environmental awareness (Gleick, 2000, 2002). More recently others have interpreted trends towards marketization,

privatisation and commodification (Harris & Roa-García, 2013), water security (Cook & Bakker, 2012), the system approach and adaptive management (Pahl-Wostl et al., 2006), or shift from government to governance (Pahl-Wostl et al., 2011) as new emerging paradigms in water governance and management.

Although interpretations on water-related paradigm shifts are manifold, traditional values seem to be characterised by 'command and control' approaches and technocratic strategies that have proven inadequate for addressing the complexity of the water system as a hole by largely ignoring environmental concerns and human dimensions (Pahl-Wostl, 2015). Although paradigms in water have been coming and going, recent discussions revolve around reoccurring topics. Amongst others these include: 1) management of problem sources not effects, 2) increased integration of issues and sectors, 3) inclusion of environmental goals, 4) more flexible management approaches, 5) participation and collaborative decision making, 6) more attention to managing human behaviour through 'soft measures', 7) open and shared information systems and 8) incorporation of learning cycles (Pahl-Wostl, 2015; p. 2).

As a general trend, water governance in the 20th century has been shaped by various prevailing paradigms, moving from state control (1960s -1970s) to decentralisation and market liberalisation (1980s -1990) and participatory approaches (from 2000s) (Pahl-Wostl, 2015). However, the identification of paradigms remains challenging, as changes may not be universal or permanent and may not result in fundamental changes in operational regimes. For this reason Pahl-Wostl (2015) concludes that it is necessary to focus more on politics and power relations than on new paradigms. This study therefore aims to analyse changes in water governance paradigms during the establishment of SDG 6 in addition to focusing on power constellations and politics.

4 Transformations towards Sustainability: Concepts and Research Traditions

The first objective of this research is to analyse the emergence of the SDGs and examine whether they can be interpreted as fundamental paradigm change and transition in international governance arrangements. The first part of this analysis is therefore placed in the realms of transition theory and policy change research.

With accelerating global environmental change and the onset of the Anthropocene, human kind is facing far reaching and abrupt changes that are difficult to anticipate, as they entail a high level of uncertainty (Steffen, 2011; Young, 2013). Scholars stress the importance of establishing more flexible governance regimes that are able to adapt to unexpected environmental change, as rigid and inert institutional or policy arrangements may enhance rather than solve environmental problems (Young, 1999; Young, 2001). The literature on policy and institutional changes is manifold and has recently been extended by research on sustainability transitions. This section therefore introduces different research traditions and concepts dealing with fundamental institutional change, shifts in policy paradigms and transitions towards sustainability.

4.1 Policy and Institutional Change

The literature on innovative policy change identifies learning cycles as important requirement for shifting public policy arrangements. Political change has been related to processes of political learning (Heclo, 1974), social learning (Hall, 1989, 1993), policy-oriented learning (Jenkins-Smith & Sabatier, 1993) and lesson drawing (Rose, 1991). The most fundamental changes in core values resulting in 'third order change' or radical changes in policy paradigms have been described by Hall (1989, 1993) to result from social learning processes. The definition of social learning that is to be used in this study is that of Keen et al. (2005), who describe social learning as processes of iterative reflections occurring during the exchange and sharing of experiences, ideas and environments.

In addition to policy changes, different types of institutional change within environmental regimes have been described by Young (2013), who explains that fundamental shifts may occur in response to processes such as progressive development, punctuated equilibrium, or collapse in the sense of disappearance in the wake of changed circumstances (Young, 2013).

Due to accelerating global environmental change, however, it appears that selective and incremental adjustments to institutional settings are becoming increasingly insufficient (Truffer & Coenen, 2012). Moving towards more sustainable environmental governance and management "requires profound structural transformation and systemic innovations" (Pahl-Wostl, 2015, p. 65) as well as in depth questioning of reigning paradigms. Scientists, politicians and civil society need to understand much more about how societies

could move towards a more sustainable future, how innovative lifestyle concepts could challenge prevailing structures, how values of sustainability could be incorporated into political ideologies and how favourable conditions for a transformation towards sustainability could be achieved (Meadowcroft, 2011). For this reason, we now turn to transformation and transition research for sustainability.

4.2 Research on Transformations and Transitions towards Sustainability

Research on transformation and transition dynamics towards sustainability is on the rise in global environmental change research and policy discourse (Patterson et al., 2015). For the purpose of this study 'transformations towards sustainability' are defined as "fundamental changes in structure, function and relations within socio-technical-ecological systems that leads to new patterns of interactions (e.g., among actors, institutions, and dynamics between human and biophysical systems) and outcomes" (Patterson et al., 2015, p. 6; Hackman & St Clair, 2012). Transformations towards sustainability occur when the prevailing system becomes untenable and relate to the aspiration of creating new systems by inducing significant and enduring change (Patterson et al., 2015; Walker et al., 2004). In the context of transformations in governance systems, this study employs the definition provided by Pahl-Wostl (2015) in terms of "change in the overall system logic which is determined by the underlying governance and management paradigm" (Pahl-Wostl, 2015, p. 160).

With regard to the transformation and transition literature it is difficult to separate the notions of 'transformation towards sustainability' and 'transition towards sustainability', as they are often used interchangeably in the same context. Studies from an earth system science or governance perspective tend to employ the term 'transformation' more frequently (e.g. Pahl-Wostl, 2015; Patterson et al., 2015), whereas studies considering structural changes in socio-technical systems refer to 'transitions' (e.g. Elzen et al., 2004; Geels & Schot, 2007; Lawhon & Murphy, 2012; Rotmans et al., 2001). Markard et al. (2012) for example define a 'transition' as something involving "far-reaching changes along different dimensions: technological, material, organizational, institutional, political, economic, and socio-cultural" (Markard et al., 2012, p. 956). In the course of such transitions radical changes in technologies, institutional structures and business models emerge (Markard et al., 2012).

The literature does not provide a unique distinction between transformations and transitions towards sustainability, as different and fragmented concepts are only just being compiled (e.g. Patterson et al., 2015). For the purpose of this research the notion of transition is therefore used to describe changes in distinct sub-systems such as paradigm shifts in public policy

frameworks. Transformations in turn are related to large-scale and fundamental changes of socio-technical-ecological systems and societies as a whole.

4.3 Classification of Different Concepts and Research Approaches

Different approaches and research traditions regarding transformations towards sustainability can be identified and have been classified along five distinct strands of analysis by Patterson et al. (2015). The two approaches most relevant to this study are presented below.

4.3.1 *Transitions in Socio-Technical Systems*

The first perspective originated in the area of innovation studies analysing structural changes in socio-technical systems such as energy supply, water supply or transportation (Markard et al., 2012). In this research tradition, socio-technical systems are characterised by interactions between actor networks, institutions (societal and technical norms, regulations, standards of good practice) material artefacts and knowledge (Elzen et al., 2004; Markard et al., 2012). The socio-technical transition theory includes four major strands of research: 1) transition management; 2) strategic niche management; 3) multi-level perspective on socio-technical transitions (MLP) and 4) technological innovation systems (Markard et al., 2012). One of the most prominent views is that of the MLP, which describes socio-technical regimes as undergoing rapid reconfigurations in response to alternative regime structures emerging from so called 'niches'. Niches are conceptualised as protected areas where prototype innovations are developed (Elzen et al., 2004; Geels & Schot, 2007; Truffer & Coenen, 2012).

4.3.2 *Transitions in Governance Regimes through Social Learning*

The second perspective relates transformations in resource governance to processes of social learning and reflexivity. One view for example emphasises the role of single, double and triple-loop learning processes in collaborative learning cycles (Armitage, 2008; Armitage et al. 2008; Pahl-Wostl, 2009). 'Single-loop learning' is described as the simple adaptation of policies and strategies in response to error detection (Armitage, 2008; Armitage et al., 2008; Patterson et al., 2015; Romme & van Witteloostuijn, 1999). 'Double-loop learning' is encouraged in institutional frameworks characterised by trust-building efforts and refers to policy changes in response to changing worldviews and value systems (Armitage et al., 2008). 'Triple-loop learning' directs attention to structural changes that enable social learning processes (Romme & van Witteloostuijn, 1999). Following Armitage et al. (2008), the emphasis put on social learning suggests "the need for collaboration, joint decision making, and multi-stakeholder arrangements which help to initiate

self-organized learning processes (Armitage et al., 2008, p. 86; Folke et al., 2005).

As this study focusses on transition dynamics enfolding within international resource regimes, the analytical framework developed by Pahl-Wostl (2006, 2009, 2015) is employed to investigate transformative change in multi-level complex governance structures in terms of social learning and innovation platforms. A more detailed description and application of this framework is provided in Section 7.

5 Water and Society: The Hydrosocial Cycle

The second part of this study focuses on the establishment of the water-related SDG 6: 'Ensure Availability and Sustainable Management of Water and Sanitation for All' in terms of paradigm changes, social power relations and interrelation of political, social and material dimensions.

The connection between nature and society has long been described through the analysis of water as integrative socio-natural element (Bakker, 2009; Budds, 2009; Linton & Budds, 2014; Swyngedouw, 1999, 2004, 2009). Water presents a suitable lens for analysing socio-ecological systems holistically, as it is often described as elixir of life by fulfilling manifold functions for humans and ecosystems. First of all, water enables the majority of life supporting processes, presents an important transport medium and enables bio-chemical processes such as photosynthesis. Humans, however, alter the water cycle to meet societal demand for water by changing landscape components and by constructing technical supply systems. Human alterations of the water cycle influence ecosystems, landscapes, freshwater flows, the atmosphere and face the long-term objective of securing the provision of freshwater services and water related ecosystems through sustainable governance and management practices (Falkenmark & Rockström, 2004).

Different professional groups have divided water related challenges (flood control, freshwater supply and wastewater treatment) into compartments that address issues separately. Urgent calls to overcome this fragmentation and the 'physical/human' split with regard to water are found in the literature on hydro-sociology (e.g. Bakker, 2009; Falkenmark & Rockström, 2004). Following Swyngedouw (2004), water renders the separation of the flows of "social, cultural, political, and ecological forces, struggles and power relations" (Swyngedouw, 2004, p. 18) impossible. Water is described as simultaneously and inseparably material, symbolic and political and therefore presents a 'hybrid thing' that internalises social meaning, cultural value, economics and physical relations (Swyngedouw, 2004).

One of the most common analytical approaches to overcome the dichotomy between human and nature is the investigations of social power relations internally embedded in water (Linton & Budds, 2014). In fact, the "multiple metabolisms of water are structured and organised through socio-natural power relations – relations of domination and subordination, of access and exclusion, of emancipation and repression – which then become etched in into the flow and metabolisms of circulating water" (Swyngedouw, 2004, p. 29). Water and social power should thus be considered as hybrids rather than separate entities that are neither purely natural nor purely social (Linton & Budds, 2014; Swyngedouw, 2004). By internalising political and economic power relations, water is conceptualised as 'biopolitical' and highly contested element (Bakker, 2012).

Although the connection and co-evolution of society and water's materiality is not yet understood completely, conceptual frameworks such as 'Waterscapes' (Swyngedouw, 1999, 2004) and the 'hydrosocial cycle' (Linton

& Budds, 2014) help to understand hydro-social dialectics in more detail by exploring socio-natural connections.

For the purpose of this research, the concept of the 'hydrosocial cycle' is introduced here and used in Section 8 to analyse the case of SDG 6.

The 'hydrosocial cycle' is not a new phenomenon and has been employed by scientists to "refer to the inseparable social and physical dimensions of water" that make and re-make each other over space and time (Linton & Budds, 2014, p. 175). As show in Figure 2, the hydrosocial cycle presents a theoretical concept and analytical lens to identify hydro-social dialectics, their mutual co-evolution and water's integrative character in terms of its political, social and material dimensions (Bakker, 2012; Falkenmark & Rockström, 2004; Linton & Budds, 2014). Through this concept, social power relations, governance, technologies, infrastructures, political beliefs and water itself can be analysed as inherently related (Linton & Budds, 2014). Water becomes "a means of investigating and analysing social practices and relations, and of tracing how power infuses these connections such that these can be revealed and, potentially, acted upon" (Linton & Budds, 2014, p. 177). In this respect, the hydrosocial cycle also repositions water as an inherently integrative and political element.

The employment of the hydrosocial cycle as analytical tool allows to overcome the traditional, dualistic analysis of water by revealing how social processes affect material water flows (and vice versa) and to uncover social inequalities sustained through water (Linton & Budds, 2014).

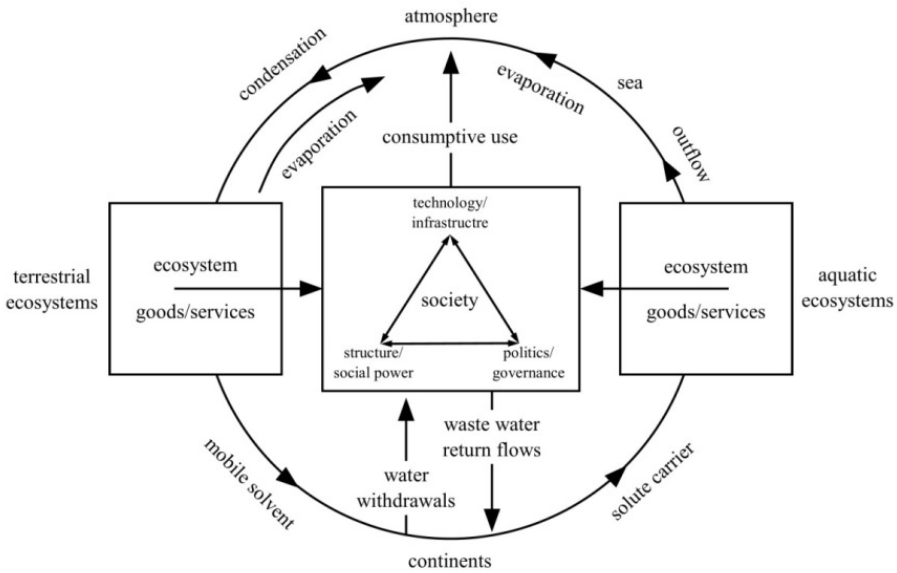

Figure 2: Illustration of the 'hydrosocial cycle' incorporating social and physical flows of water (own illustration following Falkenmark, 2013).

Considerations of the hydrosocial cycle also helps to "make obvious social processes occurring at various scales that influence water flows, including flows of capital and discourses of water" (Linton & Budds, 2014, p. 178). As

indicated by Swyngedouw (2004), water is neither global nor local and although water is deeply localised, tensions, forces and conflicts extend through regional and global levels. The interlinkages between local, national, basin and global water governance dimensions are increasingly recognised in the scientific literature, which concludes that the multidimensional nature of water challenges must include "more than one scale in space and time" (Pahl-Wostl, 2015, p. 107).

The framing of water as a hybrid illustrates the socio-nature of water, which therefore becomes a means of investigating material, social and political processes integrally across different scales and levels. Hence, for the purpose of this research, the hydrosocial cycle is applied as analytical perspective to explore the political and integrative nature of water, changing power relations and multi-level governance structures in the context of the SDG 6 drafting process. When focusing on multi-level processes related to the establishment of the SDGs and SDG 6, this research takes Germany as an example case for national level processes.

6 Research Design and Methodology

The overall research design divides this study into two main parts. The first part analyses the establishment of SDGs with regard to key actors, windows of opportunity, fundamental policy changes and transition dynamics towards sustainability. The second part aims at identifying the convolution of social, political and environmental dimensions, social power relations and governance paradigms embedded in the drafting process and final framework of SDG 6.

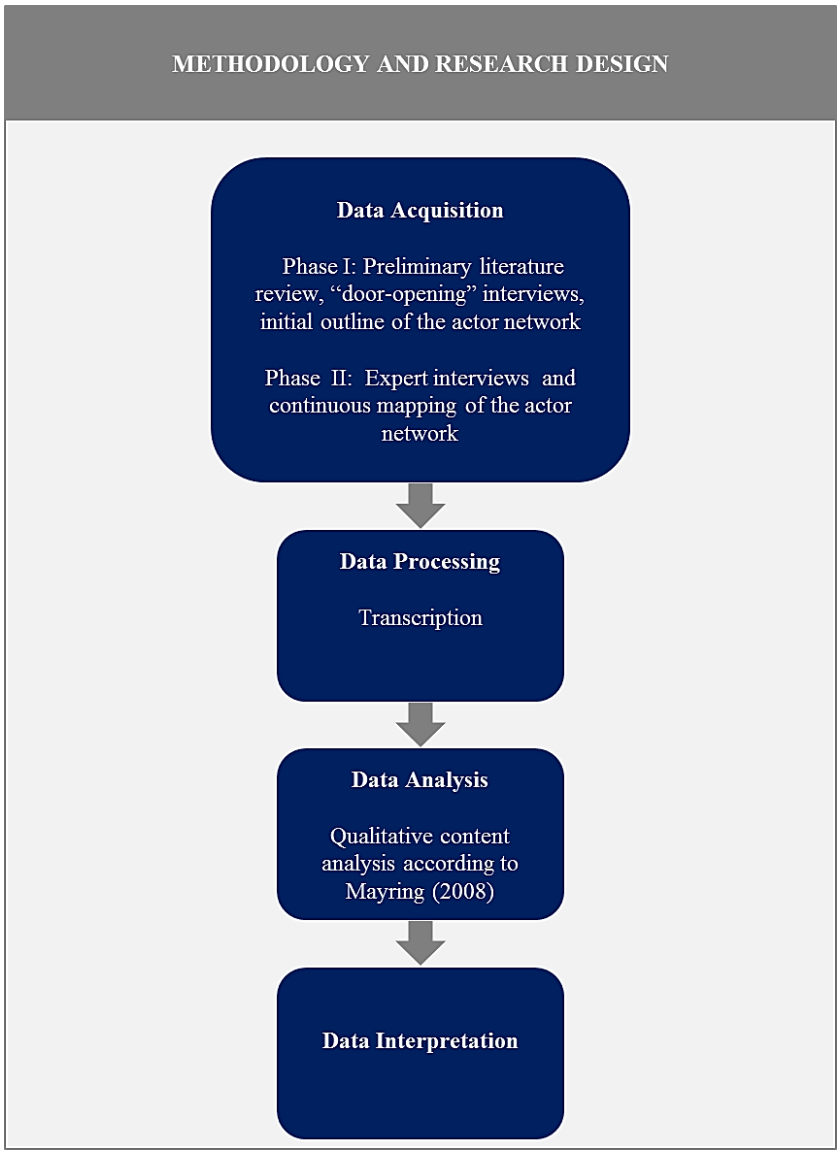

Figure 3: Methodology and research design composed of social scientific qualitative methods in terms of data acquisition, processing, analysis and final interpretation

Social scientific research methods and semi-structured interviews present the main methodological focus of this study. Qualitative and verbal data were useful for revealing chronological sequences of events by simultane-

ously providing an in depth explanation of certain processes, causal mechanisms and social (power) relations between different actors (Gläser & Laudel, 2013; Hoffmeyer-Zlotnik, 1992). Generally, the methodological proceeding was divided into separate phases of data acquisition, processing, analysis and interpretation, as shown in Figure 3.

6.1 Data Acquisition

6.1.1 *Phase I: Preliminary Literature Review and "Door-Opening" Interviews*

To gain an initial understanding of the post-2015 sustainable development process, relevant organisations and main actors, an extensive literature review was conducted during the primary research phase. UN-reports, discussion papers, proposals for sustainable development goals, newspaper articles and conference participant lists were analysed, while focusing on interna-tional and German contributions in particular.

Based on the findings and impressions obtained from this preparatory review, potential inter-view partners were contacted. This was followed by 5 'door-opening' conversations with actors not necessarily part of key organisations, but able to provide a deeper insight into the overall process. To gain a 'snowball-effect', each interviewee was asked for main actors during the SDG and SDG 6 drafting process. An initial mapping of the actor network was conducted in the context of the preliminary literature review and exploratory talks, which was continually expanded and adapted in the course of this study.

6.1.2 *Phase II: Expert Interviews*

During the second and more focused phase of data acquisition a total of 60 actors and organisations were contacted that had been named or referred to in previous interviews, published reports on the overall SDG or water framework, organised events on the topic or are involved in the monitoring of SDGs.

Over the course of ten weeks, from 3rd November, 2015 to 15th January, 2016, a total of 25 interviews (including 'door-opening' conversations) were conducted by one person according to a previously designed semi-structured questionnaire (see Appendix). Interviewees participated on a voluntary basis and although some personal meetings were possible, the majority of conversations took place over Skype or the telephone. The interviews were performed with representatives of the United Nations, civil society, the private sector, academia, the EU-Commission and German government.

Semi-structured guidelines were chosen for this study, as they allow for an open and differentiated recording of subjective interpretations and motives (Hopf, 2005). The aim was to use fixed questions to guide the development

of an interviewee's own narrative, to obtain a deep understanding of relevant topics, acquire comparable material and prevent digression into irrelevant topics (Bock, 1992). Semi-structured interviews were chosen, as they also permit a certain degree of freedom regarding the sequence and formulation of questions, further enquiries and comply with the requirement of greatest possible openness during qualitative research (Meinefeld, 2005). The interview guidelines were formulated according the theoretical background on the one hand and relevant research questions on the other. To avoid direct confrontation with sensitive topics such as power relations, competition and conflicting interest, some questions were not asked directly and interview guidelines were adapted according to specific interview situations.

For the purpose of this study, actors are generally regarded as 'collective' or 'social actors' and as representatives of their institution, organisation or interest group (Reuber, 2012). Interview partners could generally be separated into three different groups: 1) actors involved in the process as a whole, providing insights into the establishment of SDGs; 2) actors as part of the water community providing insights into the drafting process of SDG 6; and 3) actors in Germany providing insights into the multi-level dynamics of the SDG process. With regard to the restrictions of this project and the extent of intergovernmental negotiations in the context of the post-2015 process, not all relevant actors could be included in this study.

Reports and documents referred to by the interviewees were used as background material. In the case of any obscurities, questions regarding the negotiation process, or procedure of events, further material was consulted for clarification.

6.2 Data Processing

All interviews were digitally transcribed, mainly in a word-for-word manner, while excluding parts of the conversation clearly irrelevant to this study and the posed research questions. For practical reasons, it was refrained from using a formal transcription key and own transcription rules were established. Despite the rather general character of these rules, they prove adequate for the purpose of extracting and structuring relevant information for further interpretation.

6.3 Data Analysis: Qualitative Content Analysis

All interviews were coded by hand and evaluated based on the qualitative content analysis by Mayring (2008), which presents a useful and adequate technique for the analysis of semi-structured interviews. Qualitative content analyses are used to link text data to relevant research questions and an underlying theoretical framework by reducing the complexity of information into a form that allows for interpretation of emerging patterns (Gläser & Laudel, 2013). Mayring's method of 'structuring content analysis' was employed

to filter and structure information related to the aims of this research. The evaluation of raw data occurred in six steps, which are shown in Figure 4.

The 25 semi-structured interviews provided the material for this qualitative content analysis and the paragraph was chosen as major analytical unit. While conducting the qualitative content analysis, the interviews were structured through a system of categories, which was derived, verified and adapted in a continuous exchange between theoretical considerations, research topics and empirical findings (Gläser & Laudel, 2010; Mayring, 2008). The text material was coded by extracting relevant information, which were summarised and assigned to different categories according to previously determined coding guidelines. Finally, the extracted data was further structured, summarized, aggregated and abstracted, in order to obtain an information base structured by theoretical considerations and patterns of empirical information in its shortest possible form (Gläser & Laudel, 2010). During the final evaluation, the category system was interpreted along relevant research questions.

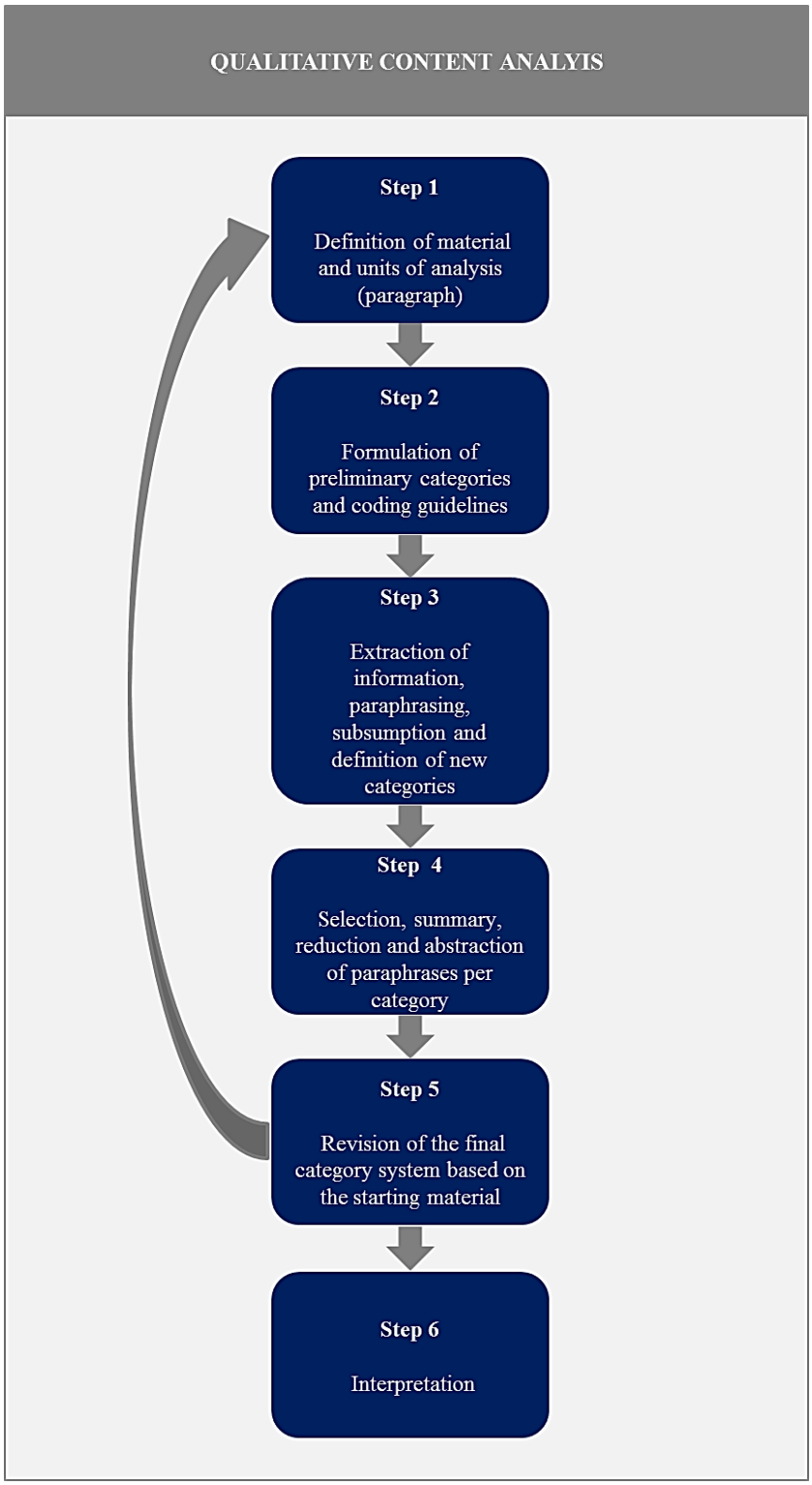

Figure 4: Overview of the different steps during a qualitative content analysis according to Mayring (2008).

7 Transition and Policy Change in Global Environmental Governance: MDGs to SDGs

The results presented in Section 7 and 8 were synthesised from the qualitative content analysis and present a summary of the category system derived from the interview material. For practical reasons and on the ground of data protection, statements are not always related back to specific text passages.

7.1 Results: The Establishment of the SDGs as Global Development Framework

7.1.1 *The Millennium Development Goals*

In the year 2000, UN member states signed the 'Millennium Declaration', which was transformed into the Millennium Development Goals (MDGs) by Kofi Annan, the UN Secretary-General at the time. In 2002, the MDGs were adopted and although they were originally designed as global targets, focus was put on the development of poorer countries in the Global South. The MDG agenda entailed eight goals, most of which emphasised social and basic development needs. Environmental protection was addressed in Goal 7, which interviewees assess as diffuse and not very meaningful.

Within the UN, the United Nations Development Programme (UNDP) was in charge of the implementation of MDGs during which an expensive "north to south" development machinery was established (Int-12, l. 87-89). In 2010, a preliminary evaluation already revealed that it would be impossible to reach all goals within the set time frame of 15 years.

In spite of this, the MDGs present one of the few international agendas that became more important over time. Main innovations and successes include the large-scale attraction of political attention and funding. The setting of voluntary global targets proved more effective than most environmental conventions. The MDGs provided a novel way of measuring progress with a set of global indicators and resulted in improved monitoring and data availability. For the first time, the MDGs introduced ambitious and measurable targets, long-term planning and the objective to holistically address global problems such as the HIV epidemic.

However, although some targets were achieved some were not and progress was distributed unevenly amongst countries. Some interviewees even assess the MDGs as failure on all levels. For example, the MDGs did not necessarily improve the situation for the poorest of the poor. Measurements were based on national data that could not be disaggregated to illustrate inter-state differences and integration of different goals was underdeveloped. Some interviewees even note that changes would have taken place automatically, meaning that improvements cannot be attributed to the establishment of MDGs explicitly. The MDGs are also labelled an old fashioned development and "aid and trade" agenda with a strong north to south power imbalance (Int-8, l. 26-28). Overall, interviewees repeatedly stressed the fact that the

MDGs presented a prescribed agenda designed in a top-down manner by "UN technocrats" (e.g. Int-19, l. 23-25) against the will of member states and without any participatory consultation process.

7.1.2 *Predevelopment and Introduction of Sustainable Development Goals*

Based on the interview statements, two different views on the appearance of SDGs as the new global development framework emerged. Some interviewees describe the SDGs as evolution of the MDG agenda that ended in 2015. Others explain that the SDGs are not a direct consequence of the MDGs, as they evolved from the merging of two separate strands: the MDG and Rio process, which facilitated international sustainable development. The SDGs were suggested in the course of the Rio+20 UN Conference on Sustainable Development in 2012, agreed upon in its outcome document but only merged with the MDGs at a later stage to form the basis of the current development framework. As many interview partners illustrated the merging of the Rio and MDG process in much detail, this is assessed as the more realistic portrayal concerning the origins of the SDGs.

Before the proposal of SDGs at Rio+20, a sense of frustration prevailed amongst environmental actors regarding sustainable development. Several international policy instruments to advance environmental matters including sustainability summits, environmental conventions and the Commission on Sustainable Development (CSD) in charge of the Rio process did not come to satisfactory conclusions. Before 2012, potential SDGs did not present a focal point of attention, as ongoing discussions within the environmental community revolved around Green Economy Models and the expansion of the mandate for the United Nations Environment Programme (UNEP).

At the same time, two separate UN-led processes were taking place. An extensive analysis was conducted to reveal how the UN addressed environmental matters in addition to investigating system wide coherence. The outcomes of these two surveys resulted in strong recommendations on environment, which at the time was "siloed and forgotten" (Int-12, l. 68), as the UN prioritised health and poverty alleviation. Furthermore, countries were increasingly impacted by climate change and efforts of the climate change community to raise awareness showed positive effects. Together with an increasing acknowledgement of large-scale environmental problems, pollution, resource consumption, competition and the termination of the MDGs, favourable conditions were created to re-launch the original idea of Rio 1992 in terms of re-addressing sustainable development and integrate development and environment more effectively.

Therefore, the Rio+20 summit took place at a favourable time in Brazil, a country that anticipated the SDGs by organising 10 sustainability dialogues in the conference lead-up, which corresponded largely to the topics adopted in the final framework. However, the concept of SDGs only gained attraction in the course of the summit, as it was proposed during a final pre-conference

meeting in New York by a Columbian diplomat, Ms. Paula Caballero. Together with Guatemala, the support of Latin America and G77 states, Ms. Paula Caballero managed to get other participants interested in the concept of SDGs. Previous attempt to propose global goals on behalf of the European Commission and a British activist group did not follow a similarly successful path.

Several motives and enabling conditions for the successful lobbying of Guatemala and Columbia could be identified from the interviews. First of all, Latin American countries had a strong position due to the location of the summit in Rio de Janeiro, Brazil. Columbia assumed a leadership role in terms of progressive thinking on environmental matters as part of national policy agendas. Several interviewees describe Ms. Paula Caballero as a strong personality with great foresight, an understanding of the complexity of environmental issues, recognition of the need to integrate development and environment in addition to outstanding negotiation skills.

Although the SDGs were later interpreted as major outcome of the conference, this was not immediately apparent, as they were "slid into the document" (Int-24, l. 16-21) and perceived as a by-product without anyone anticipating the subsequent course of events. The decision to establish an Open Working Group (OWG) to propose Sustainable Development Goals was also agreed upon in the conference document.

The Rio+20 summit left participants with a sense of frustration, as main topics like Green Economy Models had not been tackled. In retrospect, however, it can be observed that Rio+20 provided the initial stimulus to join the MDG and Rio process. Although the SDG concept was later considerably expanded and developed in the OWG, Rio+20 played a central role in outlining the SDGs and proposing the OWG in the first place. In the aftermath of Rio+20 participants were concerned about unintentionally establishing two separate global agendas: 1) a MDG+ framework receiving major attention and funding and 2) a secondary SDG agenda that would be neglected and addressed last.

Although the SDG concept had been proposed at Rio+20, the final outcome and direction of development remained unclear, as the MDGs were still in place. During an interim phase (2012-2013) these two processes remained separate, while discussions revolved around establishing universal SDGs, a MDG+ agenda or a convolution of both frameworks. A set of countries pushed for the continuation of MDGs, which presented a familiar concept with several unfulfilled objectives. Others in turn opposed the terminus SDGs and the adoption of binding environmental goals, although the environmental community heavily pushed for the integration of environmental topics. The notion of universality was also disputed by some actors.

Despite an initial aspiration to continue the MDGs in their original format, UN Secretary- General Ban Ki-moon commissioned a Global Sustainability Panel to investigate the merging of MDGs and the SDG concept. In 2013, the final decision to abandon the MDGs and establish a new SDG framework was taken at the UN General Assembly, with Secretary-General Ban Ki-moon and the President of the General Assembly playing a major role in this development. Several reasons ultimately led to this conjunction: 1) the general

acknowledgement of the need to address environmental concerns and sustainable development more effectively, 2) a strong Rio+20 outcome document and 3) raising development funding for two separate agendas would not have made sense.

The decision to merge the MDG and Rio-process had major implications across different political levels. On UN-level, mandates shifted and UN agencies were advised to collaborate more closely. On EU-level, the development and environmental community within the European Commission were joined. In Germany, the ministries of environment and development, BMU and BMZ, jointly participated in the subsequent drafting process. However, several problems were encountered during the aggregation of MDGs and the Rio-process. As a direct consequence of different actor groups coming together, conflicting interests regarding environmental and development objectives emerged. Different sectors had "different cultures and approaches" (Int-9, l. 74-80) and each worried about reduction and loss of attention. While development actors appeared doubtful, many environmental actors interpret the merging of MDGs and the Rio-process as "the only logical way" (Int-8, l. 20).

7.1.3 *The Open Working Group's Proposal for SDGs*

The first part of this section explains the establishment of the OWG and later expands on the outline of the general negotiation proceedings.

The establishment of an OWG was agreed upon during Rio+20 to propose a preliminary SDG concept as basis for further negotiations. The first OWG meeting took place in 2012 and a final SDG proposal was put forward in 2014. Overall, the SDG drafting process was divided into 1) thematic consultations, 2) the OWG work and 3) final intergovernmental negotiations. During the formulation of goals, targets and indicators, the OWG was supported by different UN task-teams.

The large majority of interview partners assesses the OWG process as very positive and relates its successful operation to its innovative and open organisation. Because of the great interest of UN member states to partake in the OWG, the 30 member state seats originally provided were shared amongst 70 countries. However, member states could not share in their established political blocks but adopted "fascinating combinations" (Int-12, l. 131). This redistribution into unusual coalitions dispersed established political blocs, initiated a re-thinking process as well as thorough discussions and negotiations amongst countries sharing seats and votes. The OWG interpreted its mandate independently and worked very constructively with members going through "an enormous learning process" (Int-12, l. 139-142). The preparatory meetings were informally organised and the OWG is described as a truly open working group characterised by attentive listening and productive exchange. Different types of knowledge were fed into the process by multiple actors and stakeholder groups such as science and civil society.

Based on interview statements, the two OWG co-chairs Mr. Kamau (Permanent Representative of Kenya) and Mr. Körösi (Permanent Representative of Hungary) could be identified as key actors responsible for creating the innovative and ultimately fruitful OWG design. Although their roles as mediators were difficult, Mr. Kamau and Mr. Körösi "did a very good job" (Int-8, l. 199) in terms of generating inclusivity and openness.

The general proceeding of the OWG's work was organised as follows. The thematic consultations, an extensive online consultation process open to the public, took place over six months. The results were later handed back to the OWG process for further development of goals and targets, which were established during monthly OWG meetings on different sustainability aspects. Several informal preparatory gatherings and discussions consulting external experts took place and were followed by an official meeting. Once a goal was agreed upon, a technical support team within the UN system was established to collect UN-knowledge on the topic and to help define corresponding targets. The indicators were developed jointly with the UN statistical commissions, which are also ultimately in charge of them during implementation.

Overall, the OWG composition received positive evaluations. "The right people were in the room" (Int-8, l. 224) and a good balance between environmental and development actors was achieved. Apart from member states sharing seats, different actors were able to take part and contribute to the OWG process. UN-agencies such as UNEP or FAO set up their own task teams and proposed goals and targets. The EU had a seat in the OWG and the European Commission published three communications on the SDGs by also proposing goals and targets. NGOs and intergovernmental organisations such as WWF and IUCN were present at each meeting and sometimes called upon as experts. They were also represented through the Major Group NGOs, facilitating the process for civil society. NGOs on national levels and the public in general were able to contribute to the online consultation process, lobby to their national governments and prepare position papers. Science and scientists were represented through the Major Group Scientific and Technological Community. Another major tool for academia was the Sustainable Development Solutions Network (SDSN) that pushed heavily for the adoption of a fixed set of 10 goals. Other stakeholder groups were represented by their major groups respectively.

While environmental actors such as UNEP, WWF, IUCN, Nature Conservation International and the World Resources Institute pursued the aim of integrating environmental topics across the SDG agenda, the development community initially struggled to find their place, as they adhered to the MDG framework with sometimes rather "old fashioned ideas about development" (Int-8, l. 51). In spite of this, development actors initially dominated the SDG process to a great extent, as they disposed of a stronger lobby, more experience with international goals and simply outnumbered other actor groups.

Organisations and participants exerted different influences during the process, although quantifying these power relations proves difficult. However, it remains questionable how much influence participants of the thematic

consultations ultimately had, as several thousands of comments were received during the online consultation process with millions of organisations taking part. To what extent this participation helped to shape the content and establishment of SDGs remains a sensitive questions.

Different discourses, discussions and argumentations dominated the drafting of SDGs and OWG process. One of the main discussions revolved around the number of goals and degree of integration. Ultimately though, each topic had a lobby, as different communities pursued the establishment of stand-alone goals. Another argument concerned the interpretation of SDGs as an extension of MDGs or new development framework. Conflicts arouse surrounding the question of whether to focus mainly on development issues or whether to put a strong emphasis on environmental dimensions by integrating development and environmental topics more strongly.

Generally, the process has been perceived as the most inclusive UN process of all times. The OWG was assessed as very inclusive, transparent with many stakeholders taking part. The two OWG co-chairs listened to various inputs and actively reached out for advice. In fact, some interviewees perceive the overall process as too inclusive, resulting in the "lowest common denominator" (Int-2, l. 107) and misguided priority setting.

In contrast, as one interviewee states, this perception of inclusivity and transparency is superficial and needs to be critically assessed. Others, in turn, perceived the overall process as impossible to influence and refrained from taking part. It has also been stated that closer to the proposition of SDGs, secret meetings took place behind closed doors.

In general, most interviewees assess the OWG process as very positive. Positive dynamics developed amongst participants and the process is labelled extraordinary for an UN-process, although the negotiations were perceived as mutually exciting and difficult. Interview statements indicate that power relations shifted in favour of countries from the Global South to overcome the north-south divide.

The process did not proceed without obstacles though and negative assessments evaluate the OWG and drafting process of the SDGs as chaotic, late and equipped with too little funding. Communities with different cultures, approaches, lobbies, interests and cultures merged, which resulted in conflicts and partially low-level discussions. The process was also viewed as highly political and characterised by diverting political interests of foreign politics.

7.1.4 *The Final Intergovernmental Negotiations and Adoption of the SDG Agenda*

When the final OWG proposal on SDGs was handed over to the final intergovernmental negotiations, it was uncertain to what extent this would be interpreted as final agenda or preliminary draft. Eventually, the OWG proposal only experienced minor alterations due to the lobbying of the G77

countries, Ban Ki-moon and the President of the General Assembly. The SDGs were endorsed at the General Assembly in 2015.

7.1.5 *Distinguishing Features between MDGs and SDGs*

The adoption of the SDGs induced significant structural changes joining actor groups across different political levels. For example, previously UNEP was in charge of the MDGs and now has to collaborate with many other agencies. Overall, the SDGs are a less UN-agency and more member state driven process.

Despite many differences in form and content, the MDGs prepared the ground for the establishment of SDGs. Only in the follow-up of the MDGs it was possible to establish even more ambitious targets than before.

The SDGs represent a new global concept and a departure from traditional approaches, as they provide a joined framework. The SDGs are neither an extension of the Rio process nor of the MDGs and go beyond an environmental or purely development orientated agenda. Some interviewees even refer to the SDGs as new social pact between governments and people by representing a moral imperative, aiming at alleviating poverty as well as protecting the environment and non-human life for generations to come. The SDGs go beyond the MDGs and aim to integrate the three dimensions of sustainability (economic, social and environmental) effectively. While the MDGs applied mainly to poorer countries, the SDGs are universal and involve everyone. A further innovation is the fact that many communities regarded the SDGs as important initiative, joined the process and pushed for the establishment of their respective stand-alone goals. Another improvement is that the SDGs aim at overcoming the much criticised problem of siloes present in the MDGs by integrating topics and overcoming the old neo-liberal development paradigm engrained in the MDGs. The SDGs were also established in a much more participatory process and represent a country owned framework.

However, parts of the SDGs are still embedded in traditional approaches. For example, the old development paradigm based on the industrialisation path of western nations and economic growth is still prevalent in Goals 8 and 9. It also has to be clarified that the UN presents an old institution with the huge and traditional machinery set up around the MDGs only undergoing slow changes, despite the SDGs being passed.

7.1.6 *The Final SDG Agenda: Evaluation and Transition Potential*

The final SDG agenda received several positive reviews from interviewees. First of all, the goals, targets and overall framework can be assessed as great and aspirational outcome, as the SDGs address a multitude of topics. From the beginning, it was by no means evident that such a comprehensive agenda would emerge as a result.

The SDGs are assessed as a framework that is "better than expected" (Int-3, l. 358-362) but also receives criticism. NGOs in particular denounce the goal on economic growth and prevailing growth paradigm. In addition, many contradictions and trade-offs are found within the agenda. Others criticise the fact that the SDGs include too many goals, of which several do not even present real goals. Formulations are vague, diffuse and inefficient. Interviewees also criticise the large number of indicators, which present a level of complexity that will be ignored by member states. Some state that the SDGs also fail with regard to the integration of human and environmental targets, which treat issues separately. Explanations for this refer to the fact that the two processes of Rio and the MDGs had to be combined in one agenda and that the SDGs are a result of extensive negotiations. The SDGs are a voluntary agenda which presents one of their major disadvantages.

With regard to the SDG negotiations and the final agenda several missing links and prevailing uncertainties become obvious. The concept of universality has been acknowledged but remains difficult to implement. For example, in Germany, the level of motivation prevalent during the negotiation process has ceased in terms of acting and putting the SDGs into practice. Furthermore, a huge gap and open questions remain in terms of financing the SDGs. The challenge of coordinating multi-level governance and translation of the SDGs into national and communal policies also remains unsolved. However, hopes are high that the SDGs manage to actually connect and match political and environmental scales.

The expected innovations and outcomes of the SDGs are manifold and diverse. Certainly, the SDGs have only been adopted and outcomes are still uncertain. Some interviewees expect the formation of new coalitions and global partnerships as well as the channeling of funding and general efforts. Some assess improved monitoring and transparency as the ultimate innovation and major outcome of the SDGs.

Generally, the SDGs can also be embedded in a wider political context. They are related and need to be related to the international climate conferences and efforts to minimise climate change. Another prominent relation is found on behalf of the Convention on Biological Diversity (CBD) and the Aichi targets, where many topics are already addressed.

If the SDGs were to be implemented as they are formulated, the existing financial and economic system would have to change drastically. Some interviewees state that we are indeed on the path towards greater sustainability, as the negotiation process unleashed a huge momentum and positive "buzz" (Int-12, l. 253) amongst participants. Interview partners interpret the fact that the SDGs were adopted in times of global economic regression as positive sign regarding existing political will. However, most interviewees justify their positive assessment with the fact that they would not be able to engage in these international processes without a strong belief in change for the better.

Others displayed mixed feelings regarding the transition potential of the overall SDG agenda. Some argue that the SDGs could indeed become an important policy instrument but this is by no means certain. Goals and targets are very ambitious and our current world is nowhere near a sustainable state. Some preparations are taking place on behalf of the countries but many states are on the "business as usual" trajectory (Int-18, l. 182). The potential to induce a transition towards sustainability is also not coherent throughout the framework.

Several requirements and baseline conditions for success have been named throughout the conversations. As a first prerequisite, reliable implementation strategies and monitoring frameworks need to be established. In this process, an adaptive, flexible and a-dogmatic approach will be critical for a successful implementation strategy. Interviewees argue that the unfolding of the transition potential embedded in the SDGs will ultimately depend on the set of indicators and measurements. Furthermore, the success of the SDGs will also rely on how the degree of complexity and integration is sustained on country level. Ultimately, successful implementation will require the attraction of political focus, will and attention.

In order to achieve the SDGs one needs to act swiftly and overcome the danger of actors going back to focussing on their own interests instead of retaining the bigger picture.

7.2 Discussion: Transition and Policy Change Dynamics Embedded in the SDG Process

7.2.1 *Indications for a Transition towards Sustainability in Global Governance*

According to the definitions presented in Section 3, radical or 'third order' policy changes occur in response to disjunctive learning processes and result in changes of the underlying value systems and policy paradigms (Bennett & Howlett, 1992; Hall, 1993). When the dominating baseline conditions make the existing system untenable, transition thresholds may be crossed to create fundamentally new arrangements and innovative development trajectories (Folke et al., 2010; Walker et al., 2004). As mentioned earlier, Pahl-Wostl (2015) defines transformations in governance systems in terms of "change in the overall system logic which is determined by the underlying governance and management paradigm" (Pahl-Wostl, 2015, p. 160).

According to these guidelines and definitions, several characteristics of 'third order' policy change and transition in global environmental governance can be identified regarding the establishment of SDGs.

Firstly, the SDGs go beyond a purely environmental or development orientated agenda and represent a convolution of the MDG and Rio-process. During the realisation phase of the MDGs, important changes of underlying baseline conditions occurred, rendering the existing development agenda untenable. The MDGs focused on social development matters and only marginally

addressed environmental problems. During their implementation phase of 15 years, however, effects of climate change increased in addition to raising awareness of large-scale environmental destruction, pollution, competition and intensifying resource consumption. As a result of the two surveys analysing the state of environment within the UN, political emphasis shifted from unilateral concerns about poverty alleviation and health towards environmental protection. The international community acknowledged the need to focus more explicitly on environmental dimensions by re-addressing the original idea of sustainable development originating at the Rio summit in 1992. With regard to the shift in north-south power relations observed during the OWG process, it is also carefully assumed that the neo-liberal "aid and trade" (Int-8, l. 26-28) development paradigm has been outdated. Generally, UN member states were dissatisfied with the top-down prescription of MDGs by UN experts and required a more state-driven process.

Secondly, the transgression of important thresholds towards a new governance system and new development trajectories occurred during 1) the conjuncture of the MDG and Rio-process and 2) the OWG's innovative working mode. As a result, fundamental structural changes occurred in different system components, within the overall system logic as well as the underlying governance and management paradigm. For example, the shift from MDGs to SDGs induced important institutional changes and re-structuring processes across the jurisdictional scale ranging from UN, EU to national levels by joining different actor groups and challenging existing power relations. While the MDGs were established in a top-down manner, without public participation and a narrow focus on basic development issues of poorer countries, the SDGs present a new governance concept and departure from these traditional development trajectories. The SDGs are a complex framework aiming to address and integrate the three dimensions of sustainable development by moving beyond a purely environmental or development orientated agenda. The SDGs are universal in nature, apply to all countries and were established by including public participation, different types of knowledge and multiple stakeholder groups. Although the CSD and Rio-process previously included different stakeholder groups in the form of UN Major Groups, participation was never as extensive as during the SDG process and the actor network not as diverse.

The fact that some interviewees describe the SDGs as "new social pact between governments and people" (Int-22, l. 133) and "moral imperative" (Int-9, l. 340) underlines the argument that the SDGs, indeed, present a fundamental shift in the overall system logic, a transition in global environmental governance and third order policy change.

7.2.2 *An Analysis of the Transition and Policy Change Dynamics Embedded in the SDG Process*

The following section analyses the dynamics of transition and policy change processes associated with the establishment of the SDGs as international resource regime.

Although the conceptual framework by Rotmans et al. (2001) is often applied to socio-technical systems, the four phases characterising transition dynamics can be adapted to the establishment of SDGs. According to Rotmans et al. (2001), transitions occur in four different phases: 1) the 'predevelopment phase' of equilibrium where the status quo does not visibly change; 2) the 'take-off phase' where the state of the systems begins to shift, initiating the process of change; 3) the 'breakthrough or acceleration phase' where structural changes take place through the accumulation of socio-cultural, economic and institutional changes reacting together; 4) the 'stabilising phase' where the speed of change decreases and a new dynamic equilibrium is reached (Fig. 5).

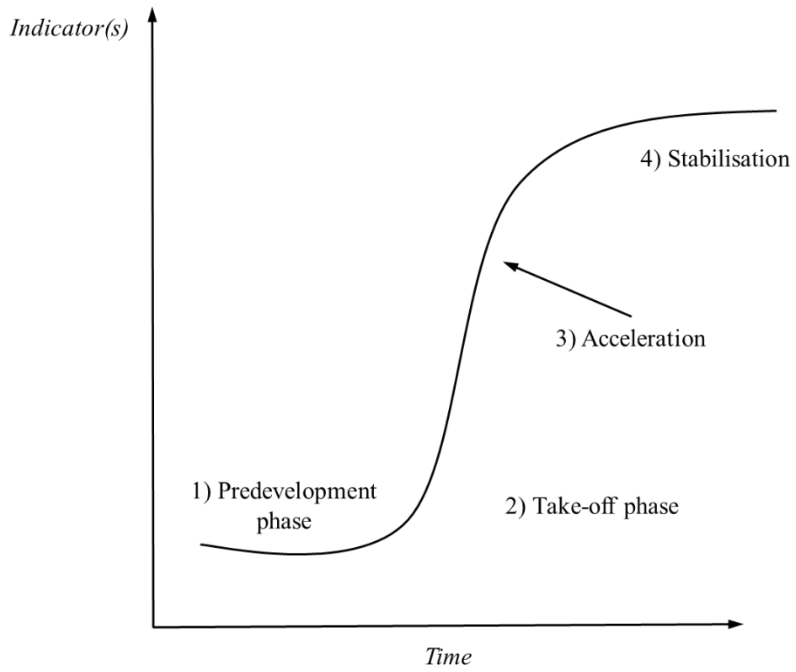

Figure 5: Transition phases: 1) Predevelopment in terms of changing baseline conditions during the implementation of MDGs; 2) Take-off phase referring to the emergence of SDGs at Rio+20 and decision to merge the MDG and Rio-process; 3) Acceleration initiated by the social learning process in the OWG; 4) Stabilisation phase initiated after the adoption of SDGs by member states (own illustration following Rotmans et al., 2001)

7.2.2.1 The Predevelopment Phase: Changing Baseline Conditions

As mentioned earlier, important changes to the underlying baseline conditions occurred during the implementation of MDGs, characterising the 'pre-

development phase' of the transition towards SDGs. During this predevelopment, the status-quo did not visibly change, as the MDGs were still in place (Rotmans et al., 2001).

Significant shifts in the baseline conditions included increasing effects of climate change, growing awareness of global environmental problems such as pollution, competition and resource consumption. The international community increasingly acknowledged the need to address environmental protection more effectively and re-think actions on sustainable development, which at the time, had not produced satisfactory outcomes. In addition, countries opposed the top-down prescribed formulation of MDGs and insisted on a more inclusive approach for any follow-up agenda.

7.2.2.2 The Take-Off Phase: Merging of MDGs with the Rio-Process

The Rio+20 summit and consequent decision to merge MDGs with the Rio-process are associated with the 'take-off phase', which is characterised by the state of the system beginning to shift towards structural change (Rotmans et al., 2001).

As a consequence of shifting baseline conditions and near termination of MDGs, Rio+20 opened a window of opportunity to re-think sustainable development and move onto a new development trajectory. The summit took place at a favourable time and was "sparkly in terms of title" (Int-12, l. 90). Columbia, and in subordinate roles Guatemala and Brazil, proposed and anticipated the SDGs. These country representatives are therefore identified as members of a small minority of early adopters, pioneers and agents of change (Pahl-Wostl, 2015; Rogers, 2003). Several independent interview statements identify Ms. Paula Caballero, a Columbian diplomat, as key individual in the context of Rio+20 who took the initiative to propose and pursue the concept of Sustainable Development Goals.

The tendency to underestimate the influence of individual actors in shaping resource regimes is often misleading (Young, 2013). Pesch (2015) for example criticises that transition theories (mainly socio-technical approaches) maintain a predominantly structuralistic perspective and focus on agency only in terms of collective groups. Recently, it has been increasingly acknowledged though that individuals are much more than just organisational representatives. In fact, individual actors are motivated by interests and values that emerge from personal interests, culture, political private or ideological convictions (Pesch, 2015). With this expansion of agency Pesch (2015) accounts for the formation of new "sets of meanings" (Pesch, 2015, p. 382) and value systems in transition processes through pioneers or agents of change.

The establishment of SDGs further stresses the importance of individual change agents in transition processes. Indeed, the role Ms. Paula Caballero adopted before and during the Rio+20 summit can be interpreted as a combination of 'tipping point' (Kim & Mauborgne, 2003) and 'cognitive' leadership (Young, 2013). On the one hand, cognitive leaders come up with new ways of thinking about key issues. On the other hand, tipping point leaders

may induce transition processes by calling for change, mobilising other key players and convincing the critical mass of people (the number of actors that need to join an initiative for it to induce political change and innovation) (Lütz, 2007; Rogers, 2003). Ms. Paula Caballero proposed the new idea of global goals in the context of sustainable development, while mainstream discussions revolved around Green Economy Models and the mandate of UNEP. Subsequently, she employed her understanding of complex human-environmental systems and her social skills to convince a critical mass of Rio+20 participants of this novel concept. The SDGs gained attraction during the summit, were adopted in its outcome document and ultimately acknowledged as major achievement of Rio+20. However, future development of the SDG concept remained unclear, as the MDGs were still in place and the ultimate decision to merge the Rio and MDG process had not been taken.

During an interim phase (2012-2013) the MDGs and Rio-process remained parallel, while discussions revolved around the issues of establishing universal SDGs, a MDG+ agenda, or whether to combine these strands. The shift from MDGs to SDGs was opposed by a set of countries, pushing for the continuation of MDGs according to their original conceptualisation. Interviewees base their explanations for this resistance mainly on the fact that the MDGs presented a familiar concept, while SDGs were a new framework making it difficult to evaluate future implications for member states.

This reaction proves typical for transition processes, as transformations are likely to be "inherently political and contested because different actors will be affected in different ways, and may stand to gain or lose as a result of change" (Patterson et al., 2015, p. 6). The largest part of actors in transition processes are unlikely to "search for innovations and change but rather tend to search for stability and the confirmation of established principles" (Pahl-Wostl, 2015, p. 66). Instead, the majority of actors seek stability and remain in their established principles and behavioural routines (Pahl-Wostl, 2015).

The decision to abandon the MDGs and establish a new set of SDGs with the help of the OWG responds to the critique of the MDGs as top-down prescription. The invitation of member states to participate in the OWG's work is regarded as simple adaptation and correction of previous policy errors and can therefore be interpreted as 'single-loop' learning process (Armitage, 2008; Armitage et al., 2008; Romme & van Witteloostuijn, 1999). In other words, this adjustment is seen as first or second order policy change - a process that "adjust policies without challenging the overall terms of a given policy paradigm" (Hall, 1993, p. 279).

7.2.2.3 The Break-Through Phase: The Open Working Group Process

According to Rotmans et al. (2001), the acceleration or break-through phase of transformations is characterised by structural changes taking place through socio-cultural, economic and institutional alterations. Although this study focuses on transition and policy change within a very specific political space and without considering further shifts across cultural and economic areas, the OWG process corresponds to a 'break-through' or 'acceleration' period. According to Rotmans et al. (2001) acceleration phases are often

characterised by collective learning processes. This holds true for the OWG, which is interpreted as an innovation platform defined by collaboration and a 'double-loop' social learning cycles. To analyse the OWG as innovation platform, the 'multi-level perspective on transformative change' by Pahl-Wostl (2015) is applied to this case study.

Pahl-Wostl (2009) introduced an evolutionary approach to transformative change based on social learning and the interplay between formal and informal processes. For the purpose of this research, the definition of social learning that is to be used is that by Keen et al. (2005), who describe it as process of iterative reflections occurring during the exchange and sharing of experiences, ideas and environments. Social learning can take place as simple policy adjustments (single-loop learning), collective problem reframing (double-loop learning) and structural changes to improve learning (triple-loop learning) (Armitage et al., 2008; Romme & van Witteloostuijn, 1999). This can be related to the literature on learning and policy change in which Hall (1993) identifies social learning as key component for first-, single-, or third order policy change.

According to Pahl-Wostl (2015), transformative change requires informal learning cycles within sub-networks that are connected to formal policy processes. Innovations emerging in these learning cycles may later diffuse through the entire system to induce fundamental change.

To qualify as a learning cycle a process must fulfil several requirements. Firstly, (partially) informal network of actors must meet regularly. In this case informality indicates that rules of the group are not formally prescribed, their mandate is open and results are not immediately formally binding but policy informing. Secondly, it must involve an issue-specific network formed to address a specific problem or problematic domains. The actor network must qualify as community of practice with joint and shared practices. Thirdly, the network must involve a clear objective to find solutions to a problem by being open and willing to explicitly experiment with a range of innovative approaches. Fourthly, it must engage in activities that enable double or triple loop learning (Pahl-Wostl, 2015).

Pahl-Wostl (2015) states that the learning cycle may introduce a new paradigm and promote radical innovations, engage different stakeholders, develop policies and set operational goals for environmental management. The learning cycle requires actors to have a certain degree of freedom to self-organise, learn to understand different perspectives and reframe problems which might result in shifting priorities. To embrace different perspectives actor networks in learning cycles should involve different sectors and perspectives.

The multi-level framework on transformative change presented by Pahl-Wostl (2015) is derived from the multi-level perspective of transitions in socio-technical regimes (MLP). The concept distinguishes between niches (micro), the government and management system (macro) and socio-ecological system (macro) (Fig. 6).

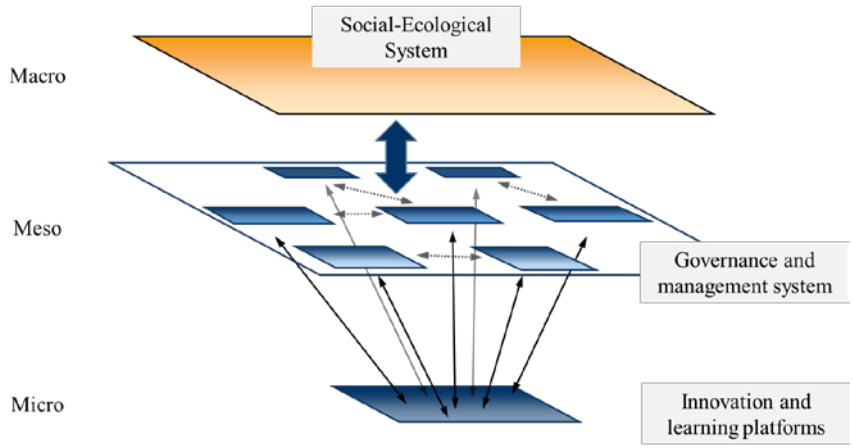

Figure 6: Multi-level representation and cross-level interaction of social learning processes: micro-level (the OWG process as innovation platform characterised by double-loop learning); meso-level (formal political structures of the UN system); macro-level (SES system addressed through SDGs) (own illustration following Pahl-Wostl, 2015)

At the micro level, innovation and learning platforms present informal spaces that are characterised by learning cycles and present the focal point for stimulating transitions or system innovations. At the meso-level, governance and management systems embrace structural configurations that keep the system largely in its current state (institutions, networks of collective actors, power constellations). The macro-level constitutes the social-ecological system providing the overall context. The sequence of levels does not have to be identical with increasing spatial scales and the multi-level perspective can also be applied to global scale systems. Instead, the different levels "refer to different kinds of social arenas rather than nested spatial scales" (Pahl-Wostl, 2015, p. 176).

Considering the results obtained through this research, the 'multi-level perspective on transformative change' (Pahl-Wostl, 2015) represents an adequate framework to analyse the emergence of SDGs in more detail. The OWG qualifies as innovative learning cycle, as it involved an informal network of actors that met regularly with the aim of proposing SDGs, which were not formally binding but policy informing. The rules of the OWG process were not formally prescribed and a certain degree of freedom to self-organise was granted, resulting in innovative political coalitions (e.g. sharing seats). The actor network was indeed issue-specific with the clear aim of proposing a preliminary set of SDGs. An informal working space was created, which included different types of knowledge and stakeholder groups introduced a range of innovative approaches.

Interviewees stated that parts of the process were defined by actors from different sectors disposing of "different cultures" (Int-9, l. 74-80), lobbies, approaches and interests. Despite prevailing conflict, this diversity initiated an "enormous learning process" (Int-12, l. 139-142) and priorities shifted from the unilateral development approaches entrenched in the MDGs towards a more holistically framed SDG agenda. Next to including goals and targets on poverty alleviation and basic human development needs the framework also addresses important ecological and economic dimensions.

This process was successfully facilitated by the two OWG co-chairs Mr. Kamau and Mr. Körösi, which were identified as key actors to enable the formation of the OWG as innovation platform. Through the skillful interpretation of the OWG's mandate they adopted a 'structural leadership' role by influencing actors to enroll in a constructive manner (Young, 2013).

Although the OWG presented an innovative and informally organised space at micro level, it was embedded in formal political structures defining the UN governance system (meso-level) and the overarching global social-ecological system addressed through the SDGs (macro level) (Fig. 6).

The OWG process tried to account for the real-world complexity of human-environmental systems, reflected on prevailing practices, recognised different types of knowledge, induced collaboration among actors from different sectors and ultimately integrated the three dimensions of sustainable development into a joint framework. In this respect, members of the OWG went through an important 'double-loop' learning process, which induced changes in cultural values in the form of third order policy shifts and institutional rearrangement across different political levels.

7.2.2.4 The Stabilisation Phase: Adoption of the Final SDG Framework

The adoption of the final SDG framework at the General Assembly in 2015 marked the beginning of the 'stabilising phase' where the speed of change decreases and a new dynamic equilibrium is reached in form of a new governance framework (Rotmans et al., 2001).

8 SDG 6: Ensure Availability and Sustainable Management of Water and Sanitation for All

This section traces the establishment of SDG 6 and aims at identifying the convolution of social, political and environmental dimensions, social power relations and governance paradigms embedded in the drafting process and final framework of SDG 6.

8.1 Results: The Establishment of the SDG 6 Framework

8.1.1 *Predevelopment and the Role of Water at the Rio+20 Summit*

Water in the MDG framework was addressed under Goal 7 'Ensure environmental sustainability' in terms of halving the number of people without access to safe drinking water and basic sanitation. In the MDGs water got lost and only narrowly focused on "taps and toilets" (Int-21, l. 14) without considering the water cycle as a whole.

The MDG target on water was successful at attracting political attention and providing safe drinking water but failed to achieve the goal on basic sanitation facilities. Overall, the Water, Sanitation and Hygiene (WASH) community was strongly engaged in the MDGs, which separated them from other water actors.

Before the adoption of SDGs, discussions about shortcomings of the MDGs had already undergone an important evolution. This research identifies several water-related events and conferences shaping the outcome of Rio+20 and SDG 6 architecture. Discussions started in 2002 during the World Summit on Sustainable Development in Johannesburg, where the unilateral focus of MDGs on water supply and sanitation was addressed critically. The World Water Forum of Istanbul (2009) stressed the importance of putting greater emphasis on wastewater, while the World Water Forum of Marseille (2012) acted as preparatory platform for the Rio+20 summit and post-2015 process on water. Consequently, a consensus formed within the international water community that the MDGs had to be expanded to address water more holistically in the international political context. In 2013, the Budapest Water Summit and conference on Water Security and Peace in The Hague took place, solidifying this understanding further. In 2010, the Aichi Targets were passed with Target 14 focusing on the protection water related ecosystems, which presented an important reference point for SDG 6.

Despite these diverse preparatory meetings and conferences, it was by no means certain that water would be addressed during the Rio+20 conference. Heavy lobbying and the establishment of a sustainability dialogue on water, organised by Brazil, were important requirements for putting water back on the international agenda. In the context of water and Rio+20, Brazil has therefore been identified as key actor, which is explained by the fact that Brazil, a water rich country, displays a strategic interest in this resource.

The water related outcome agreements of Rio+20 are indeed described as remarkable, as, for the first time, the importance of ecosystems for water cycling and their importance for sustainable development were recognised. Some interviewees interpret the sustainability dialogue and the 'Water and Sanitation' chapter of the Rio+20 outcome document as templates for the establishment of SDG 6.

8.1.2 *The Open Working Group and Technical Advisory Process for Water*

This section provides an overview of the OWG and technical advisory process for water by tracing the sequence of events, the interaction and influence of different actor groups as well as prominent discourses.

As explained in Section 7, the OWG was supported by UN taskforces to collect UN-knowledge on certain topics and help define targets and indicators. From 2012 to 2013, a concrete water goal was taking shape and 2014 was designated to develop corresponding targets and indicators.

In the case of water, the OWG was supported by a technical advisory process led by UN-Water, which fed its results back to the OWG and was called upon as technical expert. In the absence of a UN agency or organisation for water, UN-Water presents a coordination mechanism for water related issues. UN-Water comprises 31 UN member agencies in addition to partners from outside the UN system. During the SDG process, UN-Water provided an umbrella for the international water community. Ultimately, it was in charge of the thematic consultation process and responsible for proposing targets and indicators for SDG 6.

As part of this process, UN-Water organised an extensive consultation process on water, following the outline of the Rio+20 outcome document. This, however, already presented one of the first obstacles as several countries initially opposed a water related consultation process. The decision to include water was taken at a relatively late stage and has been described as "break-through moment" (Int-22, l. 58) on the way to establishing a dedicated water goal. During this consultation process, three main dialogue streams were organised including the topics 1) water, sanitation and hygiene, 2) wastewater management and water quality and 3) water resources management. For six months, comments from the civil society were collected on these topics. In addition, around 30 country consultations were organised by the Global Water Partnership (GWP).

This study identifies several key actors in the SDG 6 drafting process. First of all, UN-Water played a crucial role in combining actors from different sectors. UN-Water gave a voice to the rather segmented water community and was therefore able to provide precise and joint inputs into the OWG discussions on water. UN-Water was also important for achieving a dedicated water goal and its technical advice paper proposing targets and indicators has been described as significant milestone for the international water community. In addition, several member states such as the Netherlands, Switzerland and later Germany actively supported UN-Water in its effort to establish a stand-alone

goal. On behalf of NGOs and intergovernmental organisations, GWP, CBD and IUCN were repeatedly named as important actors. The WASH group represented the development community, while WBCSD, the Business and Industry Advisory Committee, Business Action for 2030 and AquaFed took part on behalf of private corporations.

As the OWG process rapidly organised along the lines of sectoral 'stand-alone goals', the water community lobbied heavily for a dedicated SDG on water. Strong coalitions were forming between NGOs and governments to push for a dedicated goal and 54 countries signed a letter in support of this matter. The OWG co-chair Mr. Körösi was concerned and receptive towards argumentations for a dedicated goal and has been described as "very well educated" (Int-21, l. 82) on the topic of water. During the final agreements, Mr. Körösi managed to pass the SDG framework by quieting countries worrying about transboundary issues and state sovereignty. Indeed, the OWG process was marked by an important turning point in favour of a dedicated water goal in response to 1) 'loud lobbying' and 2) the influence of Mr. Körösi.

Actors involved in the drafting of SDG 6 disposed of different means for contributing and pursing their aims in the process. For example, on UN-level and as partner of UN-Water, GWP organised several country consultations, promoted a greater focus on the human dimension of water governance and focused on the inclusion of Integrated Water Resource Management (IWRM). The Women for Water Partnership lobbied for a dedicated goal on water and promoted gender equality. Representatives of CBD took part in the UN-Water task team discussing and pushed for the inclusion of a target on ecosystem protection.

Taking German as an example case to explore processes on member state level, it became obvious that only a small national water community engaged in the formulation of SDG 6. International processes are generally not the concern of local environmental organisations and the majority of water actors did not recognise the importance of this process for their domestic work. Therefore, German environmental actors did not decide on a clear position in time to influence the process effectively. The German WASH community, on the contrary, was better organised, more vocal and defended a stronger position throughout the process.

Multiple descriptions of the role and contribution of science were collected. First of all, the UN-Water technical advice paper was interpreted as major scientific input into the discussion on water. Nevertheless, the scientific basis of this document has been described as relatively weak. In addition, other scientific organisations such as UNU-INWEH fed scientific reports into the UN-Water and OWG process. The role of science in the SDG 6 process is often described in terms of implementation, assessment and indicator development. Following interview statements, science should engage in diagnosing problems, describing the water cycle, raising awareness of water-related challenges and provide negotiators with scientific background material.

The private sector was also present as important stakeholder in the water related negotiation process and AquaFed took part in the UN-Water working group on wastewater management.

Several actors and stakeholder groups played an important role and took perceivable influence in the SDG 6 process. First of all, the water community in general mobilised a great water lobby that jointly and successfully argued for a stand-alone goal on water. The great majority of the goals and targets proposed in the technical advice paper by UN-Water were ultimately adopted and translated into SDG 6. UN-Water played a crucial role in joining the international water community and was also close to the OWG co-chairs by providing expert advice. During the formulation process, the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) and the WASH community in general were very influential, as they had previously been in charge of monitoring progress on the MDG target on water. From the beginning, the first two WASH-related targets of SDG 6 were fixed to continue the legacy of MDGs. However, JMP, although influential, lost its leadership role due to the abolishment of MDGs.

Although UNEP was often describes as playing a marginal role in the overall SDG process, in the water context, it was vocal and influential. On behalf of NGOs and intergovernmental organisations, CBD and RAMSAR were repeatedly named as influential actors with CBD succeeding at maintaining an ecosystem related target. In turn, AquaFed and UN-HABITAT successfully lobbied for an online consultation stream on wastewater without which the formulation of a wastewater target would have been improbable. Descriptions of the influence of the scientific community during the drafting process varied considerably and some interviewees attributed science only a limited role in the highly politicised SDG process.

Interviewees described the difficulties of quantifying or tracing the influence of individual actors involved in the process. It is therefore challenging to take responsibility for any outcome formulation. In fact, descriptions of the degree of inclusivity and transparency of the SDG 6 drafting process are ambiguous.

On the one hand, the process is assessed as inclusive, as all stakeholders were able to participate. UN-Water consulted with countries and the collected knowledge went into developing goals, targets and indicators. The process seemed well joined up without any missing actors.

On the other hand, although formally many hundreds of organisations contributed to the process, it remains a difficult task to assess their actual influence. The consultation took place over a very short time and UN-Water had to be careful to guide the consultation process effectively without prescribing the outcome in too much detail. Some actors on member state level found it difficult to participate and several problems were encountered in terms of access and transparency on behalf of NGOs and intergovernmental organisations. Language barriers also represented an important limitation to inclusivity for local actors and the claim that nobody was missing cannot be

assessed or verified. Indeed, interview statements hint towards several missing actor groups. For example, despite indigenous groups giving strong input into the Rio+20 negotiations, they remained largely absent during the SDG 6 drafting process and Worker Unions were also underrepresented. In Germany, the environmental community did not dispose of sufficient resources to efficiently and actively engage in the process.

To a large extend, the interaction of actors involved in the negotiation of SDG 6 was characterised by fragmentation and competition. Independent interview statement describe the water community as weak and segmented, poorly organised with conflicting interests and without strategic vision or aim for the future. Friction between different sectors and silos dominated and competition amongst UN-agencies for space and funding was common. One major aspect of SDG 6 is the dwelling conflict between the WASH community and other participants, as WASH actors were afraid to lose funding, visibility and their powerful mandate held during the MDGs. In addition, a stable group of "old water experts" (Int-16, l. 134-135) continue to disregard the human dimension of water management and often dominate the UN stage.

In spite of this, cooperation and unification were also a major aspect of the SDG 6 drafting process. In fact, negotiations about SDG 6 provided a good opportunity for the fragmented water community to connect and overcome differences. The process provided a platform for WASH actors previously involved in the MDGs to re-join the rest of the water community. UN-Water and its consultation process managed to join different silos and the community for the first time, as all actors worked on a common agenda.

Several discourses and arguments dominated the discussions about water. First of all, it was not easy to decide whether to lobby for a stand-alone goal on water or whether to integrate and mainstream water with other goals. Ultimately though, the largest part of the water community lobbied and supported the idea of a stand-alone water goal. Supporters argued that without a dedicated goal, water would not receive any visibility and funding. A stand-alone goal was needed to strengthen the international governance architecture for water and account for water as a highly political issue.

Another stream of argumentation supported the integration of water within other goals to account for its cross-cutting nature. Some actors wanted to limit the overall number of total goals and promoted the interlinkage of water with other topics.

Another line of argument stressed the expansion of the MDG focus on water by incorporating water resources management, wastewater, ecosystems and the wider water cycle in the agenda. By ignoring environmental concerns and without an expansion and broader consideration the unfinished business of the MDGs could not be adequately addressed.

The discourses shaping the SDG 6 drafting process emphasised that water could no longer be looked at from a purely engineering perspective but that

the human and environmental dimensions have to be acknowledged. Different aspects of the water cycle had to be looked at simultaneously to overcome the prevailing sectoral separations.

8.1.3 *Distinguishing Features between the Water-Related MDG and SDG 6*

SDG 6 presents a much broader agenda than the previous MDG on water and interviewees interpret SDG 6 as a combination of the old WASH targets and aims of the Rio-process (Tab.1). The first two SDG 6 targets take the legacy of the MDGs forward, while additional targets include environmental dimensions. SDG 6 is much more cohesive and presents a stronger framework for water. Next to water supply and sanitation, SDG 6 now includes aspects on wastewater, water efficiency, water scarcity, IWRM and ecosystem protection. Interviewees evaluate the architecture of SDG 6 as a real chance to transform and unify the segmented international water community, as it represents aspects of all water-related subgroups.

8.1.4 *The SDG 6 Framework: Implementation, Evaluation and Transition Potential*

This section gives an overview of the implementation strategies for SDG 6 and evaluations provided by interviewees of the final framework. It also compiles assessments of fundamental changes embedded in or to be achieved through the implementation of SDG 6.

During the implementation phase of SDG 6, different UN agencies are going to be responsible for the monitoring and measuring framework. For this purpose, GEMI, formerly labelled 'Global Expanded Monitoring', was established. The GEMI framework consists of seven UN agencies and, amongst others, is supported by Switzerland and Germany. GEMI is still under development and methodologies are currently tested in pilot countries. Repeatedly, members of GEMI acknowledged and stressed the importance of an open-minded implementation approach as well as the need to establish flexible measures, adapt the monitoring strategies and to respond to errors and defects.

The final SDG 6 architecture received varied assessments by interviewees. Overall, the water community seems content with the goals, targets and general framework. Goals and targets are described as comprehensive and although much still remains to be done, the framework presents a step in the right direction.

On the one hand, the establishment of a dedicated goal on water is evaluated as major success. Most interviewees positively assess the integration between human and environmental dimensions. The different operational spaces of the water community are represented in the targets by simultaneously highlighting the importance of ecosystems and the natural world.

On the other hand, SDG 6 also received negative reviews. Goals and targets are described as badly formulated, weak and too ambitious. Interviewees claim that the targets are too fragmented, disconnected and disregard the interlinkages between human and environmental dimensions within the hydrological cycle. Especially, targets focusing on IRWM and ecosystem protection are controversially discussed. It is also criticised that the integration of water across the entirety of the SDG agenda proves more difficult with a dedicated water goal. NGOs have interpreted SDG 6 to encourage and favour the privatisation of water, which is assessed as major disadvantage. Others criticise that the SDG 6 frameworks ignores the strong link between health and water, while water related disasters are altogether missing.

Overall, interviewees argue that the architecture of SDG 6 is suited to address global water challenges, although attention needs to be paid to differences in the regional and communal context, as problems differ across different geographical levels.

However, implementation still raises questions. First of all, interviewees emphasise several major problems regarding the development of indicators. Discussions revolve around the question of whether individual indicators are actually suited to address the water system holistically. In fact, some interviewees criticise the current set of indicators as being too quantitative.

Secondly, problems regarding applicability, long-term planning, possible transformation pathways and monitoring need to be addressed. Questions regarding governance, integration and scale issues are also pending. For example, the SDGs as a global resource regime needs to be translated into national and communal policies but overcoming silos between different water sector remains challenging. Different actors need to come together and address problems jointly. Internationally, UN-Water presents the only coordination mechanism to address water challenges in an international political context. Therefore, institutional governance arrangement in the global water architecture need to improve quickly to adequately address the implementation of SDG 6. In addition, water related data and measurements display major gaps in terms of a broad range of standards between countries.

Concerning the potential of SDG 6 to transform water governance regimes, some assessments are positive. Interviewees state that it could indeed have great positive effects when countries have to start looking into wastewater and water scarcity. Despite SDG 6 presenting a step in the right direction, however, it only presents one small step in a long journey. Although some changes can be observed, one needs to wait for further developments and results. Only because SDG 6 was agreed upon does not mean that it will be successfully implemented. Currently, the global state of water resources lags behind the final objective.

For SDG 6 to prove successful, several requirements must be met. First of all, an open minded approach needs to be maintained during monitoring and implementation, while acknowledging SDG 6 as a new concept. Silos need to be overcome and good governance frameworks have to be implemented to address the water cycle holistically.

Several interview statements describe the political nature of water in the SDG 6 drafting process. Interviewees refer to water as a politicised and politically charged element as well as competed issue. During the negotiations, countries had strong views on water. Consequently, it was not immediately apparent whether a water goal would be established, as water is also a concern of national sovereignty. Water combines many different political interests and in particular, countries were arguing about the topic of transboundary water. In addition, target 6.5. on IRWM sets a political and management focus rather than an achievable target.

Interviewees repeatedly stressed the integrative character of water, which links people and sectors. Regarding water, each person presents a stakeholder and has a strong interest in this resource. Water links environmental, social, economic, scientific, political and anthropological dimensions. It is therefore a multi-disciplinary topic, touching all aspects of life. Water also links ecosystems, environments, human development and human security. The integrative character of water is highlighted with regard to joining environmental and development issues, as water presents the strongest link between these dimensions. For example, water was identified as entry point for combining development and environmental issues within the MDG agenda. In addition, water also links across SDGs as a cross-cutting issue. Water is present not only in SDG 6 but in 14 different targets across the agenda. However, water also divides people, sectors and reinforces competition. National and international conflicts arise over water between agriculture, industry, environmental protection and upstream and downstream regions.

8.1.5 *The Global Water System and Global Water Governance Structures*

The water cycle is composed of hydrological, biological, bio-physical and human components. These components work together, although humans constantly modify the hydrological cycle. The SDG process helped to stress the importance and increased understanding of managing the water cycle holistically.

In terms of SDG 6 and effective governance, serious scale issues arise. Global versus local processes and related governance structures present pressing challenges. Therefore, hopes are high among the international community that the SDGs manage to join this scalar divide. SDG 6 has been formally agreed upon by the UN and therefore presents a formal part of global governance. In general, the water community perceived SDG 6 as a real opportunity to create better and stronger global water architectures, as currently no real institutional body exists.

Ambiguous results were obtained regarding the question of whether the traditional technical approach of water management has been overcome through the establishment of SDG 6. On the one hand, it is agreed that one has to move away from purely technical approaches. On the other hand, the UN is described as being populated with “old water experts” (Int-16, l. 134-135) that do not engage in the social dimensions or soft path solutions. It has

also been stated that transformation pathways towards sustainability are the responsibility of engineers and politicians.

8.2 Discussion: The Hydro-Social Arrangements and Changes in Water Governance Paradigms Embedded in SDG 6

8.2.1 *Indications for a Paradigm Shift in Water Governance and Management*

As illustrated in Section 3, traditional water management paradigms were characterised by 'command and control' approaches, technical solutions, expert rule and division of water issues into clearly defined sectors. Environmental concerns and human dimensions were largely disregarded. Increasingly, the tendency of policy-makers and general public to see water as technical issue is outdated and Swyngedouw (2004) even labels this technical focus as barrier to sustainable development.

Although paradigms in water have been coming and going, recent discussions about paradigm shifts in water governance revolve around reoccurring topics. Amongst others these include: 1) management of problem sources not effects, 2) increased integration of issues and sectors, 3) inclusion of environmental goals, 4) more flexible management approaches, 5) participation and collaborative decision making, 6) more attention to managing human behaviour through 'soft measures', 7) open and shared information systems and 8) incorporation of learning cycles (Pahl-Wostl, 2015; p. 2). Regarding this outline, the results of this research hint towards a fundamental change in the underlying belief system and water-related paradigms embedded in the establishment of SDG 6.

Several interview references associate the MDGs with the traditional governance and management approach, as they were established in a hierarchical and top-down manner without any participatory process. Consequently, the MDGs experienced a certain degree of resistance from UN member states and other stakeholder groups. Interviewees explained that water in the MDGs addressed the water cycle unilaterally in terms of "taps and toilets" (Int-21, l. 14) by focusing narrowly on water supply and the provision of basic sanitation facilities. This highlights the technocratic, utilitarian and command and control approach to the management of water. Considerations of the wider hydrological cycle, convolution of social and environmental dimensions as well as environmental protection were largely ignored, while water was in the hands of technical experts.

As stated in the literature, paradigm shifts occur in response to "the accumulation of a significant body of knowledge or information that is contradictory to, or unexplained by, the accepted paradigm" (Cortner & Moote, 1994, p. 168). During the implementation of MDGs, actors increasingly recognised that water management should address the water cycle more holistically and human-environmental dimensions in a more integrated

manner. Discussions revolved around considering wastewater treatments and ecosystem protection simultaneously to providing water supply and sanitation.

In fact, the establishment of SDG 6 largely meets the description of the new water-related paradigms found in the literature. Firstly, SDG 6 not only considers water supply and sanitation but also accounts for improved water quality, wastewater treatment, water-use efficiency and sustainable withdrawal, integrated resources management and the protection of water-related ecosystems (Tab. 1). It therefore addresses the management of problem sources by explicitly including environmental goals and putting attention on human behaviour. Secondly, SDG 6 increased integration of issues and sectors, as for the first time, the water community to work jointly on a common agenda. The WASH sector involved with the implementation of the MDGs joined in with the other actors to address issues in a more collaborative and integrated approach across sectors. Thirdly, SDG 6 expanded the narrow focus of the MDGs to incorporate environmental dimensions and a more holistic perception of the water cycle. Fourthly, GEMI aims at establishing an adaptive and more flexible management and monitoring system by responding to past experiences, continually correcting errors and incorporating new strategies and different types of knowledge such as 'citizen science'. Fifthly, participatory decision making was taking place in form of consulting the civil society through the online consultation process in addition to 30 country consultations organised by GWP. Furthermore, NGOs and intergovernmental organisations such as WWF, IUCN, CBD and GWP were able to contribute to the drafting process as part of the UN-Water led process and through their participation in the OWG. Finally, as described in Section 7, the SDGs and SDG 6 were established through the OWG process, which presented an innovative learning platform characterised by relatively open information systems and iterative learning cycles.

In combination, these indications hint towards a paradigm shift from hierarchical, top-down governance, focusing narrowly on technical water supply systems towards more collaborative and joint decision making processes. In addition, SDG 6 includes environmental dimensions and attempts to address the water cycle in a more inclusive system approach. Changes in the underlying value system occurred in response to changing water realities and dissatisfaction with prevailing strategies.

However, as mentioned earlier, the identification of paradigms remains challenging, as changes may not be universal or permanent and may not result in fundamental changes in operational regimes. For this reason, in addition to analysing paradigm shifts, the following section also focusses on power constellations and politics embedded in SDG 6 through the lens of the hydrosocial cycle.

8.2.2 *An Analysis of Changing Political Power Relations Embedded in SDG 6*

As explained in Section 3, water governance as the task of a single government has been expanded to account for the complex multi-level, multi-stakeholder and cross-linking nature of water. Water politics has experienced a fundamental shift from 'government' to 'governance', which is characterised by the interaction between different stakeholders (Bakker et al., 2008; Castro, 2007; Edelnbos et al., 2013; Lautze et al., 2011; Pahl-Wostl, 2015). This study therefore understands water governance as a political process through which decisions are made (Batchelor, 2007; Castro, 2007).

This notion of multi-level and multi-actor water governance proves useful for analysing SDG 6, which was established in a political process playing out across a variety of political levels and through various, sometimes conflicting, actor groups.

As a first step towards analysing politics and power relations embedded in SDG 6, this study conceptualises water according to the hydrosocial cycle as something inherently political and object of strong political forces and struggles (Linton & Budds, 2014).

This assumption is further supported by interviewees describing water as politicised, politically charged and highly contested element. Interview statements illustrate this in terms of countries adopting a strong political position to water. Firstly, Brazil played a key role in putting water back on the international agenda during the Rio+20 sustainability dialogues. This is related to the fact that Brazil as a water rich country maintains a strategic interest in this resource. Secondly, several member states initially opposed an online consultation process on water without which a dedicated water goal would have been improbable to have taken shape. In contrast, water actors pushing heavily for a stand-alone goal on water were supported by 54 countries signing a petition letter to the OWG co-chairs. During the negotiations, member states regarded water as a question of national sovereignty and partially opposed the idea of including a target on transboundary water in SDG 6. SDG 6 is therefore an inherently political goal and political construct, which is further underlined by interviewees interpreting the target on IWRM as political decision rather than real goal setting. As described in Section 5, the hydrosocial cycle repositions water as an inherently social, material, integrative and 'biopolitical element' (Bakker, 2012). Indeed, water and politics are identified as inherently related within the SDG 6 framework (Linton & Budds, 2014).

In a second step, the hydrosocial cycle is employed as analytical tool to identify social power relations embedded in the establishment of SDG 6. By analysing power relations entrenched in water, the hydrosocial cycle also helps to identify how water connects people and sectors (Linton & Budds, 2014).

Interviewees repeatedly stressed the multi-dimensional and integrative character of water. Next to linking across sectors, water is also a cross-cutting issue within the SDG agenda. Throughout the interviews, the water cycle is

described as a composition of hydrological, biological, bio-physical and human components. Interviewees stated that the SDG process helped to stress the importance of addressing the water cycle holistically by considering human and environmental components simultaneously (Fig. 7).

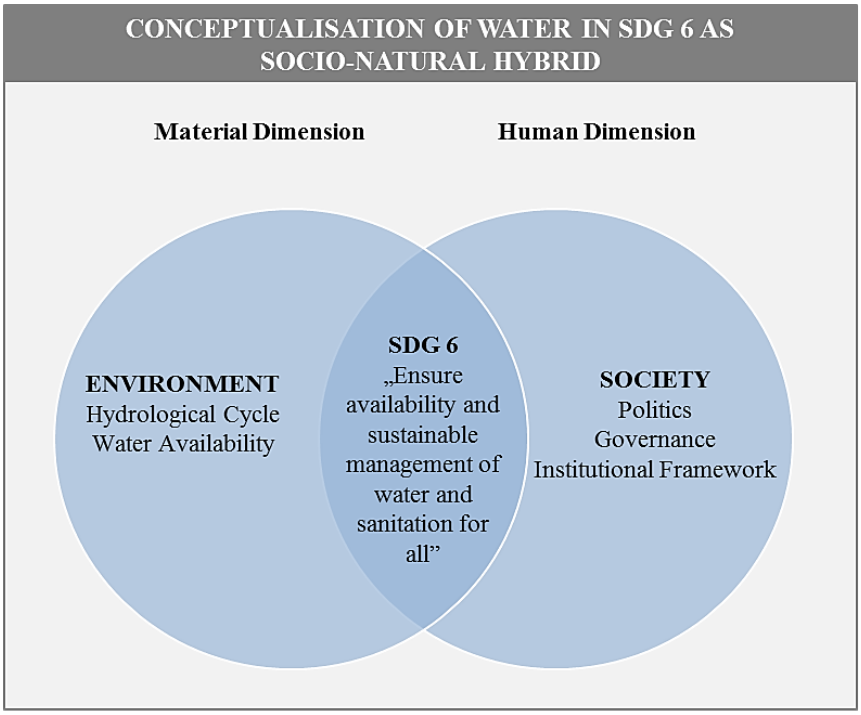

Figure 7: The conceptualisation of water in SDG 6 as socio-natural hybrid (own illustration)

Through the drafting process of SDG 6, water acted as connective link to combine different stakeholder groups. To a large extent though, interactions of water-related actors were characterised by fragmentation and competition. The international water community is described as weak and segmented with conflicting interests and political struggles. Different water-related sectors pursue their own interests and competition between different siloes largely defines the water community. As one major feature of this competition, interviewees described prevailing frictions between WASH and other water actors, as the WASH community was afraid to lose the powerful mandate they held during the implementation of MDGs. However, WASH still occupied a dominant position in terms of their long-term experience and the fact that targets on water supply and sanitation could not be questioned. Contrary to this perception, cooperation and unification were also identified as major aspects of the SDG 6 drafting process. Indeed, negotiations about SDG 6 provided a good opportunity to connect and overcome differences. The SDG 6 process provided a platform for WASH actors previously involved in the MDGs to re-join the rest of the water community. UN-Water and its consultation process were successful at joining the community for the first time and all actors worked on a common agenda. UN-Water was therefore identified to hold one of the most powerful positions in the SDG 6 process by guiding the water-related process and unifying the water community. The

OWG and ultimately the General Assembly adopted the targets and indicator proposed by UN-Water with minor changes.

The prevailing tendency to underestimate the influence of individual actors in shaping resource regimes is further refuted in this section, as Mr. Körösi has been identified as key figure for the establishment of a dedicated water goal.

With regard to these findings, it becomes clear that SDG 6 internalises power relations and imbalances inherently and through its establishment the power constellations changed within the international water community.

First of all, unlike the water-related MDG that was designed in a hierarchical and top-down manner by UN water experts, SDG 6 was established in a co-operative network governance process with power relations shifting towards the water community as a whole.

Secondly, UN-Water solidified its importance and established itself as legitimate "centre of gravity" (Int-5, l. 220) for the international water community, which had previously been missing. Although the WASH community and JMP lost their predominance, development actors still exercised influence and took a strong stance in the establishment of SDG 6. As the environmental community only joined the WASH actors in the context of the SDG negotiations, environmental actors initially disposed of comparably limited visibility. This phenomenon was enhanced by the fact that local environmental organisations did not strongly engage in the SDG drafting process. However, as interviewees rightly stated, the final SDG 6 framework continues the legacy of MDGs in the form of two targets, while the rest of the agenda highlights environmental dimensions. A certain degree of political power can also be attributed to the private sector, as SDG 6 incorporates the notion of favouring privatisation processes for water. However, the analysis of private influence on UN systems, a highly charged topic, was not object of this research and therefore could not be analysed in more detail. Despite the large majority of interviewees describing the SDG 6 drafting process as very inclusive, several hint towards missing actors such as the Worker Unions and indigenous groups, who, although giving strong input into the Rio+20 negotiations, remained largely absent during the SDG 6 drafting process.

As indicated by Swyngedouw (2004), water is neither global nor local and although water is deeply localised, tensions, forces and conflicts extend through regional and global levels. The multidimensional nature of water challenges must include "more than one scale in space and time" (Pahl-Wostl, 2015, p. 107), which is also conceptualised within the hydrosocial cycle.

In a third step, the hydrosocial cycle is therefore employed to trace political struggles manifested in SDG 6 across different political levels. For example, the struggles between WASH and environmental actors occurring on UN-level also took place in Germany. Environmental actors in Germany were badly organised and disposed of limited visibility, while WASH actors profited

from their year-long international experience, allowing them to be more vocal to begin with and influence the negotiation process more effectively. In Germany, the environmental water community did not dispose of many resources to efficiently and actively engage in the SDG 6 process.

Through the hydrosocial cycle, this section conceptualised water in SDG 6 as 'biopolitical', highly contested and connective element through which social power relations played out. By tracing the political dimensions, power relations and integrative character of water through the drafting process, it becomes clear that the "landscape of power" entrenched in the water community (Swyngedouw, 2004, p. 26) changed in favour of a more holistic and unified approach. Power shifted from the WASH-community towards environmental actors and a joint agenda was established to address water as a cross-cutting issue. In the absence of a UN agency or organisation for water, UN-Water's position as centre of gravity for the international water community was solidified during the SDG 6 drafting process.

9 Critical Synthesis of Transition Dynamics and Paradigm Shifts Embedded in the SDG Process

The following section is divided into four parts and provides a critical reflection of the research results provided in Section 7 and 8 in terms of 1) the methodology and research design, 2) transition and policy change dynamics towards sustainability, 3) the paradigm shift and changing power relations embedded in SDG 6 and 4) the ability of the SDGs to induce a societal transformation towards sustainability.

9.1 Critical Reflection of the Methodology and Research Design

This study employed semi-structured expert interviews to reconstruct political processes by accounting for conflicting interests and power relations of different actors within multi-level environmental governance regimes. This type of qualitative analysis cannot claim objectivity, as it takes place in the realms of social-constructivist assumptions, where interviewees and researchers only exhibit subjectively distorted views (Flick, 2005a; Reuber, 1999). Social sciences dispose of several validation criteria to avoid the arbitrary interpretation of qualitative research results. To increase the intersubjective traceability, this research followed the validation guidelines provided by Mayring (2008) in terms of procedure documentation, argumentative validation of presuppositions, proximity to the research subject and employment of methodological guidelines. Hence, this study aims at providing a plausible, comprehensive and transparent description of the SDG drafting process and consequent interpretation of research results within the theoretical context of multi-level governance, transition towards sustainability, policy change and the hydrosocial cycle.

The explanatory power of this qualitative study could have been increased further by including the validation criterion of triangulation and by using more diverse and additional starting material, a larger number of interview partners and an extended theoretical and methodological framework. During triangulation, data analysis is conducted from at least two different perspectives, which would have enhanced the intersubjectivity, transparency and reliability of coding (Flick, 2005b; Mayring, 2008; Steinke, 2005). Additional material such as background reports could have increased the validity of the results and created a deeper understanding of the SDG drafting process. However, due to the extent and personal limitations of this study, it was not possible to widen the scope of the investigation further.

Next to the issue of validating qualitative research results, the design of this research is subject to additional constrains. For example, the notion of governance employed in this study aims at producing generalizable statements about the mechanisms of international coordination processes. Nevertheless, the proposal of SDGs stretched over several years and involved many actors in complex multi-level networks across different countries and time scales. Furthermore, the SDG process emerged from two equally complex

and extensive international developments, namely the MDGs and Rio-process. As many agents were involved in the SDG, MDG and Rio-processes, decision making and policy change becomes difficult to comprehend for externals, especially, as the investigation of politically charged topics remains a sensitive issue. Due to the diversity and complexity of such multi-level processes, transition research will only ever have limited scope (Benz et al., 2007; Pahl-Wostl, 2015).

Several scientific challenges are also linked to the selection of interview partners, which were contacted if they had been named or referred to in previous interviews, published reports on the overall SDG or water framework, organised events on the topic or are involved in the monitoring of SDGs. Thus naturally, the set of interviewees is skewed in the direction of the most vocal and influential actors. Less privileged organisations with limited access and outreach are underrepresented as a consequence. To counteract this imbalance and to account for missing actors, the coordination partners of the UN Major Group of Indigenous Peoples were contacted to no avail. To illustrate and interpret the balance or imbalance of different perspectives in more detail, the distribution of NGOs, intergovernmental organisations, governments and private actors amongst interviewees could have been analysed quantitatively and in more depth.

Conclusively, this research cannot claim to portray the SDG process in its entirety. Instead, it attempts to answer the posed research questions by analysing the overall process within the limits of

a very specific political space and a clearly defined research objective related to transition dynamics, policy change and establishment of the SDG 6 framework. The results obtained in this study are subjective constructs and can only serve as approximation to describe trends in these clearly defined subsystems of the overall SDG process.

9.2 Critical Reflection of Transition and Policy Change Dynamics towards Sustainability

The first objective of this research was to analyse the establishment of SDGs in terms of key actors, windows of opportunity, fundamental policy changes and transition dynamics towards sustainability. This section critically examines the results and interpretations provided in Section 7 to determine whether a transition and third order policy change towards sustainability have actually occurred and to critically reflect on the social learning processes in innovative learning platforms.

As illustrated in Section 7, the establishment of SDGs features several indications for radical change in different system components and underlying policy paradigm. The SDGs represent a complex framework aiming to address and integrate the three dimensions of sustainable development by moving beyond a purely environmental or development orientated agenda. In the-

ory, the SDGs are universal in nature, apply to all countries and were established in an inclusive process characterised by different types of knowledge and multiple stakeholder groups.

However, several challenges are related to the interpretation of SDGs as fundamentally new development framework and policy paradigm. First of all, some interviewees were doubtful about the notion of universality. Taking Germany as an example, it is by no means certain that northern countries will implement the SDG and abide to the environmental target setting. In fact, German NGOs currently observe a lack of political will regarding the establishment of effective governance and implementation mechanisms.

Secondly, despite the implications of paradigm shifts and fundamental policy changes, the SDG framework embodies the ongoing struggle of sustainable development to meet the needs for the present and future generations by simultaneously protecting ecosystem health. Interviewees state that traditional development approaches based on industrialisation and economic growth are still deeply entrenched in the SDGs, particularly in Goals 8 and 9 (Fig. 1). Because of the prevalence of industrialisation, privatisation and economic growth, the SDGs receive ambiguous and controversial evaluations. As noted by Jordan (2008), the world is still struggling to solve the problem of governing sustainable development and bridging the dichotomy between the desire for economic prosperity and environmental protection. This struggle, prevailing traditional and unsustainable mind-sets are still inherently embedded in the SDGs and not easy to overcome.

Thirdly, despite all interviewees describing the process as very inclusive, transparency remains a sensitive topic. With the online consultation process the UN responded to previous critiques labelling the MDGs a hierarchical and top-down prescribed program. By consulting the international public, the UN demonstrated its willingness to respond to bottom-up ideas. Due to the complexity and extend of the SDG drafting process, it is impossible to accurately quantify and trace the influence of different actors groups. However, interviewees remain sceptical towards the direct impact of the online consultations on the outline of the final agenda.

In the case of water, interviewees described the Rio+20 outcome document as template and guideline for the final SDG 6 framework and online consultation platforms. In this regard, the question arises to what extent the consultation process was actually pre-decided and fixed in terms of content. For example, different interviewees state that without a thematic consultation on water or wastewater, neither would have emerged as separate goal or target. Furthermore, some interviewees argue that the extensive participation process diluted the final result by setting the wrong priorities. This leads to the open and unresolved question about who should participate in such processes and with what result? As stated by Lautze et al. (2011), good governance is a political process characterised by openness, transparency, broad participation and rule of law. Good governance thus, should not be confused with the outcomes of governance processes, as high participation may also

lead to the unsustainable use of environmental resources (Lautze et al., 2011).

The results obtained in terms of inclusiveness and transparency of the SDG process also relate to previous studies observing the collision of institutional organisation with changes in the political landscape. In fact, the SDG process is an example case for authorities including participation to comply with legal prescriptions or changing modes of governance, but without considering the potential benefits or effective incorporation of public contributions (Pahl-Wostl, 2015). Participatory approaches are important for reducing unexpected resistance but "participatory processes need agreement on the ground rules, for example, how decisions are made based upon the recommendations developed in a participatory process" (Mostert et al., 2007; Pahl-Wostl, 2015, p. 93).

It can be concluded that the OWG was very open and inclusive for representatives of UN member states, UN Major Groups and called-upon experts. However, the online consultation process is assessed as serving a symbolic purpose, as the rules and coordination mechanisms to effectively incorporate such an extensive consultation were largely missing.

Regarding previous processes and international agreements, the question remains whether the SDGs present a fundamentally new concept or are to be interpreted as 'old wine in new bottles'. Indeed, multiple other international declarations such as the Brundtland Report (1987) and the Agenda 21 (1992) provided a multi-dimensional concept for joining social, ecological and economic dimensions under the concept of sustainable development (Jordan, 2008). The conjunction of development and environmental actors is often described as major achievement of the SDGs, despite its origins in the initial Rio 1992 summit. In addition, the CSD and Rio-process dispose of a long history of stakeholder participation through the UN Major Groups (Adams & Pingeot, 2013).

In Section 7, the SDGs were interpreted as conjunction of the MDGs and the Rio-process. In fact, the SDGs exceed both in terms of public participation, multi-level interaction in complex governance frameworks and interrelation of social, environmental and economic dimensions. Indeed, some interviewees describe the SDGs as "new social pact between governments and people" (Int-22, l. 133), "moral imperative" (Int-9, l. 340) and the most inclusive UN process of all times. However, concerning the remaining focus on industrialisation, economic growth and privatisation, in addition to limited effects of public participation, a fundamental policy change cannot be confirmed. This research therefore concludes that although the SDGs present an important shift and transition in global environmental policy, significant parts of the agenda are still entrenched in traditional and unsustainable mind-sets. This is related to the fact that most of the efforts are also product of the same world view that has produced the mainstream concept of science, liberation and development (Nandy, 1989, p. 270). In other words: "No problem can be solved from the same level of consciousness that created it" (A. Einstein).

As described in Section 7, this study relates the establishment of SDGs to several social learning cycles, which need to be assessed critically. The decision to abandon the MDGs and establish a new set of SDGs with the help of the OWG responds to the critique of the MDGs as top-down prescription and is therefore related to 'single-loop' learning process, or second order policy change. Consequently, the OWG is interpreted as innovative learning platform characterised by informal organisation, self-organisation and diverse forms of knowledge. Members of the OWG went through an important 'double-loop' learning process, which induced changes in cultural values, third order policy shifts and institutional re-arrangement across different political levels.

These interpretations harbour several points of critique. Firstly, it was not possible to contact Ms. Caballero to identify her objectives and motives for the proposition of SDGs in more detail. All assumptions about her as change agent and 'tipping-point leader' are based on second-hand information. The interpretations of abandonment of MDGs as 'single-loop' learning process are based on the available interview statements but need further revision. Secondly, an in-depth evaluation of the social learning processes occurring in the OWG was not possible in the scope of this research. For a deeper understanding of social learning and the impact of participatory processes, the analytical framework provided by Scholz et al. (2014) could be employed in follow-up studies.

Due to the scope of this research, it remains impossible to analyse the multi and cross-level interactions and the role of learning platforms in more detail. Transition dynamics could be identified and outlined but not analysed in the depth to understand the underlying causal mechanisms and interactions in their entirety.

9.3 Critical Reflection of the Paradigm Shifts and Changing Power Relations Embedded in SDG 6

The second objective of this research was to identify the convolution of social, political and environmental dimensions, changing social power relations and governance paradigms embedded in the drafting process and final SDG 6 framework. This section analyses the results and interpretations provided in Section 8 to determine whether a paradigm change has actually occurred and to critically contemplate changing power relations embedded in SDG 6.

As described in Section 8, traditional water paradigms were characterised by 'command and control' approaches, technical solutions, expert rule and division of water issues into clearly defined sectors. By analysing the drafting process of SDG 6, this research hints towards a paradigm shift from hierarchical, top-down governance, focusing narrowly on technical water supply systems towards more collaborative and joint decision making processes. SDG 6 also includes environmental dimensions and attempts to address the water cycle within a broader system approach. Research results link these

changes to changing water realities and dissatisfaction with prevailing strategies of the MDGs.

Nevertheless, the identification of paradigms remains challenging, as changes may not be universal or permanent and may not result in fundamental changes on the ground. In fact, interviewees provide ambiguous statements concerning the question whether the technical approach has been overcome by SDG 6. Although the inadequacy of purely technical fixes to water-related challenges is generally accepted, interviewees state that the UN is still populated with "old water experts" (Int-16, l. 134-135) that do not consider social dimensions or soft path solutions. During implementation, it remains to be seen whether the traditional and technical approaches have been entirely overcome.

The inclusion of environmental protection and need to integrate the water's multiple dimensions present important elements of the 'new water paradigm'. Although SDG 6 aims at linking social and environmental dimensions, interviewees state that targets address issues separately and should have been integrated further to holistically account for the water cycle. In fact, during implementation, the risk of sub-groups focusing on their individual targets by ignoring the overall objective of a joint water agenda remains.

As stated by Pahl-Wostl (2015), paradigm changes in governance or management approaches do not necessarily translate into transformations towards sustainability. Indeed, several interviewees express serious doubt as to the successful implementation of the targets on IRWM and ecosystem protection.

Regarding SDG 6 as a whole, it is concluded that strong indications hint towards a paradigm change in global water governance. However, it remains unclear whether the agenda will result in a transformation towards sustainable water management practices in operational regimes.

Several critical points are also involved in analysing the changing power relations embedded in the establishment of SDG 6. Section 8 identified water in SDG 6 as 'biopolitical', highly contested and connective element through which social power relations played out. By aiming to address water holistically and as cross-cutting issue, the drafting process of SDG 6 changed existing actor constellations with power shifting from UN water experts to the water community as a whole and from the WASH-community towards environmental actors. During the course of events, UN-Water established itself as "centre of gravity" (Int-5, l. 220) for the international water community, which had previously been missing (Newton, 2014).

Analysing power relations in political processes remains a challenging task, especially for researchers positioned outside the actual process. Due to the limited scope of this study and constructivist assumptions, this research cannot claim to accurately and completely portray the changing "landscapes of power" (Swyngedouw, 2004, p. 26) entrenched in SDG 6. From the results obtained, only limited interpretations and conclusions can be drawn to indicate larger trends that need to be revised further.

Analysing SDG 6 as a whole, the issue of scale also needs to be critically reflected in the context of this study. This research aims at reconstructing political processes on the global level. In relation to several interview statements, it is concluded that SDG 6 could play an important role in the global water governance structure, which lacks a more formal and central institutional framework such as a lead UN agency or organisation. In fact, SDG 6 helped to create a coherent framework of global norms and a common understanding of water management to enhance the effectiveness of water policy measures (Gupta & Pahl-Wostl, 2013). The global scale is needed in water governance as "local water problems may not be as local as they seem" (Vörösmarty et al., 2015, p. 478). Local and regional water challenges are influenced by global processes and in turn accumulate to global significance (Vörösmarty et al., 2015). Accelerating climate change impacting local water resources and the globalised economy promoting virtual water trade are only two reasons for recognising the importance of a more global governance context for water (Newton, 2014; Vörösmarty et al., 2015).

However, the effectiveness of SDG 6 to induce transformative changes on the ground faces several challenges such as institutional obstacles, competition, fragmentation and the siloed approach prevalent in the international water community (Newton, 2014). As stated throughout the literature, the global level cannot be seen in isolation but must be integrated in multi-level and multi-actor governance structures. Hopes are high that the scalar divide may be overcome during the implementation of SDG 6. However, the literature on socio-hydrology and the 'politics of scale' also clarifies that scales are social constructs and actors across different levels may 'up-scale' or 'down-scale' water issues according to their interests (Bakker, 2009; Gupta & Pahl-Wostl, 2013; Lebel et al., 2005).

9.4 Critical Reflection of the Ability of SDGs to Induce a Societal Transformation towards Sustainability

This section critically reflects the ability of the SDG agenda to induce large-scale societal transformations towards sustainability. Following transition theory, sustainability transformations are associated with fundamental changes within technology, institutional organisation, politics and socio-cultural systems (Markard et al., 2012). This study narrowly focuses on the establishment of SDGs as global policy instrument. Whether or not the SDGs will actually induce continuous and large-scale societal change is a different matter and largely depends on the implementation and governance structures put into place.

Although changes have been achieved, governance transitions need to overcome the "bottleneck of implementation" (Pahl-Wostl, 2015, p. 275). The SDGs entered into force on 1st January, 2016 with an implementation phase scheduled until 2030. Currently, the SDGs need to overcome multiple obstacles preventing transformative change on the ground. At this point, effective

governance of transformation could help to shift "the emphasis from idealised outcomes towards effective processes of change" (Pahl-Wostl, 2015, p. 275).

As shown in Section 7, assessments of the SDGs are manifold and interviewees make ambiguous statements concerning the question of whether the SDGs could be interpreted as baseline agenda for societal transformations towards sustainability. In fact, interviewees list a number of prerequisites for the successful implementation. Foremost, a huge gap remains in terms of financing. The challenge of coordinating multi-level governance and translation of SDGs into national and communal policies also remains unsolved. Although the outcomes of SDGs are still uncertain, hopes are high for the SDGs to actually connect and match political and environmental scales, form new coalitions and global partnerships as well as directing funding and political efforts.

Following the explanation provided by Young (2001), the SDGs are an incentive mechanism in the form of overarching goals and requirements that need to be translated into national and communal law by member states, which are able to make their own choices on how to fulfil the requirements. Young (2013) lists different mechanisms through which such voluntary international agreements may turn into politically effective forces. These include: 1) designating a lead agency for the purposes of implementation, 2) embedding the provisions of a regime in social practices and 3) using the existence of the regime as an important argument in domestic legal proceedings (Young, 2013). Establishing institutional change through these measures could increase the effectiveness of SDGs, which are currently still associated with many uncertainties. However, as stated in the interviews, the UN represents an old institution which is expected to undergo only slow changes in response to the SDGs. Regarding the disconnect of water-related ministries, different sectors and areas of influence, interviewees remain critical towards SDG 6 being able to join different administrative spheres to effectively implement sustainable water management.

In addition to creating an effective institutional framework, this research concludes that science could play a stronger role in the development of environmental regimes and their implementation. In fact, interviewees draw an ambiguous picture regarding the role of science during the drafting of SDGs. Some state that science had a significant influence, while others indicate that the scientific input was negligible, as the process was highly politicised. The majority of interviewees see the role of science in establishing a monitoring framework of quantitative indicators and only one or two statements relate to science providing a system understanding. Similarly to Baumgartner and Pahl-Wostl (2013), this study revealed missing links between knowledge generation and policy making. This is derived from the fact that only one or two interviewees drew a connection between the vast amount of Earth System research and the SDGs. In fact, when asked explicitly, most interviewees refuted the influence of Earth System or sustainability science on the SDG process. Although represented through a UN Major Group and the SDSN, the

scientific community did not unitedly engage in the proposal of SDGs. Instead, individual scientists such as Prof. J. Sachs or Prof. J. Rockström lobbied for the inclusion of their scientific ideas, although failed to take significant influence on the final design of the agenda.

Regarding the planetary situation and emergence of the Anthropocene, business as usual science along disciplinary divides will no longer suffice (Gallopín et al., 2001). To address global environmental change through the establishment of environmental regimes and their implementation, interlinkages between social, political, physical, biological, chemical and geological study areas is "a new imperative by developing dynamic and cross-system explanations" (Gallopín et al., 2001, p. 219). The scientific tradition to "divide the world into two separate poles, nature on the one hand and culture on the other, seems to have lost much of its explanatory power and political power in an era when it is becoming increasingly apparent that thing 'natural' and things 'cultural' do not exist side by side as the two opposite poles of a dialectical unity" (Swyngedouw, 2004, p. 13). Concerning the multi-dimensional and hybrid character of water, science needs to overcome its fragmentation and establish an integrated socio-ecohydrological approach by taking the complexity of socio-ecological systems into account (Falkenmark & Rockström, 2004). What is generally needed are systematic and interdisciplinary approaches in the social sciences and across the social-natural interface to also establish a new relationship between science and society (Gallopín et al., 2001; Pahl-Wostl, 2015). However, integrative, inter- and transdisciplinary science analysing the integration of social and environmental dimensions, defining sustainable development and helping to lay the ground for a real transition is still missing to a large extent. With regard to the interviews, science is nearly exclusively associated with quantitative analysis and statistics instead of integrative system understanding.

The literature on sustainability science and results of this research stress the importance for politics and science to change direction in terms of incorporating different types of knowledge to address complex systems more effectively and integrate across sectors.

However, some positive trends can be observed. For a long time, science played an important role in successfully raising awareness of global environmental change and climate change in particular. In GEMI, different UN agencies collaborate to monitor SDG 6 jointly by involving adaptive and flexible management practices, crowdsourcing and citizen science. Scientific literature (e.g. Pahl-Wostl, 2015; Vörösmarty et al., 2015) and international research platforms like 'Future Earth' scientifically engage with the SDGs and their implementation.

This research concludes that in the future, the scientific community needs to enter political and public discourses on environmental resource regimes and sustainable development with a strong and unified voice. For example, sustainability science stresses the need for establishing "global networks of national platforms linking scientists, policy makers and practitioners in their quest for sustainable pathways" (Pahl-Wostl et al., 2013b, p. 682).

Referring to Biermann (2007a) (Biermann,È, the development of global knowledge platforms has long been one of the major outcome of environmental regimes. Therefore, hopes are high for the SDGs to motivate scientists to engage and help unfold the transition potential embedded within the final agenda.

10 Conclusion and Outlook

The SDGs mirror the shift from 'government' to 'governance' and were established in a complex multi-level coordination process that included UN member states, the private sector, civil society and other organisations representing sectoral interests such as international agencies and NGOs. The SDGs present an international voluntary incentive mechanism in the form of overarching goals and requirements that need to be translated into national and communal law by member states, which are able to make their own choices on how to fulfil the requirements. This research therefore conceptualises the SDGs as constitutive international resource regime that is to be expanded by operational regimes in the course of implementation, which involves the interlinkage of foreign and domestic politics across multiple levels of jurisdiction (Castro, 2007; Young, 2013) .

Social learning is central to cooperative governance an can induce governance transformations (Armitage et al., 2008; Pahl-Wostl, 2009) and radical shifts in policy paradigms (Hall, 1993).

This study identified several indications for the SDGs presenting a transition towards sustainability and third order policy change. For example, the shift from MDGs to SDGs induced important institutional re-structuring processes across the jurisdictional scale ranging from UN, EU to national levels by joining different actor groups and challenging existing power relations. While the MDGs were established in a top-down manner, without public participation and a narrow focus on basic development issues of poorer countries, the SDGs present a complex framework aiming to address and integrate the three dimensions of sustainable development, by moving beyond a purely environmental or development orientated agenda. In theory, the SDGs are universal in nature, apply to all countries and were established by including public participation, different types of knowledge and multiple stakeholder groups. The fact that some interviewees describe the SDGs as "new social pact between governments and people" (Int-22, l. 133) and "moral imperative" (Int-9, l. 340), underlines the argument that the SDGs, indeed, present a fundamental shift in the overall system logic and governance paradigm.

However, several challenges are related to the interpretation of SDGs as fundamentally new development framework and policy paradigm. First of all, some interviewees were doubtful about the notion of universality and it is by no means certain that northern countries will implement the SDG and abide to the environmental target setting. Additionally, the traditional notions of industrialisation according to western models, economic growth and privatisation are still deeply entrenched in the SDG framework. The SDGs are struggling to solve the problem of governing sustainable development and bridging the dichotomy between the desire for economic prosperity and environmental protection. This challenge and traditional mind-set is still inherently embedded in the SDGs and not easy to overcome.

Despite all interviewees describing the process as very inclusive, transparency remains a sensitive topic. This research concludes that the OWG was

very open and inclusive for representatives of UN member states and UN Major Groups. However, the online consultation process is assessed as serving a symbolic purpose, as the rules and coordination mechanisms to effectively incorporate such an extensive consultation were largely missing.

To conclude, the SDGs present an important shift and transition in global environmental policy, although significant parts of the agenda are still entrenched in traditional and unsustainable mind-sets characterised by industrialisation and economic growth. This is related to the fact "no problem can be solved from the same level of consciousness that created it" (A. Einstein).

The establishment of SDGs was characterised by social learning processes and occurred in four distinct phases of predevelopment, break-through, acceleration and stabilisation. As a consequence of shifting baseline conditions and near termination of MDGs, Rio+20 opened a window of opportunity to re-think sustainable development and move onto a new development trajectory. During the Rio+20 summit, Ms. Paula Caballero could be identified as change agent and 'tipping point' leader by convincing a critical mass of participants of the concept of SDGs. Unfortunately, it was not possible to contact Ms. Caballero in order to identify her objectives and motives for the proposition of SDGs in more detail. All assumptions about her and interpretation of 'tipping-point leader' are based on second-hand information and need to be revised further. More research is needed to analyse why previous attempt to propose global goals on behalf of the European Commission and a British activist group were not as successful as the proposals made by Columbia. This could be combined with an analysis of the SDGs as policy instrument to overcome the global north-south divide and power imbalances.

The decision to abandon the MDGs and develop the SDG in an Open Working Group is interpreted as reaction to the critiques of MDGs as top-down policy programme and is therefore related to 'single-loop' learning process and first or second order policy change. The OWG is interpreted as innovative learning platform characterised by informal organisation, self-organisation and diverse forms of knowledge. The two co-chairs created an open and innovative space trying to account for the real-world complexity of human-environmental systems by involving different stakeholders and ultimately integrating the three dimensions of sustainable development into a joint development framework. In this respect, members of the OWG went through an important 'double-loop' learning process, which induced changes in cultural values, third order policy shifts and institutional re-arrangement across different political levels. However, for a deeper understanding of social learning and the impact of participatory processes, the analytical framework provided by Scholz et al. (2014) could be employed in follow-up studies. Due to the scope of this research, it remains impossible to analyse the multi and cross-level interactions and the role of learning platforms in in more detail. Transition dynamics could be identified and outlined but not analysed in the depth to understand the underlying causal mechanisms and interactions in their entirety.

The second objective of this research was to analyse the convolution of social, political and environmental dimensions, social power relations and governance paradigms embedded in the drafting process and final framework of SDG 6.

Results obtained in this study strongly hint towards a paradigm shift from hierarchical, top-down governance, focusing narrowly on technical water supply systems towards more collaborative and joint decision making processes. In addition, SDG 6 includes environmental dimensions and attempts to address the water cycle in a broader system approach. Changes in the underlying values and approaches to water occurred in response to changing water realities and dissatisfaction with prevailing strategies.

The identification of paradigms remains challenging, as changes may not be universal or permanent. Doubts remain concerning the question whether the technical approach can actually be challenged through SDG 6. Although the inadequacy of purely technical fixes to water-related challenges is generally accepted, interviewees state that the UN is still populated with "old water experts" (Int-16, l. 134-135) that do not consider social dimensions and soft path solutions. Regarding the implementation of different water-related targets such as IWRM and ecosystem protection, interviewees expressed serious doubt of their practicality. In fact, during implementation, the risk of subgroups focusing on their individual targets by ignoring the overall objective of a joint water agenda is very present. It remains largely unclear whether SDG 6 and corresponding paradigm changes will result in sustainable water management practices in operational regimes.

Through the hydrosocial cycle this research conceptualised water in SDG 6 as 'biopolitical', highly contested and connective element through which social power relations played out. By tracing the political dimensions, power relations and integrative character of water through the drafting process, it becomes clear that the "landscape of power" entrenched in the water community (Swyngedouw, 2004, p. 26) changed in favour of a more holistic approach. Power shifted from UN water experts to the water community as a whole and from the WASH-community towards environmental actors by establishing a joint agenda to address water as a cross-cutting issue. During the course of events, UN-Water established itself as "centre of gravity" (Int-5, l. 220) for the international water community, which had previously been missing (Newton, 2014).

However, due to the limited scope of this study and constructivist assumptions, this research cannot claim to accurately and completely portray the changing "landscapes of power" (Swyngedouw, 2004, p. 26) entrenched in SDG 6. From the results obtained, only limited interpretations and conclusions can be drawn to indicate larger trends in complex power constellations that need to be revised further.

To conclude, this research indicates that SDG 6 could play an important role in the global water governance structure, which lacks a more formal and central institutional framework such as a lead UN agency or organisation. In fact,

SDG 6 helped to create a coherent framework of global norms, and a common understanding of water management to enhance the effectiveness of water policy measures.

Overall, it remains to be seen whether the SDGs are suitable for inducing a societal transformation towards sustainability. Despite several positive evaluations, the SDGs face the bottleneck of implementation, large financing gaps, governance challenges and lack of political will. To turn into a successful and effective environmental regime, social capital and governance structures need to be adapted and improved rapidly to face the challenges of the Anthropocene effectively.

In addition to creating an effective institutional framework to successfully implement the SDGs, this research concludes that in the future, the scientific community needs to enter political and public discourses on environmental resource regimes and sustainable development with a strong and unified voice. With regard to the interviews, science is nearly exclusively associated with quantitative analysis and statistics instead of integrative system understanding. However, what is needed is the establishment of "global networks of national platforms linking scientists, policy makers and practitioners in their quest for sustainable pathways" (Pahl-Wostl et al., 2013b, p. 682). In the past, the development of global knowledge platforms has often emerged as major outcome of environmental regimes (Biermann, 2007a). As stated in the interviews, if the SDGs were to be implemented as they are formulated the existing financial and economic system would have to change drastically. Therefore, hopes are high for the SDGs to motivate scientists to engage and help to unfold the transition potential embedded within the final agenda through integrative, inter- and transdisciplinary science.

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Appendix

Interview Guidelines

- Could you tell me something about the transition from MDGs to SDGs? How did environmental aspects get incorporated into the MDG agenda?
- Did the establishment of the SDGs and SDG 6 always seem possible?
- How did the drafting process of SDG 6 evolve in general and what are your impressions? How did you or your organisation take part? What were your position and responsibilities?
- Were there problems encountered during the drafting process and what caused SDG6 to emerge in its final form?
- Do the SDGs/SDG 6 reflect the integration of social, economic and natural dimensions of sustainability adequately?
- Does the end result reflect the aims of your institution and are you content with the end result?
- What were other central actors and interest groups? What were their aims? Where there main actors missing: which?
- Has the process changed actor coalitions? (Global North vs. Global South; re-arrangement of the global water community; empowerment of civil society)
- How did the different actors work together (across different scales)? Was this successful?
- Has science played a role in the drafting process? Where did science contribute?
- What are the main issues/problems/challenges of the global water situation? (What is this perception based on?)
- Which SDG and which water-target is the most important and should be given priority?
- Is this perception shared by other actors? Is there a consensus?
- Moving on from the drafting process towards implementation: Do you perceive a real transition/change/impact with regard to the integration and awareness of environmental and sustainability aspects?

WaterPower is a laboratory for experimenting with novel ways of doing research based on the integration of multiple disciplines, approaches, methods and non-academic knowledge through dialogue and collaboration.

We contribute to current debates on society-nature relations by mapping, analyzing and understanding processes that unfold in the urban water sphere.

Our analyses critically study the interplay of socio-political and ecological processes and how they configure place and scale.

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