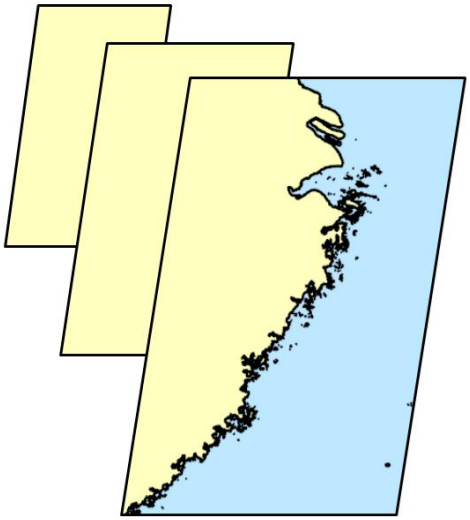
Master's Thesis – Master Sustainable Development

Cascading problems through the Ramsar Convention



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11/07/2022

Word count: 19,334 excluding tables

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Acknowledgements

Thank you to Rak for your regular, insightful supervision and invaluable guidance throughout. I also owe a huge thanks to Jannah and Renate for providing feedback, honesty and support for my sanity from the very start of this research process. Finally thank you for the words of encouragement from friends and family, it was greatly appreciated.

Summary

Cascades in which independent failures propagate until a tipping point is reached are common in densely connected networks but remain under researched in environmental governance on Multilateral Environmental Agreements (MEA).

Through the use of classical decision making theory an analytical framework was devised, that used conditions for decision errors as the independent failures that propagated until a combination of decision error was reached, to tip the system into a cascade. Decision errors occur through the MEA decision making stages of think, act and observe and included the error of solving the wrong problem (Type III), the error of not acting when action was required (Type V), the error of acting when you should not (Type VI) and falsely claiming a relationship that does not exists (Type I). It was theorised that three types of cascade occur: Cascade 1 (Type III + Type V), Cascade 2 (Type III + Type VI) and Cascade 3 (Type I and Type VI).

To illustrate the functioning of the framework, it was then applied to an identified cascade case study. The cascade started after afforestation was advocated by the United Nations Convention to Combat Desertification to prevent the problem of soil erosion. However this action that was seen in the Loess Plateau, China reduced the sediment run off and lowered the sediment load of the Yellow River. This contributed to the eroding of the Shandong Yellow River delta which is a designated site under the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar). This shifted the problem onto Ramsar. However, the problem again shifted to the United Nations Framework Convention on Climate Change (UNFCCC). Ramsar was the central MEA that connected these problems together, creating a cascade and so this research looked to understand *How do environmental problems cascade through multilateral environmental agreements?*

This research found that through states agreeing minimal obligations and then failing to abide by them, the Ramsar Convention was limited in its ability to identify relationships that caused problem shifts. Furthermore conflicting perspectives of contracting parties weakened language in resolutions. This meant that action to designate, protect and fund wetlands based on their ability to sequester carbon was denied and then delayed by contracting parties. The results demonstrated the consequences of silo mentality as a problem fell between Ramsar and UNFCCC and meant that mechanisms were not in place to allow an intervention of the Cascade 1.

Key Concepts

Cascade, decision error, decision making, Multilateral Environmental Agreements, problem shift

Acronyms

APA	Ad Hoc Working Group on the Paris Agreement
CDM	Classical Decision Making
COP	Conference of the Contracting Parties
CRIC	Committee for the Review of the Implementation of the Convention
CP	Contracting Parties
ENB	Earth Negotiation Bulletin
EU	European Union
IPCC	Intergovernmental Panel on Climate Change
MEA	Multilateral environmental agreement
NDC	National Determined Contribution
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIS	Ramsar Site Information Sheet
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
STRP	Scientific and Technical Review Panel
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America

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1 Introduction

The concept of institutional overlap and resulting risks and problems that stem from interaction is not new in environmental and broader institutional literature (Gehring & Oberthür, 2009; Oberthür & Gehring, 2003; Rosendal, 2001; Zelli, 2005). However, these global problems have begun to be assessed in the context of a dense network of risks that result from the cross scale interactions between globally connected social-ecological systems (Galaz et al., 2017; Keys et al., 2019). This is reflected in the high complexity and interconnectedness of international treaty regimes (Keys et al., 2019; Kim & Mackey, 2014a; Kim, 2020), to which globally networked environmental risks create difficult decision making challenges in governance. One such challenge is the possibility of anthropogenic driven cascades through a connected environmental network (Galaz et al., 2017; Keys et al., 2019).

Global cascades result from the "robust yet fragile nature of many complex systems" in which independent failures propagate until a tipping point is reached (Watts, 2002, p.1). The exact point these complex systems reach the fragility and how they result in cascades across social organisations is not yet known (Galaz et al., 2017; Keys et al., 2019). This is the knowledge gap that this research will begin to solve, through the identification of tipping point within institutions, as Galaz et al., (2017) highlights how institutions play a key role in creating, identifying and acting on these risks.

The role of institutions in counteracting risk has previously attracted strong but not focused academic attention. One such area has been regarding the consequences that stem from the action of an institution in the pursuit of addressing their objective of origin, which can be inferred as an identified problem or risk. For example, following concerns regarding the depletion of the ozone layer, the Montreal Protocol led to the ban of ozone-depleting substances such as chlorofluorocarbons. In response, the use of hydro-chlorofluorocarbons increased but these are greenhouse gases with a greater positive radiative effect and thus shifted the risk and problem from the ozone to the climate regime (Kim & van Asselt, 2016). Through this action, or lack of action, institutions have created additional problems for other institutions and their respective objective of origin. This can be defined as a problem shift. However, the lack of an overriding principle has meant that an array of other names also exist for similar concepts including externalities, spillovers, negative consequences, leakages, secondary effects and co-benefits (Downing et al., 2021; Johnson & Urpelainen, 2012; Nilsson, Griggs, & Visbeck, 2016; Van den Bergh, Folke, Polasky, Scheffer, & Steffen, 2015).

Many of the cases in which these concepts have been explored have focused on a single dyadic relationship between two institutions which means that the concepts are often framed as a singular positive or negative outcome. However, this does not reflect the complexity of international regimes or potentially the more significant role of globally networked environmental risks such as cascades. To better reflect the complexity, this research will look to expand this area of research by focusing on problems shifting in a chain of three institutions, to better understand the processes at play for a tipping point to be reached and a cascade to develop. In this study cascades will be defined as the connected chain of interdependent problem shifts through different problem levels (Figure 1).

The high complexity of international treaty regimes which results from the high number of Multilateral Environmental Agreements (MEAs) leads to a high density network of overlapping membership, objectives and rules (Kim & Mackey, 2014b; Kim, 2020; Schleussner et al., 2016). MEAs are a type of intergovernmental institution that through the use of "treaties, conventions, charters, statutes, or protocols between three or more governments" attempt to change state behaviour

relating to the environment (Mitchell 2003, Chambers 2008, Kim 2013). The interconnectedness and high density of MEAs presents a worthwhile unit of analysis through which to identify cascades. This is because through their attempts to change state behaviour, they may not only cause a single problem shift but create a chain of connected problem shifts (Figure 1), in this researched named a cascade (Watts, 2002). If this occurs then Oberthur and Gehring (2003) believe that these interactions, beyond a simple one step, means that the outcome, whether positive or negative, can vary for different institutions and thus affect how the overall regime effectiveness is perceived. This is thus important to understand for society to help decision makers improve MEA's and the effectiveness of the entire environmental governance system.

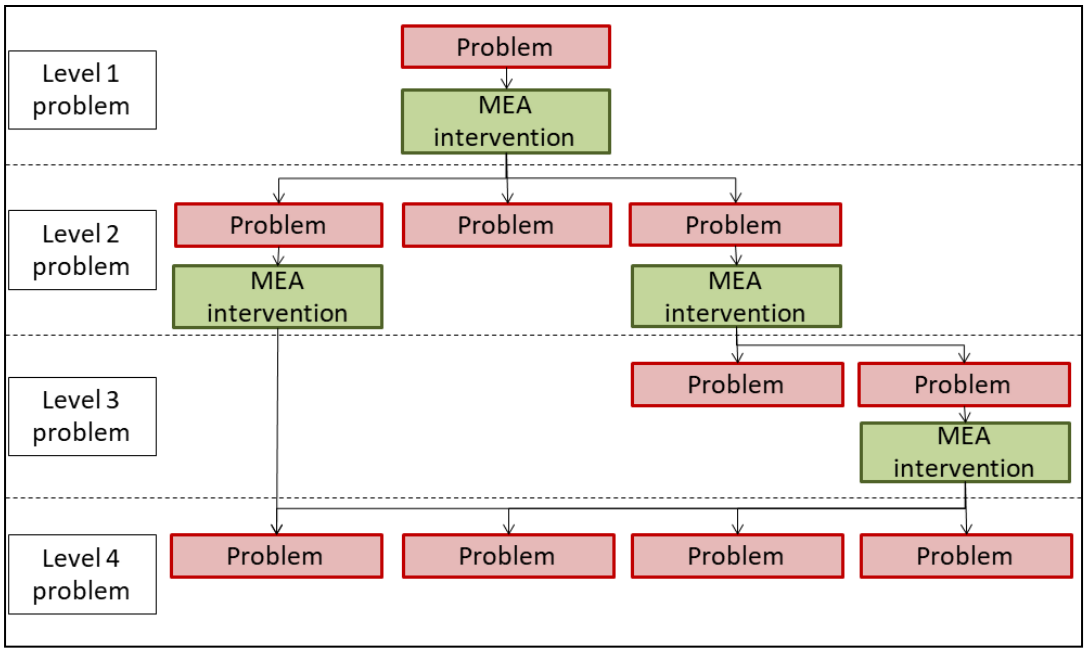

Figure 1: Consecutive problem shifts (represented by arrows) to different MEAs resulting in a linear cascading of problems.

Whilst environmental governance literature references cascades, it is not yet mature or theoretically established. References to cascade effects (Galaz et al., 2017; Nilsson et al., 2016; Van den Bergh et al., 2015), is often used to describe the multiple consequences that directly result from a single intervention on the problem level 1 (Figure 1). However this research looks to focus on the problem level 2, because for a cascade to develop an MEA needs to respond to a shifted problem and then also cause a problem in the future. This could be explained by the first rule of system thinking, which is that "today's problems come from yesterday's solutions" (Senge, 1997) p42. The rule outlines that externalities go undetected because often those who solved the first problem are different from those who inherit the new problem. By focusing on a central MEA in a chain of three, this research objective was to explore how they can receive a problem and then shift another problem to show how a cascade occurs through them. This leads to the main research question of the thesis:

1.1 Main research question

How do environmental problems cascade through multilateral environmental agreements?

Due to the minimal reference to cascades in environmental literature, the research will aim to answer the research question through the creation of a new framework based on the theory of Classical Decision Making (CDM). This research thus also has a sub aim to offer insights into *how and under what conditions problem shifts and possible cascades occur in environmental institutions.*

CDM theory incorporates the idea that multiple actors can influence the decision process and outcomes regarding problems and has been incorporated into literature on complex systems (Boal, Kimberly B. & Schultz, 2007). Mark Meckler, Kim Boal, as well as Patrick Hester and Kevin Adams are the prominent researchers on CDM theory, which details how actors need to define problems and make decisions on the best way to resolve them, otherwise they risk making decision errors that can combine in particular combination to create cascades (Hester & MacG, 2017; Meckler & Boal, 2020). It is this combination of errors that is the tipping point leading to a cascade. Thus this theory offers a suitable template to show how cascade develop from certain combinations of decision errors within an MEA intervention that connects single problem shifts in a chain. To illustrate the functioning of the framework, it was then applied to an identified cascade case study.

The case is outlined in the methods section and details how the United Nations Convention to Combat Desertification (UNCCD) promoted afforestation to prevent soil erosion amongst its member states. This led to large areas of tree planting in the Loess Plateau in China, but has since been found to have reduced the sediment run off in the catchment and lowered the sediment load of the Yellow River which has been directly linked to wetlands erosion downstream (Sun et al., 2015; Zhao et al., 2018). Specifically, research found that wetland degradation occurred in the Shandong Yellow River delta which is a designated site under the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar). The erosion of the Ramsar site has also been found in research to contribute to a loss of carbon storage (Ma et al., 2019), and thus an increase in atmospheric greenhouse gas emissions which should be a concern for the United Nations Framework Convention on Climate Change (UNFCCC).

This research applied the framework to Ramsar as the central MEA, to see how combining decisions errors could be responsible for allowing the environmental problems experienced in the Yellow River to cascade through them (Figure 2). To assess the decisions made within Ramsar, resolutions agreed by states and their decision making process were analysed and the combining decision errors and influencing conditions are outlined in the results section. The research ends with reflections in the discussion and conclusion.

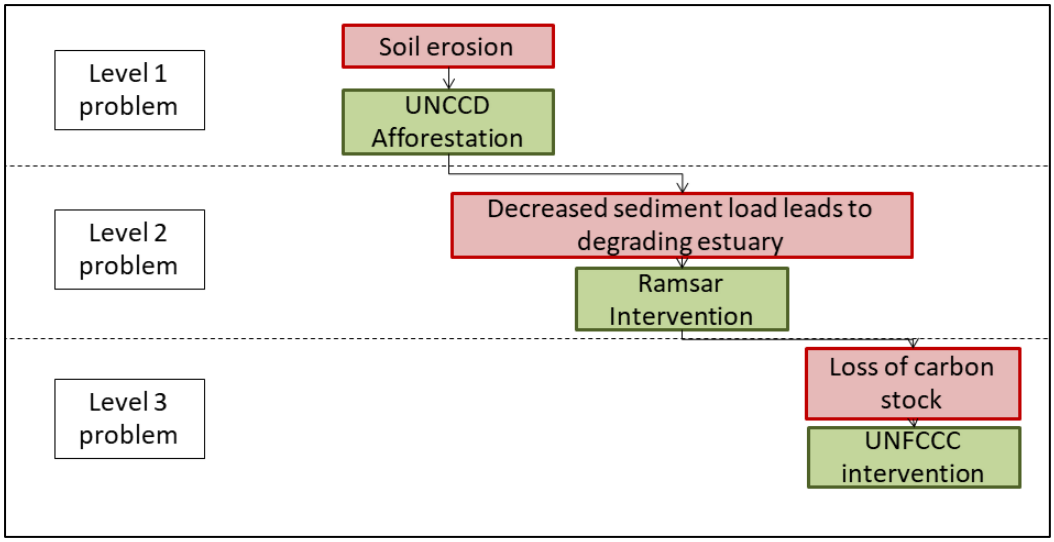

Figure 2: Consecutive problem shifts and resulting cascade through the Ramsar Convention.

2 Theory

Unlike environmental governance literature, global cascades between systems have been studied in greater depths by other domains, such as ecosystems and social media (Kim, 2020; Potschin-Young et al., 2018; Stella, Cristoforetti, & De Domenico, 2019; Watts, 2002). The theory section outlines the current understanding of cascades in governance literature and details how cascades are explained by CDM. The section then finishes by outlining what CDM can offer for MEA in order to assess how cascade develop through them.

2.1 Current understanding of cascades in complex governance system

Figure 1 details how MEA interventions to address an environmental issue on level 1 can cause additional environmental problems on level 2. This can be seen as a singular problem shift in a dyadic relationship. Whilst Figure 1 does not illustrate the interlinkages between problems and MEA's on different levels that exist due to the complexity of MEA network, it does illustrate the flow of linear interdependent problems shifts. This link between interdependent problem shifts will be the focus of the research, specifically how an MEA at level 2 could be responsible for creating an additional problem shift to level 3, and thus a cascade. To understand how this happens, the decisions that are made by Contracting Parties (CP) in Ramsar will be analysed. This is important as the decision making procedure of institutions is one of eight factors that need to be explored to understand problems (Young, King, Schroeder, Galaz, & Hahn, 2008). Young has emphasised how institutions and academics need to begin to think systemically as we are living in the Anthropocene (2013; 2019), yet decision making theory has not yet been used to look at problem shifting, despite it allowing for the opportunity to study decisions in complex systems with multiple actors.

2.2 The stages of decision making within an MEA intervention

CDM theory incorporates different decision making stages. Whilst Meckler and Boal (2020) identified four linear stages of decision making, Hester and MacG (2017) preferred to discuss the decision process as a cycle. The cyclical stages think, act and observe (Figure 3), is adopted by this study, and make up the decisions that will be analysed within the MEA intervention boxes in Figure 1. The three stages represent how institutions play a crucial role in the emergence, detection and response to problems (Galaz et al., 2017), whilst a cyclical approach enables the possibility to see the MEA decision making process over time, to see if it adapts to changing situations and reassesses its objectives and action. Fundamentally, it better reflects the dynamic nature of decision making in turbulent and evolving complex systems with emergent behaviour and changing boundaries that lead to new actors entering the problem (Young, 2013; Yue & Barkley, 2015). This emergent nature of complex systems means that Figure 1 is only a snapshot in time, and the problems and MEA intervention can be fluid. The three stages and the six decision error types will be explored below.

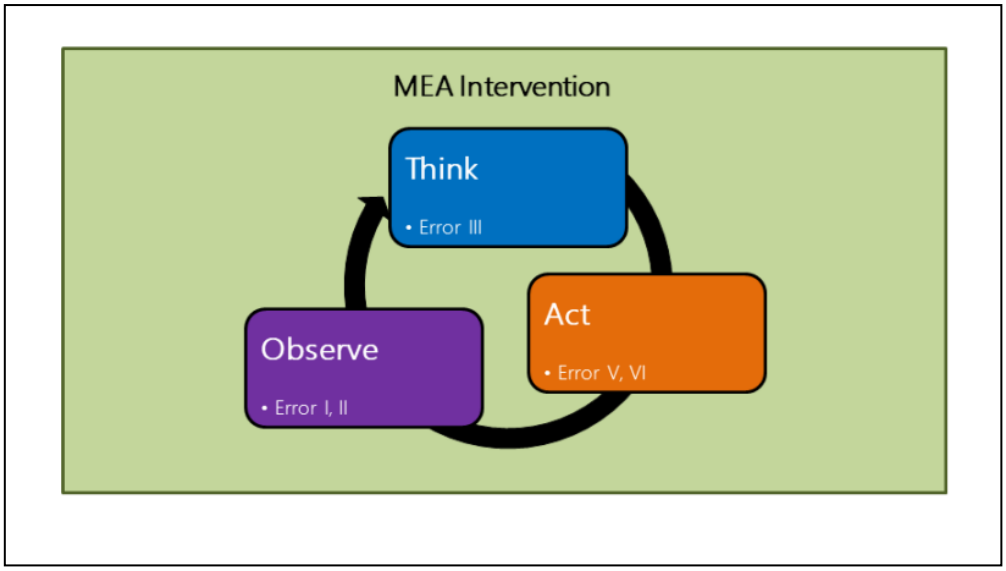

Figure 3: The three stages of decision making and possible decision errors within an MEA intervention.

2.2.1 Think stage

The first stage of decision making sees issues being prioritised and goals being identified, which is a fundamental phase in understanding complex systems and is thus often seen as the most important stage of decision making (Bea, Mitroff, Farber, Foster, & Roberts, 2009; Katina, Polinpapilinho F., 2015; Meckler & Boal, 2020). In this research, the creation and operation of MEA's, which are environmental intergovernmental institutions occurs at this stage. Intergovernmental institutions can be defined as the "cooperative arrangements among national governments to address transboundary environmental problems" (Mitchell et al., 2020, p.37). What this definition struggled to portray is the friction that exists in the process of agreeing on an environmental problem. This friction is dependent on the actors involved that often make the agreement of a problem a political process. The reason for this is because MEAs, are designed to change state behaviour (Chambers, 2008; Mitchell, 2003). This change of behaviour threatens states sovereignty, and thus the problem formulation, as well as strategy and decisions that need to be agreed are influenced by how states perceive scientific knowledge, not the knowledge itself (Dietz, 2015). However it does also raise the possibility of several MEA's being within a single MEA intervention box (Figure 1), if they define the problem as being relevant to them. Never the less, it is the exact difficulties in agreeing a problem structure that are revealed at this stage of decision making, through the presence of Type III and Type IV decision error.

Error of the third kind (Figure 3) results from trying to solve the wrong problem (Mitrofff & Betz, 1972). If this is committed, then resources are wasted on a strategy that will at best be indirectly effective and at worst leave the original problem to fester or even worse, cascade (Boal, Kim & Meckler, 2010; Meckler & Boal, 2020). This failure will require greater resources in the future, with denial of this situation leading to organisational decline (Adams & Hester, 2012). This is the first error that is required for a cascade to develop. Another error that can develop at this stage is error of the 4th kind which refers to a decision making body lacking innovation. However, it is not necessary for a cascade to develop and will thus not be a focus of the research.

2.2.2 Act stage

Whilst the think stage focuses on the creation of a broader goal and objective by the high level decision makers, this stage focuses analysis on how MEA influences action by CP (Meckler & Boal, 2020; Tichy & Bennis, 2007). This is because this stage refers to the phase that looks to improve the problem through the process of selecting the correct or feasible action and implementing it in order to achieve the desired end state of the agreed goal in the vision stage (Gilboa, 2011; Hester & MacG, 2017). MEA's attempt to alter state behaviour as they "agree to create programmes of actions or commit funding to improve and promote actions for environmental betterment" (Chambers, 2008, p.49). However, two types of decision error, type V and VI could promote incorrect action (Figure 3).

The decision for inaction, Type V error, occurs when decision makers do not act when they should (Meckler & Boal, 2020). Type VI error occurs after action is chosen when no action would have been more favourable, as the action contributes to the growing of the complexity as it introduces new forces into the situation (Hester & Adams, 2013; Meckler & Boal, 2020).

2.2.3 Observation stage

The final stage is the observation stage, which provides the main input for knowledge on the real world which helps to establish the relationships between the factors of the problem (Hester & MacG, 2017; Meckler & Boal, 2020). These findings then input into the future decision making stage in the thinking and action stage. However decisions are also made in the observation stage (Figure 3), as literature argues that observation and the collection of data is already interpreted as it goes through perceptual and contextual filters. This means error can exist in preparation, selection of observed variable, recorded observations, inferring of data and reporting of the analysis (Hester & MacG, 2017). Within this stage Type I and type II errors occur due to misunderstanding correlation and forces at play (Boal, Kim & Meckler, 2010).

Type I error occurs when a correlation or relationship is claimed to be present, but none exists. This directly contributes to a cascade, unlike Type II Error which occurs when it is claimed that no correlation or relationship occurs, but one exists and this is required for a cascade to occur.

2.3 Decision theory offer to problem shifting research

The most important aspect that CDM theory provided to this research is the pathway to a cascade, sometimes referred to as error of the 7th kind. This is because it creates an entirely new problem that can't be defined and solutions can't be agreed (Adams & Hester, 2012). Furthermore it no longer resembles the original problem and requires entirely different resources to overcome (Meckler & Boal, 2020). The cascade results from the combination of different decision errors at different stages within an MEA intervention. The combination results from Type III and Type V or VI errors, or the combination of Type I and VI error, as they manifest into a situation that is too much for the system to cope with, leading to a cascade (Watts, 2002).

CDM theory details how the three different combinations can be identified through conditions that lead to the individual decisions errors. What the conditions are and how they create decision errors that combine into a cascade are explored below.

2.3.1 Cascade 1: Type III + Type V

This first cascade results from decisions in which actors cannot agree on a definition for the problem which creates a Type II error. This is compounded if actors cannot see the root cause of the problem,

which means that they struggle to envision a plausible way to solve the situation (Meckler & Boal, 2020). Even if a plausible strategy is found, agreeing upon an intervention is challenging and means that not acting, despite the need to act, is the outcome and thus leads to an action error of the 5th kind. In combination, these errors lead to a cascade (Figure 4) and is a possible pathway for cascades to develop in MEA's where consensus is often required.

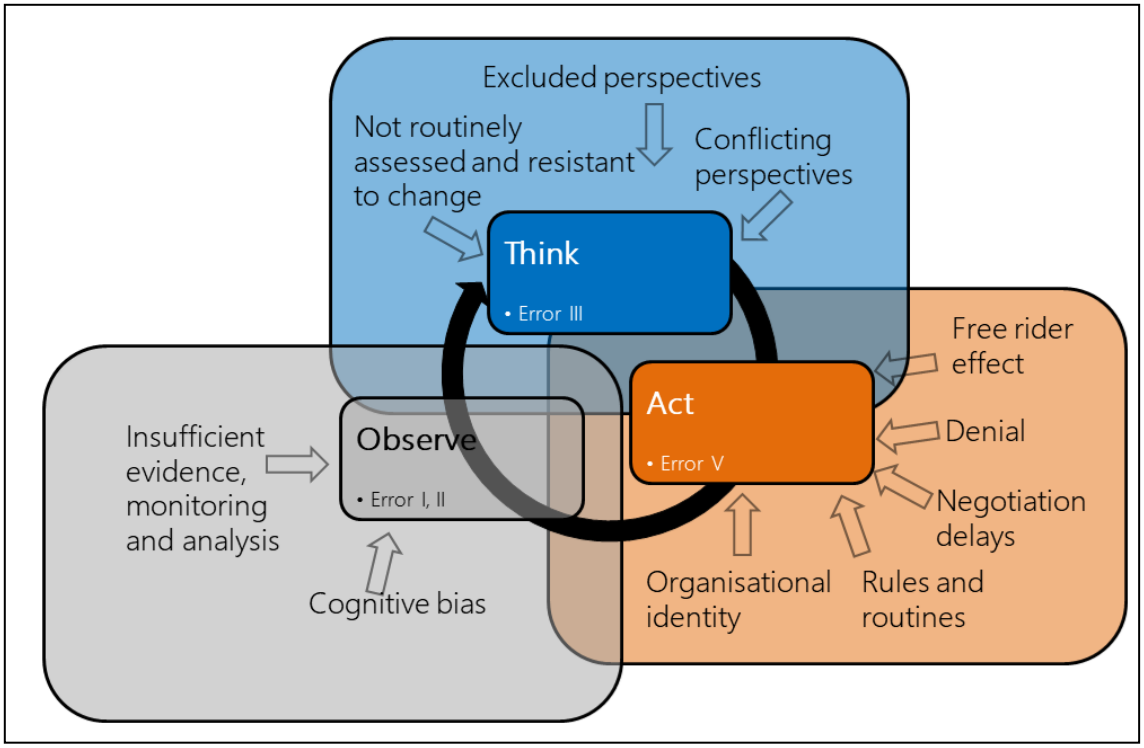

Figure 4: Active conditions that lead to decision errors in Cascade 1.

2.3.1.1 Conditions of cascade 1

During MEA formation and resolution creation within Conference of the Contracting Parties (COP), the divergence of philosophy, resource allocation, power, control and interests amongst state actors is to be expected in international institutions (Hester & MacG, 2017; Young, 1989). However, this creates the risk of conflicting perspectives that make it challenging to agree a problem definition (Figure 4). Game theory suggests that if there is a shadow of the future during negotiations, then nations could delay an agreement for bargaining, as they know that the process will take a long time and be repeated (Young, 1989). This is particularly seen within MEA's with regular COPs, such as the UNFCCC where delay has been a common occurrence in climate regime since the Kyoto protocol (Adams & Hester, 2012; Keohane & Victor, 2011). Furthermore, states can attempt to link issues together, which increases the complexity and time spent in decision making. If no stakeholder consensus is reached on decisions then this leads to delaying discussions on the issue and ultimately inaction due to lack of singular prevailing vision (Hester & Adams, 2013). This inaction is a Type V error if an intervention cannot be agreed and gives time for the problem to fester (Meckler & Boal, 2020).

Due to the need for consensus in MEA decision making, it often means that a clear and succinct problem definition cannot be agreed as the lowest common denominator is selected to appease the most countries. This can create a broad problem that lacks clarity. Young (1989) believed that countries are more willing to accept such a problem structure due to a veil of uncertainty that impairs their own judgements regarding what their priorities and agenda will be in the future. This broad

mandate and problem formulation, means that states can be flexible in the future. However, the lack of a singular prevailing vision affect the action promoted by MEA's, as it leads to the creation of ambiguous and inconsistent strategy with submaximal goals being set (Hester & Adams, 2013). This can also lead to social loafing also known as the free rider effect as states believe that it would be easier to achieve the goal when others are helping, so work less hard as a result (Latané, Williams, & Harkins, 1979). Thus states may not ratify agreements or internalise rules and principles into national law, regulation and policies meaning that the problem remains unresolved (Jung, 2003).

Differences in perspectives such as philosophy can mean that certain perspectives are excluded from MEA's and thus within the problem formulation stage. This can be through states own desire not to be involved, such as China not being a signed and ratified state party of Convention on the Conservation of Migratory Species of Wild Animals. This means that these actors may not act at all, or to the desired standard established in the MEA which reduces the effectiveness. Other actors that demand improvement in action may also be excluded, meaning that certain voices are not heard and thus not sufficient action is taken to improve the situation. For instance, Non-Governmental Organisations (NGOs) are often excluded because they may increase demands and make it more difficult to achieve consensus (Mikadze, 2016).

To overcome a type III error, MEA's and their identity can be routinely assessed (Katina, Polinpapilinho F., 2015). However if this process is not in place to assess the ability of the MEA to provide a consistent guide in decision and action, then error of the third kind can develop (Katina, Polinpapilinho Freeman, 2016). This is important in complex systems, as even if no vision error was originally made during the MEA formation, in time the complexity and boundaries of the system and the problem may have changed, so the MEA likewise needs to (Yue & Barkley, 2015). The ability of the MEA to assess itself can be compounded by its rules and routines (Boal, Kim & Meckler, 2010). Rules, such as the frequency of decision making COPs, affect how reactive MEA's can be and may intentionally or unintentionally slow down decision making process, inhibit the search or delay assessment and lead to the continual misdiagnosis of the problem and no action (Boal, Kimberly B. & Schultz, 2007; Meckler & Boal, 2020). This organisation transactive memory makes them naturally resistant to change, which is common in larger institutions. Frequency of COPs also affects visibility of the problem; as if it recurs regularly then it is not forgotten. However, high recurrence needs appropriate human and financial resources. Some authors have called for an adjustment of the decision making process within international governance (Biermann et al., 2012), which could be seen as attributing organisational rules, routines and procedures as the debilitating process within decision making.

If the system is reassessed, a Type III error can occur if it is fed by incorrect information by actors which means that it does not have sufficient knowledge on variables involved (Adams & Hester, 2013). Due to fear of embarrassment and poor communication symptoms to a problem can be underreported, creating a Type I or II error as actors underemphasises a problem in the think stage and means that no action is taken (Adams & Hester, 2012; Meckler & Boal, 2020).

This leads to the unfortunate situation in which actors continue to believe in an erroneous relationship of variables, e.g. that existing control system is good enough. It also illustrates a sense of denial, which stems from the belief that the system will fix the problem itself or the problem will become inconsequential (Meckler & Boal, 2020). This can occur if an MEA doesn't realise that it is ineffective and ignoring the impact of emergent properties and not acting, which leads to type V error (Meckler & Boal, 2020). Institutional denial may also result from a fear that interference could worsen the problem (Adams & Hester, 2013).

Organisations identity directly makes it resistance to change, particularly if decision makers believe that their identity meets current societal demands (Fox-Wolfgramm, Boal, & James G.(Jerry) Hunt, 1998). For instance, if there has been particular past success, then this is often used to justify a continual commitment to the existing action (Weitzel & Jonsson, 1989). However, this inhibits organisational learning and exploration (Boal, Kimberly B. & Schultz, 2007; March, Schulz, & Zhou, 2000). It also inhibits the expansion of mandates if states feel that the action is not suitable to the organisation identify or if it duplicates action elsewhere. This can keep related issues separate and leads to silo mentality. This was seen by US that looked to keep discussions and finance between the forestry and climate change regime separate (Johnson & Urpelainen, 2012). This means that MEA's may be excluded or have a weakened role regarding the discussion on certain topics, even if relevant to their mandate.

2.3.2 Cascade 2: Type III + Type VI

Similar to Cascade 1, Cascade 2 occurs from visioning error that infringes decisions makers' ability to see the original problem, so they lose focus on the root of the problem and make an erroneous action error. However, this cascade occurs from the interaction between type III and VI error, meaning that actors chose to act when not acting would be preferred. This results from a lack of consideration for broader macro level factors as they become unaware or underestimate the weight of risk from the potential interactions within the original problem that could thus occur when they decide to act on the wrong problem (Meckler & Boal, 2020). As the action is not made on the root cause of the problem, it means that the original problem may fester, worsen and become larger (Meckler & Boal, 2020). At the same time the incorrect action introduces new elements to the problem, which creates a cascade (Figure 5).

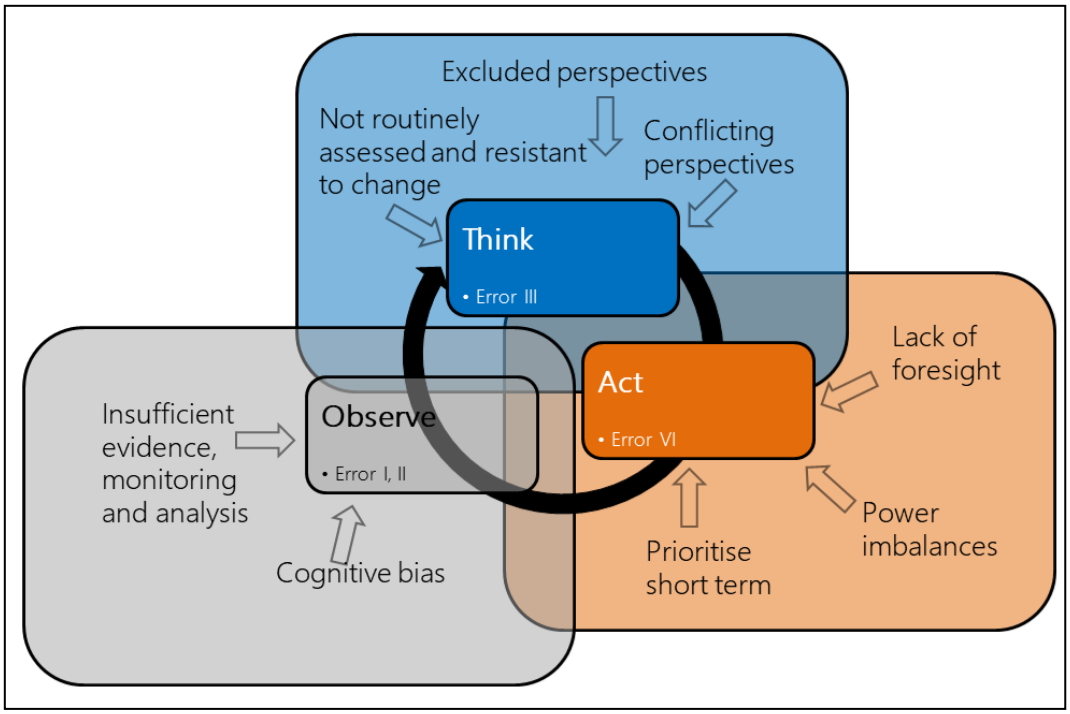

Figure 5: Active conditions that lead to decision errors in Cascade 2.

2.3.2.1 Conditions of cascade 2

Traditionally MEA's excluded all but scientific perspectives, meaning that a lack of representation often begun at the outset of their formation (Young, 1989). However, if decision making is left to technical expertise the problem becomes narrow (Bea et al., 2009; Young, 1989) and risks a type III error (Mitroff, 1997). Adopting a problem oriented approach in which MEA's were established around a certain problem, meant that seeking to improve the condition of a singular component or objective leads to oversimplification of the problem and action that it is not compatible with the need to think systemically in complex systems (Bea et al., 2009; Hasenclever et al., 1997). This is because a single problem's goal doesn't sufficiently represent the problem structure of the system (Hester and Adams, 2017). A following type VI error then constrains the overall performance of the governance system (Hester & Adams, 2013; Katina, Polinpapilinho Freeman, 2016; Mitroff, 1997). This narrow focus also contributes to the silo approach (Azizi, Biermann, & Kim, 2019), as conflict develops between MEA's in the same issue-area, due to incompatible rules even if principles and norms are compatible (Hasenclever, Mayer, & Rittberger, 1997; Oberthür & Gehring, 2003; Rosendal, 2001; Winham, 2003). This failure to identify interaction and overlap can be reduced through cooperation, either through secretariats or state members in both, and by broadening the perspectives involved such as different civil society actors. However, including many perspectives runs the risk of error type V.

The goal of systemic thinking is achieving increased understanding of a problem, which doesn't presuppose that our situation will reach a conclusive state (Hester & MacG, 2017). Katina, (2016) emphasises the need to include perspectives from the metasystem, which includes those from inside the system that MEA's are responsible, and those outside but are still affected, either by actions or because their actions impact the original MEA. If MEAs don't have fully range of necessary perspectives then certain knowledge and viewpoints can be excluded from the decision making process, which leads to the incorrect problem formation, insufficient reassessment of the vision and inappropriate action. This poor knowledge can also be fed by type I or II error as decision makers receive incorrect information, which means that forces and consequences were analysed incorrectly or insufficiently (Adams & Hester, 2013; Meckler & Boal, 2020). This leads decision makers to believe in an erroneous relationship of variables, e.g. that existing control system not good enough, and ultimately leads to unnecessary action.

Unnecessary action can result from prioritising the short term and urgency, for example if action is implemented to achieve a goal within a short time frame or in an emergency situation (Rodriguez-Aseretto, Schaerer, & de Rigo, 2014). This situation could increase the need for acting for the sake of acting and results from missed precaution as a result of limited information, and an underestimation or oversimplification of causal forces (Meckler & Boal, 2020; Patt & Zeckhauser, 2000; Rodriguez-Aseretto et al., 2014). Both of which can result from having inadequate perspectives in the visioning stage.

The inclusion and exclusion of perspectives can relate to the distribution of power amongst decision makers. However Young (1989) has an issue with the rationalist assumption that participants in negotiations are fully aware of their interests and those of others and potential overlap that this could produce (Hasenclever et al., 1997). Young does acknowledge that hegemonic power of states is a factor in extreme cases (1989). However, even if all perspectives are included institutional bargaining outlines that if a stakeholder group is too weak for decision makers to worry about, they will be ignored (Conca, Wu, & Mei, 2006; Meckler & Boal, 2020). Stakeholder power can determine the prioritisation of goals and factors, meaning that stakeholder power can influence the short term versus long term interests and lead to ill-advised solutions (Meckler & Boal, 2020). Power imbalances also

influence the reassessment of vision, because certain powerful actors may wish to continue the pursuit of a certain goal or action that they benefit from, even if it isn't best for the overall system.

2.3.3 Cascade 3: Type I + Type VI

This final type of cascade illustrates how even if the correct problem is identified, MEA's can still make decision errors that transform a problem. This occurs when a relationship between variables is falsely identified in the observation stage which leads to a Type I error. This is then compounded by a Type VI error as decision makers decide to act to improve a variable in a relationship that doesn't exist (Figure 6). The intervention does more harm than good as it introduces new variables and allows the original problem to morph into something greater (Meckler & Boal, 2020).

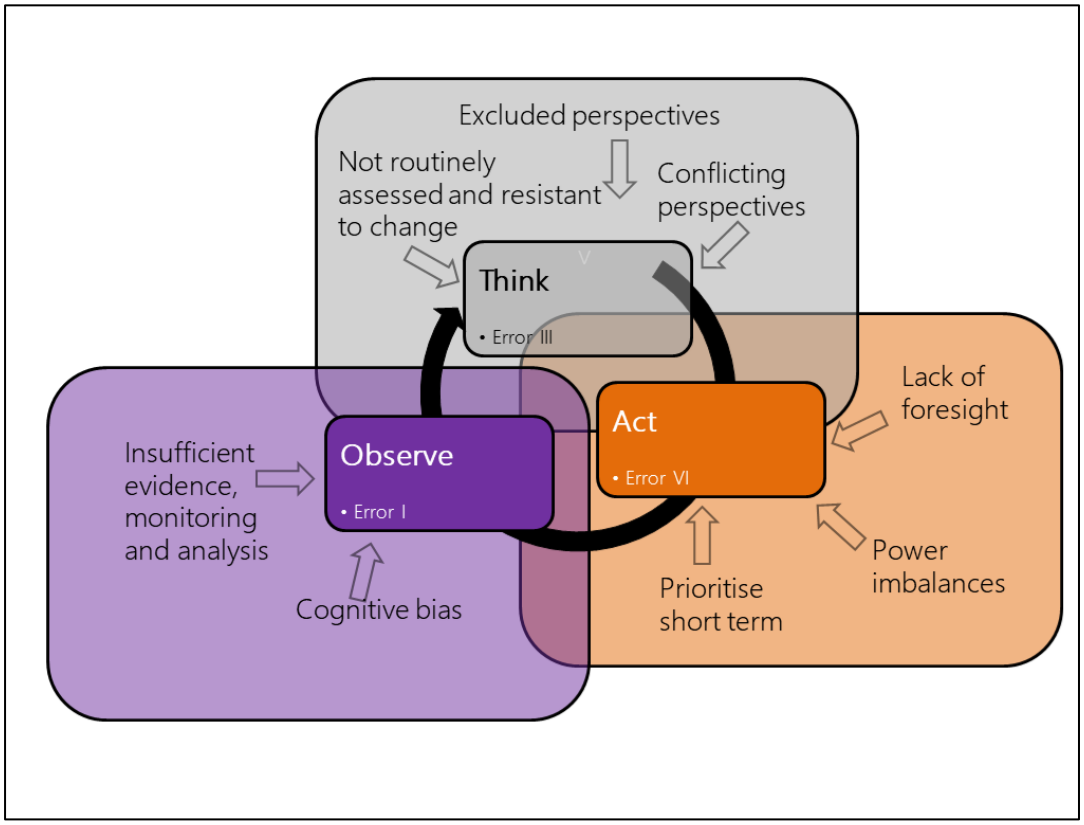

Figure 6: Active conditions that lead to decision errors in Cascade 3.

2.3.3.1 Conditions for cascade 3

The first condition is insufficient evidence, poor monitoring, and analysis which means that the existing observation is not suitable to understand the systemic complexity created by instabilities of the environment and technology (Hunt, Osborn, & Boal, 2009; Meckler & Boal, 2020). Katina outlined how this error occurs if there is a lack of monitoring of the system, if there is insufficient processing of data and if there are a lack of performance indicators (2016). Whilst this can result from inexperience, it can also come from a place of ignorance and inattention that allows excessive personnel, tolerance of incompetence and cumbersome administrative procedures to prevail (Adkins, Adams, & Hester, 2015; Meckler & Boal, 2020; Weitzel & Jonsson, 1989). The poor observation stage can then prevent an MEA from having foresight, which can lead to Type VI error. This could particularly occur if a problem is of high priority and action is urgently needed. This could lead to a situation in which the observation of a particular action may not have had the appropriate scrutiny and

long term analysis, which could not significantly test relationships. Due to the urgency and a lack of foresight, the action is rushed through and the cascade develops.

The second and final condition results from bias that can affect the observation of data. This includes the availability heuristic, representativeness heuristic, conjunction fallacy, anchoring and adjustment heuristic, recognition heuristic, confirmation bias (Hester & MacG, 2017). Theory-laden observation describes how the observer's personal beliefs impact each stage of the observation. However, it is known that bias, such as the conjunction principle, falls dramatically when people can consult on a problem with others or receive financial incentives (Charness, Karni, & Levin, 2010). However, evidence exists of this cascade occurring. For instance the United States of America (USA) decision to invade Iraq could be attributed to a type 1 error as they thought that Saddam Hussein possessed weapons of mass destruction. This error was then compounded by the countries decision to invade, which as the most powerful military power in the world convinced other countries into action as part of the Multi-National Force in Iraq. Combined, these errors had cascading consequences, as the original problem that was a hidden terrorism cell in Iraq, escalated into war, massive debt and a global loss of influence and power for the USA (Meckler & Boal, 2020).

Environmental governance literature has adopted the aspects of system dynamics literature regarding wicked problems and high complexity, but it has not yet explored cascades. Based on theoretical insights within CDM cascades may be occurring due to decision errors. This understanding is illustrated through a case study of a cascade that along with an analytical framework that operationalises decision errors, is outlined in the methods.

3 Methods

3.1 Research strategy

The identified cascade case study is the basis of the research strategy. It allows the theory of cascades that was presented previously to be illustrated through the decisions made by a central MEA, Ramsar. Figure 7 outlines how this will be achieved to answer the research question, as first the case study will be outlined and then the data collection and analysis with the analytical framework will be explained.

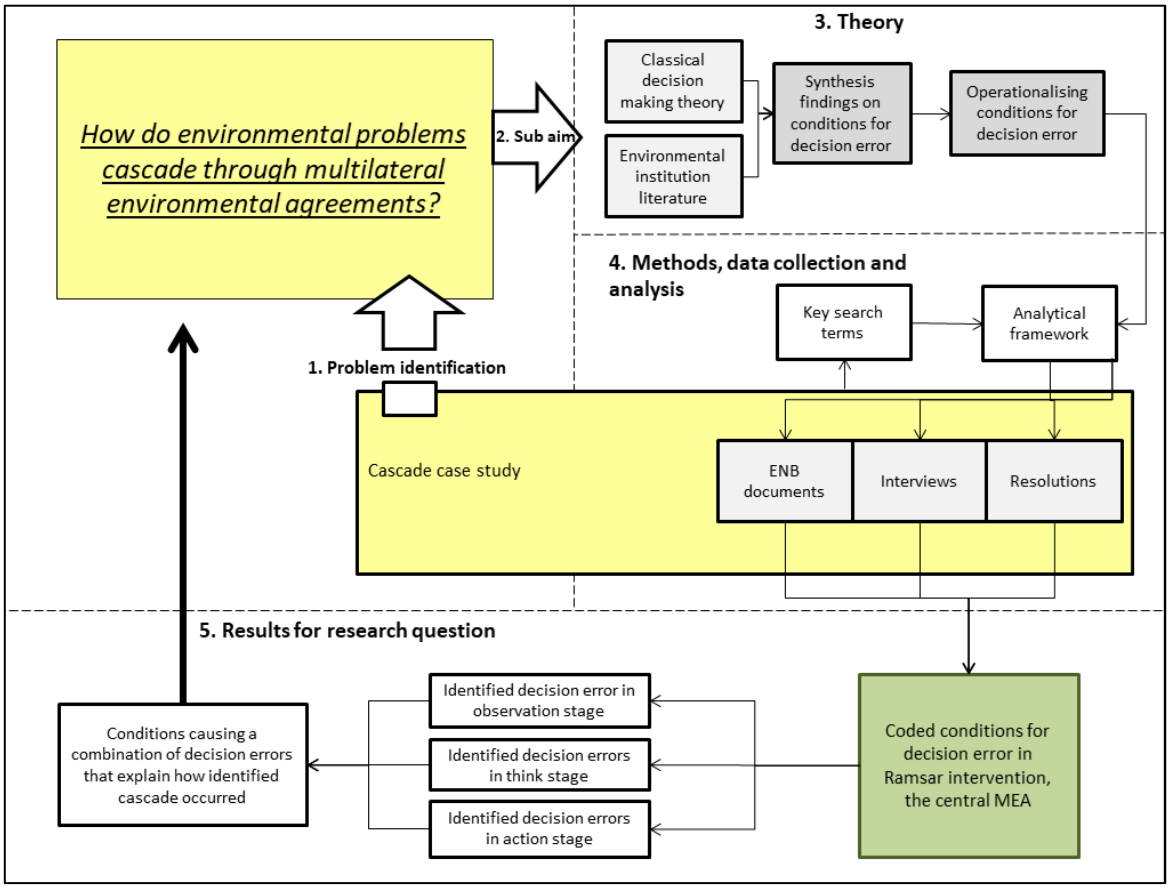

Figure 7: Flow diagram of research process.

3.1.1 Case description

The identified cascade down the Yellow River, China, is outlined and then how this relates to the responsible MEA's, notably the central MEA Ramsar is detailed.

3.1.1.1 The cascade case study: The Yellow River, China

The Yellow River, also known as the Huang He, flows 5464 km east through northern China from the Qinghai-Tibet Plateau to the Bohai Bay (Chen, Y., Syvitski, Gao, Overeem, & Kettner, 2012; Ren & Shi, 1986). The middle course of the river flows through the Loess Plateau (Figure 8), which suffers from high water and wind erosion of its loose loess soil, which supplies more than 90 % of the Yellow Rivers sediment load. The heavy sediment load of the river, maintains the alluvial plain that makes up the Yellow River Delta (Chen, Y. et al., 2012; Ren & Shi, 1986).

The soil erosion within the Loess plateau means that it is a risk of desertification, which has been a concern for China since the 1950's as it has attempted different conservation and management approaches, to increase soil and water conservation, including the use of check dams, biological measures and then the ratification of the UNCCD in 1997 (Kong, Stringer, Paavola, & Lu, 2021).

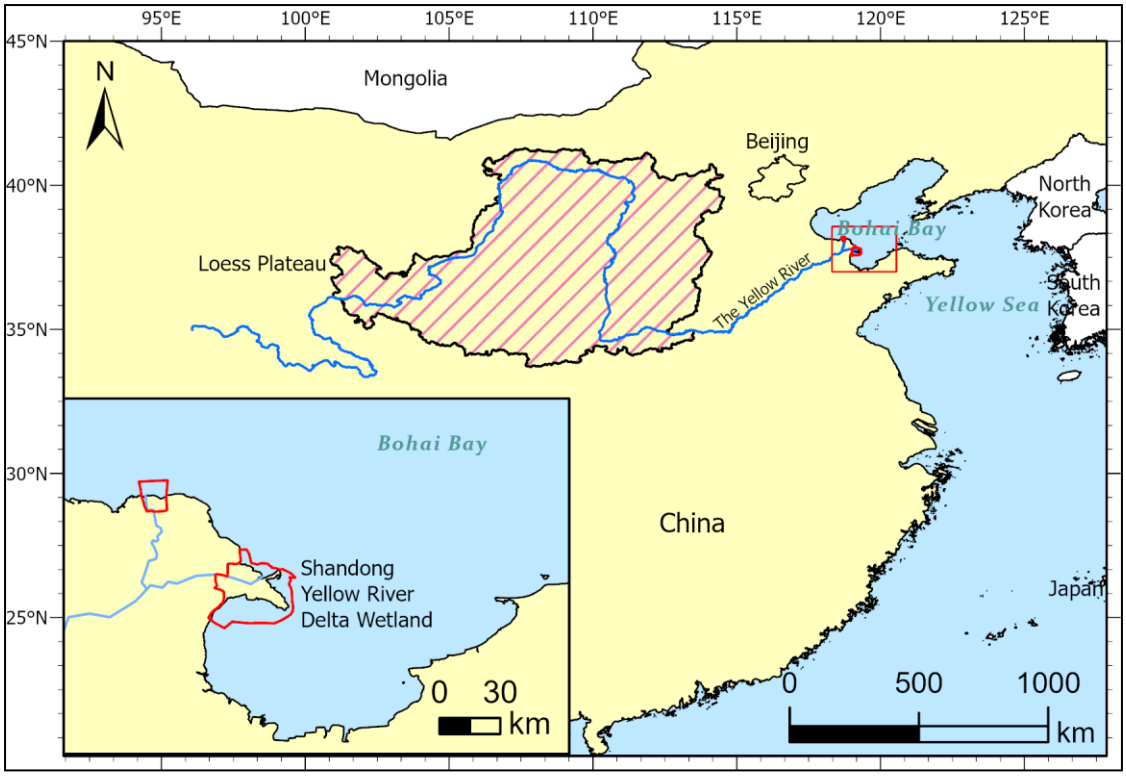

Figure 8: Geographical location of cascade through the Yellow River, China.

Being one of three Rio Conventions, along with UNFCCC and Convention on Biological Diversity, the UNCCD sought to create synergies between them, with their 2000 COP4 Decision 8 (UNCCD, 2000). It looked to accomplish this through the "*launching of reforestation/afforestation programmes and intensification of soil conservation programmes*" (UNCCD, 2000, p.30). This was because forests were seen as a cross cutting issue of the Rio Conventions (Gaynutdinova & Juncurt, 2004), and led to the promotion of afforestation by UNCCD as it "stressed the need to prevent desertification during the first decade of the 21st century" (UNCCD, 2000, p.30).

One such action that commenced in the run up of the resolution was China's Grain for Green program. From 1999 farmers that lost farmland to afforestation in the Loess Plateau were compensated with grain and cash (Kong et al., 2021). China had been experimenting with afforestation as a solution, and its participation within UNCCD shaped its national response (Kong et al., 2021) as it amended and approved the UNCCD resolution (Doc.1), which allowed the continued support and extension of the Grain for Green program.

The program successfully reclaimed deserted land, but over time negative problems began to be identified, including the poor tree growth and a decreased watershed runoff (Kong et al., 2021). Furthermore, as afforestation was made to reduce soil erosion, sediment run off into the Yellow River decreased (Figure 9) and untimely led to the observation of a decreased sediment load in the Yellow River (Shi et al., 2020; Wang et al., 2016; Zhou et al., 2017). This had consequences downstream, as it increased the threat of erosion of the Shandong Yellow River Delta (Ye et al., 2022) , which was a designated Ramsar Site from 2013 (Yueliang, Kelin, & Baoshan, 2013).

The designation of Ramsar sites is one of three key pillars of Ramsar, and was ratified by China in 1992. The initial purpose was to designate sites that were important to waterfowl, however the criteria has since expanded (Bridgewater & Kim, 2021). The other pillars are the importance of international cooperation and to ensure "the conservation and wise use of all wetlands", which is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" (Ramsar Convention Secretariat, 2010, p.16).

The Shandong Yellow River Delta includes areas of tidal flats and marshes covering 959.5 km^2 in two sections (Yueliang et al., 2013). The accretion and erosion responsible for the delta is controlled by sediment loading, which has been gradually decreasing (Sun et al., 2015). Erosion experienced at the site has contributed to a loss and degradation of the wetland area, but the wetlands are also greatly threated by human land use change and reclamation (Jiang et al., 2021; Zhao et al., 2018; Zhou et al., 2017).

It is recognised that these wetlands play a fundamental role within the carbon cycle, as they sequester carbon and can store carbon in wet soil, which is one of 5 carbon stores within the Yellow River Delta (Chen, Q., Guo, Zhao, & Xing, 2018). With the loss of area and degradation in the Shandong Yellow River Delta, the wetland has decreased in size as a carbon sink. Ma et al., (2019) stated that the carbon storage of the delta decreased by 10.2%% from 1970 to 2010, which led to an increase in greenhouse gas emissions. Whilst the majority of the loss could be attributed to direct human land use change, 23.39% of the loss was attributed to the natural processes of erosion and 18.74% to regressive succession (Ma et al., 2019), which can result from decreased sediment supply.

Due to the loss of wetlands, the decreased carbon stock has increased greenhouse gas emissions which can be seen as a second problem shift to the UNFCCC (Figure 9), as Article 2 of the framework states that it aims to achieve "*stabilization of greenhouse gas concentrations in the atmosphere*" (1992). China has also ratified this third MEA in 1993, as well as Kyoto protocol in 1998 and the Paris Agreement in 2016 (UNFCCC, n.d.).

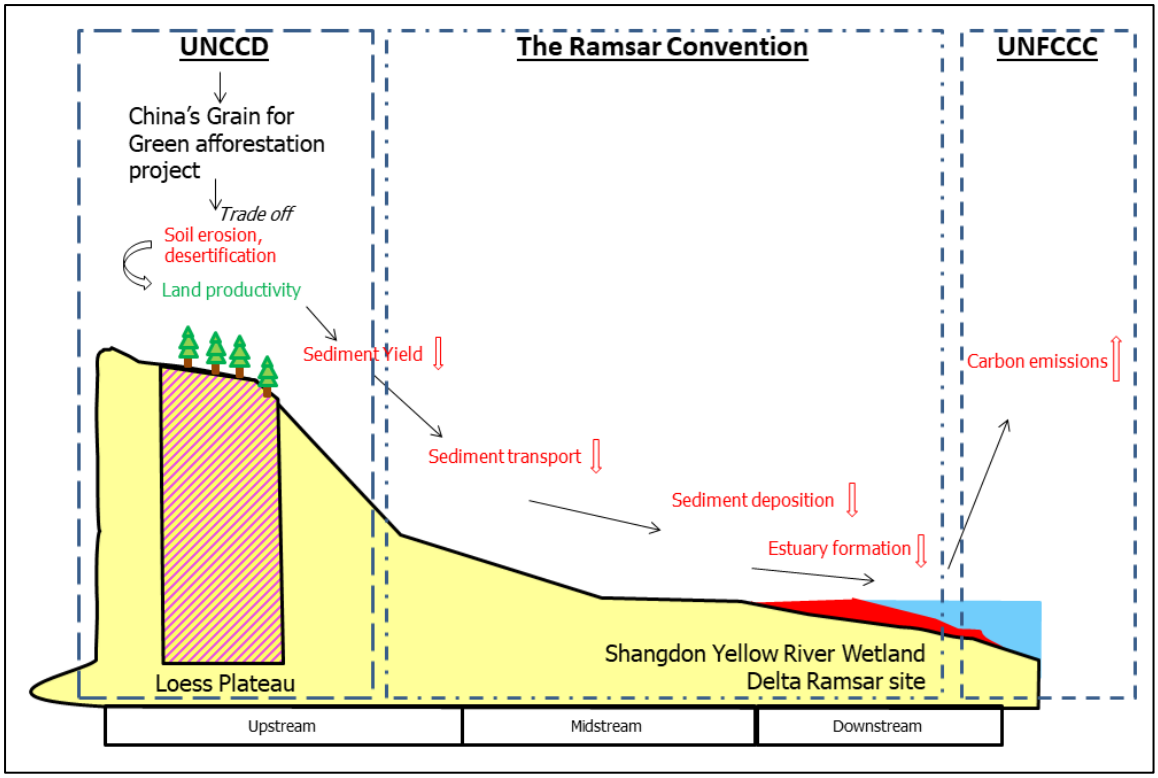

Figure 9: The cascade of problems down the Yellow River, China in relation to responsible MEA's where their obligations should be, modified from (Jiang et al., 2021; Zhao et al., 2018).

3.1.1.2 The Ramsar Convention as the central MEA

The case study of cascading environmental problems down the Yellow River in China represents a situation with three problems: soil erosion, wetland degradation and greenhouse gas emissions (Figure 9). Individually these are three problems around the world that MEA's, specifically UNCCD, Ramsar and UNFCCC, are responsible for as their objectives are designed to be preventing the problem by altering state behaviour. However, within a single catchment these interdependent problems form two problem shifts that Ramsar connects into a cascade. The retrospective decisions made across these MEA's will be explored, but the research did not look to assess the specific case of how China and its regional actors responded to the obligations of these. Rather it looked to identify decision errors within Ramsar that determined the obligations put on CP that would have enabled the problems seen in the case to link into cascade.

3.1.2 Data collection

Ramsar as the central MEA within the cascade was the focus of the analysis and thus the data collection. To identify decision errors made by CP within the intervention stages, decisions regarding agreed resolutions at COP were analysed. To enrich the understanding behind decisions on resolutions, Earth Negotiations Bulletin (ENB) reports from MEA events were collected, as well as interviews. This triangulation enabled cross-referencing of sources necessary to enhance the validity of findings due to not being present within the decision making processes.

3.1.2.1 Ramsar Resolutions

Decisions reveal the preferences of the conventions CP via the submission, discussion, and adoption of resolutions (Jung, 2003).

A total of 237 resolutions adopted by Ramsar were collected for data analysis. These stemmed from the 1987 COP3 until the COP13 held in 2018 (Table 1). Prior to COP3 only recommendations were adopted by the members, which were not included in analysis. In addition only annexes that were in resolution documents were included, which meant that separate annex documents were not included in research. However, if relevant resolutions referenced a separate annex document, then this was then included in analysis and cited if used.

Table 1: Number of resolutions made in Ramsar COPs.

COP	Year	Location	Number of resolutions
COP3	1987	Regina, Canada	4
COP4	1990	Montreux, Switzerland	5
COP5	1993	Kushiro, Japan	9
COP6	1996	Brisbane, Australia	23
COP7	1999	San Jose, Costa Rica	30
COP8	2002	Valencia, Spain	46
COP9	2005	Kampala, Uganda	25
COP10	2008	Changwon, Republic of Korea	32
COP11	2012	Bucharest, Romania	22
COP12	2015	Punta del Este, Uruguay	16
COP13	2018	Dubai, United Arab emirates	25
Total			237

3.1.2.2 Ramsar Earth Negotiation Bulletin reports

ENB reports were used to identify the conditions that were present and influenced CP decisions to cause error. These second hand reports on proceedings during negotiations are an established data source (Betsill & Corell, 2001; Petri & Biedenkopf, 2020), because they open up access to an otherwise closed process. The standardisation of these independent reports also provided a consistent and comparable data set over time, but change in authors did lead to a degree of variation (Petri & Biedenkopf, 2020). The transparency of the reports was crucial for research on decision making as they provided a sense of the occasion, mood and analysis. Additionally they also provided preferences of CP; on objections, weakening of texts and obligations. This was fundamental because problem shifts come from how obligations are agreed and followed (Kim & van Asselt, 2016).

No reports were accessible prior to COP7, but they were subsequently available thereafter. Here summary reports, daily reports of main proceedings and curtain raiser reports were collected, which totalled 56 documents (Table 2).

Table 2: ENB reports of Ramsar COPs.

Cop	Year	Summary report	Curtain raiser report	Main proceedings report or highlights
COP7	1999	1	1	7
COP8	2002	1	1	7
COP9	2005	1	1	5
COP10	2008	1	1	5
COP11	2012	1	1	5
COP12	2015	1	1	5
COP13	2018	1	1	8
Total		7	7	42

3.1.2.3 UNCCD and UNFCCC Earth Negotiation Bulletin reports

Whilst the Ramsar Convention was the central MEA in the cascading chain, the decisions within their intervention can be influenced by other MEA's that leave and enter a problem. Thus the ENB reports of UNCCD and UNFCCC were also collected to identify references to the problems and to see if decisions were also made regarding them.

A total of 10 ENB reports on COP and Committee for the Review of the Implementation of the Convention (CRIC) meetings were used to search for resolutions that related to the developed cascade (Table 3). A period of 10 years, 1997 to 2007, for the document analysis was chosen which allowed analysis of decisions made in the run up to COP4 Decision 8. Then it allowed the inclusion of the action and observation period afterwards to help identify if the problem was addressed and allowed an overlap with the period of analysis within Ramsar Convention.

Table 3: ENB reports of UNCCD events.

UNCCD Event	Year	Location	Summary
COP1	1997	Rome, Italy	1
COP2	1998	Dakar, Senegal	1
COP3	1999	Recife, Brazil	1
COP4	2000	Bonn, Germany	1
COP5	2001	Geneva, Switzerland	1
CRIC1	2002	Rome, Italy	1
COP6	2003	Havana, Cuba	1
CRIC3	2005	Bonn, Germany	1
COP7	2007	Nairobi, Kenya	1
CRIC5	2007	Buenos Aires, Argentina	1
Total			10

16 ENB reports for UNFCCC COPs from 2015 until 2021 were analysed, as well as those from Subsidiary Body for Implementation (SBI) , the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Ad Hoc Working Group on the Paris Agreement (APA (IISD, 2022). Here summary reports, daily reports, side events and pre-event content were collected. This totalled to 211 documents (Table 4). Side events were chosen to be analysed if the title of the event included reference to forestry, afforestation and wetlands. A full list of side events that were included in the analysis are listed in the Appendix.

Table 4: ENB reports of UNFCCC events.

UNFCCC events	Year	Location	Summary	Main proceedings	Side event
COP21	2015	Paris, France	1	11	0
SBI44, SBSAT44, APA1	2016	Bonn, Germany	1	10	0
COP22	2016	Marrakech, Morocco	1	11	2
SBI 46, SBSTA46, APA1-3	2017	Bonn, Germany	1	10	4
COP23	2017	Bonn, Germany	1	11	4
SBI48, SBSTA 48, APA1-5	2018	Bonn, Germany	1	11	0
SBI 48-2, SBSTA 48-2, APA 1-6	2018		1	6	0
COP24	2018	Katowice, Poland	1	14	5
SBI50, SBSTA50	2019	Bonn, Germany	1	10	0
Latin America and Caribbean Climate Week	2019	Salvador, Brazil	1	0	0
COP25	2019	Madrid, Spain	1	12	1
June Momentum for Climate Change	2020	Virtual	1	6	0
Climate Change Dialogues	2020	Virtual	1	10	0
Climate Ambition Summit	2020	Virtual	1	1	0
Sessions of the Subsidiary Bodies	2021	Virtual	1	16	0
COP26	2021	Glasgow, UK	1	12	0
Total			16	179	16

3.1.2.4 Interviews

To get a greater understanding of the internal processes that could not be identified by documentation regarding the Ramsar Convention, interviews were conducted to get information from individual people. Interviewees provided data about the situation of decision making process and so acted as informants, whilst also providing knowledge as experts (Verschuren, Doorewaard, & Mellion, 2010).

Sampling of interviews compromised purposive sampling, in which participants were selected based on their involvement in Ramsar COP processes and those particularly to do with discussions on climate change and those that attended UNFCCC COPs whilst representing Ramsar. This allowed the possibility to examine the role of Ramsar at UNFCCC conferences and to reveal the depth that wetlands are discussed in this process. These were identified through attendance lists and Ramsar Secretariat website, but other people were also identified through snowball sampling, as participants recommended people that they though appropriate for the research (Sebele-Mpofu, 2020).

A total of 7 interviews were conducted with people from the Ramsar secretariat, Scientific and Technical Review Panel (STRP) and experts external to the convention. Combined, the total interview run time was 346 minutes. Semi structured interviews were conducted, with questions being asked about themes around the problems in the cascade and conditions within the analytical framework. The used interview frame can be found in the appendix.

3.2 Data analysis with analytical framework

Data analysis of resolutions, ENB documents and interview transcripts was compiled within Nvivo. To help identify relevant discussions within ENB reports and within resolutions that were not raised by interviewees, search terms were used to reduce the quantity of data within analysis and thus streamline the process. These were selected based on key information relevant to the two problem shifts within the cascade (Table 5). The terms were searched using the query function in NVivo with stemmed words included, unless the word was within another larger word e.g. ‘carbon’ in ‘carbonic’. If search terms were more than one word it was searched with quotations.

Table 5: Search terms for document analysis. Stem words included (S) and No stem words included (NS).

Problem shift	Search term	Query function	Justification	Document used
First problem shift	UNCCD	NS	The first MEA within the cascade	Ramsar ENB document and resolutions
	Desertification	S	Original problem	Ramsar ENB document and resolutions
	China/ Yellow sea/ Yellow Delta/ Bohai Bay/ Loess Plateau/ Grain for green	S	China case study specific terms to see if UNCCD identify the specific case	UNCCD ENB document
	Afforestation	S	Action used by UNCCD	UNCCD ENB document, Ramsar ENB document and resolutions
	Forest	S	Action used by UNCCD	UNCCD ENB document, Ramsar ENB document and resolutions
	Sediment	S	Environmental condition that has been changed by intervention that could be monitored to identify second problem	Ramsar ENB document and resolutions
	Erosion	S	Environmental condition that has been changed by intervention that could be monitored to identify second problem	Ramsar ENB document and resolutions
	Accretion	S	Environmental condition that has been changed by intervention that could be monitored to identify second problem	Ramsar ENB document and resolutions
	Water quality	NS	Ramsar term to recognise sediment load in water.	Ramsar ENB document and resolutions

Second problem shift	Ramsar	S	The second central MEA	UNCCD ENB documents
	UNFCCC/ FCCC	NS	The third MEA	Ramsar and UNCCD ENB document and resolutions
	Climate Change	NS	Problem area that receives problem shift	Ramsar ENB document and resolutions
	Peatland	S	Intervention of environment that could be made to prevent problem shift	Ramsar ENB document and resolutions
	Wetland/ estuary/ coastal/ marsh/ seagrass/ mangrove/ delta/ peatland	S	Different types of wetlands that could be referred to	UNFCCC ENB documents
	Carbon	NS	Can refer to carbon storage/carbon sequestration/carbon stock/ blue carbon – All intervention if carbon stock is protected which can prevent problem shift	Ramsar ENB document and resolutions
	Sequestration	S	Identify discussions around wetland ecosystem services as storing carbon and methane	Ramsar ENB document and resolutions
	Greenhouse	S	Identify discussions around wetland ecosystem services as storing carbon and methane	Ramsar ENB document and resolutions
	Emission	S	Identify discussions around wetland ecosystem services as storing carbon and methane	Ramsar ENB document and resolutions

Following the search of key search terms, discussions on relevant resolutions to the cascade were identified. To analyse, the analytical framework was applied.

3.2.1 Analytical framework

Whilst the theory section combined the conditions for decision errors to demonstrate how cascades could occur from the linkage between errors in Figure 4, Figure 5 and Figure 6, the analytical framework (Table 6), first identified the extent that individual conditions were present. From this extent, it could then be assessed to what impact these conditions had in causing decision errors and a resulting cascade. This reduced the complexity of the analytical framework and also helped to identify alternative relationships between conditions that were not established within the theory. However, the three possible combinations to a cascade outlined in the theory remained fixed (Figure 10).

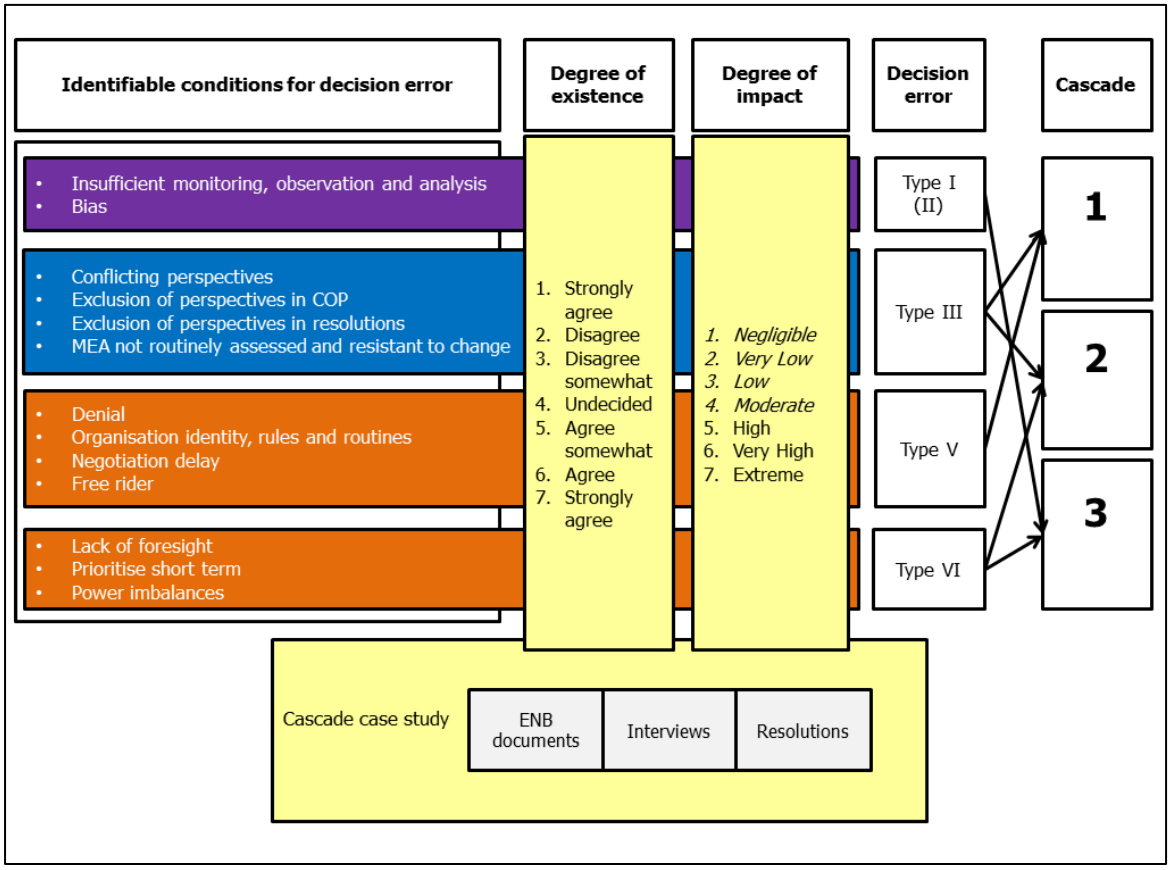

Figure 10: Analytical framework applied to collected data of case study.

3.2.1.1 Conditions for Type I and II errors

These were identified by looking at what Ramsar obliges states to do in monitoring resolutions. It also assessed the ability of the convention to analyse and publicise its findings, through work such as reports by STRP. This information as well as bias was sought from ENB resolutions to reveal state preferences and interviews. Whilst type I error is required for a cascade, the sources can also reveal a type II error, which whilst not necessary for cascades, can be present in cascade 1 and 2. Data for this condition was all qualitative.

3.2.1.2 Conditions for Type III errors

A mixture of qualitative identification of conditions and quantitative identification of conditions through search terms was used.

Conflicting perspectives amongst CP were identified in interviews and ENB reports which state CP preferences and objections to language and resolutions. The resulting effect this had was then cross examined in final resolutions.

ENB documents records how CP negotiate the particular wording of language between drafts and final resolutions. Thus resolutions were used to assess the strength of language finally agreed on. What determined the strength of language can be inferred differently, however this research states that language is weak if this was used by interviewees or recorded in ENB documents. Strong language uses words where there is little degree in interpretability and included the use in obligations that CP "will" do something, whilst weaker language included words that have a greater degree of interpretability due to conditionality that reduces obligations. This included the use of words such as "urged" to do action "as far as possible within national capacity".

The identification of conditions for excluded perspectives in COPs and resolutions, as well as inconsistent strategy included use of quantitative data, through the recorded frequency of the selected search terms (Table 5). These were in resolutions and ENB documents, and could be seen over time to show, in a simple way, if a problem was known and how high a priority it was in discussions.

Excluded perspectives could also be revealed in interviews and ENB documents through CP preferences to remove reference to other MEA's or a particular environmental problem. These qualitative insights could also be gained to assess if CP were resistant to change.

3.2.1.3 Conditions for Type V error

All conditions for Type V error not acting when they should were identified qualitatively in interviews and document analysis. Evidence of negotiation delays and denial, such as the belief that the problem was insignificant were documented in ENB reports and supported by interviewees. Furthermore, the condition of organisations identity, rules and routines impacting CP decisions was revealed in interviews and document analysis, with the effects cross referenced in the final resolutions. The free rider effect was identified in similar ways, whilst Ramsar also named and shamed countries not following obligations in particular resolutions.

3.2.1.4 Conditions for Type VI error

Conditions for the inaction error of acting when states should not were also identified qualitatively. For instance, a lack of foresight was identified if CP demonstrated a lack anticipation of consequences to other MEA's. This differed slightly from prioritisation of the short term, as here states could have foresight but still prioritise the short term if there was urgency. Along with power imbalances these conditions were revealed by interviewees and in ENB reports, whilst a goal and its timeframe could be confirmed in final resolutions.

Table 6: Analytical framework outlining the causal conditions for decision error and their operationalisation.

Decision Error	Condition for decision error	Operationalisation of condition	Source to identify condition
Type I	Insufficient evidence monitoring and analysis	Quality of monitoring: Obligations that exist for states to monitor their Ramsar Sites, extent they are followed, use of indicators to track progress	Interviews Document analysis of ENB reports Document analysis of final resolutions
		Mechanisms for data processing and analysis: the capacity for Ramsar instruments such as STRP to publicise analysis, process that Ramsar shares information with other MEA's, reach of reports Ramsar produces such as global wetland outlook	Interviews Document analysis of ENB reports
	Bias	Cognitive bias and personal beliefs that exist within CP	Interviews
Type III	Conflicting perspectives	Differing philosophy, resource allocation and interests of CP	Interviews Document analysis of ENB reports
		Attempts to weakening language, add conditionality's and broaden mandate and problem definition	Interviews Document analysis of ENB reports Document analysis of final resolution
		Attempts to weaken language, to reduce obligations and develop an ambiguous goal	Interviews Document analysis of ENB reports

		Document analysis of final resolution
	Inconsistent strategy and reoccurrence of resolutions over COPs	Document analysis of ENB reports
		Frequency of search terms
Exclusion of perspectives in COPs	Focus on scientific input, creation of a single narrow simplified or technical goal	Interviews
		Document analysis of ENB reports
		Document analysis of final resolution
	Lack of ratification of MEA treaties, protocols and other agreements and low attendance, low contributions or lack of discussion by CP	Interviews
		Document analysis of ENB reports
	Lack of reference to problems shift and receiving/shifting MEA	MEA's attendance at COP's
		Interviews
		Document analysis of ENB reports
		Frequency of search terms
	Lack of reference to other MEAs	Document analysis of ENB reports
		Frequency of search terms
Exclusion of perspectives in resolutions	Weak language and weak obligation on CP, including on follow up mechanisms such as indicators and repeat visits at future COPs	Interviews
		Document analysis of ENB reports
		Document analysis of final resolution

		Lack reference to problem shift and receiving/shifting MEA	MEA's attendance at COP's Interviews Document analysis of ENB reports Document analysis of final resolution Frequency of search terms
	MEA not routinely assessed and resistant to change	A lack of learning, adaption and exploration in time. Can be hindered by the receivable of insufficient information	Interviews Document analysis of ENB reports
		Continual use of the same vision and strategy	Interviews Document analysis of ENB reports Document analysis of final resolution
Type V	Denial	Evidence that states think the problem will fix itself or become inconsequential	Interviews Document analysis of ENB reports
		Belief of CP that the existing action is good enough and working	Interviews Document analysis of ENB reports

Organisations identity, rules and routines	CP lack desire to talk about certain subject as not seen to match the organisation identity of MEA. Reference point in resolution.	Interviews Document analysis of ENB reports Document analysis of final resolution
	Lacks resources to achieve its objective, CP deny increase of resources and capabilities due to its identity	Interviews Document analysis of ENB reports
	CP and other actors opinion on how COP frequency impacts decision process in the think, act and observe stages	Interviews Document analysis of ENB reports Document analysis of final resolution
Negotiation delays	States refuse to agree to action until after negotiations in another institution, potentially an MEA, have taken place	Interviews Document analysis of ENB reports Document analysis of final resolution
	Lack of urgency regarding the agreeing action. Maybe due to states knowing by future COP will provide opportunities to continue discussions.	Interviews Document analysis of ENB reports
	States link other issues to negotiation adds complexity and time, which delays action. Can	Interviews Document analysis of ENB reports

		be seen in how action is laid out in resolution.	Document analysis of final resolution
	Free rider effect	Lack of ratification of MEA agreements or States not complying to obligations in ratified agreements	Interviews Document analysis of ENB reports Document analysis of final resolution
Type VI	Lack of foresight	Lack of long term thinking which and anticipation of consequences that would result from particular action	Interviews Document analysis of ENB reports
	Prioritise short term	Urgency of CP or other actors means priority given to short term which increases need to act quickly	Interviews Document analysis of ENB reports
		Goal with short timeframe	Document analysis of final resolution
	Power imbalances	Same states that support certain action and strategy influence outcome. Can often see small states lack input on discussion	Interviews Document analysis of ENB reports

The conditions in the analytical framework were then coded in Nvivo (codebook in the appendix). By using the analytical framework with fixed conditions, this allowed for the use of the same codes throughout all of the source documents, providing consistency and stability to the analysis (Campbell, Quincy, Osserman, & Pedersen, 2013). Furthermore, the validity of the codes were justified in the theory section and analytical framework. Once all documents were coded, to aid identification of decisions, the codes were then grouped into certain topics regarding COP decisions.

To assess the influence of the conditions in relationship to other decision errors, the presence of each condition was assessed using a methodology inspired by Katina (2016). When doing similar work on identifying conditions for decision error, Katina utilised a seven point Likert scale to assess the degree of existence and degree of impact of each condition. This was done because a seven point scale is more reliable and stable than smaller scales (Katina, Polinpapilinho Freeman, 2016).

The degree of existence was assessed using the evidence compiled in the data analysis. Frequency of reference was determined by the number of times the condition was coded for each COP, but also determined by the frequency and specific linkages between documents and interviews (Table 7). If there was high frequency for the same condition in reference to a single decision event then the research strongly agrees that it was influencing decision making.

Table 7: The degree of existence of causal condition.

1	2	3	4	5	6	7
Strongly disagree	Disagree	Disagree somewhat	Undecided	Agree somewhat	Agree	Strongly agree
Zero reference	Minimal reference in negative sense in data source	Infrequent reference and lack of decision in data sources	Contrasting evidence given across data sources	Reference in two of the data sources but specific decision may be absent	High reference to condition in all data sources. At least one data source references one decision.	High reference to same decision in all data sources.

The degree of impact of each condition was the likelihood that they impacted decisions to cause a decision error. The Likert scale allowed the sum of the degree of existence (1-7) for each condition to be calculated over all COPs to identify its severity. As 6 COPs were analysed, the total sum of each degree of existence was 42 (Table 8). Thus the degree of impact was determined by the sum in relation to 42. Decision errors could then be identified if the degree of impact of conditions was high. How these high impactful conditions combined is illustrated in the results below.

Table 8: The degree of impact of conditions on decisions.

1	2	3	4	5	6	7
Sum ≤ 6	Sum ≤ 12	Sum ≤ 18	Sum ≤ 24	Sum ≤ 30	Sum ≤ 36	Sum ≤ 42
Negligible	Very Low	Low	Moderate	High	Very High	Extreme

4 Results

A Cascade 1 was identified to have occurred in Ramsar, as Type III and Type V decision errors were found to be present during the intervention. The results of this cascade will begin in Ramsar's observation stage, by identifying the conditions present that were responsible for not identifying the first problem shift prior to COP8. The results then follow the think act and observe stages chronologically through Ramsar COPs to illustrate how Ramsar went from a problem receiving MEA to a problem shifting MEA.

4.1 Observation obligations from the Ramsar Convention

Three components of the observation obligations on CP were found to consistently impact decisions throughout the COP's and made evidence, monitoring and analysis monitoring in Ramsar observation insufficient. It was found that Ramsar had little or no warning of the unfolding problem shift but also that its obligations for data were not specific or detailed enough to identify it, and were not complied with.

4.1.1 Limited sharing of data with UNCCD

It can be said that the original problem shift MEA, UNCCD did not know about the trade-off that would develop from afforestation, or create tools to help identify potential trade-offs in the future.

Within UNCCD's COP4 Decision.8, there was no incentive to data share and discuss threats between MEA's (UNCCD, 2000). There was no reference to Ramsar or implications to wetlands within the resolution. The most common reference to Ramsar in ENB reports was regarding the need to increase synergies between the two MEA's (Figure 11). However what is meant by synergies was often about "less duplication and more effective use of existing funds" (Doc.3) and less about identifying threats that came from overlapping mandates. Indeed 'trade-off' was not mentioned in any of the ENB reports, hinting that this was not on the mind of decision makers.

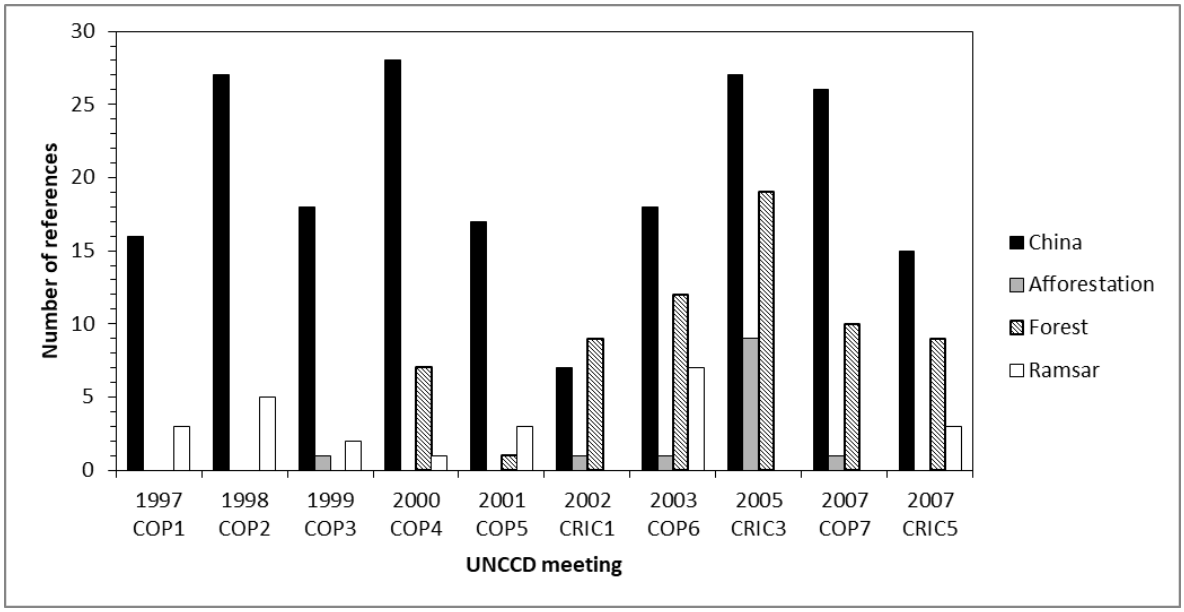

Figure 11: References to first problem shift search terms within UNCCD ENB reports.

There was also little evidence that UNCCD was observing the impacts over time or discussions around the specifics of the Yellow River case occurred, as there was zero mention of the Yellow Sea or delta, Bohai Bay, Loess Plateu or 'Grain for Green' within the proceedings at UNCCD events.

This presents a situation in which the UNCCD was not aware of the changes that could happen from acting with afforestation on dryland, such as that happening in Yellow River and were not monitoring or reporting on the impact of afforestation to Ramsar.

4.1.2 Not specific obligations

The ability of Ramsar to identify changes in ecological character at its designated sites was also insufficient, as the language and detail of its resolutions that set out obligations for CP to observe the sediment load of riverine inputs for wetlands appeared to be minimal.

Following Resolution VII.11 from COP7 in 1999, guidance for compiling Ramsar Information Sheets (RIS) was provided to CP which was required for all designated sites. However, information on physical features, hydrological values and catchment land use information such as forestry could only be included by attaching it to a capped 10 extra pages. This presented how this type of information was not seen as a major area of concern for CP as it was not mandatory. Furthermore this information was not regularly updated because there was no legal obligation to update RIS for each site, but CP was expected to update them every six years. This was an unsuitable frequency for which to identify trends in sites that are highly dynamic.

It was not until COP9 that obligations on states regarding reporting on physical quality of sites was improved, in Resolution IX.8 indicators reflected an attempted improvement in data collected, as they would have included information highlighted in Annex D of Resolution IX.1 including information on trends in water quality (defined in Resolution VII.25 as including information on sedimentation) and measuring environmental quality in wetlands, which included trends in water quality and the frequency of threats affecting Ramsar sites. This would have begun to enable CP to identify the trade-offs regarding sediment yield, transportation and deposition within the Yellow River (Figure 9). However, the resolution could only "urge" parties to use the Ecological "outcome-oriented" indicators, meaning states were again not obliged to report on this information.

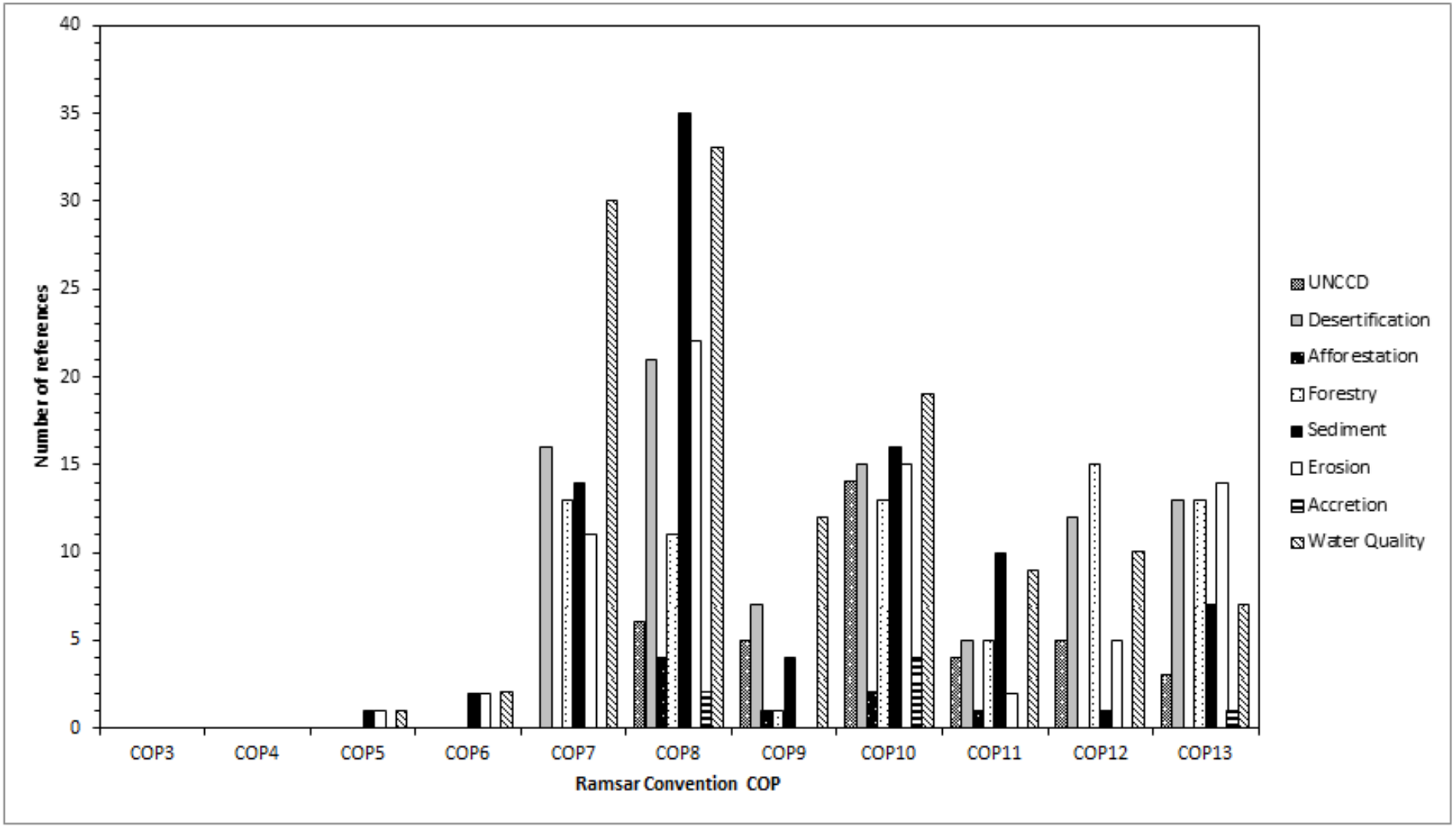

Figure 12: References to first problem shift search terms within Ramsar resolutions.

Not all countries were opposed to improving monitoring through quantifiable parameters and improving analysis with databases, such as Australia, India, Kenya and Tanzania (Doc.10; Doc.11). However attempts to create standardised monitoring for sites had been difficult to get countries to agree to, as interviewees stated that states wanted to protect their national sovereignty. This meant that obligations regarding sediment monitoring to this day remain minimal, with weak references such as the need for CP to "*ensure that coastal sediment and water needs from riverine inputs are maintained through the appropriate regulation*" (The Ramsar Secretariat, 2018b, p.7).

The lack of obligation shows how this was not a priority for CP and is supported by the inconsistent references to search terms in resolutions (Figure 12) (Figure 13). This inconsistency resulted from a lack of follow up and reporting mechanisms. It created a process in which each COP there was a lack of continuation, and just a stop start approach. One interviewee stated that they didn't even believe this could be called a process: "*we actually should be stop checking what's going on, rather than just diving in and then diving out again and that's it. So I think the process is pretty fundamentally. Well, there isn't a process. I was going to say it's broken, but there's nothing there to break*".

4.1.3 States not following obligations

Finally the observation within Ramsar was also restricted by states not following the obligations. Interviewees suggested that CP had been monitoring and publicising data, but to other bodies, such as European states sending information to the European Community Habitats Directive. Three interviewees believed that this was because the convention was not taken seriously or seen as a priority by CP. This factor, along with CP desire not to duplicate work, meant that they didn't receive information.

Not being seen as apriority was supported by the ineffective resolutions at each COP that called out countries for not updating their information, as some of the information remains "shockingly out of date and patchy" according to one interviewee. This is despite countries being named and shamed with, the Ramsar Secretariat (2018a) revealing that 1,138 Ramsar sites out of a total 2,314 sites required updated information

By CP not updating RIS and national reports, the IUCN's World Database on Protected Areas was also not updated. This decreased the ability to spread knowledge and identify global threats, such as eroding wetlands. According to 3 interviewees it also reduced the analysis by STRP members which is a crucial component of observation stage. However, one interviewee stated that here were ways of getting over this obstacle. 2 interviewees also raised the limited capacity that STRP has to be an effective process. This also affected the ability of the voluntary panel to horizon scan for future issues related to wetland degradation. National state governments also controlled the engagement and the activity of national focal points in STRP and the lack of engagement was highlighted by one interviewee as not all STRP focal points had been active which further decreased the sharing of information.

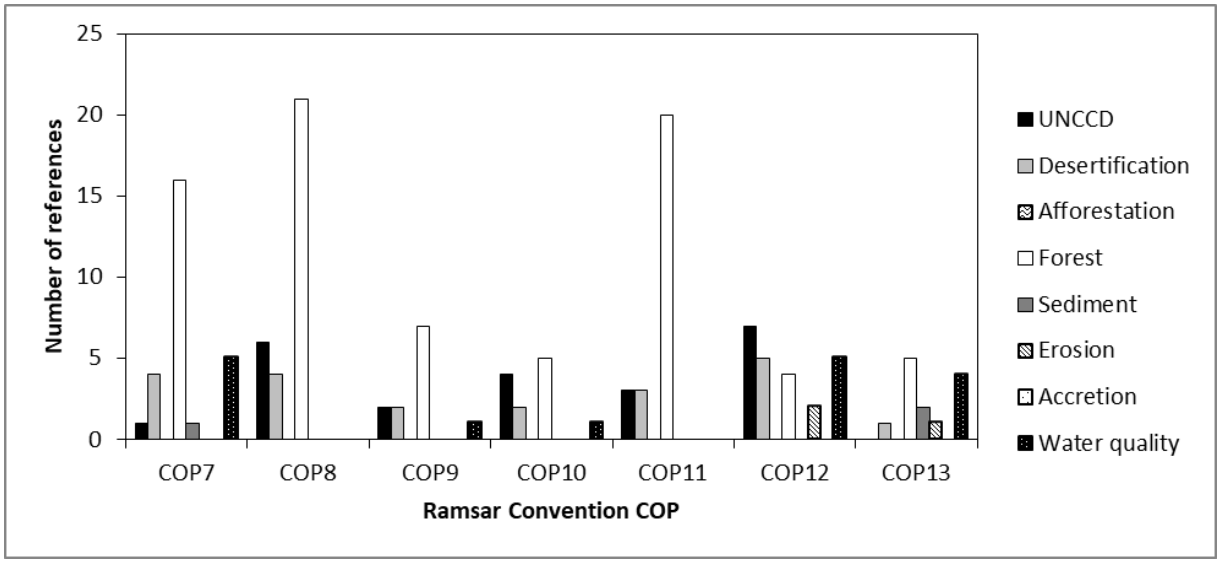

Figure 13: References to first problem shift search terms within Ramsar ENB reports.

4.1.4 Section conclusion insufficient evidence, monitoring and analysis monitoring in observation

The Ramsar Convention's ability to observe and monitor changes in its designated sites and then compile a global understanding of the threats to wetlands and their needs was impacted by CP agreeing weak monitoring obligations and insufficiently reporting on the status of sites. This reduced information on ecological character of specific sites and meant that CP and Ramsar was not aware of the unfolding cascade of the case study and could not discuss with other MEA's about limiting the possibility because as an interviewee stated, how Ramsar engages with other MEA's, such as UNCCD and UNFCCC, is guided by decisions and information provided by parties. The lack of awareness is seen in the lack of references in resolution and ENB reports to UNCCD and related search terms to do with erosion and accretion of wetlands. States were not going to hear about these threats if other states were not reporting on them, which stopped the convention knowing extent of threats across their sites. This highlights the high presence of insufficient evidence monitoring and analysis that led to observation error as the convention was unable to acknowledge threats and change thinking accordingly.

This led to Type II error as relationships between variables that existed were not identified or were been ignored. This includes relationships between land use change such as afforestation and wetland degradation, as well as relationships between wetland extent and carbon storage. Whilst this error in the observation stage is not a direct cause of the cascade, it did provide insufficient data that then led to errors in the think and act stage.

4.2 Think and act stages from the Ramsar Convention

Through the insufficient evidence, monitoring and analysis within the observation stage of the MEA intervention described in the previous section, decision makers were continuously not informed about the extent of global wetland degradation and the consequences this would have on their ecological functions. This meant that CP continually denied the severity of the situation and declined multiple opportunities to strengthen the mandate of the convention.

One such opportunity that the convention was seeking to expand into and could have helped to strengthen its mandate was the problem of climate change. However, CP failed to take this

opportunity and act on it, because as will be explained below there was a Type III visioning error in the decision making, as most conditions for the error were present. How this vision error within resolutions continued to delay action and hinder observation which led to Type V error will be detailed in chronological order of each COP.

4.2.1 COP8 hosted by Valencia, Spain in 2002

Around the turn of the millennium, Ramsar was experiencing change as it was broadening out its mandate. This brought subsequent challenges that came with increasing politicisation and conflicting perspectives on environmental protection (Doc.4; Doc.5).

With the broadening of the conventions mandate, came the broadening in understanding of a wetlands ecological function. More than providing an important habitat for waterfowl, wetlands were now also seen as playing a "potentially important role… in mitigating climate change" (VIII.3, p.1). This language was adopted by the convention in its first resolution on climate change, as the appreciation for wetlands role as a carbon sink was acknowledged, as seen by the increase in references in resolutions (Figure 14) and ENB reports compared to previous COPs (Figure 15). However, despite this rise in reference some CP sought to block off discussions surrounding climate change in Ramsar, which led to a weakened language within all resolutions. According to two interviewees the Bush presidencies meant that the USA limited any reference to climate change. Indeed, one said how the USA "virtually gutted…quite a strong climate resolution" (Resolution VIII.3). This was also reported by ENB, as the USA along with Australia forced through the removal of an annex that aimed to outline climate change mitigation response options. Despite South Africa and other CP warning that deleting it would weaken the resolution it was removed (Doc.5). This was clear evidence of CP knowingly excluding perspectives from decision making and resolutions via the existence of loose language that weakened state obligations. Indeed ENB made direct reference to the strength of chosen language within such discussions as being an area of disagreement (Doc.5). Weak language with high use of conditionality was seen in Resolution VIII.3 as paragraph 15 only "*CALLS UPON all relevant countries to take action to minimize the degradation, as well as promote restoration, and improve management practices of those peatlands and other wetland types that are significant carbon stores, or have the ability to sequester carbon*"(VIII.3, p.2). This acknowledges the role of wetlands to sequestrate carbon, but it does not define what are considered relevant countries anywhere in the resolution, meaning that no countries are obliged to follow the guidance. The resolution successfully excluded perspectives which led to minimal weak obligations and conflicting perspectives. Two interviewees felt that if the original strong resolution on climate change was kept, then things would be in a different situation today, as Ramsar would have taken a lead on the issue globally.

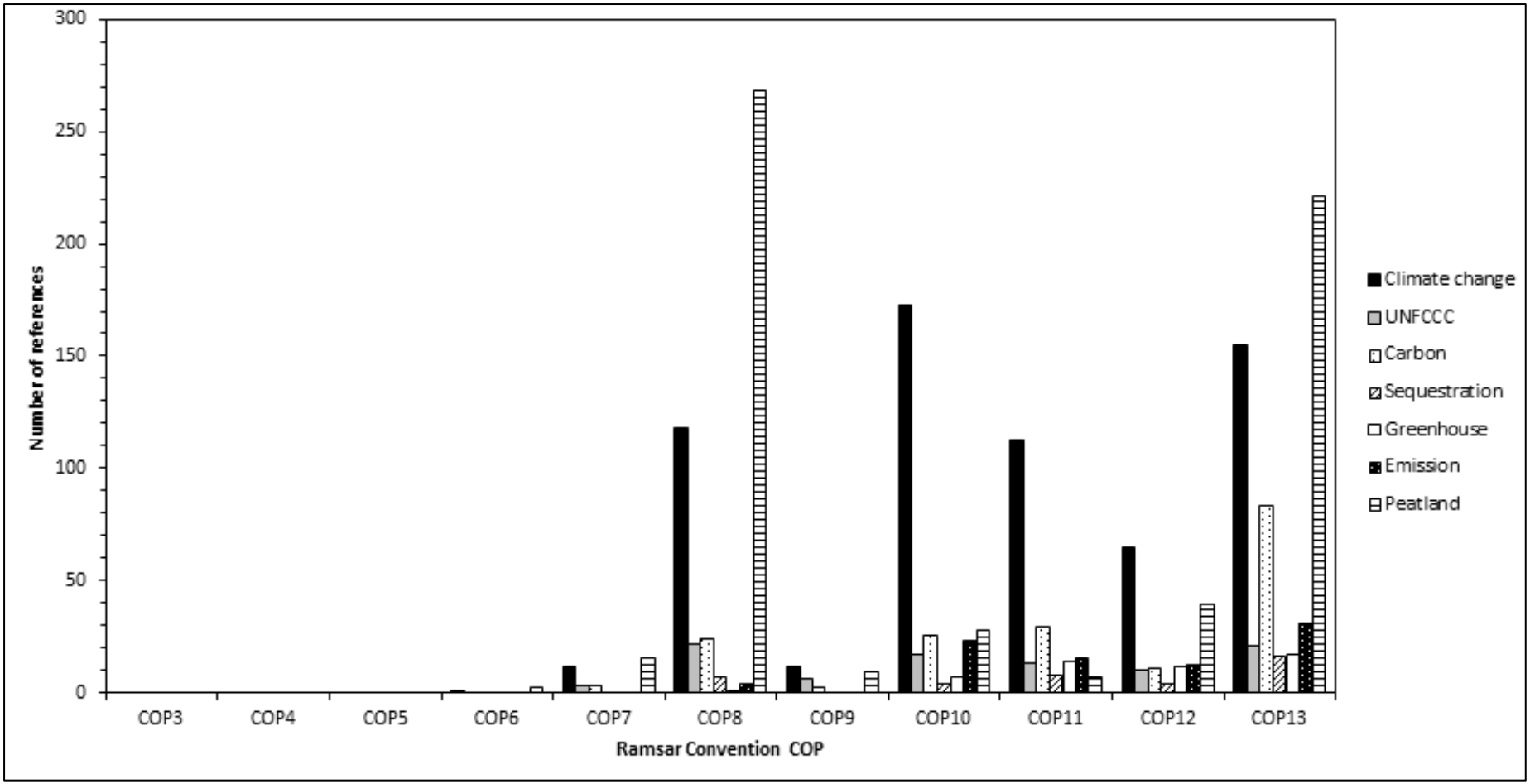

Figure 14: References to second problem shift search terms within Ramsar resolutions.

The above conditions were also present in negotiations on how the STRP would analyse and monitor climate change going forward. The STRP were limited by weak monitoring obligations on physical properties of wetlands prior to COP8, which was outlined in Paragraph 12 of Resolution VIII.3 as CP were "*AWARE that the STRP's report recognizes that there are key gaps in current knowledge and information on…the ways in which wetlands can mitigate climate change impacts, notably the role of peatlands in carbon sequestration*". However, conflicting perspectives impacted attempts to fill the knowledge gap, as difficulties in negotiation occurred within the contact group that negotiated over "text requesting that the STRP conduct further work on this issue" (Doc.5). Japan disputed the need for STRP to conduct "follow-up work on wetlands and climate change, arguing that the STRP's workload is already heavy" (Doc.6). But whilst South Africa, Austria and Burkina Faso proposed including additional text requesting the STRP to continue assessing new information on climate change and make it available as an information paper, the USA again halted this as they had reservations (Doc.8). This demonstrated the continued denial of the situation, as CP did not deem climate change valuable for STRP time.

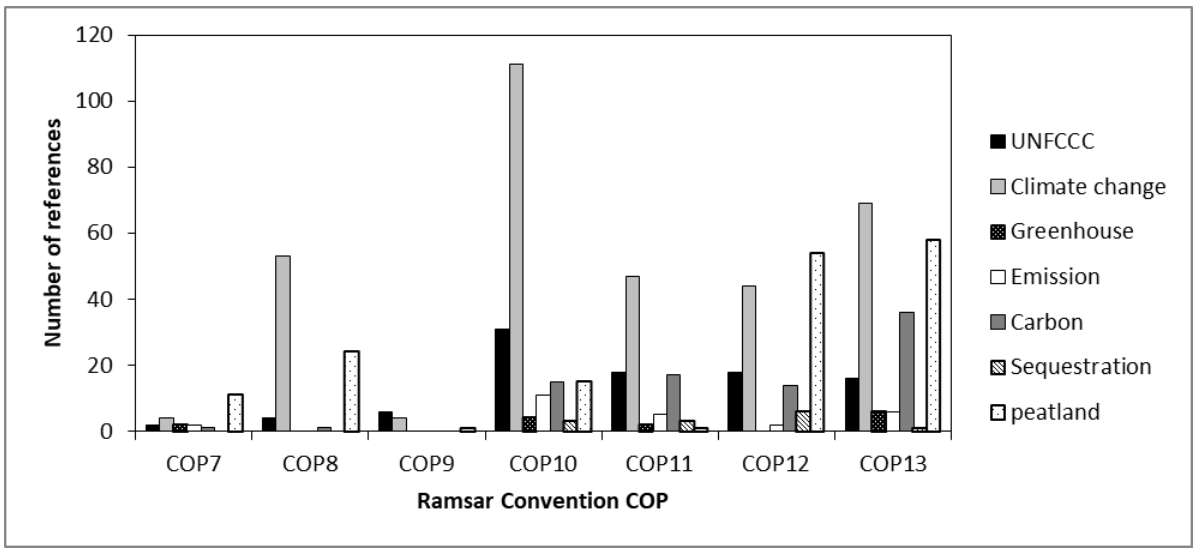

Figure 15: References to second problem shift search terms within Ramsar ENB reports.

Along with the broadening of the wetland ecological functions, came the broadening in understanding of different wetland types. COP8 saw the growth in recognition that peatlands were an underrepresented wetland within the convention, despite them potentially accounting for 50% of Ramsar sites according to an interviewee. This was seen by the peak reference to peatlands within all resolutions (Figure 14). This recognition also brought with it the understanding that peatlands could play a key role within climate mitigation. However as with climate change resolution it had the removal of strong references, including to UNFCCC as CP removed any reference to the Kyoto Protocol regarding guidelines on peatlands in resolution VIII.11 (Doc.7). Furthermore, the perspectives were further limited as this understanding of the role of peatlands to carbon sequestrate was consigned to the Annex but it did mention that peatlands play an important role in "global carbon retention relevant to climate change" (VIII.11, p.4). This lack of perspective and understanding meant that instead of state parties acting on this resolution, one interviewee described how very little was "taken up and implemented by the countries" despite the guidance being "quite a comprehensive programme". This again reflected the pattern seen in resolution VIII.3 and in the observation stage, CP agreeing to minimal obligations and then proceeding to not follow them.

The COP in Valencia showed how conflicting perspectives led to the exclusion of key perspectives in decision making process and resolutions (Table 9**Error! Reference source not found.**). Furthermore, the research strongly agrees that denial and organisation identity prevented any action from occurring.

Table 9: The degree of existence of the conditions for decision errors at COP8.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Agree
	Cognitive bias	Disagree
Type III	Conflicting perspectives	Strongly agree
	Exclusion of perspectives in COPs	Strongly agree
	Exclusion of perspectives in resolutions	Strongly agree
	MEA not routinely assessed & resistant to change	Disagree somewhat
Type V	Denial	Strongly agree
	Organisations identity, rules and routines	Strongly agree
	Negotiation delays	Agree
	Free rider effect	Disagree somewhat
Type VI	Lack of foresight	Disagree
	Prioritise short term	Strongly disagree
	Power imbalances	Disagree

4.2.2 COP 9 hosted by Kampia, Uganda in 2005

Following COP8, the number of references to key terms in the cascade dropped and no resolutions included climate change in the title. This demonstrated the lack of opportunity for wetlands to be debated in climate change context, and led to a lack of perspectives in final resolutions and revealed the continued denial of the role that wetlands could play in climate mitigation.

The limited references again show the influence of the Bush presidency in blocking climate change decisions (Figure 15). However, some countries did attempt to include perspectives on climate change as the Russian Federation, El Salvador and Uganda, proposed broadening Resolution IX.5 to incorporate the UNFCCC and CCD. However delay and weak language were also present as Canada wished to only note a future intention to include UNFCCC in the future. In the end the observer status of Ramsar within UNFCCC was noted by the Secretariat (Doc.9).

Further exclusion of reference to climate change was seen in Resolution IX.2, as Brazil proposed to delete any tasks for the STRP that referenced climate change mitigation. This resulted in no mention in Annex 1, that outlined the immediate priority and high priority tasks for the STRP between 2006 and 2008. This thus continued to limit future observations.

The complete exclusion of climate change as seen by the drop in references shows that there was not even a platform to convince countries of the need to discuss wetlands in the context of mitigating climate change. The removal of climate change mitigation as a task for STRP showed how the exclusion of perspectives in COPs and resolutions remained (Table 10), and would continue to impact observation. This meant that denial and to a lesser extent delay of action could continue unchallenged.

Table 10: The degree of existence of the conditions for decision errors at COP9.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Agree
	Cognitive bias	Strongly disagree
Type III	Conflicting perspectives	Agree somewhat
	Exclusion of perspectives in COPs	Strongly agree
	Exclusion of perspectives in resolutions	Agree
	MEA not routinely assessed & resistant to change	Agree somewhat
Type V	Denial	Agree
	Organisations identity, rules and routines	Strongly disagree
	Negotiation delays	Agree somewhat
	Free rider effect	Strongly disagree
Type VI	Lack of foresight	Strongly disagree
	Prioritise short term	Strongly disagree
	Power imbalances	Disagree

4.2.3 COP10 hosted by Changwon, Republic of Korea in 2008

At COP 10 there was an increase in the number of references to climate change in resolutions, the highest out of all the cops (Figure 14). This was prominently down to Resolution X.24, which continued to be impacted by conflicting perspectives and weakened language as countries wanted to prevent duplication between Ramsar and the UNFCCC (Doc.10). Efforts were made at the COP to keep Ramsar within the scope of the convention and not broaden out.

Despite paragraph 10 of Resolution X.24 "noting the Global Assessment on Peatlands, Biodiversity and Climate Change …confirmed that peatlands are the most important carbon store in the terrestrial biosphere, storing twice as much carbon as the forest biomass of the world, and that degradation of peatlands has been contributing annual emissions equivalent to 10% of global fossil fuel emissions" countries continued to deny the need to discuss climate mitigation. States including Argentina, Brazil, China, Ecuador, India, and the Philippines sought to delay negotiations because they didn't want to impact discussions regarding Reducing Emissions from Deforestation and forest Degradation (REDD+) within the UNFCCC (Doc.10; Doc.12). Brazil particularly cautioned against duplication in all resolutions with reference to mitigation (Doc.11). Whilst some states such as El Salvador, Cuba and Australia supported the retention of reference to climate mitigation the language ended up being weakened and dressed in conditionality's, as the reference no longer stood as a standalone option (Doc.10), but rather diluted within the broad term 'wise use' and as an included option within a list of wetland services:

"URGES relevant Contracting Parties to take urgent action, as far as possible and within national capacity, to reduce the degradation, promote restoration, improve management practices of peatlands and other wetland types that are significant GHG sinks, and to encourage expansion of demonstration sites on peatland restoration and wise use management in relation to climate change mitigation and adaptation activities" (Resolution X.24, p.32).

Further weak language was seen within paragraph 42 as it only encouraged CP "to undertake, where possible, studies of the role of wetlands in carbon storage and sequestration". The weak language with conditions meant that many actors felt that an opportunity to increase the visibility of the convention on the global scale had been lost and that parties would reflect on "the missed opportunity that wetlands are at the heart of the UNFCCC deliberations" (Doc.10, p.18). For UNFCCC to then not discuss wetlands and nature based solutions until after 2015, as seen by the lack of references (Figure 14), highlights the opportunity missed by Ramsar to lead on discussions around wetlands and climate mitigation.

Debates on the specifics of peatlands also continued at COP10 as part of the climate change negotiations. Despite the Ramsar guidance on peatlands in 2002 and the Global Assessment on Peatlands, Biodiversity and Climate Change, CP continued to dispute the relationship between peatlands and climate mitigation, raising doubts that the IPCC Fourth Assessment Report was inconclusive (Doc.10). ENB reported how a delegate within negotiations states that "we need to avoid ill-advised climate mitigation measures on peatlands" (Doc.10, p.13). This denial led to more delays as additional research and information sharing was called for (Doc.10), which whilst it allowed wetlands and climate change to be observed as part of the STRP tasks for 2009-2012, it meant that action could not be discussed until the following COP in 3 years' time.

The denial wasn't shared by all at the negotiations as the ENB reported how the STRP chair Heather MacKay thought that issues such as biodiversity, climate change, water and wetlands need to be discussed together instead of separately (Doc.10). To address this, Resolution X.3 The Changwon Declaration on human well-being and wetlands highlighted the important link between all factors, and it included particular reference to the importance of carbon storage and the emissions that are released due to human disturbances. However obligations were again severely weakened as "the Secretariat noted that the Declaration would be "welcomed" rather than "adopted". Furthermore, the conventions ability to observe and assess if countries were following the proposals within resolutions were hindered by countries reluctance to develop indicators. This was seen by Japan who requested deleting any mention to them for the Changwon Declaration. It took an intervention from President Kim Chan-woo, not another state, to suggest "improving the paragraph, rather than deleting it" (Doc.12, p.2). This continued the error in the observation stage of the MEA intervention, as states lowered their obligation requirements, which delayed identifying the carbon potential and the risk that degrading them posed to this ecosystem service.

Negotiations in COP10 continued to be caught by the "inconvenient truth" that is the role that wetlands can and should play in mitigation and reducing greenhouse gas emissions and revealed how states were thinking in silos (Doc.10). One delegate in the wetlands and biofuel negotiation commented on the Sisyphean nature due to the inclusion that always results with discussions about carbon balances and impacts on carbon storage capacity (Doc.10). This limited the overlap with other MEA's, which prevented in making any strong resolutions on climate change and again delayed action.

Overall COP10 saw some progress in recognising the importance of wetlands, particularly peatlands, in carbon mitigation. This reduced the exclusion of perspectives in decision making, but again conflicting perspectives amongst CP limited references in resolutions (Table 11). This contributed to a continuing of the error of the third kind, as the convention failed to recognise the role of wetlands in climate mitigation. This then led to action error of the fifth kind until the next cop as negotiations were delayed as CP waited for UNFCCC negotiations to conclude, action error of fifth kind. Furthermore states continued to denying the role that peatlands could play. Ramsar missed

opportunity again to lead global action. Some action was still possible, as the STRP could do some work that would assist in observation stage prior to the next COP.

Table 11: The degree of existence of the conditions for decision errors at COP10.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Agree
	Cognitive bias	Strongly disagree
Type III	Conflicting perspectives	Agree
	Exclusion of perspectives in COPs	Undecided
	Exclusion of perspectives in resolutions	Agree
	MEA not routinely assessed & resistant to change	Undecided
Type V	Denial	Agree
	Organisations identity, rules and routines	Agree somewhat
	Negotiation delays	Agree
	Free rider effect	Strongly disagree
Type VI	Lack of foresight	Strongly disagree
	Prioritise short term	Strongly disagree
	Power imbalances	Disagree

4.2.4 COP 11 hosted by Bucharest, Romania in 2012

Discussions on climate change at the next COP were limited by Brazil as they didn't want a resolution on climate change due to parallel negations occurring with UNFCCC at the same time. These attempts to block discussions are revealed in the reduced number of references of climate change related search terms within both resolutions and ENB reports compared to COP10 (Figure 14 and Figure 15).

Both the higher counts of carbon and UNFCCC reveal the main point of discussion; reluctance to talk about carbon sequestration as the parallel negotiations within UNFCCC were regarding REDD+ process and as one interviewee put it Brazil didn't want to "*agree something in a Ramsar context that can then be used to set the precedent for negotiations, which are yet to happen in the UNFCCC context*". The concern that the Ramsar conventions identity was not the appropriate place to discuss climate mitigation was so high that the first paragraph that the contracting parties agreed to state in Resolution XI.14 on climate change was that they wanted to acknowledge that the UNFCCC would always be the location for climate mitigation and carbon sequestration matters as the CP:

"Acknowledges the distinct mandates and independent legal status of conventions and affirms that the UNFCCC and IPCC are the key references for the terms mitigation, adaptation, carbon sequestration, greenhouse gas emissions and carbon storage used in this Resolution, as they pertain to climate change" (Resolution XI.14, p.5)

Brazil was not alone in wishing to maintain the clear distinction and silo approach between MEA's, as China reaffirmed support for Brazil in the push for climate change funding to only be discussed in UNFCCC, whilst Canada and also the USA wanted to prevent duplication. This again emphasised how the organisation identity of Ramsar was not associated to deal with climate mitigation and states only saw duplication and not synergies, when it came to funding and REDD+. This perspective meant that many states wanted to exclude reference to REDD+, despite opposition from Norway and China proposing to reference it generally (Doc.13). This conflicting perspective led to informal

deliberations, to which the UK proposed a compromised text to satisfy the most perspectives that weakened obligations and broadened out the problem formulation as it removed any reference to funding mechanisms for mitigating climate change (Doc.13). This resulted in the single inclusion of reducing emissions from deforestation and forest degradation without the acronym as it noted the discussions within UNFCCC and encouraged CP "*to promote the importance of wetlands in ongoing discussions on this issue*" (p.3). So whilst REDD was included in the resolution, which could be seen as an inclusion of perspectives in resolution, there was a complete exclusion of reference to funding. This showed the clearest missed opportunity to link Ramsar with UNFCCC, to aid the lack of funding for wetlands and to prevent their degradation, which would have preserved carbon stocks. This mentality of clear divisions between MEA's, despite overlap in relation to climate change mitigation reveals the silo approach that states created. These conditions led to the creation of climate change resolution that according to ENB, contained weaker language compared to that from COP10 (Doc.13) and meant that action error remained as wetlands were denied funding.

Despite the opportunity missed to prevent the problem shift to climate change, COP11 did see the Ramsar Convention strengthen its observation capabilities through the adoption of the RIS 2012 revision annexed to Resolution XI.8. ENB considered this a success as greater depths of information could now be submitted electronically. However the updated RIS guidance proposed little that would work to detect both the initial problem shift of eroding wetland and the second problem shift of carbon emissions. This is supported by the part 3.3 of the revised RIS, which only required ecosystem services such as soil and sediment retention to be scored as present or absent, and if possible on a scaled of 3. For the conventions ability to identify and warn against the problem shift to UNFCCC, Part 3.3 uses the same scoring system to assess the extent that Carbon storage/sequestration is a present at site. Furthermore, Part 3.2 allows the recording of the ecological processes including the carbon cycle and ecological character description. However, this is not mandatory to complete as part of the standard RIS (The Ramsar Secretariat, 2012). These non-obligatory elements of RIS could come from states not seeing either as a priority area of discussion, as there was little references regarding monitoring of sediment accretion in ENB documents and Ramsar resolutions (Figure 12 and Figure 13).

COP11 showed how countries began to appreciate better monitoring and analysis of designated sites, which reduced errors at the observation stage. However, the think stage was still marred by conflicting perspectives and a very strong silo mentality to keep funding for climate mitigation out of resolutions (Table 12). This delayed any action and prevented closer alignment to UNFCCC on the problem of carbon sequestration, further contributing to error of fifth kind.

Table 12: The degree of existence of the conditions for decision errors at COP11.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Disagree somewhat
	Cognitive bias	Disagree
Type III	Conflicting perspectives	Agree somewhat
	Exclusion of perspectives in COPs	Agree somewhat
	Exclusion of perspectives in resolutions	Strongly agree
	MEA not routinely assessed & resistant to change	Undecided
Type V	Denial	Agree
	Organisations identity, rules and routines	Strongly agree
	Negotiation delays	Strongly agree
	Free rider effect	Disagree somewhat
Type VI	Lack of foresight	Strongly disagree
	Prioritise short term	Strongly disagree
	Power imbalances	Disagree

4.2.5 Observation of peatland degradation post COP11

Since COP11 there was evidence that decision errors reduced within the observation stage as states could follow updated guidance on RIS and the secretariat made efforts to make CP meet their obligations. Furthermore, individual states began to identify and acknowledged the role of wetlands in climate change mitigation.

With the growing understanding of wetlands role in climate change mitigation, other actors' began to get involved in the observation stage in monitoring greenhouse gas emissions. This was seen as the IPCC published the wetlands supplement in 2013 which built on the 2006 standards for greenhouse gas emissions from wetlands that originally focused on peatlands managed for extraction (Hiraishi et al., 2013). This demonstrated the start of a growing interest from the Climate change regime actors, such as the IPCC and UNFCCC, that could have pushed states into action; as whilst one interviewer stated that the extent that this information was used by states varied and that there was "a need for something more" if a collective international community was going to act, evidence gathered showed that it only took one state to use the information to instigate stronger resolutions. This came from Denmark and highlighted the reliance that Ramsar had on individual states to make change to the convention.

In the run up to COP12 Denmark had observed that 90% of its peatlands were degraded and that this would have negative impact on their ability to meet Intended Nationally Determined Contributions that were being drawn up following Warsaw UNFCCC COP in 2013. To protect their last remaining peatland from also degrading Denmark was convinced to pursue the idea to propose the peatland resolution that would allow peatlands to become designated Ramsar sites for their ability to mitigate climate change. This would enable Denmark to designate a site for the first time in 30 years, and as they were also the current head of EU presidency, it would also give them something to promote at the Ramsar Convention. Thus Denmark looked to promote this observation within the thinking stage.

This shows how a country's individual action and motivation in the observation stage can remove error of the second kind, as Denmark identified the relationship between protecting peatlands and mitigating climate change. However it still demonstrated that this did not result from Ramsar Conventions obligations in resolutions, and thus shows the conventions vulnerability to this error appearing in the future again should individual countries not wish to see the relationship and problem.

4.2.6 COP 12 hosted by Punta del Este, Uruguay in 2015

The heightened UNFCCC involvement in decision making process was seen from the second day of the proceedings as a statement from the Secretariat of the UNFCCC was read out by General Briggs (Doc.15). However, the secretariat was invited to participate but by only sending a statement reveals that UNFCCC still did not value the perspective of Ramsar. Furthermore, states such as Brazil and Argentina felt it necessary to clarify that this statement was from the UNFCCC Secretariat, and not the perspective of UNFCCC parties.

Following on from Denmark's observation of the importance of peatlands in mitigating climate change, work had already been made to get support prior to the COP. Denmark looked to include perspectives in the resolution by first gaining support with the Nordic Baltic Wetland Initiative countries, then through scientific backing with publication of reports and then finally with EU backing. This allowed the resolution to overcome familiar reluctance as Brazil stressed that the only forum to discuss climate change was the UNFCCC (Doc.15). This was due to the parallel negotiations again going on within UNFCCC in the run up to Paris Agreement at the end of 2015. The reluctance again led to delay in action as there was a need to conduct future studies on peatlands value as carbon sinks (Doc.14). This was despite the findings within the Global Assessment on Peatlands, Biodiversity and Climate Change presented and acknowledged at COP10. ENB reported that Brazil believed that action on climate change mitigation should be the focus of developed countries through the specific action of reducing fossil fuel use. Furthermore with the support of Argentina, Bolivia, Cuba and Venezuela they argued against sectoral approaches to climate change and requested to remove references to mitigation and adaptation as ecosystem services provided by peatlands.

Despite this, the EU and Mexico were supported by Colombia in stating that they wished to include mitigation and adaptation as ecosystem services (Doc.14). Other support for including climate change mitigation came from USA in relation to development policies and planning (Doc.16). The USA, along with New Zealand also supported work on peatlands and carbon sequestration (Doc.14), and demonstrated how the USA was no longer blocking climate discussions.

In the end support for the Resolution XII.11 on peatland was strong and was aided by a statement that was read out by Norway on behalf of the Nordic Council, possible because they were not a member of the EU. ENB stated that Norway highlighted the importance for preserving biodiversity and limiting anthropogenic climate change (Doc.14), with one interviewee stating that this process led to the Brazil and other Latin American countries keeping quiet and the resolution was passed with a huge applause because the Ramsar Convention could finally get over the resistance to deal with climate change in the convention. Two interviewees detailed how they felt the resolution was strengthened by the inclusion of a statement for the need to follow up in the next COP, which prevented the cycle of resolutions being agreed and forgotten. This was seen after COP8 when peatlands were discussed with high reference numbers in resolutions and ENB reports, but then not seen again until COP12 (Figure 14).

This showed how conflicting perspectives were reduced as states from around the world came together showing how perspectives were included in the decision making of the Resolution XII.11. Furthermore, this led to a stronger reference to climate change in the resolution and included reference to a follow up discussion at the next COP. This allowed action and observation to be possible. There is evidence of limited existence of action errors, as attempts to delay by Brazil eventually quashed and showed organisation identity could change and not always limit resolutions (Table 13).

Table 13: The degree of existence of the conditions for decision errors at COP12.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Disagree
	Cognitive bias	Strongly Disagree
Type III	Conflicting perspectives	Undecided
	Exclusion of perspectives in COPs	Undecided
	Exclusion of perspectives in resolutions	Disagree
	MEA not routinely assessed & resistant to change	Disagree Somewhat
Type V	Denial	Disagree
	Organisations identity, rules and routines	Disagree somewhat
	Negotiation delays	Disagree
	Free rider effect	Strongly Disagree
Type VI	Lack of foresight	Strongly Disagree
	Prioritise short term	Strongly Disagree
	Power imbalances	Strongly Disagree

4.2.7 COP13 hosted by Dubai, United Arab Emirates in 2018

The last COP in the analysis saw Denmark bring two follow up resolutions on peatlands, whilst a more controversial resolution on blue carbon was also negotiated. This led to a higher reference of all search terms in resolutions related to the second problem shift and showed how the Convention was not resistant to change (Doc.17).

Many countries including the African Group and Uruguay and Ecuador supported the follow up peatland resolutions, Resolution XIII.12 and XIII.13 (Doc.17). This showed the benefits that result from building on discussions from a previous COP, as states and attendees did not forget about it unlike the majority of resolutions, and it enabled the inclusion of different perspectives now that further time had passed to observe. The resolutions were adopted with relatively little discussion and provide guidance on mapping the extent of peatlands and carbon sequestration which can then enable the designation of peatlands as wetlands of international importance (Doc.17). Another reason for the success of these resolutions was that by focusing on Ramsar Sites there was not deemed to be a significant overlap with the work done by UNFCCC and Paris Agreement. However, there were some shortfalls in the resolution as Belarus highlighted the lack of quantitative and qualitative indicators to categorise degraded peatlands (Doc.17), meaning that data collected in observation would not be systematic and comparable across CP. Furthermore, unlike the previous peatland resolutions, there was no follow up mechanism for the next COP. This raises doubt about the future level of action on the resolution, as one interviewee believed that there will be no follow up resolution as no country was taking initiative and another interviewee stated how extent data on this issue is still “too weak”.

This again highlights how dependent MEA's are on states to limit action errors as well as thinking errors.

Unlike the peatland resolution, Resolution XIII.14 on blue carbon was "extremely politically sensitive" (Doc.17, p.13). This was due to a lack of agreement on the definition of 'blue carbon', with Brazil, Argentina and Bolivia concerned that this could have consequences for discussions on the Paris Rulebook. These states as well as Venezuela and Cuba wanted to emphasise that methods to finance and protect wetlands already exist (Doc.17). The weakening of language was also again seen relating to NDCs (Doc.17), as countries excluded reference to them, as they felt that these were covered by UNFCCC. This demonstrated the return of the silo mentality that stemmed from organisational identity not seen since COP11.

The contrasting success of the peatland and blue carbon resolutions led to a undecided existence of many conditions (Table 14), however, the exclusion of reference to NDCs still represents how CP denied forging strong links between Ramsar and UNFCCC as states felt they would be covered in UNFCCC.

Table 14: The degree of existence of the conditions for decision errors at COP13.

Decision Error	Causal condition	Degree of existence
Type I (or Type II)	Insufficient evidence monitoring and analysis	Disagree
	Cognitive bias	Disagree
Type III	Conflicting perspectives	Undecided
	Exclusion of perspectives in COPs	Undecided
	Exclusion of perspectives in resolutions	Strongly Agree
	MEA not routinely assessed & resistant to change	Disagree Somewhat
Type V	Denial	Undecided
	Organisations identity, rules and routines	Undecided
	Negotiation delays	Undecided
	Free rider effect	Disagree Somewhat
Type VI	Lack of foresight	Strongly Disagree
	Prioritise short term	Strongly Disagree
	Power imbalances	Strongly Disagree

However, the return of the silo approach with the presumption that wetlands were being protected by UNFCCC in NDCs was still unsubstantiated. Whilst Ramsar in last 5 years had attempted to increase cooperation and coordination with UNFCCC, and increased the secretariat attendance at UNFCCC since Paris Agreement in 2015, there is still no joint work plan. Additionally, two interviewees discussed how UNFCCC was adopting more nature based solutions in side events at Glasgow COP26, including peatlands and the use of paludiculture which could provide an economic incentive to protect wetlands. However, UNFCCC conferences still do not recognise Ramsar and wetlands as a big enough issue to provide a significant coverage as there was minimal references to either in the ENB reports at UNFCCC Conferences (Figure 16). Indeed, one interviewee described how "*to specifically talk about wetlands under the UNFCCC is a bit of a pipe dream*". Whilst 2018 was the peak reference to wetlands in UNFCCC, the same year as Ramsar cop13, there was then a fall to zero mentions at COP26. Disappointedly, the Glasgow Pact does not specifically refer to wetlands,

however the reference of "terrestrial and marine ecosystems" as carbon sinks could be seen as opening the door to future expansion of action.

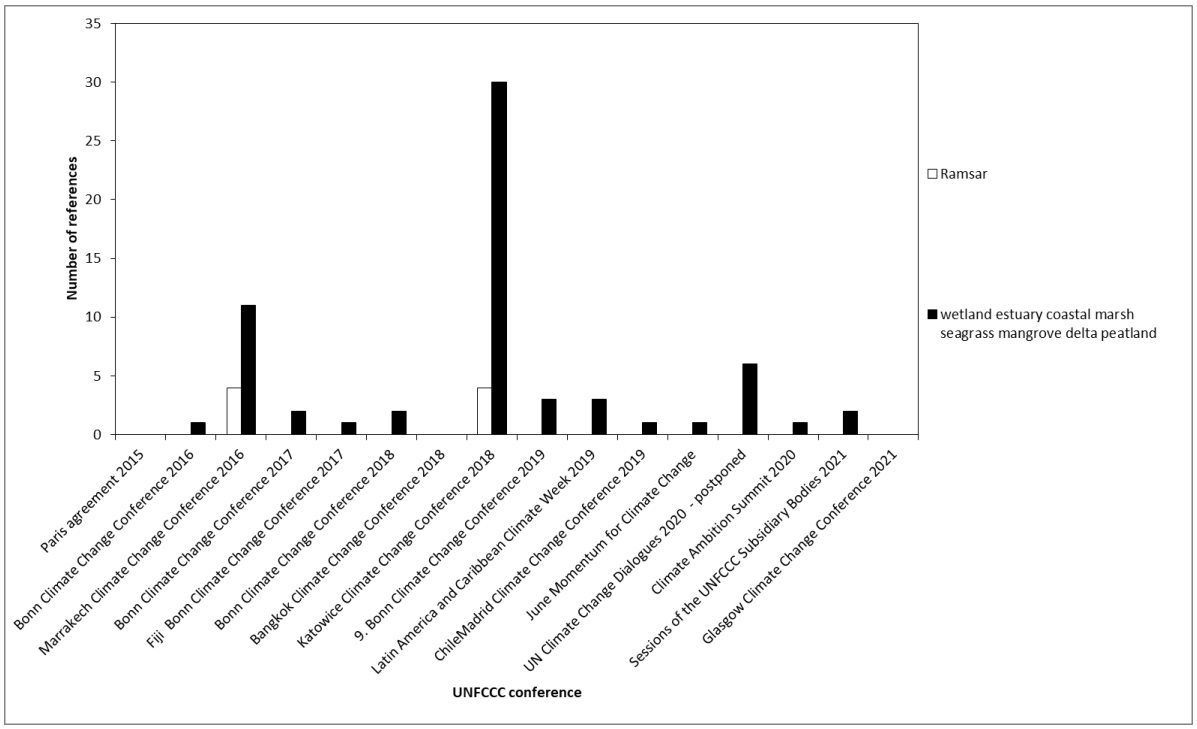

Figure 16: References to Ramsar and wetlands from UNFCCC ENB Reports.

4.3 How a Cascade 1 occurred through the Ramsar Convention

The extent of the conditions that led to decision errors revealed that, 3 types of decision error were present through Ramsar, type II + III + V. This contributed to a cascade type 1 occurring between COP8 and COP11, as this was the period of time with the highest frequency of conditions for errors.

Minimal obligations for CP to observe designated sites meant that threats were not identified and tracked in RIS which decreased how informed CP were at COPs. CP were not tracking sediment loads into Ramsar sites, identifying if degraded and how this relates to other ecosystem services such as carbon sequestration. Furthermore states also were not following obligations which decreased data sharing, particularly through databases. This meant CP were giving themselves inadequate information to diagnose issues and create suitable problem definitions leading to unsuitable action. This led to insufficient evidence monitoring and analysis having a high impact in the observation stage (Table 15).

Table 15: Degree of impact of conditions for decision error. Calculations can be found in appendix.

Decision Error	Causal condition	Degree of impact on decision making
Type I (or Type II)	Insufficient evidence monitoring and analysis	High
	Cognitive bias	Very low
Type III	Conflicting perspectives	High
	Exclusion of perspectives in COPs	High
	Exclusion of perspectives in resolutions	High
	MEA not routinely assessed & resistant to change	Moderate
Type V	Denial	High
	Organisations identity, rules and routines	High
	Negotiation delays	High
	Free rider effect	Very low
Type VI	Lack of foresight	Very low
	Prioritise short term	Negligible
	Power imbalances	Very low

The inadequate monitoring obligations of sites meant that when Shandong Yellow River Delta Wetland was designated a Ramsar site in 2013, the resolutions did not strictly mandate China to publish and report all information on the ecological condition of the site. Indeed the limited monitoring obligations in Ramsar, mimics the minimal obligations within China which has had limited funding for research and monitoring of coastal wetlands (Sun et al., 2015). It meant that the reduction in sediment supply to the delta and erosion was not identified. Thus it is understandable that nobody interviewed from Ramsar knew of the specific case in the Yellow River, yet did state that they were aware that land use change within a river catchment was a threat to wetlands. This was because states were not reporting on their degrading sites. This failure to meet obligation is also true for Shandong Yellow River Delta Wetland, as its RIS has not been updated on the Ramsar website since 2013. However, COP13 Doc.12 shows that only four of China's sites need updating and sites are not named.

By being unaware or underappreciating the relationship between wetlands degradation and the impact this would have to mitigating climate change, decisions made by states from COP8 until COP11 decision error Type III was deemed to be present. This resulted from conflicting perspectives, exclusion of perspectives in COPs and in resolutions having high impact. This was particularly felt on Resolution VIII.3, Resolution X.24, Resolution XI.14 and the lack of opportunity to debate climate change mitigation matters in COP9.

Conflicting perspectives came to Ramsar with the introduction of climate change as an area of concern. The need for consensus in Ramsar COP decision making meant that states such as Brazil and USA were effective in blocking and lowering obligations, as negotiations were held to the lowest common denominator, as one interviewee put it. This meant that when countries didn't agree with a resolution the problem definition could be broadened. This led to resolutions that lacked reference to key climate related organs such as to Kyoto and REDD+. The agreed resolutions were deemed weak by both interviewees and ENB, as those climate resolutions post COP8 were described by one

interviewee as "*less weak in relative terms… in absolute terms, they're shockingly weak and always have been and always will be*".

With it being such a controversial and politicised global topic, issues in UNFCCC influenced Ramsar decisions and meant that not all negotiators were speaking the same language (Doc.5). This counteracts how one interviewee stated that UNFCCC had little influence on Ramsar negotiations, as document analysis and 5 interviewees also revealed that states refused to discuss topics that they felt were already dealt with by UNFCCC. This started with denial of the relationship between peatlands and wetlands to sequester carbon in Resolution VIII.3 which prevented Ramsar taking a global lead on the issue, and later evolved into delaying of action. This ultimately led to decision error Type V, as action did not happen to protect wetlands and carbon stocks due to the high impact of denial, organisations identity, rules and routines and negotiation delays. Decisions such as Resolution XI.14 denied opportunities for funding to protect wetlands based on their potential to sequester carbon through the Ramsar Convention, despite limited inclusion of wetlands in UNFCCC discussions where financial mechanism existed (Figure 16). This meant that wetland climate mitigation fell between the cracks of silos which continued to delay any action and contributed to the eventual cascade (Figure 17).

If CP had agreed strong obligations to monitor sites for sediment deposition and carbon storage potential, it would have meant that CP around the world would have been aware of the potential problem shifts earlier. Furthermore, even though Resolution XI.8 strengthened the obligations of revised RIS on CP, this only came into formal use for designation of new sites from January 2015. This meant that when Shandong Delta in China was designated in 2013 the more detailed approach was absent from this site and meant that its RIS does not include any mention to carbon or carbon sequestration and thus the cascade went undetected. This could still be the case, because as explained above, China has not updated the RIS for the site, which was due in 2019.

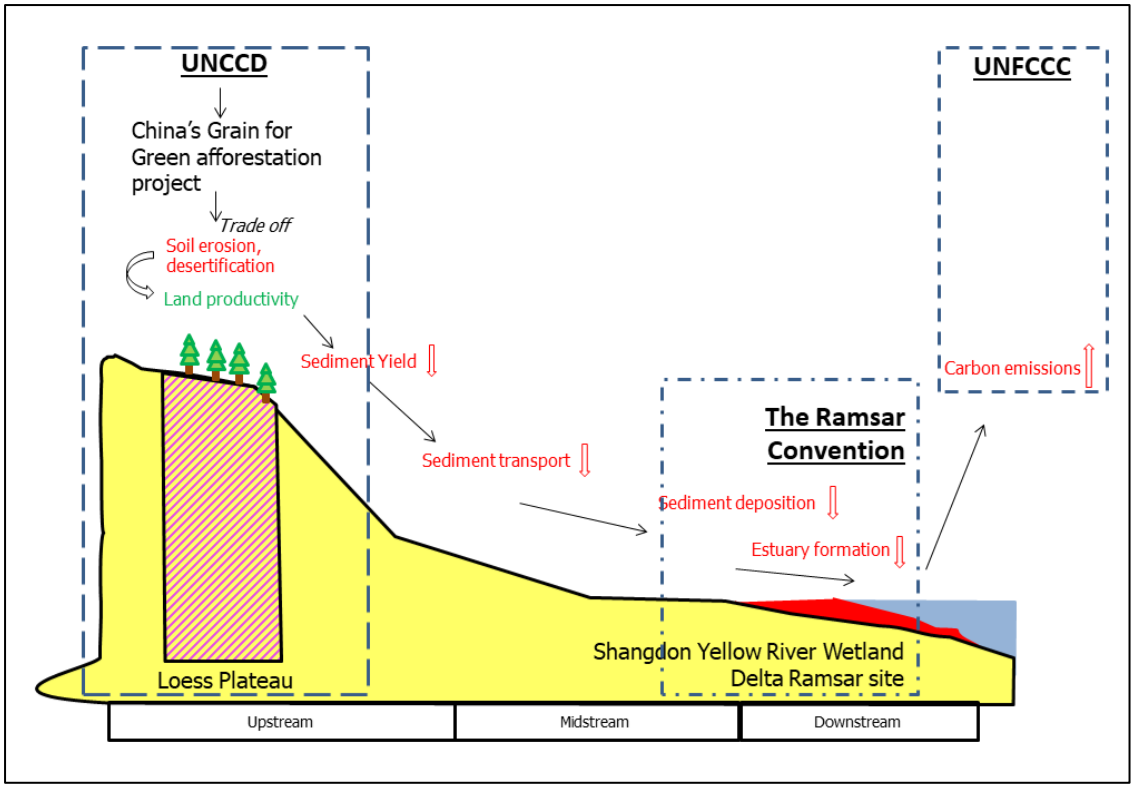

Figure 17: Updated Figure 9 to show how the silo and obligations of MEA's were insufficient to identify the cascade of problems down the Yellow River, China, modified from (Jiang et al., 2021; Zhao et al., 2018).

5 Discussion

The combination of decision errors II then III and V within the intervention to degrading wetlands by the Ramsar Conventions show how a central MEA in a chain of three can connect problem shifts into a cascade. This section explores the implication of these findings for policy and decision makers in the Ramsar Convention as well as MEA's more broadly. It also reflects on the theoretical findings and their implication for future researchers whilst limitations of the research are also discussed.

5.1 The silo mentality of contracting parties

The results of this case study revealed an important finding for policy and decision makers, as through the Rio Conventions desire to create synergies, via the use of afforestation, a cascade in space and time transpired that eventually created a problem for them, because as well as some trees not growing well, a rise in greenhouse gas emissions also materialised. This was because a problem was shifted onto the Ramsar Convention, but due to the conventions inability to observe, identify and report on the problem shift and then act on it, a cascade occurred through them onto the UNFCCC.

This inability came from CP lack of regard and reluctance to meet obligations of monitoring and data sharing which debilitated decision making and diminished the visibility of problems. This matches to the theory section identifying that externalities go undetected as Ramsar were new actors and unaware of the problem. The poor visibility and understanding of issues could also be linked to the inconsistent nature that resolutions are brought to COPs, which demonstrated how momentum for discussing and solving problems could be lost. To prevent this, institutional memory could be improved by the use of actions within resolutions that stipulate a repeat visit at the next COP. This was seen to be used by Denmark to great effect.

This loss of institutional memory, along with Ramsar being fed by limited knowledge, delayed growth of Ramsar mandate and enabled states to restrict its collaboration with the UNFCCC, due to its organisation identity being perceived as less of a priority in comparison. However, this case study revealed that if CP continues to think in silos and focus on priority problems that restricts the funding for other MEA's, reduces their visibility and ability to fulfil their mandate, then cascades can develop through these MEA's in time, which adds more and bigger problems to the higher priority MEA's. This shows the value in thinking systemically when it comes to supporting all MEA's objectives. However, as explored below, CP agreeing on consensus is challenging.

5.2 Framing of problems and objectives

The denial and blocking of action on climate mitigation within Ramsar revealed the inappropriateness of MEA's being held by the lowest common denominator in the think stage. This is because it creates a broad problem definition, with weak language and obligations. This increased the chance of decision errors being present as the original problem was not defined, and so the problem was unlikely to be resolved. This could explain why most MEA's are ineffective (Chambers, 2008). Indeed, theory suggested that inappropriately defining the scope of a problem would require greater resources in the future and this could be the case for all three MEA's within the cascade, as the problems have only deteriorated in time. However it cannot be denied that there are fine margins in decision making between including perspectives but not to lose the true problem by pleasing the most states. For decision makers, determining where this middle ground could be is more challenging prior to a decision then in retrospect.

Questions should also be asked of how problems are defined and presented by states through MEA's, as this cascade has shown that environmental degradation won't get solved until the true problem is formulated, and action is aligned. This started with the initial problem shift which resulted from short

termism to use afforestation to solve soil erosion. However the cause of eroding soil was not addressed, just the effect of it. Questions also need to be asked of who thinks it was a problem. For instance, desertification in the Loess Plateau and elsewhere was a problem for China since the 1950's as mining expanded into dry areas, but was frequently negatively impacted by dust storms (Kong et al., 2021). This demonstrates the influence of power imbalances and warns against using a sense of urgency that an environmental problem needs to be resolved as a reason to act. Action can actually lead to more harm than good especially if certain types are seen as a panacea that will solve an incorrectly formulated problem. Similar issues could result from the EU and China's mass scale afforestation plans made in order to meet the Paris Agreement targets (European Commission, 2021; Stanway, 2021). Furthermore, more extreme action approaches such as geoengineering have been proposed (Horton, Keith, & Honegger, 2016; MacMartin, Ricke, & Keith, 2018). This could also be true in wetland restoration, because a narrow focus on carbon sequestration could also lead to further problem shifts, as an interviewee warned that South Korea had been examining the possibility to introduce alien invasive species *Spartina* to the ecosystem instead of the local *Phragmites* due to its higher carbon storage potential. This could continue the cascade to Convention Biological Diversity. Further caution regarding such action comes with the knowledge from results that MEA's may not have the capacity to observe changes.

Another issue identified by the theory and then within the results was the importance of problems and how they are framed in MEA's. This has been done differently in different environmental treaties. Some are looking to conserve, preserve or promote ecosystems or species, whilst some such as Ramsar are a combination of the two. On the other hand some are problem based, such as UNFCCC and UNCCD which focus on the symptoms of a cause. The challenge this creates is that with problem based treaties in complex systems, the problem is never simple or singular, because as knowledge on the issue continues to be understand, the more the problem grows and expands into other problems and causing overlap with other MEA's. How this problem grows is entirely dependent on how decision makers, which are often states, wish to view the information and perceive the problem. Knowing that states think in silos whilst prioritising issues and that problems will continue to grow and overlap each other, this means that there may always be problem shifts and cascades. This then creates governance challenges. Particularly as this research has revealed, states can choose the venue of decisions and use this as a reason to delay decisions in other MEA's, a direct contributor to cascades.

Knowing the issue of low obligations and low compliance experienced by Ramsar, this raises a question about what do decision makers want MEA's to be; to ensure the highest standard of motivated countries which could lose CP or a bottom up approach to raise the standard of the least motivated. With different problems comes a different approach. However stronger obligations within Ramsar would enable better accuracy in monitoring and improve information sharing with the World Database on Protected Areas and the UNEP-World Conservation Monitoring Centre database. This global cooperation and collaboration of data would help identify previously undetected externalities and future threats to wetlands quicker. The site based approach also means Ramsar could explore the former option because a local catchment within one state is less vulnerable to free rider effect experienced by UNFCCC, which requires all actors around the globe to contribute to GHG emissions reductions. However, the current low levels of obligations are not always enforceable even in motivated countries, due to electoral changes and powerful government departments outside the environment department halting action due to other priorities. Furthermore, the disinterest in wetlands and poor utilisation of enforcement mechanisms such as Montreux protocol suggests stronger obligations veer on fantasy.

5.3 The uncertain roles of the Ramsar Convention and UNFCCC in the future

Whilst some action will remain a fantasy, other action simply remains uncertain. The end of the results revealed a mess of a governance structure and confusing picture about where the responsibility for preserving wetlands for their role in sequestrating carbon currently lies; Ramsar or UNFCCC. This uncertainty may simply come from the lack of a Ramsar COP since 2018, a direct result of COVID-19 delay. However, it still presents a concerning reality that the problem may be outside either of the two silos.

The developed overlap between Ramsar and UNFCCC has led to confusion for states between the roles of the two MEA's. Discussions on NDC's were excluded from Ramsar, but it is uncertain how far states are pushed to incorporate wetlands in the UNFCCC regime. However, the fact that states recognise that NDCs are a tool of action for this problem demonstrates how a new actor in the UNFCCC has joined the complex problem structure as the problem has shifted to them . However, UNFCCC may not yet acknowledge that the problem has shifted down the cascade, potentially due to wetlands low visibility.

With the minimal visibility and compliance by CP, one interviewee stated Ramsar may need to continue to spearhead issues and provide inspiration to other conventions to then adopt these as their problems. This could reveal how problems are purposely shifted onto MEA's with greater capabilities. Another interviewee stated similarly that competencies to deal with the problem exit in both conventions, but for states to act "sometimes you need that sort of process or just exchange of information to ensure that those two ends actually really meet".

For the two ends to meet and to stop the problem being dropped between both silos, silos need to grow closer and a bridge needs to be built between MEA's, with both speaking the same language and agreeing to the same problem definition. This relies on states being convinced of the intrinsic need and goes beyond attempts to find synergies to reduce duplication. With this states can reduce decision errors in decision making process.

5.4 Theoretical implications of the research

This research represents one of the first studies to identify globally networked environmental risks such as cascades. Now identified, cascades need to be further established and could be the overarching concept that is needed to group previous research on dyadic relationships together. This could improve delineation between concepts, if dyadic relationship is placed at different stages of a larger cascade. This would better reflect the complexity of international regimes. Whilst this could introduce further complications in analysis of the effectiveness of regime complexes, it would enable researchers to identify if a system of international governance adds up to less than the sum of its parts. This is because the cascade demonstrated that action even if deemed positive for a single MEA could actually lead to cascade in space and time for other MEA's. Thus the value of research analysing the effectiveness of a single MEA should be explored.

This potential complexity and not knowing if cascades existed prior to the research, was one of the reasons that this research focused on the connecting MEA in a chain of three. A qualitative case study provided an in-depth insight into one type of cascade, but as the theoretical section outlined more are possible. These could be identified with a similar methodological approach, but more innovative and quantitative approaches exist. For instance causal loop diagrams and systems dynamic models offer a relevant approach to network cascade research in the future. Furthermore, the research could learn from methodologies used by researchers of cascades and similar concepts in other literature, as this research utilised classical decision making theory. Other promising avenues include iatrogenesis in

medical literature and shifting the burden in systems thinking publications. The existence of this literature shows how research would be aided by greater mixing across disciplines to share knowledge of similar concepts and prevent repetition of already established and researched themes.

An implication of using theory that has had little practical implication previously meant that some conditions within the analytical framework remain underdeveloped. Whilst Cascade 1 and Cascade 2 were the most developed in the theory section, further research would benefit the understanding of how Cascade 3 could develop in an environmental governance context. Particularly the identification of conditions for observation errors. This could be because these are more difficult to determine and report at state level, whilst research details that bias reduces in a group. However it could be inferred that the denial of peatlands as carbon stores for so long despite contrasting evidence was a bias by certain CP. Thus further research would aid the development of this framework, and to confirm if Cascade 3 is possible.

A final theoretical insight of the research is that this case offers potential to study the influence of individual actors from the secretariat and STRP. This includes individuals writing up resolutions as well as convincing states to adopt resolutions or lead the development of other instruments, such as the Global Coastal Forum. However, it remains to be seen if individuals influencing states in the think stage always translates to influencing states in the act stage.

5.5 Limitations

A limiting factor in this research was the time spent and difficulty in identifying the cascade case study, both in terms of the MEA case and finding a specific geographical case. The systematic process of identification the case is outlined within the appendix. However this process reduced the time available to collect data, and the late identification of the case also led to time being lost on unnecessary data collection. To save time search terms were used in data analysis, but this could have introduced bias, as they may have led certain results and resolutions to be missed. However interviewees allowed key decision points not to be missed.

With more time, a greater level of data could have been collected from interviews. In total 25 people were contacted for interviews, but not everybody was available or responded to email requests. This limited the number of people that could be interviewed, which reduced the ability to reach saturation for certain answers and could introduce bias (Hennink & Kaiser, 2021). Use of snowballing could also have introduced bias if interviewees recommended people who held similar views. Both of these could have implications on the validity of results. However, as mentioned in the methods section a smaller sample is still beneficial and it was felt that the majority of interviewees, which were supported by document analysis, highlighted how states were responsible for recognising synergies and are responsible for blocking certain action.

It was also unfortunate that nobody could be interviewed from China. Attempts were made to reach out via email to people from the area, including researchers on the topics within the cascade and regional advisors to the Ramsar Convention Secretariat, but there was no response to interview requests. This limited the understanding of how China was influenced by Ramsar decision error. However the case in China was used to illustrate the consequences in the real world of decisions made at an intergovernmental organisation level, rather than show how Chinese actors in the Yellow River catchment implement Ramsar at the local level. Whilst the link between MEA level and China could be argued against, this research argues that if stronger obligations on monitoring and preserving wetlands for carbon sequestration were made by CP including China, and if obligations were conformed to, then by the time Shandong was designated as a site, there would have been a greater

chance to observe the cascade or even prevent it occurring. However, further research could be done to look at how China responded to the obligations created by Ramsar.

The quality of data gathered from interviews could also have been limited due to a number of difficulties, notably by inexperience with the data gathering methodology. It is a skill and training is required to create questions that can steer and help extract the relevant data. Factored in with the novelty of the topic which meant that interviewees lacked knowledge on the concept of problem shifting, this could have led to misunderstood answers. Furthermore the research topic lends itself to a sense of negativity by questioning the insufficient ability of Ramsar, which created a challenge as semi structured questions were required to be framed in a way to identify conditions for error without interviewees getting defensive. Thus future students of master theses should consider these points prior to adopting interviews as a main data collection method.

Another limitation with the collected data was that information was secondary data, via document analysis and interviewees. This meant that interviewees had to recall events from up to 20 years ago, in which memory may not be specific enough to have high reliability. Furthermore, the data focus was conditions influencing decisions of states and by not being present during negotiations in decision making rooms some conditions for error may have been forgotten and lost, as the research is reliant on those in documents and what interviewees would like to share. Never the less, despite being limited in number interviewees in the research had represented states at COPs, and so could provide an aspect of this perspective. Furthermore the data sought may never truly be possible to gather, even if present at COPs because it is difficult to truly know what states think as it may be classified. In addition, Young (1989) suggests that they may not even know what they think, so a researcher may always only be inferring.

A final limitation of the research could be the framing of the case study. Due to the possible 3 cascades types, if the problem shift case was framed differently, decision errors within a type 2 cascade could also be possible. For instance if the initial problem was climate change instead of desertification, then it could be argued that UNFCCC ignored the perspective of wetlands and Ramsar in the think stage as they create a single goal that led to the oversimplification of a problem, as they overlooked the carbon sequestration in wetlands. This then led to action error supported by powerful actors in countries such as Peru where wetlands were drained and reclaimed for afforestation (Crump, 2017). This back and forth nature of problem shifts highlights the complexity and interrelated nature of MEA's and their objectives, and shows the challenge in communicating the many intrinsic relationships in research.

6 Conclusion

Cascades have previously been identified in other literature and this research presents one of the first cases of an identified cascade resulting from international environmental governance. The identification of a cascade in the Yellow River China led to the research question *How do environmental problems cascade through multilateral environmental agreements?* This was answered in the attempt to understand how Ramsar went from a problem receiving MEA to a problem shifting MEA.

The research question was answered through the use of decision making theory as it illustrated how cascades result from the combination of decision errors. Decision errors were identified through the presence of conditions impacting states in the decision making process within the Ramsar Convention via interviews and document analysis.

This research found that through states agreeing minimal monitoring obligations and then failing to abide by them, the Ramsar Convention was limited in its ability to identify problem shifts and threats to its designated sites in its observation stage. This hindered its ability to discuss and raise awareness of future threats that wetland degradation would have on wetland ecosystem services, such as carbon sequestration. On this issue, conflicting perspectives amongst contracting parties of the convention led to the weakening of language in resolutions having high impact and type III error. This error in the think stage meant that resolutions for action to designate and protect wetlands based on their potential to sequester carbon dioxide was first denied and then routinely delayed as contracting parties felt that its organisation identity was not appropriate to deal with such problems despite climate change being a concern for wetlands, such as sea level rise. States felt that this role was already fulfilled by the UNFCCC, despite action being absent here as well. The result of this highly impactful denial was a problem that fell down the gap between two silos, with nobody taking responsibility because instead of forging closer relationships between the Ramsar and the UNFCCC, action error type V materialised. This led to a cascade 1 occurring between 2002 and 2012, as the resulting weak resolutions meant that mechanisms were not in place to allow China to identify the cascade occurring with the Yellow River.

The cascade as illustrated in China warns of the consequences of the silo mentality along with the prioritisation of MEA's. It creates an imbalanced governance system that does not reflect the finely balanced interconnected natural system that it is meant to be protecting, because if problems are shifted onto undervalued and underfunded MEA's with weak obligations and low compliance, to the extent to which an MEA cannot fulfil their function to change state behaviour then problems cascade through MEA's. This means that decision makers justifying decisions based on the creation of winners and losers will only ever make the natural environment lose. To help reduce decision error in bounded rational actors the gaps between silos need to be narrowed along with the enhancement of transparent data monitoring and sharing processes to bridge between MEA's.

The results present one of the three types of cascade outlined in the theory section, which means that future research will be required to identify if other variations are possible. However, knowing that MEA's and state derelictions exist in a complex interconnected network, their presence is likely. Indeed this research has shown what needs to be considered in all cascade research and by decisions makers in the future; an MEA does not intervene in a problem alone, but instead is influenced by its and other MEA's abilities to both identify threats whilst also being proactive in action to prevent future problems. If this function is denied to them, then environmental concerns and the appreciation of crucial ecosystems, such as wetlands, will be washed away by the rising sea of morphing cascading environmental problems that may be festering within the Anthropocene.

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7 Appendix

7.1 Methods for identification of literature in the theory

Scientific literature was used to improve the detail regarding conditions that lead to decision errors in an institutional setting of the analytical framework proposed by Boal and Meckler (2020). As detailed in the theory section, this is because it is a relatively new framework with little development and empirical testing. Thus it was felt that further depth is needed for the causal conditions.

This improvement was achieved by using decision making and systems theory for organisations and institutions, with two lines of work making up the main contribution as they frequently cited each other. This was the previous work by Boal and Meckler which began in 2010, as well as work by Adams and Hester (2012). The referenced theory of their work was explored, as well as the papers that cited their work. This was chosen to be explored to further understand the latest theory on conditions for decision error and possible interlinkages that lead to cascades. 19 citations of Adams and Hester (2012) resulted from the Scopus search, but Meckler and Boal (2010) work did not feature. However it appeared on Google Scholar and was cited 19 times, whilst Adams and Hester were cited by 29 articles with all 19 citations from the Scopus search featuring in the scholar search (

Table 16). Thus Google Scholar was chosen as the source for this section of the research. The authors other works on the topic was also explored for similar reference to causal conditions for decision error. In

Table 16, ‘not used’ refers to articles that were not included in the study either because of no access, articles not written in English language or it was not relevant because it lacked reference to conditions that lead to decision error. Snowballed literature was also used, which meant that relevant articles referenced in any of the source papers were also read. The full list can be found in appendix.

This was then adapted to the specific environmental institution context by using existing environmental literature on decision making within international regimes such as MEA’s. This was achieved by drawing on the work of Oran Young (1989, 2013) regarding negotiation theory and institutional bargaining as detailed in the 1997 article by Hasenclever et al.,. This was felt necessary as decision making theory refers to the importance in how issues are prioritised and goals are identified. This is a fundamental process within the establishment and negotiation of MEA’s. Furthermore, Oran Young’s work was chosen to identify theories from decision theory that may be similar and already exist in environmental negotiation theory and bargaining theory, but just have different names. This would help the research to increase interdisciplinary by merging similar concepts under one name, as named by Young, for the environmental context. The appropriate literature was drawn from the 37 articles that resulted from the Google scholar search allintitle: "Negotiation theory" OR environment OR institution "international regime" (

Table 16).

Table 16: Sources of information from Google Scholar to improve analytical framework

Source	Number of articles		
	Search return	Used	Snowballed
Boal and Meckler (2010)	19	9	0
Adams and Hester (2012)	29	15	10
Google Scholar search "allintitle: "Negotiation theory" OR environment OR institution "international regime"	27	12	2
Total	75	36	12

7.3 Methods for identifying case study

To identify possible problem shifts and problem shifting cascades an iterative process was used. It begun with an initial search to find a cascade resulting from afforestation promoted by the paris agreement, but it was soon found that the limited time that has passed since 2015 meant that this would be challenging. Nether the less, the search that led to the discovery of the eventually used cascade case study, as written separately by Zhao et al and Jiang et al (2021; 2018).

Scopus was used to conduct the search, due to the ability to search for specific terms in the Title, abstract or author-specified keywords and the greater number of peer reviewed articles. Search terms for the intervention 'afforestation', whilst 'Paris Agreement' or 'climate change' were included in order to identify effects of afforestation as a result of climate mitigation. Articles may have been written about mitigation efforts without reference to Paris Agreement, but as the Paris Agreement is the most recent MEA from UNFCCC which is looking to mitigate climate change, this phrase was also included. To look for problem shifts it was found that including an additional search term about problem shifts in the search further increased the relevance of the results. 'Trade-offs' was used over spillover and problem shift as this is a broader and more commonly used term, as McElwee et al., (2020) outlined how the IPCC in their report on 1.5 ^{o}C used terms 'trade-off' when discussing co-benefits and adverse side-effects. Problem shifts is still a relevantly new research area so did not return a significant number of articles. Including 'Paris Agreement' in the search provided 4 specific papers but when using the broader search term 'climate change' the search included a year filter, which limited the search to papers published post 2015 Paris Agreement. No papers from 2015 appeared in the original search prior to the limit of years being applied, so 2016 to 2022 papers were looked at. This produced 40 papers (Table 17).

Table 17: Problem shifts of Paris Agreement's afforestation

Search	Number of search returns	Number of used articles
TITLE-ABS-KEY (afforestation AND Paris AND agreement AND trade-off)	4	3
TITLE-ABS-KEY (afforestation AND climate AND change AND trade-off) AND (LIMIT-TO (PUBYEAR , 2022 to 2016(none in 2015))	40	24
Total	44	27

To speed up the reading and analysis process, overlapping search terms that were explored in the theory section were used and the text around these was also read to get context of the reference. The search terms were: Spillover, consequence, shift, cascade, leakage, secondary effects, co-benefits, trade-off, opportunity cost and conflict. Those articles not used did not bring relevant information from the search terms. Another criterion for articles not being used was if the papers appeared in both searches. All 4 papers that appeared in the first 'Paris Agreement' search appeared in the second search. The 3 that were used from the initial search were not counted as being used in the second search (Table 17).

7.4 Earth negotiation documents

Document number	Date	name
Doc.1	11/12/2000 – 22/12/2000	SUMMARY OF THE FOURTH CONFERENCE OF THE PARTIES TO THE CONVENTION TO COMBAT DESERTIFICATION
Doc.2	11/11/2002 – 22/11/2002	SUMMARY OF THE FIRST SESSION OF THE COMMITTEE FOR THE REVIEW OF THE IMPLEMENTATION OF THE CONVENTION TO COMBAT DESERTIFICATION
Doc.3	12/03/2007 – 21/03/2007	SUMMARY OF THE FIFTH SESSION OF THE COMMITTEE FOR THE REVIEW OF IMPLEMENTATION OF THE UNCCD
Doc.4	10/05/1999 - 18/05/1999	SUMMARY OF THE SEVENTH MEETING OF THE CONFERENCE OF CONTRACTING PARTIES TO THE RAMSAR CONVENTION ON WETLANDS
Doc.5	18/11/2002 – 26/11/2002	SUMMARY OF THE EIGHTH MEETING OF THE CONFERENCE OF THE CONTRACTING PARTIES TO THE RAMSAR CONVENTION ON WETLANDS
Doc.6	19/11/2002	RAMSAR COP8 HIGHLIGHTS TUESDAY, 19 NOVEMBER 2002
Doc.7	22/11/2002	RAMSAR COP8 HIGHLIGHTS FRIDAY, 22 NOVEMBER 2002
Doc.8	25/11/2002	RAMSAR COP8 HIGHLIGHTS MONDAY, 25 NOVEMBER 2002
Doc.9	11/11/2005	RAMSAR COP9 HIGHLIGHTS FRIDAY, 11 NOVEMBER 2005
Doc.10	28/10/2008 – 4/11/2008	SUMMARY OF THE TENTH CONFERENCE OF THE PARTIES TO THE RAMSAR CONVENTION ON WETLANDS
Doc.11	31/10/2008	RAMSAR COP 10 HIGHLIGHTS FRIDAY 31, OCTOBER 2008
Doc.12	03/11/2008	RAMSAR COP 10 HIGHLIGHTS MONDAY, 3 NOVEMBER 2008
Doc.13	06/07/2012 – 13/07/2012	SUMMARY OF THE ELEVENTH CONFERENCE OF THE PARTIES TO THE RAMSAR CONVENTION ON WETLANDS
Doc.14	02/06/2015 – 09/06/2015	SUMMARY OF THE TWELFTH MEETING OF THE CONFERENCE OF THE PARTIES TO THE RAMSAR CONVENTION
Doc.15	04/06/2015	RAMSAR COP12 HIGHLIGHTS: THURSDAY, 4 JUNE 2015
Doc.16	06/06/2015	RAMSAR COP12 HIGHLIGHTS: SATURDAY, 6 JUNE 2015
Doc.17	22/10/2018 – 29/10/2018	Summary of the Thirteenth Meeting of the Conference of the Parties to the Ramsar Convention on Wetlands: 22-29 October 2018

7.5 Interview questions template

Questions about Ramsar convention

1. What were your personal work and specific role and affiliation with Ramsar?
2. Why are countries not fulfilling their role in providing up to data information to Ramsar convention?
    a. Is it that they're not even compiling the data within the countries or that they're not forwarding the information onto Ramsar?

Questions about Secretariat

1. How reliant are you on data from states Parties to the Convention for your role?
2. What is your capacity to fulfil your roles?

Questions about STRP

1. What are the biggest obstacles to your work do you find in analysing and reporting?
2. What role does the strp play in providing technical advice to the Ramsar convention and beyond?
3. What is their capacity to research?
4. How reliant are you on data from state parties in your work for the STRP to assess the situation of wetlands?
5. How does that affect your role for the panel in your analysing and reporting on wetlands degradation and issues?

Questions about Ramsar and land use change

1. What does Ramsar doing in terms of indirect threats to maybe wetlands outside designated suites such as land use change in the watershed
2. Is Ramsar aware or trying to understand the indirect threats from land-use change such as afforestation
3. Does Ramsar do enough in addressing these indirect threats from land-use change?
4. Is data collected regarding these, such as understanding the inputs of sediment to wetlands?
    a. Is this information being tracked by parties?
    b. Is it part of the information forms?
    c. Is this information being tracked?

Questions about Ramsar and climate change

1. Why was there reluctance to discuss climate mitigation policy within wetlands?
    a. Why did some country maybe have issues with including specific reference to wetlands for NDCs?
2. How and why has the perception of climate and wetlands changed

3. How do you see the strength of resolutions around climate?

Questions about Ramsar and UNFCCC

1. From your perspective, what is the role of Ramsar and its secretariat at UNFCCC COP's and is this sufficient?
    a. Has the role and/or strategy of Ramsar changed at different cops?
    b. What was the objective of Ramsar participation at UNFCCC cops?
    c. Has the perception of Wetlands changed since the lead up to Paris Agreement in 2015 and 2021 Glasgow?
    d. What is the cause for the slow interest in wetlands, is it a reluctance from Ramsar in linking it to the climate mitigation and adaption or was it within more the UNFCCC side focused on something else such as forests? What explains the lack of integration?
2. How do you see the respective roles between UNFCCC and Ramsar in taking this issue of wetlands/peatlands and climate in the future?

Questions about Ramsar relationship with other actors such as MEA's

1. What work do you contribute towards with other MEA's?
2. How are Ramsar trying to increase synergies with other MEA's?
3. Do they work cooperatively together to address the issues or is there some form of friction there still?
4. Does any conflict or challenges arise between MEA's with different focus such as those trying to protect a habitat over a species?
5. How has the role of Ramsar changed since its formation, where their position lies with other NGOs, actors or MEAs in protecting wetlands and migratory birds?
6. How is collaboration with partners and other MEA's going in yellow sea region
7. What gap do you see the world coastal forum filling in international governance? And are there any particular actors that are pushing it?

7.6 Interviewees

Interviewee	Date	Length (minutes)
Ramsar Secretariat	04/04/2022	43
Ramsar Secretariat	04/04/2022	47
Ramsar Secretariat	11/04/2022	63
Ramsar Secretariat	29/04/2022	35
Ramsar STRP	06/05/2022	63
Ramsar STRP	31/05/2022	37
External to Ramsar	11/05/2022	62

7.7 ENB side events at unfccc

UNFCCC cop	Name of side event
Marrakech Climate Change Conference 2016	Incorporating Blue Carbon into Nationally Determined Contributions (NDCs) under the Paris AgreementPresented by the Government of Australia, Wetlands International and the International Partnership for Blue Carbon, Advancing Global Goals on Forests & Climate ChangePresented by the UN Development Programme (UNDP)
Bonn Climate Change Conference 2017	Long-term Strategies for 1.5ºCPresented by Climate Action Network (CAN) International, CAN Europe and World Wide Fund for Nature (WWF) European Policy Office, Re-Discovering the Magnificent Carbon Storage Potential of Wetlands and PeatlandsPresented by the Center for International Forestry Research (CIFOR), the European Space Agency (ESA) and the Friedrich Schiller University Jena (FSU Jena), Contribution of Forest Landscape Restoration to Nationally Determined Contributions Presented by the International Union for the Conservation of Nature (IUCN) and the international Institute for Applied Systems Analysis (IIASA), Climate and Development Benefits of Black Carbon MitigationPresented by the Institute for Advanced Sustainability Studies (IASS), the Climate and Clean Air Coalition (CCAC) and the Governments of Canada, Chile and Mexico
Fiji / Bonn Climate Change Conference 2017	Sustainable Forest Management (SFM) and Climate Change: What are the Issues? What Actions? Presented by the Ministry of Agriculture, Agrifood, and Forestry, France, The Global Platform for the New York Declaration on Forests and the Bonn Challenge: From Commitments to ActionPresented by the German Pavilion, the UN Development Programme (UNDP) and International Union for Conservation of Nature (IUCN), Addressing Uncertainties in Estimating GHG Emissions and Removals in the Agriculture, Forestry And Other Land Uses (AFOLU) Sector to Strengthen Land Management ImpactsPresented by Institut de Recherche pour le Développement (IRD), Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Cornell University, Institut National de la Recherche Agronomique (INRA) and New Zealand, Forests Country ShowcasePresented by the International Union for Conservation of Nature (IUCN), Enhancing the Resilience of Forests and Ecosystems to Achieve the Nationally Determined Contributions (NDCs) of Latin AmericaPresented by EUROCLIMA+, funded by the EU
Katowice Climate Change Conference 2018	Black Soils for Food Security and Climate Change Adaptation and Mitigation, Getting to the Point: The Relevance of Wetland Ecosystems for Increasing NDC Ambition, Low-Emissions Solutions Conference (LESC) High-Level Dinner Dialogue, Forests First – From 10 Years REDD+ to the Full Scope of Nature-Based Climate Solutions, Natural Resources, Climate and Biodiversity Resilience Strategies for Sustainable Development
Chile/Madrid Climate Change Conference 2019	20191209_Nature-Based Solutions on the Ground (SDG 15) UN Support to People and Landscapes

7.8 Ramsar Resolutions

Conference of parties	Resolution	
COP7	Resolution VII.11	Strategic framework and guidelines for the future development of the List of Wetlands of International Importance
	Resolution VII.25	Measuring environmental quality in wetlands
COP8	Resolution VIII.3	Climate change and wetlands: impacts, adaptation, and mitigation
	Resolution VIII.5	Partnerships and synergies with Multilateral Environmental Agreements and other institutions
	Resolution VIII.8	Assessing and reporting the status and trends of wetlands, and the implementation of Article 3.2 of the Convention
	Resolution VIII.11	Additional guidance for identifying and designating underrepresented wetland types as Wetlands of International Importance
	Resolution VIII.17	Guidelines for Global Action on Peatlands
COP9	Resolution IX.2	Future implementation of scientific and technical aspects of the Convention
	Resolution IX.5	Synergies with other international organizations dealing with biological diversity; including collaboration on, and harmonization of, national reporting among biodiversity-related conventions and agreements
	Resolution IX.8	
	Resolution IX.9	The role of the Ramsar Convention in the prevention and mitigation of impacts associated with natural phenomena, including those induced or exacerbated by human activities
COP10	Resolution X.3	The Changwon Declaration on human well-being and wetlands
	Resolution X.10	Future implementation of scientific and technical aspects of the Convention
	Resolution X.24	Climate change and wetlands climate change
COP11	Resolution XI.8	Streamlining procedures for describing Ramsar Sites at the time of designation and subsequent updates
	Resolution XI.14	Climate change and wetlands: implications for the Ramsar Convention on Wetlands
COP12	Resolution XII.11	Peatlands, climate change and wise use: Implications for the Ramsar Convention
COP13	Resolution XIII.12	Guidance on identifying peatlands as Wetlands of International Importance (Ramsar Sites) for global climate change regulation as an additional argument to existing Ramsar criteria
	Resolution XIII.13	Restoration of degraded peatlands to mitigate and adapt to climate change and enhance biodiversity and disaster risk reduction
	Resolution XIII.14	Promoting conservation, restoration and sustainable management of coastal blue-carbon1 ecosystems

7.9 Code list

Folder	Name	Files	References
Codes	Error II	0	0
Codes	Error II\Black swan	0	0
Codes	Error II\Cognitive bias	0	0
Codes	Error II\Evidence, monitoring, analysis	10	19
Codes	Error II\Insufficient evidence monitoring analysis	11	30
Codes	Error II\Insufficient evidence monitoring analysis\horizon scanning	1	3
Codes	Error II\Insufficient evidence monitoring analysis\Lack indicators to monitor progress of resolutions	2	2
Codes	Error II\Insufficient evidence monitoring analysis\limited resources of STRP	2	6
Codes	Error II\Insufficient evidence monitoring analysis\Peatland data	6	6
Codes	Error II\Insufficient evidence monitoring analysis\poor wetland data	4	5
Codes	Error II\Insufficient evidence monitoring analysis\Reliant on state parties	5	15
Codes	Error II\Insufficient evidence monitoring analysis\Wetland role in CC mitigation	1	1
Codes	Error III	0	0
Codes	Error III\Conflicting perspectives	13	28
Codes	Error III\Conflicting perspectives\Between meas	1	1
Codes	Error III\Conflicting perspectives\Biofuels	2	2
Codes	Error III\Conflicting perspectives\Climate change	7	11
Codes	Error III\Conflicting perspectives\Country history	1	2
Codes	Error III\Conflicting perspectives\Need consensus	1	2
Codes	Error III\Conflicting perspectives\Not priority	1	1
Codes	Error III\Conflicting perspectives\Peatlands	3	3
Codes	Error III\Conflicting perspectives\political broadening	4	6
Codes	Error III\Conflicting perspectives\poor visibility	1	1

Codes	Error III\Conflicting perspectives\States dont want to be embarrassed	4	7
Codes	Error III\Consensus	1	1
Codes	Error III\Excluded perspective in DM process	5	10
Codes	Error III\Excluded perspective in DM process\Biodiversity saturation	1	2
Codes	Error III\Excluded perspective in DM process\Ramsar poor visibility and track record	2	4
Codes	Error III\Excluded perspective in DM process\Silo mentality	6	10
Codes	Error III\Excluded perspective in DM process\unfccc silo	5	8
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions	21	45
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions\Biodiversity	1	1
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions\Blue carbon	1	2
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions\climate change	16	29
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions\monitoring	1	1
Codes	Error III\Exclusion or weakened reference to perspectives in resolutions\Peatlands	9	12
Codes	Error III\Including perspectives	23	63
Codes	Error III\MEA not resistant to change	11	15
Codes	Error III\MEA resistance to change, not assessed	9	14
Codes	Error III\MEA resistance to change, not assessed\finance	3	3
Codes	Error III\MEA resistance to change, not assessed\Horizon scanning	1	1
Codes	Error III\MEA resistance to change, not assessed\lack of mechanisms to follow progress	4	6
Codes	Error III\MEA resistance to change, not assessed\legal status (UN)	1	1
Codes	Error III\MEA resistance to change, not assessed\secretariat limited resources	1	1

Codes	Error III\MEA resistance to change, not assessed\Synergies	1	1
Codes	Error III\Scientific focus	4	6
Codes	Error V	0	0
Codes	Error V\Denial	9	11
Codes	Error V\Denial\dont want to be embarrassed	2	2
Codes	Error V\Denial\financial	1	1
Codes	Error V\Denial\not priority	2	4
Codes	Error V\Denial\Peatland	1	1
Codes	Error V\Denial\silo	4	4
Codes	Error V\Denial\weak language	2	2
Codes	Error V\Free rider	3	3
Codes	Error V\Negotiation delays	9	15
Codes	Error V\Organisations identity, rules and routines	8	18
Codes	Error V\Organisations identity, rules and routines\China	1	1
Codes	Error V\Organisations identity, rules and routines\Different perspectives	1	1
Codes	Error V\Organisations identity, rules and routines\limited capacity	5	7
Codes	Error V\Organisations identity, rules and routines\No follow up mechanism	2	4
Codes	Error V\Organisations identity, rules and routines\not taken seriously	2	3
Codes	Error VI	0	0
Codes	Error VI\Foresight	1	1
Codes	Error VI\Lack of foresight	4	4
Codes	Error VI\Lack of foresight\problem shift3	1	1
Codes	Error VI\Lack of foresight\silver bullet	1	1
Codes	Error VI\LT focus	0	0
Codes	Error VI\Power imbalances	7	9
Codes	Error VI\Power imbalances\Country alliances	2	2

Codes	Error VI\Power imbalances\forestry	2	2
Codes	Error VI\Power imbalances\Lack finance	1	1
Codes	Error VI\Prioritise short term	1	1
Codes	Global Coastal Forum	3	3
Codes	Global peatland initiative	2	3
Codes	Role parties	7	17
Codes	Role Secretariat	7	12

7.10 Degree of impact calculations

Table. Degree of existence (DoE) and Degree of Impact (DoI) of conditions that contributed to decision errors.

Error	Causal condition	COP8 DoE	COP9 DoE	COP 10 DoE	COP 11 DoE	COP 12 DoE	COP 13 DoE	Sum DoI
Type I (or Type II)	Insufficient evidence monitoring and analysis	6	6	6	3	2	2	25
	Cognitive bias	2	1	1	2	1	2	9
Type III	Conflicting perspectives	7	5	6	5	4	4	31
	Exclusion of perspectives in COPs	7	7	4	5	4	4	31
	Exclusion of perspectives in resolutions	7	6	6	7	2	7	35
	MEA not routinely assessed & resistant to change	3	5	4	4	3	3	22
Type V	Denial	7	6	6	6	2	4	31
	Organisations identity, rules and routines	7	1	5	7	3	4	27
	Negotiation delays	6	5	6	7	2	4	30
	Free rider effect	3	1	1	3	1	3	12
	Lack of foresight	2	1	1	1	1	1	7
Type VI	Prioritise short term	1	1	1	1	1	1	6
	Power imbalances	2	2	2	2	1	1	10