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Exploring Change Agents in Watershed Governance: The Case of Lake Mälaren, Sweden

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1.0 INTRODUCTORY CHAPTER

The aim of this study is to add nuance to the concept of change agents, add a top-down water related case viewed from a transformation lens, and to further the understanding of water governance in Sweden. The focus of the study, performed in Lake Mälaren watershed, is to identify the type of change agents and their (dis)satisfaction with status quo (current water quality and governance situation), their vision (here defined as a vivid mental image, especially a fanciful one of the future (Oxford, 2016)) and strategies for change. This introductory chapter discusses epistemological background, reflections on theoretical background, methodology, as well as validity, reliability, and overall weaknesses and strengths of the study.

1.1 Epistemological background

This study is conducted from a "constructivism" perspective where the researcher aims to understand the worldviews of the respondents and relies on their perception of what is being studied (Creswell, 2009). Grounded theory (Charmaz, 2014) and in-depth interviews (Patton, 2002) allows me to understand their view of the system, visions and strategies for change. The flexible semi-structured interview allows respondents to express details about aspects they consider to be important, which in turn affects the researcher (Kvale, 1996). This enables a co-construction of meaning and theory, which is central in constructivism (Mills et al. 2006).

1.2 Theoretical reflections

The initial inspiration for this thesis was the critique that the resilience assessment fails to incorporate transformative capacity, as it focuses on evaluating adaptation. "Resilience practice" (Walker & Salt, 2012) describes the different phases of transformation but does not propose an evaluation method. The RAPTA framework ("The resilience, adaptation pathways and transformation assessment framework: from theory to application") distinguishes transformative from adaptive capacity by, for example, getting past denial, connectivity across scales, capacity to change values and norms (O'Connell et al., 2015) but lacks operationalisation of transformative capacity. All workbooks that focus on resilience assessments fail to acknowledge the importance of key individuals who make change happen, despite the attention it is getting from scholars around the world (e.g. Olsson et al., 2006; Westley et al., 2013).

Transformative capacity is a theory in its infancy without a universal definition (Ernstson et al., 2010; Olsson et al., 2010) which increases complexity during operationalisation. A selection of factors for transformative capacity is inclusiveness, multiform governance, diversity of networks, system awareness, collective vision, reflexivity and learning, and agency across levels (Wolfram n.d.).

This study merges a few aspects that distinguishes transformative from adaptive capacity, and important aspects of transformations overall, such as: 1) the role of key individuals in transformations (Olsson et al., 2006; Westley et al., 2013), 2) dissatisfaction with status quo creates incentive for change (Wilson et al., 2013), 3) a shared vision can act as the dominating discourse of the new trajectory (Gelcich et al., 2010) and, 4) how change agents orchestrate their strategies to overcome barriers for change (Olsson et al., 2010).

Previous transformation cases have been studied in hindsight (Gelcich et al., 2010; Olsson et al., 2004) which enables them to pin-point important individuals and events. Overall, transformations are dynamic, vary across scales and lack a clear end-state (Gunderson & Holling, 2002). In this case, the water governance is still re-organising (Hammer et al., 2011), and the water restoration measures are few compared to the total need (M. Wallin, personal communication, 2016-05-29). This indicates that a transformation is ongoing, which makes it challenging to identify individuals that contribute to significant change. However, it is also the strength of the study as it is, 1) still uncommon and, 2) valuable for planning and governance.

The conclusions of this study will not apply to transformative capacity in its broadest sense, but is inspired by Olsson et al. (2010) factors to build transformative capacity 1) to understand where you are, 2) figure out where to go and, 3) develop strategies to get there. This study focuses on the change agent perspectives and will therefore explore these steps in an open, flexible and mainly inductive way. Focus is put on if their vision and strategies are shared, as scattered efforts decreases the probability of a transformation (Hahn et al., 2006).

The first research question aims to identify the types of change agents connected to water governance in Mälaren's watershed. The categorisation is based on Westley et al. (2013) but modified to fit Olsson et al. (2010) phases of transformation. The first phase of transformation prepares the system for change through sense-making, envisioning, and gathering momentum by building networks (Moore et al., 2014). Change agents in this phase are knowledge builders and carriers (i.e. spreads

alternative knowledge and ideas, and/or conducts research (Crona & Bodin, 2006; Huitema & Meijerink, 2010)), interpreters that use ecological knowledge in new ways, visionaries and inspirers that creates a shared vision and incentive for change (Folke et al., 2003), and network builders that bridge, bonds and links networks (Hahn et al., 2006). The second phase, navigating the transformation, consist of choosing which innovative change to focus on (Moore et al., 2014). It involves innovators that introduce new processes and ways to conduct business (Folke et al., 2003), facilitators who negotiates and resolves conflict (Vasseur et al., 1997) and, brokers defined as outsiders who introduces novel ideas and networks (Bebbington, 1997). The third phase consists of building resilience in the new state, scaling up change and routinization (Moore et al., 2014). The change agents are followers, the willing participants who make projects work (Folke et al., 2003), policy entrepreneurs who invest resources in policies they favour (Huitema & Meijerink, 2010), champions that facilitate decision-making and experiment-review-feedback processes (Gilmour et al., 1999) and, organisers that initiate self-organising groups (Folke et al., 2003).

1.3 Comments and reflections to research design

1.3.1 Selection of respondents

The selection of respondents was based on change agent characteristics that have been of key importance to transform complex, social-ecological systems: large social networks, build knowledge, be innovative, and able to resolve conflict (based on (Westley et al., 2013)). These characteristics are chosen because they are, 1) easily explained to someone who is unfamiliar with transformation theory and, 2) extensively mentioned in transformation research (Westley et al., 2013).
These characteristics are important in transformations in several ways. Conflict resolution decreases the risk for disagreement and that different parties push their agenda instead of working collectively (Hahn et al., 2006). To evoke change people need to think differently, find innovative solutions and have passion. In “Getting to maybe” a social innovator had “the strong feeling that something had to change and that they were the ones who must lead the way, not necessarily because they were the best people to do it but because they were the ones who realized it had to be done” (Westley et al., 2007, p.35). It is also instrumental to connect people with a shared feeling that change is needed by building networks as they mobilise social memory, generate social capital, and political and financial support (Hahn et al., 2006).

Individuals with a central position in a network are more likely to exert power, influence and coordinate action (Burt, 2002).

These characteristics define my change agents, and could affect my results. The characteristics could be too general and, in turn, these individuals might not orchestrate the system and manoeuvre change as in previous cases (Olsson et al., 2004). The change agents that I have identified are to a large extent (but not merely) network and knowledge builders (see section 5.1) which could be an effect of the selection process. These aspects indicate differently: 1) they are dissatisfied with water governance due to lack of collaboration, which is countered by creating networks, 2) they all inflict change on the system (see appendix 1) and, 3) they were often mentioned multiple times during the snowball method which indicate that they are key individuals.

The snowball method is a repetitive and dynamic sampling procedure (Noy, 2008). A gatekeeper was used, which could create bias if networks are not overlapping (Watters & Biernacki, 1989). To avoid bias, a second gatekeeper was used based on 1) recommendation from researchers at Stockholm Resilience Centre with extensive experience with research in the region, 2) works in a progressive municipality (Eskilstuna) and, 3) has participated in previous research projects (see (Sellberg et al., 2015). She validated my choice of respondents as two persons were already involved in the project. The desktop-mapping (i.e. investigate the a person's characteristics and role in system through internet) was used as triangulation, as multiple methods enhances legitimacy of findings (Mathison, 1988). The characteristics in the desktop-mapping corresponds to those in the snowball method.

1.3.2 Interviews

In total 13 interviews were conducted. New respondents were contacted until the data set was complete, indicated by data replication or redundancy (Bowen, 2008). Each respondent was asked to create a time-line with sequential events connected to their engagement in Lake Mälaren, (similar to (Schamber, 2000)) and to talk me through a change process they contributed to. This allowed me to identify type of change agents by understanding their background, skills, and incentives for change (see appendix 1). They were asked about their vision, if they had one and what it was, and also how to reach it. They were also asked "what is needed to reach good water status?" to get a holistic understanding of their strategy for change. To investigate current problems

and incentive for change, they were asked about their (dis)satisfaction with status quo in terms of water governance and quality.

1.3.3 Analysis

The analytical framework (see table 1) narrowed down the research questions regarding transformations. The analytical framework contributed, for example, with the notion that a shared vision is important in transformation processes. Overall, a inductive-deductive method (similar to (Fereday & Muir-Cochrane, 2006)) was used as this study is partly deductive (e.g. categorisation of change agents) and partly inductive, as the themes were created inspired by grounded theory, a common, flexible method that stays grounded in data (Charmaz, 2003). This is a beneficial approach when 1) exploring novel research areas, 2) exploring an individual's experience, 3) taking a holistic approach to study a phenomena (Corbin & Strauss, 2014). It is, however, recognised that despite if theory is grounded in the empirical world the researcher still has preconceived ideas of what is important in data (Wagenaar, 2011).

Memo-writing started early as it enables researchers to engage with their data, creates depth, and acts as a vehicle that transports the researcher from the concrete to the conceptual (Birks et al., 2008). Memos captures thoughts, comparisons and connections you make, and crystalizes questions and directions to pursue (Charmaz, 2014). Putting it on paper makes it concrete, manageable and exciting (ibid).

1.3.4 Validity and reliability of the study

Concerns regarding validity, that the research questions are being answered, are connected to if the respondents truly are change agents and if responses have been truthful. The latter is a concern as the water directive sets clear goals for 2021 which pressures civil servants whose main task is to implement the water directive.

The reliability, data quality, in this study has been improved by 1) taking notes during the interviews to facilitate transcription, 2) transcribing as soon as possible after interviews, 3) plenty of time during interviews which enables clarification questions, and 4) transcribing in a word-to-word manner.

2.0 EXPLORING CHANGE AGENTS IN WATERSHED GOVERNANCE: THE CASE OF LAKE MÄLAREN, SWEDEN

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The world is changing rapidly and it has become increasingly important to build resilience, through adaptation and transformation, to maintain the ecosystem services that watersheds provide. The importance of change agents to prepare for and navigate the transformation, as well as build resilience in the new state has been highlighted by scholars, however not in a comprehensive way, but rather as a final conclusion. This study investigates the role and perceptions of change agents around Lake Mälaren, Sweden. Through in-depth interviews, it explores incentives for change, visions, and strategies to reach those visions. The findings show that many actors without holistic and overarching governance creates dissatisfaction among change agent. Components of their visions are shared: well-functioning ecosystems that provide ecosystem services in the future, and to achieve legislated goals. Their strategy on how to reach their vision diverge: powerful political decisions and stricter steering, or changes in values and the inclusion of local knowledge of citizens. This study adds nuance to visions, highlights the importance of a common strategy and that collaboration is key to maintain the future provision of the essential ecosystem services watersheds provide.

Key words: change agents; transformations; resilience; water governance.

3.0 INTRODUCTION

It is essential to govern freshwater sustainably to maintain the supply of ecosystem services, ES (Millennium Ecosystem Assessment, 2005), which are fundamental to human societies (Falkenmark & Folke, 2000). Governance of ecosystems is often inadequate as it is remiss to recognise that the world consists of complex, intertwined social-ecological systems (SES) at multiple scales (Folke et al., 2010). A transformation of the governance structure is necessary (Biermann et al., 2012) to "ensure availability and sustainable management of water and sanitation for all" and thus to achieve the sustainable development goals of a universal transformation (UN, 2015). As humanity is facing major environmental challenges (Steffen et al., 2007) it

is a vital task for resilience scholars to investigate how key individuals potentially can contribute to sustainability transformations (Westley et al., 2013).

The overarching aim of this study is to contribute to transformation research by 1) adding nuance to the concept of change agents, 2) adding a water related top-down case to the repertoire of transformation research and, 3) build on previous research to improve water governance. According to Olsson et al. (2010) to build transformative capacity it is important to (a) understand where you are, (b) figure out where to go and, (c) develop strategies on how to get there. These steps are explored from a change agent perspective in the Lake Mälaren catchment area in Sweden (see fig 1).

The following research questions are explored in this study:

1) What type of change agents can be found connected to the governance of Lake Mälaren?
2) What causes (dis)satisfaction with status quo regarding water quality and governance of Lake Mälaren among change agents?
3) What are the change agents' visions for Lake Mälaren?
4) What are the change agents' strategies to reach their vision and to reach good water quality in Lake Mälaren?

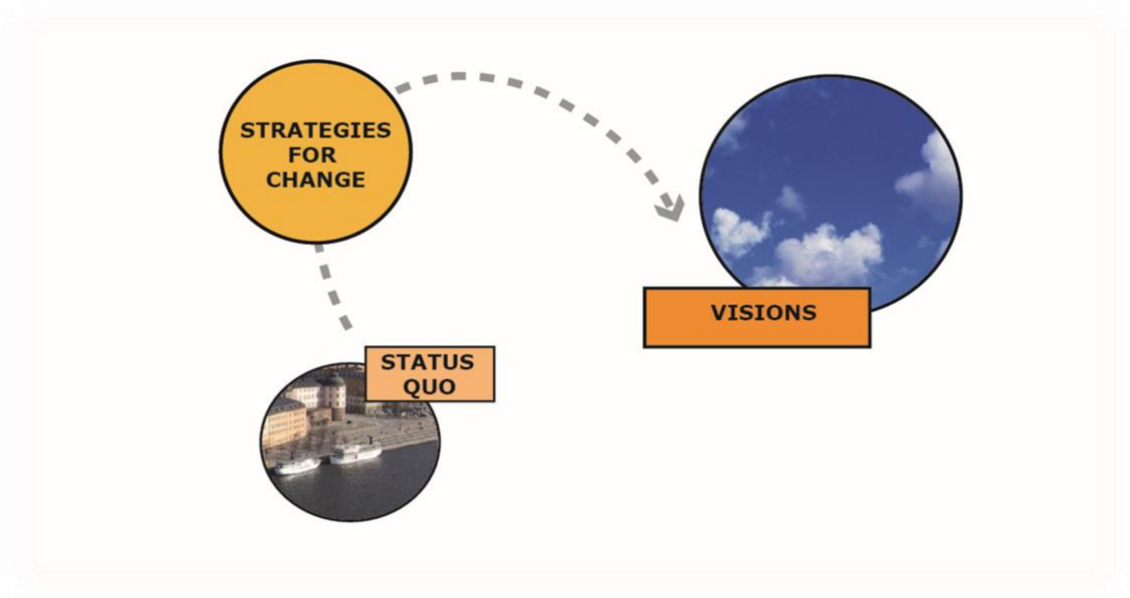

Figure 1 illustrates 3 out of 4 research questions of this study. What is causing the change agents' (dis)satisfaction with status quo (the current social-ecological system of Lake Mälaren's watershed), what is their future vision for the area, and what are their strategies to get there?.

3.1 Theoretical background

Resilience thinking addresses the dynamics of complex social-ecological systems (SES), i.e. the notion of people and nature as interconnected systems (Folke, 2006). Three aspects are central; resilience, adaptability, and transformability (Folke et al., 2010). Resilience is the capacity of a SES to change and remain within critical thresholds, through adaptability (adjustment to change that enables continuation in the current trajectory), and transformation (the capacity to change trajectory when the current one is unsustainable) (ibid). Previously, scholars have stated a distinction between resilience, adaptation and transformation in the sense that adaptation builds resilience whereas transformation decreases resilience as a fundamentally new state is created (Walker et al., 2004). It is argued that it might be necessary for transformations to occur on a lower scale to enable resilience on a larger scale (Folke et al., 2010). Scientists concerned about the future of the planet and human-kind have voiced the need for sustainability transformations (Weinstein et al., 2013). Transformation occurs in three phases, 1) preparing the system for change (sense making, envisioning, and gathering momentum by building networks), 2) navigating the transformation (choose which innovative change to focus on), and 3) building resilience in the new state (scaling up change, routinization) (Moore et al., 2014; Olsson et al., 2004). These phases and sub-processes could occur simultaneously or in varying order, and transformation is generally triggered by internal or external perturbation e.g. deterioration of ecosystems (Moore et al., 2014). Successful transformations have been known to be well-planned and transparently navigated pathways that include innovation and strategies developed by key players (Gelcich et al., 2010). They take place when key persons are able to shape change in a favourable opportunity context (Olsson et al., 2010) which is driven by two main drivers: diversity of organisational forms and the degree of institutionalisation (Dorado, 2005). A multiplicity of organisational forms creates leverage points and enables action that supports innovation and change (ibid). When multiplicity is too great, resources are fragmented and difficult to coordinate in large masses, and when diversity is too low, resources are absent (ibid). Institutionalisation governs our behaviour and when it is too high, behaviour is taken for granted and innovation is unlikely, whereas too little institutionalisation creates unwillingness to take risks and behaviour is unpredictable

(ibid). Embedded in these opportunity contexts are the key individuals, change agents, who maneuver systems and "make it happen" (Westley et al., 2007).

Individuals who are vital for the process of transformation have been said to have transformative agency. They are here referred to, on a general level, as *change agents*, defined as individuals who facilitate transformations in all of its stages (Westley et al., 2013). Such individuals have been connected with skills such as building visions and knowledge, resolving conflicts, creating networks and, being innovative (Westley et al., 2013). Change agents have played a crucial role in the transforming systems by understanding ecosystem dynamics, providing visions and goals (Olsson et al., 2004). Transformation has failed when leaders have not provided a novel approach and their vision facilitated stability and adaptation, rather than transformation, which had a dampening effect on the transformation process (Olsson et al., 2006). Factors that differentiate transformation from adaptation are: identifying a new vision/goal, high innovation, dissatisfaction with status quo, and individual responsibility (Wilson et al., 2013).

3.2 The study context – water governance in Sweden

Freshwater is the bloodstream of the biosphere (Folke, 2003) and provides ES at different scales (locally and globally) (Nykvist et al ., n.d.). Surface water provides drinking water and recreation (Queiroz et al., 2015) a dependence that has led to a history of active water governance (Nykvist et al., n.d.).

Water governance in Sweden has undergone radical change as the EU Water Framework Directive (referred to as the water directive in this study) was implemented in the beginning of the 2000's (Hammer et al., 2011). The aim of the water directive is twofold: first to protect European waters and achieve good water status; and second, to involve citizens and stakeholders actively in the water management process (ibid). The legislated goal of achieving good status ecologically (flora and fauna) and chemically (maximum amount for toxins) should be achieved by 2021 or 2027 at the latest (Kallis & Butler, 2001). The water directive has led to 1) increased knowledge, 2) that the administrative maps of water institutions have been redrawn and, 3) changed from pollution control to ensuring the integrity of the entire ecosystem by adopting an ecosystem approach (Hammer et al., 2011; Hering et al., 2010).

The Swedish water governance structure is decentralised, but highly institutionalised (Aligica & Tarko, 2012). It consists of a complex web of actors (private and public), but the formal responsibility is shared between municipalities and County Administrative Boards (Nykvist et al., n.d.).

3.3 Case description – Lake Mälaren catchment area

Lake Mälaren's watershed covers 5% of Sweden (22600 km2) (Wallin et al., 2000) and is located in south-central Sweden (59°25'N 17°24'E) (see fig 2). The landscape is heterogeneous with a mix of agriculture, forestry, wetlands and urban areas (Elmhagen et al., 2015). The Lake is the main freshwater resource in the region and provides drinking water to over 2 million inhabitants in the region making it an essential resource (Ledesma et al., 2012). The area provides a high diversity of ecosystem services, including natural and cultural values (Queiroz et al., 2015) enjoyed by the over 3 million residents.

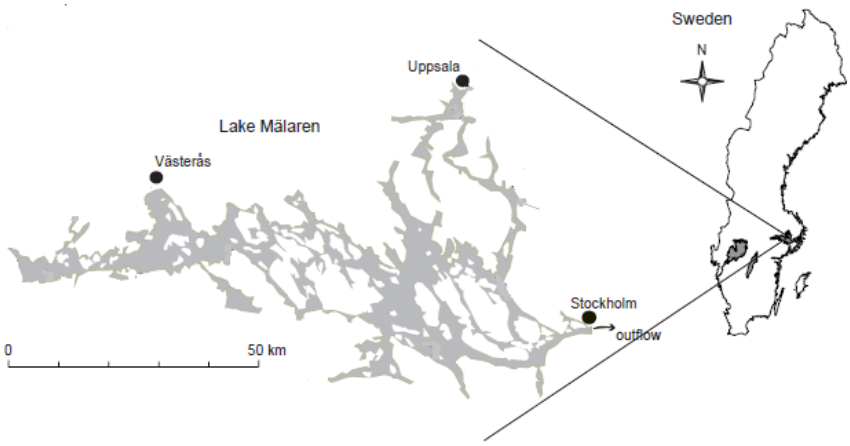

Figure 2 shows an adapted map of Lake Mälaren, Sweden, and the largest cities surrounding it (Weyhenmeyer et al. 2004).

Water governance of Lake Mälaren has certain adaptive governance characteristics, such as flexible institutions and that power is dispersed among actors and the generation of ecological knowledge, which is however fragmented among actors (Nykvist et al., n.d.). The water governance lack reflection, evaluation and experimentation (ibid). In recent years a bridging organisation has developed "Mälaren – a lake for millions" (MLM), that aims to 1) create novel networks, 2) build knowledge and, 3) collectively apply for grants towards water restoration measures (here referred to as water measures) (Morberg, 2015).

Lake Mälaren watershed is interesting from a transformation perspective for a number of reasons. First, it is located in an area that has been and still is changing rapidly. Water levels have been regulated since 1943 to prevent flooding and produce fertile land which has altered the ecology (Willén, 2001). Rapid urbanisation is increasing the vulnerability of aquatic and terrestrial habitats (Hammer et al., 2011). Climate change will lead to warmer and wetter weather with more extreme events and as sea levels are rising so is the probability for salt water intrusion (Länsstyrelserna, 2011) which is a concern as Lake Mälaren and the Baltic Sea are connected at the harbour in Stockholm. Second, Lake Mälaren does not fulfill the water directive goals of good water status. The lake consists of several basins that have been classified as "good" in the east, "moderate" in the west and, "unsatisfactory" in the north (see fig 3) (Morberg, 2015).

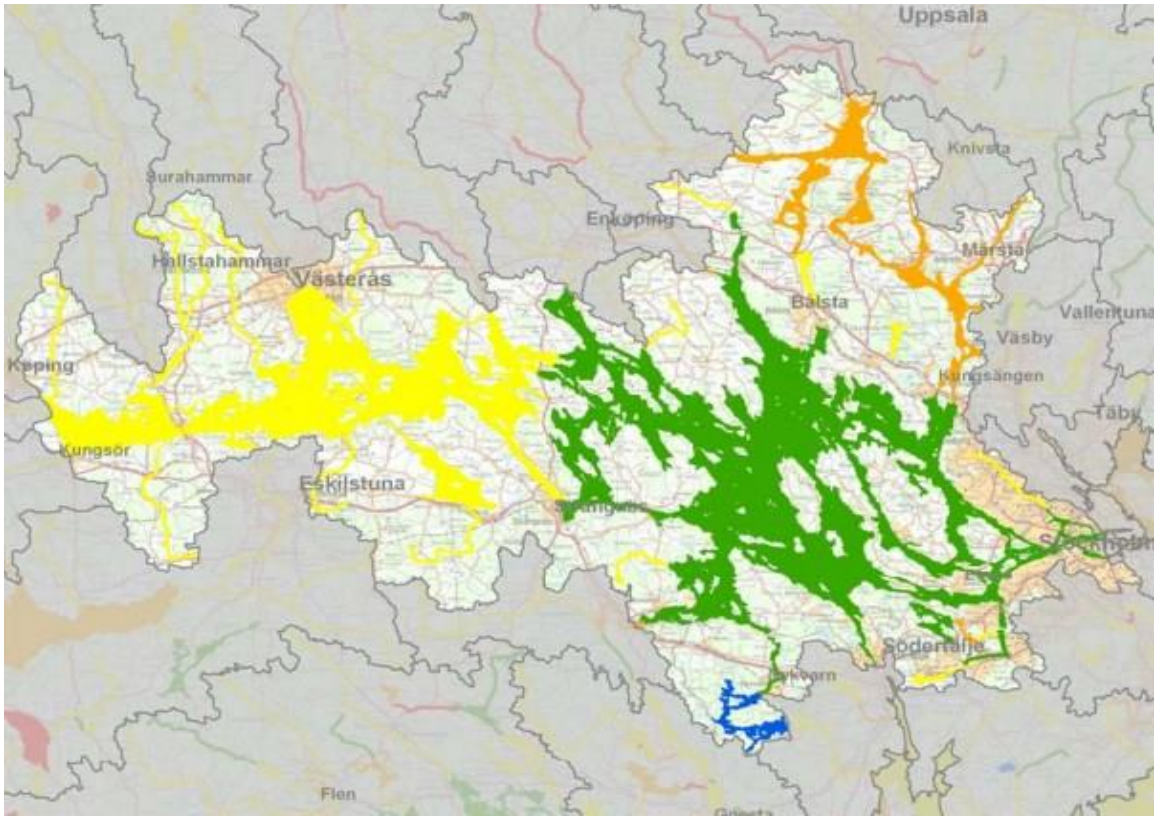

Figure 3 shows the local municipalities that encompass Lake Mälaren, Sweden, and the lake's water status that ranges from high quality (blue), good (green), moderate (yellow), unsatisfactory (orange) and bad (red). (Vattenmyndigheterna, 2008).

4.0 METHODOLOGY

A qualitative case study approach with in-depth interviews was used to categorise change agents and to get a deep understanding of their perspectives of change agents

connected to Lake Mälaren, in terms of a) (dis)satisfaction with status quo regarding water quality and governance, b) visions for the future and, c) strategies to achieve their vision for Lake Mälaren. The interviews were coded using a hybrid inductive-deductive approach (Fereday & Muir-Cochrane, 2006).

4.1 Selection of respondents and data collection

The selection process for interviewing required that all respondents had to express certain change agent features and be presently engaged in water governance. Respondents had to fulfill two out of four change agent characteristics 1) innovative thinking, 2) skills in conflict resolution, 3) building knowledge and, 4) having a large social network (based on Westley et al., 2013). Furthermore, their position in the system (e.g. municipality or county administrative board, and geographically) was taken into account to ensure the inclusion of as much diversity of perspectives as possible.

To strategically select respondents the snowball methodology (Noy, 2008) was complemented with desktop-mapping to cross-check their characteristics and role in system. The desktop-mapping allowed for cross-checking of the potential respondents role in system and characteristics. The sources used were formal documents (e.g. statements from the County Administrative Board or reports), notes (from e.g. municipality meetings), power-point presentations, social media (e.g. LinkedIn), newspaper articles, and radio clips and blogs posts.

The entry point for the snowball method was the project leader for "Mälaren – a lake for millions", a bridging organisation in the area (Morberg, 2015), as he was recommended by two scientists at Stockholm Resilience Centre with extensive research experience in the region. Persons who were identified through the snowball method could be excluded if (a) they didn't fulfill the characteristics according to the desktop-mapping or, (b) had the same role (e.g. same municipality) as someone who had already been selected for an interview. A detailed list of respondents (appendix 1) and their change agent characteristics can be seen in fig 3.

In total 13 interviews (60-120 min) were conducted with semi-structured, open-ended questions (Patton, 2002). Examples of questions that were asked are: "what is your opinion on how Lake Mälaren is governed?" and, "what is your vision for Lake Mälaren?" (See appendix 2 for full interview script). The interviews were audio recorded, and notes were taken during the interviews to spur follow-up questions to

increase richness and depth of data (Kvale, 1996). The interviews were thereafter transcribed (using Express Scribe Transcription Software) and coded (using Atlas ti6.2).

4.2 Analytical framework

The analytical framework draws mainly on literature of change agents and transformations, but is also influenced by resilience thinking (see table 1). First, the study aims to map and categorise the change agents in Lake Mälaren's watershed based on an extensive review of agency, skills and phases of transformation (see (Westley et al., 2013)). As unhappiness with status quo creates incentive to change the system (Wilson et al., 2013) the second aim is to identify their (dis)satisfaction with water quality and governance, and the cause for (un)happiness. The probability of a transformation increases if people have a shared vision that supports a novel pathway (Wilson et al., 2013), that can create a common discourse (Gelcich et al., 2010). A shared vision has been important to increase collaboration and development of networks and important when figuring out where to go and alternative pathways for the social-ecological system (Olsson et al., 2010). This study aims to identify the dominating themes of their visions, and aspects that might be contradicting. This is important as the change agents' visions expresses what type of society and system they promote, and aim to achieve. Important factors for accomplishing a transformation include innovation and strategies developed by key players, during the preparation phase of transformation this involves identifying dysfunctional states, alternative pathways, and strategies to overcome social and ecological problems (Gelcich et al., 2010). Strategies are important in multiple ways: to overcome barriers for change, keep the momentum of the transformation and building resilience in the new state (Olsson et al., 2010).

Table 1. Analytical framework that links research questions, analytical components and empirical questions.

Research question	Analytical components and references:	Example of interview questions:
What type of change agents can be found connected to the governance of Lake Mälaren?	What type of change agents (i.e. brokers, facilitators or, visionary leaders etcetera (Westley et al (2013). can be found connected to governance of Lake Mälaren based on skills and personality when they contribute to a change process?	Please, give an example when you contributed to a change process. What did you contribute with in that change process?
What causes (dis)satisfaction with status quo regarding water quality and governance of Lake Mälaren among change agents?	What is their view on the water quality and water governance and thus (dis)satisfaction with status quo (Wilson et al 2013)? What are current issues connected to water quality and governance?	What is your opinion on the water quality in Lake Mälaren today? What is causing these issues? What is your opinion on the governance of Lake Mälaren? What are current issues connected to water governance?
What are the change agents' visions for Lake Mälaren?	Do they have a shared vision (Olsson et al 2006)? What are their differences, are they contradicting?	What is your vision for Lake Mälaren How long do you think it will take to reach this vision?
What are the change agents' strategies to reach their vision and to reach good water quality in Lake Mälaren?	What is their view on their own role to contribute to change? Do they have a shared strategy? (Olsson et al., 2006) Are the solutions ecosystem based or technically oriented?	What is your view on how to reach th vision? What is your role in reaching this vision? What is your organisations role in reaching this vision? What is needed to improve Lake Mälaren's water quality?

4.3 Analytical procedure

Analysis was conducted using a inductive-deductive hybrid methodology (Fereday & Muir-Cochrane, 2006) that maintains the link between theory (see analytical framework section 4.2) but stays open for novel insights that is out of the scope of the concepts and theories. The identification of types of change agents was deductive (based on (Westley et al., 2013)) based on their skills and contributions during a change process (see appendix 1). This study is deductive as the analytical framework identified research gaps (see section 4.2), but themes with in research gap (status quo, visions and strategies) were conducted inductively, inspired by grounded theory in sense that it was flexible and stayed grounded in data (Charmaz, 2003). Coding consisted of two phases, initial and focused coding where the codes went from specific to increasingly general (Charmaz, 2014). Data analysis started early in the data collection process which allowed for adjustment of follow-up questions based on novel insights, and to get more specified data as time passed (Charmaz, 2014). To allow for a comparative analysis (of e.g. visions) the basic interview script stayed consistent throughout the study. Memo writing was conducted throughout this study: before, during and after interviewing, transcribing and coding. It ensures the maintenance of ideas that may otherwise be lost and values early hunches that could be of great importance later in the analytical process (Wagenaar, 2011).

5.0 RESULTS

The results are presented in the following order: type of change agents, (dis)satisfaction with status quo, visions and strategies. This provides an understanding of the change agents' incentives to change the system, where they are heading and how they intend to get there. The themes for each research question are created inductively (except type of change agent), but relate to the analytical framework (see section 4.2). The themes and categories (for all result sections) are not mutually exclusive and can overlap as the aim is to identify nuances, hence, one respondent could fit into several categories. The respondent who is being cited is indicated in brackets after the quote (for example CA1), for personal information (see appendix 1) and view who connects to which theme (appendix 2).

5.1 What type of change agents can be found connected to the governance of Lake Mälaren?

The types of change agents connected to watershed governance in Lake Mälaren are mainly coupled to the preparation phase of transformation: knowledge carrier and stewards, sense maker and interpreter and, network builders (see fig 4). They are building novel networks and organisations in the region to increase collaboration (see appendix 1). By doing so, they are incorporating a diversity of ideas and perspectives into water governance. Two novel types of skills are identified: 1) little fear of conflict, and 2) endurance.

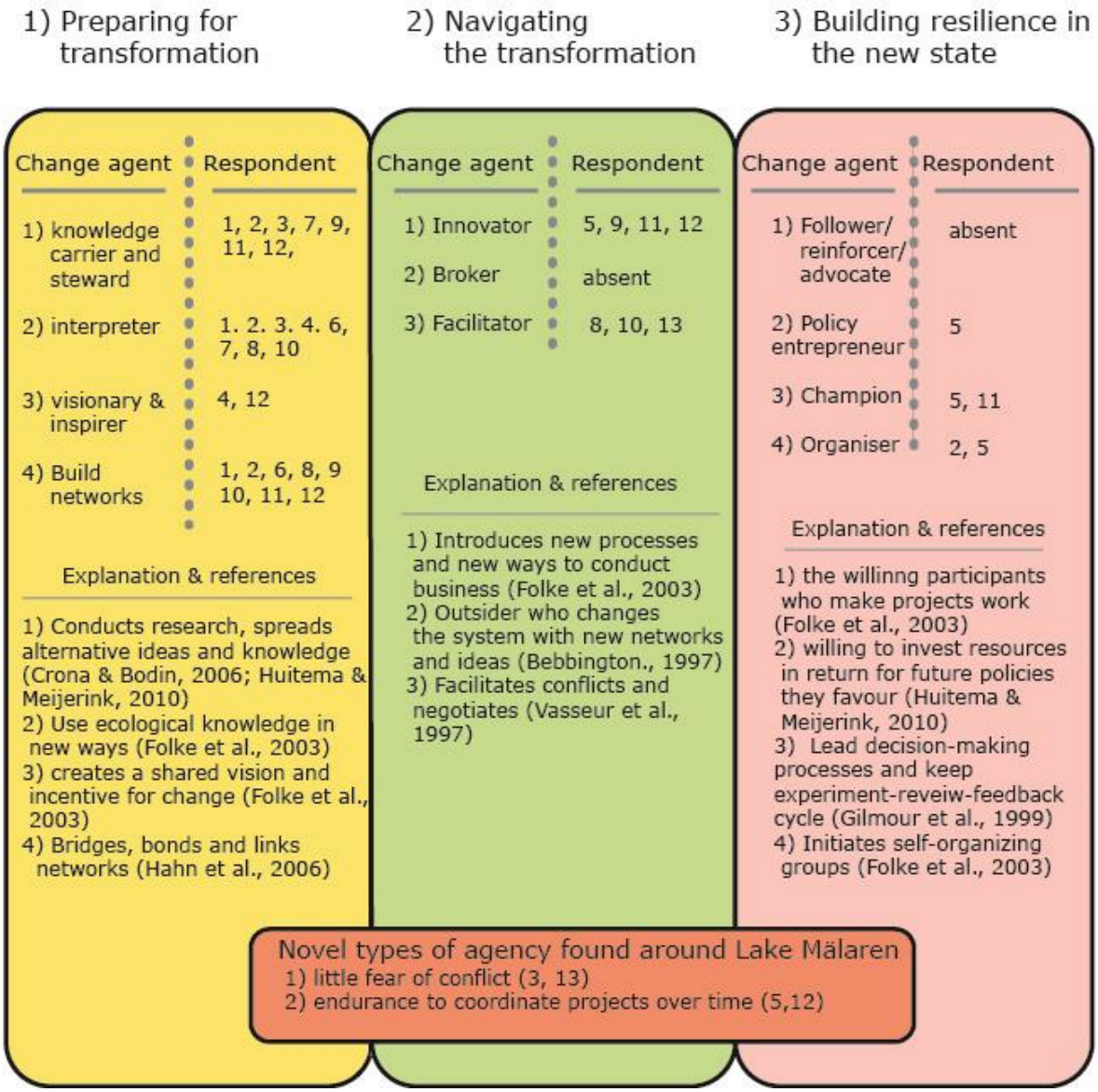

Figure 4 shows the types of change agents (based on Westley et al., 2013) in this study (engaged in water governance in Lake Mälaren's watershed) and categorised after which skills are needed in different phases of transformation. Preparing for transformation (yellow), 2) navigating the transformation (green) and 3) building resilience in the new state (pink) (based on Olsson et al., 2010) and novel types of skills (red): little fear of conflict and endurance to coordinate projects over time.

5.2 What causes (dis)satisfaction with status quo regarding water quality and governance of Lake Mälaren among change agents?

This section presents the change agents' (dis)satisfaction with status quo and thus barriers for change, reasons for dissatisfaction and motivation for change. The overarching themes for water quality are: a) the water quality is satisfying, b) water quality varies and is complex, and c) human-induced stressors are threatening the water quality. The dissatisfaction with governance of Lake Mälaren has its core in lack of holistic coordination, responsibility, collaboration and communication among actors and organisations. The themes on water governance are: a) the governance is satisfactory, b) Lake Mälaren is being "milked" and, c) the governance lacks edge and experimentation**.**

5.2.1 The change agents' (dis)satisfaction with status quo regarding water quality

a) The water quality is satisfying.

There are problems such as eutrophication and toxins, but the water quality is relatively good. "The water quality in Lake Mälaren is relatively good, it's not alarmingly poor at least" (CA6). The following quote expresses a distinction between natural and anthropogenic causes "the nutrient content is too high" // "but the lake is located in a muddy plain, the particle content and turbidity is naturally high." (CA2).

b) Water quality varies and is complex.

A dominating theme is that the water quality varies over time and space. CA11 exemplifies this by adding "each sub-basin is so different that I consider Mälaren as several lakes". Varying levels of eutrophication is quoted as "it's eutrophic in the West, and strangely enough, it gets better the closer you get to Stockholm" (CA3). Toxins vary over space, expressed as "it is clear that the problem is larger near cities, but it is complex and varies across the lake" (CA1). The water quality also varies over time, quoted as "in recent years, turbidity has gotten worse as an effect of brownification that increases because of reduced acidification" (CA3).

c) Human-induced stressors are threatening the water quality.

Dissatisfaction is caused by the anthropogenic pressures (e.g. changes in land-use) that Lake Mälaren is exposed to. CA7 expresses concern "our mentality is very short-term. We are so afraid to lose our jobs that we sacrifice the health of our grandchildren and the ecosystems that we are so dependent on". We are in an unsustainable trajectory and must act to avoid a deteriorating water quality, as expressed by CA13 "the algae blooms every August barely makes you want to jump in the water"// "it is eutrophic, and we have to act to stop that development".

5.2.2 *The change agents' (dis)satisfaction with status quo regarding water governance*

a) The governance of Lake Mälaren is satisfactory.

The governance of Lake Mälaren is satisfactory, quoted as "It is pretty balanced. Of course, one could say that we need more of this and that, but overall I think everything is under control" (CA10). A common vision, communication and clarification of roles are points to be improved. CA1 says "it is difficult to say who governs Mälaren as there is no single responsible organisation and 70 municipalities in the catchment area".

b) Lake Mälaren is being "milked".

The governance is considered poor due to many intertwined actors with separate agendas, and the lack of overriding responsibility. This is exemplified by the quote "Mälaren is not governed, it is navigated by many different actors on different levels in a non-coordinated way with different sets of regulations. We lack the tools we need to govern certain issues, like agriculture" (CA6). This is further expressed by (CA3) "It's poor. There is no overarching responsibility. Everybody plans for themselves: the industry, agriculture, forestry, infrastructure, maritime traffic, and municipalities plan differently across borders". Furthermore, "there is no overarching strategy in spatial planning, Mälaren is being "milked" of resources" (CA13).

c) The governance lacks edge and experimentation.

Dissatisfaction is caused by the lack of water measures despite ambitious goals set by EU, quoted as "they have high ambition and set goals about good ecological and chemical status but if we are going to reach them we need to put in some hard work" (CA7). The water governance "lacks edge"//"when are we actually going to start doing things?" (CA8). Another reason to be dissatisfied is the lack of experimentation and novelty as "I think local initiatives are underestimated, we should investigate

what they can contribute with. Also, few new technological solutions are being done" (CA5).

5.3 What are the change agents' visions for Lake Mälaren?

This section provides an understanding of their vision and thus the system they aim to create. Their visions for Lake Mälaren are rooted in three general themes: a) grounded in ecology, b) good water status and, c) emphasis on the governance structure. Several of the change agents admit to their lack of vision, or have one applicable to a subsystem (e.g. sanitation or a geographically smaller area) of Lake Mälaren's watershed.

a) Grounded in ecology.

A well-functioning ecosystem with rich biodiversity and ecosystem services such as drinking water and recreation were frequently mentioned. The core aspect of their vision is quoted as "an ecologically well-functioning lake with marginal problems" (CA8). Focus is put on cultural ecosystem services, expressed as "there should be a possibility to fish, swim and use Mälaren as a recreational area" (CA3). Many respondents highlight the importance of the *continuous* provision of ecosystem services, and one respondent mentioned a sustainable society as a vision. CA2 described it as "a lifestyle that can continue over time where everybody is responsible for their own actions and its consequences and that nobody else, in time and space, has to pay for what I am doing now".

b) Achieve legislated goals.

Many of the respondents have visions connected to the Water Directive. CA4 expresses this "My vision for Mälaren's water is that we reach good ecological and chemical status for all of Mälaren. That's it". CA2 said that "My vision is to initiate the broad participation and support that is needed to enable change. In this profession, change is connected to the environmental quality standards, a legislated goal, rather than a vision for Mälaren's bathing sites".

c) Emphasis on the governance structure.

This theme is focused on governance and how to create change. CA5 envisions a grass root governance structure based on local values and capacities, and is quoted as

"to create a governance structure that enable us to manage our waters as a natural part of life, just like you manage your own land". CA6 envisions a sustainable nutrient management by "mobilising actors, collective power, and by initiating novel collaborations that result in water measures". CA12 strives for a "sustainable resource management through sustainable leaders that are genuinely interested in collaboration". CA7 wants to reduce emissions at its source, expressed as "the vision is to decrease emissions upstream and remove a lot of unnecessary toxins, cosmetics and unwanted substances". CA10's vision for water quality is secondary "I have one for food production, that we should continue to produce food efficiently and still minimise effects on the environment by using modern methods."

5.4 What are the change agents' strategies to reach their vision and to reach good water quality in Lake Mälaren?

The strategies presented are actions needed to reach visions, goals and to improve the water quality of Lake Mälaren. The strategies range from concrete water measurements (e.g. downstream measures in Lake Mälaren by removing toxic sediments) to large systemic changes (a transformation to circular economy and reduction of working hours). The strategic themes are a) practical water measures, b) collaboration and communication, c) knowledge and innovation and, d) policy instruments.

a) Practical water restoration measures.

Reducing agricultural emissions through upstream water measures is a dominating theme concerning Lake Mälaren's water quality. However, some respondents think too much pressure is put on individual farmers. "There is a lot of focus on upstream measures. The farmer is under fire with small opportunities to make significant changes by him/herself" (CA5). A few respondents highlight the idea that downstream measures might be a useful complement to better the water quality. "We have to start thinking outside of the box when it comes to water measures. We have to combine old-fashioned, conventional limnology with new and more cost-effective measures, both within the lakes and the catchments." (CA4).

b) Collaboration and communication.

The dominating theme shared among most respondents is that cross-sectorial collaboration needs to permeate all levels, organisations and actors in the entire system. "I believe in formalised collaboration between municipality sectors, joint

planning and overarching goals. We need government funding and binding, through incentive or force, collaborations" (CA6). Communication and dialogue in diverse groups and through ecosystem services have been highlighted as important factors to enable change. "Communication through monetary values and ecosystem services are key factors for success" (CA4).

c) Knowledge and innovation.

Systemic and specific knowledge and critical thinking are key aspects especially for decision-makers such as politicians but also citizens. It is also important to incorporate local knowledge of farmers into water governance. A holistic viewpoint is called for and expressed as "It is important to"//" not to stare blindly on the well-being of the municipality but to get the big picture, you will lose many important aspects otherwise" (CA9). The call for new, innovative solutions is expressed as "we need new solutions that are sustainable. We can't continue to use the old systems; they won't work when the population continues to increase" (CA12).

d) Policy instruments.

Financing water measures is complicated and time-consuming, and the lack of holistic governance calls for stricter steering through political decisions. Financial issues are expressed as "Today, we have to work very hard to find financial reasons for municipalities, businesses and farmers to do water measures" (CA6). There are different propositions on how to finance water measures, 1)"all municipalities pay their share" (CA8), 2) "I believe in price policy which refers to charging polluters and using the money to do water measures" (CA6), 3) "a combination between polluters pay and users pay" (CA4) and, 4) the quickest way would be if the government said "here's a budget and this is what you are going to do" (CA2).

6.0 DISCUSSION

The results show that the type of change agents mainly correspond to the preparation phase of a transformation, and they are both dissatisfied and satisfied concerning water quality and governance. The water quality is generally satisfactory, but problems such as eutrophication and toxins that vary in time and space causes concern. Dissatisfaction with water governance originates from it being uncoordinated, complex, and often lacks implementation of water measures. The

change agents' visions consist of a few common themes such as; an ecologically well-functioning lake that provides ecosystem services (e.g. recreational), and has good water status. There are overlapping and common themes, but there is no collective vision shared among all actors. The strategies for change differentiate in certain aspects, if change is most appropriate through the creation of a bottom-up grass root governance structure with emphasis on local knowledge, or a stricter top-down regulation with powerful decisions.

6.1 Can the type of change agents indicate the phase of transformation?

The change agents in Lake Mälaren's watershed are connected to the skills needed in the first phase of transformation (preparation phase) (see section 5.1). They are creating networks (i.e. network builders) to increase collaboration across borders (organisational and geographical). They build knowledge by integrating a diversity of perspectives and ideas, and increase ecological knowledge of decision-makers (e.g. politicians). This could indicate that that water governance is in a preparation phase and will transform when the opportunity context is beneficial and a window of opportunity is created (Olsson et al., 2006). There could also be a mismatch between the phase of transformation and type of change agents that exist within the system, which possibly could inhibit or lessen the process of transformation. The water governance system has been re-organising since 2000's due to the implementation of the EU water directive (Hammer et al., 2011). As the re-organisation has been triggered in a top-down manner (compared to other transformation cases see (Olsson et al., 2004)), this could cause a mismatch as the change agents and system overall might not be ready for such a significant change.

The respondents were categorised (based on Westley et al. (2013)) and two novel types of characteristics were identified: 1) little fear of conflict, and 2) endurance. Little fear of conflict, could be significant especially in the preparation phase, as it is important to acknowledge when the current system is untenable (Walker et al., 2004) and to voice the need for change. Interestingly, the change agent with little fear of conflict was also highly skilled at conflict resolution. This might seem contradictory, but little fear of conflict might be needed to resolve conflict in a respectful, and pedagogic, but still direct way. The second characteristic, endurance, to e.g. coordinate projects over time is useful as it often takes time for transformations to occur and one might have to wait for the opportunity context to become beneficial.

6.2 Maneuvering barriers in water governance

The lack of collaboration and implementation of water measures is causing dissatisfaction with status quo (see section 5.2.2) as it was frequently mentioned among change agents on all levels (e.g. municipality, county administrative board, and water authorities). There is an urgent need for holistic responsibility, and communication that permeates all sectors and organisations, which confirms a previous study on the adaptive capacity of water governance in the region (see (Nykvist et al., n.d.)). This study adds an understanding of how they are maneuvering change by countering these barriers (see fig 4).

Their ability to change the system is dependent of the structure (institutionalisation, norms, resources) of the organisation and the system they are embedded within (Dorado, 2005). Swedish water governance context is highly institutionalised (Aligica & Tarko, 2012) which could decrease the amount of innovation as behaviour is taken for granted (Dorado, 2005). Based on the changes the respondents have contributed with (see appendix 1) it becomes clear that they are altering their opportunity context to maximise change. For example, by initiating the project "Mälaren – a lake for millions" in the Lake Mälaren Water Conservation Association (LMWCA) they have changed the context and opportunity in the organisation and the watershed overall. Previously, LMWCA increased ecological knowledge through environmental monitoring. Now, with "Mälaren – a lake for millions" that acts as a bridging organisation in the system (Morberg, 2015) they increase dialogue and connectivity across scale which allows them to operate across spatial borders. Bridging organisations provide a forum for different kinds of knowledge, coordinates tasks, enables co-operation, builds trust and networks, and resolves conflict (Berkes, 2009) and have been vital in the process of transformation toward adaptive co-governance (Hahn., et al 2006). They are collectively applying for EU grants and self-organising sub-networks are being created (e.g. Fyra Mälarstäder) which increases readiness and opportunity for change. This could increase the general resilience (ability to absorb disturbances, anticipated or unforeseen) as it increases diversity, modularity, and levels of capital (Walker and Salt, 2012).

It is not always possible to change the opportunity context within an organisation. There is a possibility that a mismatch between the opportunistic and progressive change agent and a retrogressive organisation occurs. The change agents acts on the

edge within their opportunity context to always maximise change, which can create friction and that inhibits change. In such case, there might be a time-lag before the changes that the change agent have contributed with does any good. It seems like the most dissatisfied change agents are positioned in opportunity context that are retrogressive which dramatically decreases their opportunity for change.

6.3 The implications of visions and the "problem of fit"

In previous studies, the concluding remark is that a shared vision was one important ingredient for the transformation to occur (Gelcich et al., 2010; Olsson et al., 2006). In Kristianstad Vattenriket, Sweden, one key individual played an important role in transforming the system into adaptive co-governance by creating a common vision, setting goals and seizing a political window of opportunity (Olsson et al., 2004). Studies are often conducted in hindsight, and there might have been other visions that were in contention, and later outcompeted, along the process of transformation. This study clearly shows the nuance of visions that exist among the change agents: they are ecosystem based, guided by legislated goals and, focused on governance structures (e.g. grass root governance structure) (see section 5.3). Carpenter and Folke (2006) emphasise the importance of positive visions grounded in ecology during transformations as people, especially in urban areas, are becoming decoupled from their dependence on ecosystem services. If such visions have been articulated, it allows for better decisions and positive change when the opportunity is given (ibid). In Australia, after a crisis, the vision that was provided lacked novelty which played a dampening rather than a facilitating role for transformation which moved the system further down an undesired trajectory (Olsson et al., 2006). Many of the change agents (especially civil servants) envision a Lake Mälaren with good water status in accordance with the water directive, which could promote adaptation within this trajectory rather than a transformation into something fundamentally new. However, to be able to achieve the water directive we might still have to restructure water governance as there is a lack of water measures (see section 5.2.2). If the system continues in a trajectory that the EU has decided, rather than citizens, on it is of significance to reflect about 1) potential winners and losers, and 2) who decides which state is desirable and not.

The visions for Lake Mälaren consist of overlapping themes, but their perspective of the system can differentiate which in turn affects the scale of their vision. Many of the

change agents have a vision for a subcategory (e.g. nutrient emissions) or a subsystem (e.g. a smaller lake in the catchment area) of Lake Mälaren. This is interesting as 1) their visions don't correspond to the institutional water governance maps that have been redrawn by the water directive and, 2) it could pose a challenge for the collective effort that is needed for a transformation (Olsson et al., 2006). If they perceive the system differently from each other they might have different opinions of what is inhibiting change and what needs to be transformed. For example, the farmer in this study envisions a common pathway were farmers are increasingly included into the process of implementing water measures, and thus focus on the trajectory, rather than the goal. Whereas others might have a strong vision to fulfill the legislated goal of reaching good water status. This in turn, could act as a barrier for change as it might lead to scattered efforts for change and decrease the system's ability for transformation.

6.4 Is a shared strategy more important than a shared vision?

As in the case of their visions, there are commonalities concerning their strategies for change (e.g. the call for collaboration and communication see section 5.4). However, some overarching aspects diverge from each other. To solve the lack of measures (see section 5.2.2) some respondents voice the need for stricter steering and powerful political decisions as change occurs through top-down governance. Others state that change occurs when values of citizens are changed, and highlights the incorporation of local knowledge to find a common pathway (see section 5.4).

As the water directive and the re-organisation of water governance has been imposed by EU (Hammer et al., 2011) changes have occurred in a top-down manner. It is interesting that some change agents want to strengthen this structure, whereas others want to empower local citizens and thus lessen the power of authorities. A top-down governance allows them to coordinate large scale issues efficiently, which is appealing as time presents a major dilemma and it is time to address sustainability challenges (Anderson & Bows, 2011). On the other hand, system transformations are likely to be resisted and blocked due to the lack of broad acceptance that is needed for it to be successful (Mickwitz et al., 2011). Previous transformation studies have highlighted the need for a common vision (Olsson et al., 2004;Westley & Mintzberg, 1989). In this study the change agents envision an improved lake (see section 5.4) but as their strategies for change diverge, that could create polarisation. In Thailand and

USA a transformation was inhibited as the actors could not agree on a common pathway following a crisis (Olsson et al., 2006) which voices the need for a common strategy. Especially in the complex problem domains, change is associated with a number of actors that helps the system progress through stages of innovation and transformation (Hahn et al., 2006).

6.5 Conclusions

The change agents connected to water governance around Lake Mälaren are tightly coupled to the preparation phase of a transformation. This could indicate that the system is in a preparation phase, or, that there is a mismatch between change agents and phase of transformation. This is possible as the re-organisation has been opposed upon them, and the rest of Europe, in a top-down manner without recognition of the opportunity context and if people are ready for change.

Previous transformation research highlights the importance of a shared vision, but in this study the strategies for change diverge, and focus on either strengthening the top-down governance with stricter political steering, or a bottom-up approach that incorporates local knowledge and lessens the power of authorities. Is a transformation possible if efforts are scattered? This is an important research topic, as transformation is so tightly coupled to the resilience, and thus the future provision of ecosystem services, in social-ecological systems.

Many envisioned a future where the water directive had been achieved, which could facilitate adaptation rather than transformation. It is important to reflect about winners and losers in such a scenario, what are the trade-offs? Which ecosystem services might be lessened? To improve water governance there is a need to increase the holistic responsibility and improve collaboration that should permeate all borders and organisations, as the lack thereof is causing great dissatisfaction. It is also important to identify the next step forward in a transformation for water governance in Sweden, which could be to spur innovative and experimental processes.

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Appendix 1 describes the respondents (current and previous) role in the governance of Lake Mälaren's watershed. Names, type of agents (based on interviews) and what they are referred to in the article (e.g. CA1).

Name and interview date:	Current role in the system:	Previous role:	Change processes:	Type of agent:	Referred to as:
Susanna Hansen (2015-11-18)	Water coordinator at Västerås municipality, "Mälaren a lake for millions", Fyramälarstäder (a collaboration between four cities around Mälaren) and, Lake Mälaren Water Conservation Association	County Administrative Board Västmanland.	Initited MER and Sagåns water council, is creating fauna passages in Västerås municipality.	Argumentation and voices the need for water measures (with politicians), initiates projects, builds knowledge and networks, solves problems.	CA1
David Liderfelt (2015-11-06)	Lake Mälaren Water Conservation Association, project leader for "Mälaren – a lake for millions" (MER)	Field work at Asköviken, project leader for Västerås water plan, water coordinator at Västerås municipality, County Administrative Board Kalmar, consultant Alcontrol	Created one of the first water plans in Sweden for Västerås, initiated two Water Councils and MER, Water coordinator at Västerås municipality.	Social butterfly – adapts to social situations. Works in an inclusive, explorative and experimental way. Contributes with new perspectives. Builds novel networks through MER.	CA2
Lennart Gladh (2015-11-18)	World Wide Fund for Nature (WWF) – expertise in eutrophication, the Baltic Sea, freshwater and agriculture, water delegation (North Baltic District)	County Administrative Board, Västmanland. active in decision-making concerning the re-construction of harbour in Stockholm (Slussen)	Convinced others in decision-making processes to respect the ecology (nature reserves) when re-constructing Slussen, the solution will be a richer ecology around Lake Mälaren. Initiated a restoration project for Asköviken	Is not afraid of conflict, argues for ecological values when other interests are dominating. Adds new perspectives.	CA3
Juha Salonsaari (2015-11-20)	Water coordinator Stockholm municipality, MER, Tyrisån water council.	National Board of Fisheries, County Administrative Board Södermanland, Bothnian Sea Water District Authority	Contributes to continuous change as coordinator for water measures in Stockholm, and development of classification of water status, helped create the action programme	Acts as bridge between basic biology and people who need to understand it, Ambitious, goal-oriented, visionary.	CA4
Staffan Lund (2015-01-26)	Program coordinator at the Swedish University of Agricultural Sciences, SLU, and founder of local grass root	Coordinated research project Baltic Sea Compass that focuses on water governance on a Baltic Sea regional level.	Has coordinated and developed the Nordsjön/Vansjön governance project since 2000. The project aims to pave the way for future local grass root water governance.	Possesses stubbornness and endurance to keep a project alive for almost two decades. Innovative and ground breaking.	CA5

	governance project Nordsjön/Vansjön Väl (www.vnval.se), Swedish Agency for Marine and Water Management				
Mats Johansson (2015-11-27)	Senior consultant and Partner at Ecoloop, founder of VA-guiden AB	Worked as a consultant with focus on sewages and wastewater, started avloppsguiden.se water and sewage planning	Initiated the project "good, small sewages", contributes to "levande kust 2020", initiated MER and developed seminars.	Creates network platforms, is the spider in the web, builds knowledge, identifies himself as a change agent (after reading Westley et al., 2013)	CA6
Per Ericsson (2015-12-01)	Development manager Northern Water Board (produces and distributes drinking water north of Stockholm)	Laboratory manager at Northern Water Board, chair in VAS-rådet, member of EURO1 (drinking water networks)	First to voice the changes in organic matter and climate change (and its threat to drinking water), initiated water reserve around the Norther Water Board.	Argumentation, voices novel connections, ambitious, builds knowledge.	CA7
Viktor Kärvinge (2015-12-02)	Politician (S) Sala official "water politician" , environmental officer in Västerås, board of Sagån Water Council		Has changed Sagåns Water council from opposing water measures to formalising a vision with concrete water measures, initiated facebook page (platform for dialogue).	Builds knowledge, lobbyism, dialogue that emphasises mutual respect, networking	CA8
Anna Åhr Evertson (2015-12-03)	Environmental planner at Upplands Väsby municipality, a member of Oxsundaån water collaboration	Head administrative officer at Swedish Environmental protection Agency, Programme Manager Water resources at the County Administrative Board Stockholm	Initiates many projects, created an action programme for the County Administrative Board and a vision and plan for water measures in Upplands Väsby municipality	Initiates projects, a "doer", strategically minded and always acts to enable as much change as possible, solution oriented.	CA9
Petter Ström (2015-12-09)	Farm owner, member of the Water Authorities (North Baltic District), active in the federation of Swedish Farmers (LRF), Board for agricultural consultant firm (Hushållninssällskapet).	Consultant (Hushållninssällskapet).	Has gotten the water authorities to require more research about field margins.	Voices the farmer's perspective to find a common pathway. Builds networks. Highlights the importance of water measures to farmers.	CA10
Mats Wallin (2015-12-16)	Water director at the Water Authority of the Northern Baltic Sea River Basin District, Västmanlands County Administrative Board	Researcher at Swedish University of Agricultural Sciences	Continuous change as he coordinates the action programme.	Comes from a research background, backs everything up and works for a more experimental water governance	CA11
Karl-Axel Reimer (2015-12-15)	Environmental and health manager at Södertälje Municipality, chairman Swedish	Environmental planner and project leader, Trosa Municipality.	Initiated Trosa to become an "ekokommun" (environmentally friendly municipality), initiated project with urine recycling sanitation and	Has a systemic perspective, has endurance and is stubborn and goal-oriented, innovative, visionary.	CA12

	Society for Nature Conservation Sörmland.		wetlands in collaboration with LRF, initiated nature reserve in Trosa		
Gunilla Lindgren (2016-01-11)	Natural environment department at Uppsala County Administrative Board.	Consultant, Gävle County Administrative Board.	Continuous change at the County Administrative Board (e.g identified status of all waters in the county), and demanded storm water solutions for a shopping centre	Skills is conflict resolution, and facilitates sensitive subjects, brave and willing to stand up for nature. Very concrete and straight forward	CA13

Appendix 2 shows which change agent that is connected to each theme for status quo, visions and strategies for change. Each respondent is indicated by change agent (CA) and then the number of the respondent. For information about who is connected to each number see appendix 1.

Result section	**Theme:**	**Change agent:**
Status Quo, Water quality	**The water quality is satisfying**	CA2, CA4, CA8, CA9.
	Water quality varies and is complex	CA1, CA3, CA6, CA11.
	Human-induced stressors are threatening the water quality	CA5, CA7, CA9, CA13.
Status Quo, Water governance	**The governance of Mälaren is satisfactory.**	CA1, CA9, CA10.
	Lake Mälaren is being "milked".	CA1, CA2, CA3, CA4, CA6, CA7, CA9, CA11, CA12, CA13.
	The governance lacks edge and experimentation.	CA5, CA7, CA8.
Visions for Lake Mälaren	**Grounded in ecology**	CA1, CA2, CA3, CA4, CA5, CA7, CA8 CA9, CA10 CA13**.**
	Achieve legislated goals	CA1, CA2, CA3, CA6, CA9, CA11 CA2, CA5, CA6, CA7, CA12.
	Emphasis on the governance structure	CA5, CA6, CA7, CA10, CA12.
Strategies for change	**Practical water measures**	Agricultural measures: CA1, CA3, CA4, CA5, CA6, CA7, CA13. Downstream water measures: CA2, CA4, CA5.
	Collaboration and communication	Collaboration: CA2, CA4, CA3, CA4, CA6, CA8, CA11, CA12, CA13. Communication: CA4, CA5, CA9, CA13.
	Knowledge and innovation	Knowledge: CA1, CA7, CA9, CA12, CA13. Innovation: CA5, CA11.
	Policy instruments.	Financial mechanisms: CA2, CA4, CA6, CA8. Legislation and formal steering: CA1, CA2, CA3. CA4, CA6, CA8, CA11.

Appendix 3 shows an interview script (translated from Swedish) that connects the four themes of the study (change agents, vision for Lake Mälaren, (dis)satisfaction with status quo in terms of water governance and quality, and strategies for change).

1) Can you please draw a time-line when you follow me through you commitment for Lake Mälaren?
   How did your commitment start?
   What are important events that have led to where you are today?

2) Please, give an example when you contributed to a change process connected to Lake Mälaren.
   How did the change process occur?
   What did you contribute with during that process?

3) What is your vision for Lake Mälaren?
   How long do you think it will take to reach your vision?
   How do you think we will reach your vision?
   What is your role in achieving this vision?
   In your profession, what can you do to achieve this vision?
   What is your organization's role in achieving this vision?
   What is indicating that you will reach this vision?
   What is indicating that won't achieve this vision?
   Do you think we will reach your vision?

4) What is your opinion on Lake Mälaren's water quality?
   Are there any problems?
   What is causing these issues?

5) What is your opinion on the governance of Lake Mälaren today?
   What is working well concerning water governance?
   What are current issues connected to water governance?
   What can you do to improve water governance?
   What can your organization do to improve water governance?