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Master's Thesis - master Sustainable Development

# The Effects of Short-termism on Sectoral Problem Shifting

A case study analysis on sectoral problem shifting and short-termism between  
the Montreal and Kyoto Protocols

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## Summary

Multilateral environmental agreements enacted to protect the environment play a crucial role in promoting sustainability. However, as global environmental domains such as climate and ozone are interlinked, policies implemented to address a narrow problem in one domain can shift environmental problems to another domain. Such displacement of problems is increasingly recognized in academic literature as a fundamental challenge to effective environmental policy. However, while spatial problem shifting has received broad attention in literature, cross-sectoral shifting of problems has not, which has motivated the introduction of the sectoral problem shifting concept. Up until now, literature has failed to show which underlying conditions enable problems to shift from one environmental domain to another. A systematic literature review has revealed that, among others, short-termism potentially causes problems to shift from one environmental domain to another. The idea is that the focus on identifying and implementing short-term fixes for urgent environmental problems tends to discount the risk of worsening other environmental problems. To test the influence of short-termism, one clear case of sectoral problem shifting between the Montreal and Kyoto Protocols has been identified, and incorporated in the following research question: *How has short-termism influenced the occurrence of sectoral problem shifting from the Montreal Protocol toward the Kyoto Protocol?* To answer this research question, a case study analysis has been used which uses data from case studies and reports of the Montreal Protocol COPs and MOPs. Evidence from the case study analysis suggests that short-termism of the delegates of the Parties under the MEA could have enabled sectoral problem shifting from the ozone to the climate regime. Together with the other findings of the literature survey, which revealed fragmentation, a narrow set of indicators, and power imbalance as other potential causal conditions, a broader discussion is promoted on the enabling conditions of sectoral problem shifting between multilateral environmental agreements.

## Keywords

Sectoral Problem Shifting, Enabling Conditions, Short-termism, Multilateral Environmental Agreement, Ozone Depletion, Climate Change

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## List of Acronyms

EIA	-	Environment Investigation Agency
ENB	-	Earth Negotiations Bulletin
CFC	-	Chlorofluorocarbon
CMP	-	Cross-media Pollution
COP	-	Conference of the Parties
CSA	-	Case Study Analysis
GHG	-	Greenhouse Gas
GWP	-	Global Warming Potential
HCFC	-	Hydrochlorofluorocarbon
HFC	-	Hydrofluorocarbon
KP	-	Kyoto Protocol
LCA	-	Life Cycle Assessment
MEA	-	Multilateral Environmental Agreement
MOP	-	Meeting of the Parties
MP	-	Montreal Protocol
ODP	-	Ozone Depleting Potential
ODS	-	Ozone Depleting Substance
SLR	-	Systematic Literature Review
SPS	-	Sectoral Problem Shifting
ST	-	Short-termism
UNFCCC	-	United Nations Framework Convention on Climate Change

## Definition of Terms

### *Sectoral problem shifting*

Transforming one environmental impact to another, through a policy intervention, negatively affects a different environmental domain than before.

### *Multilateral environmental agreement*

An intergovernmental document intended as legally binding with a primary stated purpose of preventing or managing human impacts on natural resources (Mitchell, 2003). Together with its governing bodies, COPs, and MOPs, an MEA is broadly interpreted as an institution with an agency, which actively steers environmental governance.

### *Short-termism*

Focus on short-term fixes of environmental problems at the expense of an environmentally sustainable future.

# 1. Introduction

In response to global environmental issues like ozone depletion and climate change, the international community started to develop international legal structures that deal with these problems. Major anchors of this global environmental governance are multilateral environmental agreements (MEAs). These MEAs and their overarching governance mechanisms, collectively defined as regimes, are separately established to respond to specific environmental problems (Kim & van Asselt, 2016). However, these regimes increasingly affect the development and performance of each other (Gehring & Oberthür, 2004), creating both positive and negative spillovers onto each other's issue domains (Faude & Große-Kreul, 2020). One of the concepts that has been used to conceptualize this phenomenon of negative spillovers is problem shifting. Problem shifting is in broad terms understood as improving the performance of one system by degrading another (Nilsson & Persson, 2012). In terms of environmental governance, it is a phenomenon that refers to a situation in which an intervention aimed at solving an environmental problem causes problems to be transferred in space, time, or transformed into a different environmental impact (Kim & van Asselt, 2016).

Problem shifting is a common feature in many attempts to manage natural resources sustainably. Instances of problem shifting have been observed frequently at both local and regional levels. For instance, the protection of one species, say grizzly bears, could negatively affect another species, such as fish (Wuethrich, 2000). Building hydroelectric dams to mitigate climate change may reduce fossil fuel consumption and therefore partially mitigate climate change, but it would simultaneously create adverse impacts to local flora, fauna, and the water quality (Sperling, 2012). Similarly, using biofuels instead of fossil fuels could reduce our fossil fuel consumption, but also affect freshwater depletion and pesticide contamination (Lecksiwilai & Gheewala, 2020). Reducing local air pollution through introducing electric vehicles instead of conventional vehicles might be effective, but the production of lithium batteries creates negative environmental impacts as well (Kobayashi et al., 2017). One thing that becomes clear is that the risk of problem shifting is real.

However, on a global level, the potential negative impact of multilateral environmental agreements on environmental issues other than their own is rarely studied. Examples of such instances are the Kyoto Protocol, which promotes carbon mitigation options that could have adverse effects on ecosystems and species (Totten et al., 2003). Or the Montreal Protocol (MP), which regulates ozone depleting substances, but fails to account for the global warming potential (GWP) of their substitutes (Oberthür et al., 2011). These environmental treaties were believed to be inherently green, creating outcomes that were either green or unintended and inevitable. But is this true? Is problem shifting between MEAs inevitable, or do these treaties shift problems because it is just the easiest way to solve their own problem?

Instead of using the concept of problem shifting, this research introduces the concept of sectoral problem shifting to investigate in particular cases with a transformative element. Such cases transform environmental impacts, affecting different environmental domains than initially targeted by the intervention. Whereas literature includes multiple concepts which focus on the spatial element of problem shifting, such as leakage and waterbed effect (Aichele & Felbermayr, 2015; Rosendahl, 2019), the sectoral element has been largely ignored. Combined with introducing the time dimension (short-termism), and investigating the relationship between the time and sectoral dimensions, makes this an interesting and novel research area.

This research aims to create a better understanding of the sectoral problem shifting phenomenon in global context. To do so, first, an extensive systematic literature survey investigates problem shifting on various governance levels, between institutions other than MEAs. This literature survey is used to, among other elements, reveal the enabling conditions of problem shifting between two separately governed environmental problems. One of the conditions that has been identified is short-termism (ST) among policymakers. Then, employing a case study analysis, which studies problem shifting between the Montreal Protocol and Kyoto Protocol (KP), the short-termism hypothesis is tested in the MEA context. It is hypothesized that when the delegates of the Parties focus on addressing the objective of the MEA as the most urgent issue, sectoral problem shifting between MEAs occurs. In this case, sectoral problem shifting occurs because certain ozone depleting substances (ODSs), and their alternatives, are powerful greenhouse gases (Oberthür et al., 2011). Two of the most widely used alternatives to ODSs, hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), have a very high GWP compared to CO<sub>2</sub>. As such, promoting the use of these alternatives creates new problems in the climate change domain. Up until now, it remains largely unknown why, apart from the environmental interlinkages, this shifting of problems has occurred. This makes this well-described case the perfect testing ground for investigating how short-termism has influenced the decisions, leading to problem shifting.

## 1.1 Research aim and question

Within this research, unlike conventional research, special attention is provided to the literature reviews. This is the case for the conceptualization of sectoral problem shifting, which is based on an extensive and thorough narrative review. This review investigates a wide range of concepts related to the problem shifting phenomenon and highlights the gap in the literature concerning the sectoral dimension in problem shifting. This review aims to introduce SPS, compare it to other PS-related concepts, and visualize the overlaps and complete disjoints among the concepts (figure 1). In addition, this literature review reveals which concepts can be used to further investigate SPS in the second literature review. The second literature review, a systematic review of the literature on the enabling conditions of SPS, provides the necessary theoretical understanding of why SPS could occur. This systematic approach provides a comprehensive overview of the current understandings of conditions that could enable problems to shift from one environmental domain to another, which has been missing in the current body of literature. The findings from both literature surveys have been used as input for the scope and aims of the main research question of this thesis.

This research aims to build on the theoretical understanding of sectoral problem shifting and create new understandings of short-termism in a global environmental governance context. Using the short-termism condition and the information on the SPS case between the Montreal Protocol and the Kyoto Protocol resulted in the following main research question: *How has short-termism influenced the occurrence of sectoral problem shifting from the Montreal Protocol toward the Kyoto Protocol?*

To answer this question, first, the dominant understanding of multilateral environmental agreements needs to be challenged, which are predominantly conceptualized as inherently green. However, investigating cases of problem shifting created by MEAs shows that this might not always be the case. Then, a definition of short-termism in a global context is formulated, which gives insight into what is



understood by short-termism. To do so, clarification is necessary on why short-termism could be relevant within an MEA context. Research and statements that have revealed the potential effect of short-termism are not always so explicit in who 'practices' this short-termism, and on which governance level this could be of key influence. Therefore, by putting this phenomenon in an MEA context, it will become clear why ST is relevant for research on MEAs. Finally, an case study analysis needs to test the hypothesis regarding the influence of short-termism on sectoral problem shifting. The outcome of this CSA could either be that the hypothesis is falsified, or that it is not falsified.

This thesis is structured as follows. Within the next chapter, the theory is provided which forms the thorough framework in which this research is conducted. First, the conceptualization of sectoral problem shifting is discussed, providing a comprehensive overview of how problem shifting has been addressed in literature. Second, the findings of the systematic literature are discussed, showing some of the potential enabling conditions of SPS as discussed in literature. Third, the conceptualization of multilateral environmental agreements shows why MEAs might not be so inherently green as previously understood. And fourth, the key condition of this research, short-termism, is defined and situated in a global environmental governance context. Then, chapter 3 provides the case study methodology used to identify the presence of short-termism in the specific case. This chapter consists of the operationalization of the dependent and independent variables, the case selection, and the data collection. Then, the results of the case study are shown, which are divided into two periods. Next, the overall discussion of this research provides insights into the theoretical and policy implications, complemented with limitations and further research directions. Finally, the conclusion provides an answer to the main research question and shows the main findings of this research.

## 2. Theoretical framework

### 2.1 What is sectoral problem shifting?

This chapter aims to introduce and conceptualize the concept of sectoral problem shifting. Then, an overview is provided of some of the most widely used concepts related to the environmental problem shifting phenomenon in literature. Finally, to show which concepts overlap and which are fundamentally different compared to SPS, a comparison is provided including visualization in figure 1.

In literature, various concepts have been used to describe types of displacement of environmental problems, some of which are broad in scope and include multiple forms of displacement, such as the spillover concept, while other concepts address a more specific form of displacement, such as the waterbed effect describing a form of spatial displacement. According to Kim and van Asselt (2016), problem shifting is a common feature of complex dynamic systems, occurring from improving the performance of one system by degrading another. Problem shifting is about the transfer of negative impacts from one location to another (spatial), over time (temporal), or the transformation of one type of impact into another (sectoral) (Kim & van Asselt, 2016). Additionally, Kim and van Asselt (2016) argue that the notion of 'shifting' implies that the transfer or transformation of impacts can be both intended and unintended, as the negative side effects are sometimes known. While this is true, Zwart (2015) shows that the concept 'unanticipated consequence' has been replaced in literature by the concept of unintended consequence, falsely suggesting that they are the same. A side-effect of a policy could be unintended, not the aim of the intervention, but both anticipated and unanticipated. Sometimes policymakers are aware of the possible side-effects, and sometimes they are not. In addition, a side-effect could also be intended and anticipated. It is important to recognize these differences when investigating the various concepts describing phenomena related to problem shifting.

Combined, these elements show the various interpretations possible of the problem shifting concept. To identify more specific forms of problem shifting, concepts have been formulated which address some of these elements. For example, this has been done for spatial problem shifting, using terms like leakage and waterbed effect, which are widely used in environmental literature. In contrast, the sectoral element of PS has not received such attention. Currently, to the best of the author's knowledge, there is no concept which specifically addresses the transformative element of problem shifting. Without recognizing and researching this specific element of PS, it is unlikely that it will receive much attention, and that we will be able to understand the potential negative consequences.

As such, this research focuses on the transformative type of problem shifting, which is conceptualized by introducing a new concept, sectoral problem shifting (SPS). SPS is defined as transforming one environmental impact to another, through policy intervention, negatively affecting a different environmental domain than before. This shifting of environmental impacts from one domain to another is the sectoral element of the concept. SPS can for example be found in biofuel cases, which address global warming but by doing so create new problems such as freshwater depletion and pesticide contamination (Lecksiwilai & Gheewala, 2020). In contrast to SPS, problem shifting with a spatial character consists of the same problems shifting from one location to another. An example of spatial problem shifting is carbon leakage, which has occurred due to the Kyoto Protocol (Aichele & Felbermayr, 2015). According to Aichele and Felbermayr (2015), the binding commitments under the

KP have increased the carbon from noncommitted countries to committed countries, which illustrates that the carbon emissions have shifted towards noncommitted countries.

Using and reformulating the definition of Kim and van Asselt (2016) of problem shifting has resulted in the following three main elements of SPS: (1) an original environmental problem, (2) a policy intervention, and (3) one or more new or aggravated environmental problems in different environmental domains. Element 2 has a narrower scope compared to the original because this research focuses on environmental policymaking, and not on other types of interventions. Only when these three elements are present, the phenomenon is identified as sectoral problem shifting. For example, the case of the biofuels provided above does include these three elements. First, the original problem is global warming, created by the increasing use of fossil fuels. Second, the problem is transformed and shifted through policies like the Alternative Energy Development Plan, stimulating liquid biofuel production. And third, the impacts on the original problem are transformed into adverse impacts on environmental issues like freshwater depletion and pesticide contamination (Lecksiwilai & Gheewala, 2020).

As the SPS concept introduced above is new and will not produce results in a systematic literature review, other concepts with similarities to SPS are used to identify enabling conditions of SPS in literature. In addition, comparing these concepts with SPS shows the gap in literature that is addressed by introducing SPS. First, a narrative review has been conducted which provided an overview of problem shifting phenomena in literature, presented in table 1. Then, these concepts are compared with SPS, showing which concepts are suitable for use in the SLR. A concept is deemed suitable when, based on its definition and the type of shifting it describes (spatial, temporal, sectoral, or multiple), it is likely that it has been used on cases that include the three elements of SPS.

**Table 1.** Conceptual Framework – Definitions and key examples of problem shifting concepts

Terminology	Definition	Key examples
<b>Problem shifting</b>	Problem shifting is about the sectoral, spatial, and temporal transfer of negative impacts, occurring from improving the performance of one system by degrading another (Kim & van Asselt, 2016)	Environmental policies aimed at improving carbon footprints can shift problems when the carbon reductions are obtained at the expense of other environmental domains (Laurent et al., 2012)
<b>Cross-media pollution</b>	CMP is about the transfer of pollutants from one environmental medium to another (Teclaff & Teclaff, 1987). This phenomenon stems from the behavior of pollutants in the environment which tend to cycle from air to land to water (Tangley, 1985).	Water and groundwater pollution from regulating gasoline oxygenate additives (Fernandez & Dumas, 2009)
<b>Spillover effect</b>	Spillover refer to the effects of an activity that have spread further than was originally intended, with positive	Owners of electric vehicles have a reduced intention and perceived moral obligation to

	or negative consequences (Cambridge Dictionary, n.d.-a). It is most commonly used to describe the effect an intervention has beyond the scope of the intervention (Truelove et al., 2014).	reduce car use compared to conventional vehicle owners, illustrating a negative spillover of pro-environmental behavior (Klößner et al., 2013)
<b>Leakage</b>	Leakage is a subset of the broader term spillovers and refers to a specific type of spillover in which an environmental policy indirectly triggers impacts that go against the aims of the policy, reducing the overall benefit (Lima, Persson & Meyfroidt, 2019).	Carbon leakage from committed countries under the Kyoto Protocol to non-committed countries (Aichele & Felbermayr, 2015)
<b>Unintended consequences</b>	A broad concept that often relates to the unintended consequences of certain policy interventions. Lewison et al. (2019) describes it as the unintentional displacement or transfer from one jurisdiction to another.	Increased fishery's carbon footprint by introducing more marine protected areas to protect the target species and reduce ecosystem impacts (Farmery et al., 2014)
<b>Trade-off</b>	A broad concept which refers to a situation in which you accept something bad to have something good (Cambridge Dictionary, n.d.-b). Sometimes, the negative effects are known, but they can be unintended and unanticipated as well (Davies et al., 2018).	Large-scale bioenergy production without complementary measures results in negative effects on various sustainability indicators like deforestation and CO <sub>2</sub> (Humpeönder et al., 2018)
<b>Waterbed effect</b>	A phenomenon that when an agent restricts the use or emission of a substance in one region or sector, the use or emission will be transferred in space or time. As a result, net emissions or use will not change (Rosendahl, 2019).	The offset of emission reduction initiatives in one EU member state by increased emissions in other member states, given the EU-wide cap (EU ETS) (Osorio et al., 2020)
<b>Green paradox</b>	Climate policies can instead of solving climate issues encourage businesses to increase their extraction rates of harmful substances, e.g., fossil fuels (Sinn, 2009).	Subsidizing renewable energy such as solar and wind increases the extraction of fossil fuels, and consequently aggravates global warming (van der Ploeg & Withagen, 2012)

The first four concepts which are presented are, besides the problem shifting concept itself, deemed suitable for use in the SLR. One of the concepts revealed by the literature survey is 'cross-media pollution' (CMP). According to Teclaff and Teclaff (1987), cross-media pollution is about the transfer of pollutants from one medium to another. CMP is a concept that is closely connected to SPS but is narrower in scope. The term 'pollution' is narrower in scope compared to the term 'problem' as it is limited to tangible damage by pollutants, and not dormant or potential hazards, which are covered by the term 'problem'. In addition, the term 'cross-media' can be interpreted narrower in scope as it only includes transfer from one medium to another, which could be identified as a subset of 'sectoral'. SPS can occur within one medium, e.g., addressing ozone depletion affects global warming by using alternatives with a high GWP which is limited to the atmosphere, while CMP would occur when a substance is transferred from, e.g., the atmosphere to the ocean. Cases of CMP can include all three elements of SPS.

The second concept which is closely related to sectoral problem shifting is 'unintended consequence' (UC). Lewison et al. (2019) describe it as the unintentional displacement or transfer from one jurisdiction to another. The term 'unintended' shows that UC describes cases with an unintended nature, anticipated or unanticipated, and does not include intended cases. The term 'consequence' shows that UC includes a broad range of sectoral, spatial, and temporal shifting cases. In addition, while UC could indicate both positive and negative consequences, in literature it has primarily been used to describe negative consequences. Cases addressed by UC can include all three elements of SPS.

The third concept which overlaps with sectoral problem shifting is the 'trade-off' concept. Kim and van Asselt (2016) argue that trade-offs are by definition intentional, resulting from an explicit act of choice by a decision-maker, aware of the secondary effects. However, as has been shown by Davies et al. (2018), trade-offs can be explicit management decisions, but they can arise as well as unintended consequences of interventions. According to the Cambridge Dictionary (n.d.-b), trade-off is a broad concept that refers to a situation in which you accept something bad to have something good. In addition, Merriam Website (n.d.) states that a trade-off is "a balancing of factors all of which are not attainable at the same time". This research acknowledges both intended and unintended trade-offs, with anticipated or unanticipated consequences. As such, the TO concept is a broad concept which overlaps with a wide range of PS-related phenomena. Cases addressed by this concept can include all three elements of SPS.

The fourth concept is the 'spillover effect', which overlaps with sectoral problem shifting, but is broader in scope. The concept refers to the effects of an activity that have spread further than was originally intended, with positive or negative consequences (Cambridge Dictionary, n.d.-a). According to Truelove et al. (2014), it has been most commonly used to describe the effect an intervention has beyond the scope of the intervention. The spillover concept is larger in scope compared to TO because it includes cases with solely positive outcomes as well. The concept is also larger in scope compared to UC because spillovers can be both intentional and unintentional. The broad formulation of the spillover definition overarches all other PS-related concepts included in this research, as has been visualized in figure 1. As such, spillover effect could include all three elements of SPS.

The concepts that are presented in previous paragraphs are used to conduct the literature review on enabling conditions of SPS. The following concepts do describe a specific type of environmental

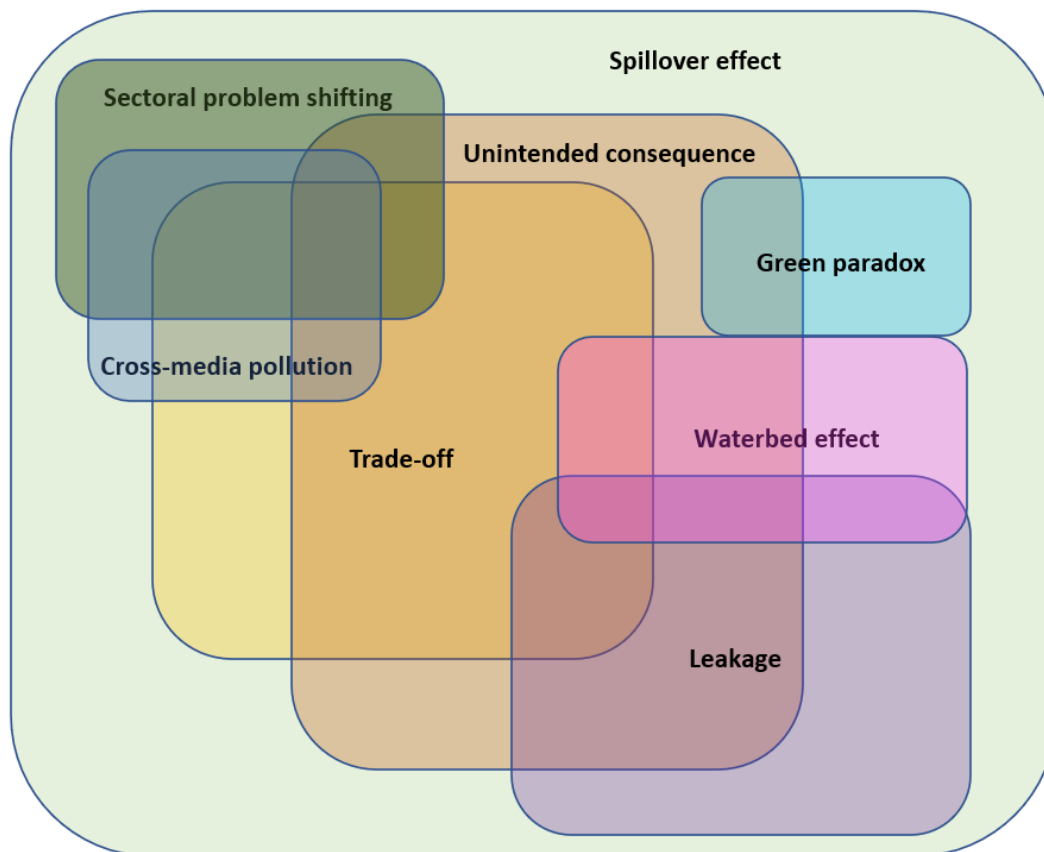
problem shifting, however, by definition, these concepts do not include one or multiple of the elements of SPS. Therefore, these concepts are only used to conceptualize SPS and create a broader understanding of the phenomenon, and not in the literature review. One of these concepts is 'leakage'. Leakage is a concept which represents a subset of the broader term spillover. It refers to a specific type of spillover in which an environmental intervention creates impacts that work against the aims of the intervention, which reduces the overall benefit (Lima, Persson & Meyfroidt, 2019). Following this definition, leakage includes two of the three elements of problem shifting. It does have an original problem and a policy intervention; however, it does not have one or more new problems in a different issue area. Instead, it affects the same problem as addressed by the intervention. As such, the problem shifts in space and/or time. For example, Aichele and Felbermayr (2015) argue that the Kyoto Protocol has led to carbon leakage from committed countries to noncommitted countries. This illustrates a case in which the problem has shifted in both space and time, as the leakage occurred gradually from committed countries to noncommitted countries.

A concept strongly related to leakage is the 'waterbed effect'. The waterbed effect is a concept which describes the phenomenon that when an agent restricts the use or emission of a substance in one region or sector, the use or emission of this substance will be transferred to other regions or sectors without these restrictions (Rosendahl, 2019). Waterbed effect includes an original problem and an intervention or policy activity, however, it lacks the sectoral transformation of environmental impacts.

At last, the concept 'green paradox' focuses on the temporal shifting of problems. The green paradox is a phenomenon that results from climate policies like carbon taxes and subsidies for renewable energy. According to Sinn (2009), these policies could instead of solving climate change, encourage organizations that own fossil fuel reserves to increase their extraction rates because of the fear that their reserves will become worthless. As such, the problems of tomorrow are shifted to today. Because of the lack of good outcomes within the green paradox, the concept only overlaps with spillover effect and leakage, not with trade-off. The concept covers the first two elements of SPS, but it lacks the third element.

To summarize, this chapter has introduced the new concept of sectoral problem shifting, and has provided an extensive overview and comparison of concepts related to environmental problem shifting. SPS addresses a gap in literature by focusing on the sectoral element of problem shifting, describing a transformation of impacts from one environmental problem to another. The overview of the PS-related phenomena has shown that in literature, many concepts are used to describe broad and more specific forms of PS. The comparison provided insights that will be used in the next section, the literature survey on enabling conditions of SPS. Using the concepts which overlap with SPS provides enough data to research the potential enabling conditions of this phenomenon. Below, in figure 1, this overview and the overlaps are visualized in a Venn diagram.

**Figure 1.** Venn diagram visualizing the PS-related phenomena



## 2.2 Enabling conditions of sectoral problem shifting

As has been introduced in the introduction, the literature review on enabling conditions of SPS is an important element of this study. It provides the theoretical background of potential enabling conditions of SPS, which up until now have not been clearly identified in literature. Information on these conditions has been hidden in literature and not the main topic of academic research. This literature survey is aimed at revealing which enabling conditions of sectoral problem shifting can be found in literature. While the main RQ of this thesis focuses on SPS between MEAs, the scope of this literature survey is broader and includes cases from various governance levels, from local to global. Focusing on MEA cases would not have provided enough data to conduct a comprehensive SLR. As a result, the condition that has been selected for the case study testing, short-termism, needs to be put in MEA context, which is done in section 2.4. Below, the various steps undertaken to gain insight into these conditions are described. In the end, this has provided a framework of conditions potentially enabling sectoral problem shifting on various governance levels, shown in table 6.

### 2.2.1 Systematic identification of the enabling conditions through a literature survey

To answer the main research question, a systematic literature review has been used to acquire the information needed to identify potential enabling conditions of SLR. According to McNally (2016), a systematic literature review (SLR) identifies, selects, and critically appraises research to formulate an answer to a clear research question. A systematic literature review follows a clearly defined research

protocol that states the research framework before the review is conducted. As a result, an SLR deviates from a standard literature review by preventing a selection bias. During conventional literature reviews, authors are more likely to select research that is already consistent with their opinion and expected results, resulting in biased outcomes (Nightingale, 2009). By following a research protocol including clearly defined criteria, there is a smaller chance of selection bias. An SLR is a comprehensive and transparent search for literature, conducted over one or multiple databases and possibly other types of literature which are easily replicated by other researchers (McNally, 2016).

The use of an SLR instead of a conventional method such as a narrative review provided multiple important advantages to this research. First, using this type of literature survey provided the ability to create a comprehensive understanding of the enabling conditions of SPS without a selection bias. Up until now, such an overview did not exist. Second, the outcomes of the SLR are relatively reliable and verifiable, which gives future research the ability to use the outcomes. And third, as there are strong differences among the articles that needed to be analyzed in terms of scope and concepts used, the literature survey needed a structured approach to create meaningful and complete outcomes. While SLR is a time-consuming method, it strongly reduces the risk of missing important insights from the literature.

The SLR has been performed using five concepts that are believed to provide a strong representation of cases including the three elements of SPS: problem shifting, cross-media pollution, unintended consequence, trade-off, and spillover effect. To search for cases including these phenomena, Scopus has been used. Scopus is an academic database that included literature from almost all disciplines and a great variety of journals. The main research question is concerned with SPS between MEAs, and thus, on global governance level. Limiting the search to global cases will not provide enough data to perform the SLR. As such, the SLR includes cases on sub-global levels as well. To make sure the researched condition is relevant in global context, its global relevance is described in section 2.4.

Below the SLR strategy is elaborated, which consists of four steps, starting with the first search on Scopus, and ending with the final analysis of the articles which contain relevant information. The first step of the SLR was to search for the keywords within Scopus and add additional keywords when the search provided too many irrelevant results to analyze in a timely efficient manner. The search looked at the title, abstract, and keywords of the articles. Table 2 below shows which keywords are used, based on the concepts as previously identified. In addition, the table provides the number of results that the searches have provided. In all cases, except “cross-media pollution”, additional keywords are needed to specify the search string to get more accurate results.

**Table 2.** Number of results on concepts without additional keywords

Key concepts	Number of results
“problem shifting”	119
“cross-media pollution”	18
“spillover”	30.184
“unintended consequences”	10.028
“trade-off”	154.630



The type of additional keywords that have been used is based on the results for each search string, in particular the irrelevant articles that were found within the search results. The titles and journals of these irrelevant articles provided information on which elements need to be excluded from a more accurate search. For example, multiple concepts which are used in the searches are not used exclusively in environmental studies. Therefore, by adding the word “environment” or “environmental”, the search is narrowed down to studies including environmental elements. Table 3 shows the full search strings that have been used, including the additional keywords. The spillover concept needed further narrowing down because of the broad application of the concept in literature. To do so, the ‘subject areas’ of Scopus have been used. These subject areas categorize the articles within the database per subject. The subject areas that are relevant to this research, and therefore have been used in the search string for the spillover concept, are environmental sciences, energy, and earth and planetary sciences. In total, using these final search strings provided 551 articles, as is shown in table 4.

**Table 3.** Final search strings including additional keywords

Key concept	Search string
<b>Problem shifting</b>	“problem shifting” AND “environment” OR “environmental”
<b>Cross-media pollution</b>	“cross-media pollution”
<b>Unintended consequence</b>	"unintended consequence" AND ("environmental policy" OR "environmental regulation")
<b>Trade-off</b>	"environmental trade-off" AND ("policy" OR "regulation")
<b>Spillover</b>	"spillover" AND ( "environmental policy" OR "environmental regulation" ) AND ( LIMIT-TO ( SUBJAREA , "ENVI" ) OR LIMIT-TO ( SUBJAREA , "ENER" ) OR LIMIT-TO ( SUBJAREA , "EART" ) )

During the second step of the SLR, the remaining articles were examined one by one. A Title-Abstract-Keywords (TAK) analysis has been used to filter out irrelevant articles from the sample, which resulted in 98 potentially relevant 453 irrelevant articles (see table 4). When the article was categorized as potentially relevant, the rest of the article was read in step three, paper reading. When step three revealed that the article did include at least one of the concepts, and both an original environmental problem and one or more transformations of impacts toward new environmental problem(s), the article was included in the final analysis, step four. These multiple steps of narrowing down the results provided a literature review as meaningful as possible, without omitting too many articles which could contain relevant information.

Common to most removed articles in step three was that they did not include a clear original environmental problem, or they did not include a transformation of negative impacts from one problem to another. Especially the concepts trade-off and spillover did not provide many articles which contained relevant information for this research. Most articles found on trade-off included cases of trade-offs between two different disciplines, such as the environment and economy. As such, these cases do not describe a shift of impacts between two environmental problems, but rather describe the shift from one discipline to another. Articles found on the spillover concept focused to a large extent on spatial spillovers, and not on spillovers between two different environmental problems. In addition, this concept has primarily been used to describe positive spillovers, negative spillovers are less common, or at least less well-described in literature.

In the end, 47 articles have been selected to analyze in step four of the SLR. To give structure to the analysis, an analytical framework has been developed, which can be found in Appendix 1. Each paper that was read has been broken down into the elements of the analytical framework. A broad range of elements has been chosen, providing useful information to both this research and potential further research related to SPS. In Appendix 1, table 9, an example is provided of the application of the analytical framework on an article by Lecksiwilai & Gheewala (2020), describing the SPS case from global warming to several local environmental impacts.

**Table 4.** SLR strategy article selection

Stage	Concept	Included	Excluded
<b>Initial search</b>	Problem shifting	67	-
	Cross-media pollution	18	-
	Unintended consequence	102	-
	Trade-off	94	-
	Spillover	270	-
<b>T-A-K analysis</b>	Problem shifting	19	48
	Cross-media pollution	7	11
	Unintended consequence	32	70
	Trade-off	18	76
	Spillover	22	248
<b>Paper reading</b>	Problem shifting	19	-
	Cross-media pollution	7	-
	Unintended consequence	15	17
	Trade-off	6	12
	Spillover	-	22
<b>Total</b>		47	

Step four of the SLR consists of both the application and analysis of the analytical framework. The analysis focused on revealing which conditions potentially enable sectoral problem shifting. To do so, not all elements of the analytical framework have been used. The analysis primarily looked at the concept(s) used, original and new problem(s), the presented enabling conditions, how many times the conditions were mentioned, and to which governance levels the conditions were related. When a condition was mentioned in at least three articles, it was deemed relevant. In the next section, the four enabling conditions that have been identified are presented.

2.2.2 Key enabling conditions

The 47 articles from the literature survey revealed four conditions that potentially enable sectoral problem shifting. Some of these conditions can have various interpretations, such as ‘fragmentation’ and ‘short-termism’, while others are more specific, such as the ‘set of indicators’. Below, the four conditions are presented, including the number of articles that included the condition, and the references of these articles. After the table, each condition is further elaborated.

**Table 5.** Conditions and references from SLR

Condition	Times mentioned	References
<b>Fragmentation of laws and organizational structures</b>	14	Szalavetz (2018); Obersteiner et al. (2016); Baumgartner & Korhonen (2010); Ristic et al. (2019); Farmery et al. (2014); Fernandez & Dumas (2009); Sigman (1996); Hohmann (1994); Hahn & Malès (1990); Irwin (1989); Clarence-Davies (1984); McCormick & Kapustka (2016); Everard & McInnes (2013); Golden et al. (2010)
<b>Set of indicators</b>	13	Subramanian et al. (2021); Lecksiwilai & Gheewala (2020); Martin et al. (2020); Bastos et al. (2019); Szalavetz (2018); Iacovidou et al. (2017); Kobayashi et al. (2017); Hjuler & Hansen (2018); Wang et al. (2015); Venkatesh & Elmi (2013); Turconi et al. (2013); Laurent et al. (2012); Spicer et al. (2020); Čavoški (2017); Farmery et al. (2014); Bouter et al. (2020)
<b>Short-termism</b>	4	Ristic et al. (2019); McCormick & Kapustka (2016); Golden et al. (2010); Kim & Bosselmann (2013)
<b>Power imbalance</b>	3	Hazlewood (2012); Lovera-Bilderbeek & Lahiri (2021); Kiggundu et al. (2017)

#### *Fragmentation of laws and organizational structures*

The first and most broadly identified condition that has been revealed by the SLR is the fragmentation of laws and organizational structures and related to it the narrow (media-specific) focus of environmental regulation. According to Hahn and Males (1990), the current framework of environmental regulation is a product of statutes and programs which are established independently. Especially in cross-media pollution literature, the problem of the fragmented way in which laws and organizational structures are designed is discussed. Fernandez and Dumas (2009) argue that one of the conditions that create a situation in which CMP is more likely to occur is the piecemeal and media-specific fashion of environmental regulation. This leads to regulations with inefficient outcomes, shifting a problem from one medium to another. Sigman (1996) adds to this that because of the fragmented manner of pollution control policies, policy goals and instruments are chosen separately for emissions into different media, resulting in isolated policies aimed at for example either air or water pollution.

Both Fernandez and Dumas (2009), and Hahn and Males (1990), provide cases that illustrate the problems that can arise because of the fragmented framework as described above. Fernandez and Dumas (2009) present the case of regulating gasoline oxygenate additives in California. This regulatory policy is aimed at reducing air polluting, which succeeds, but fails to account for the unexpected cross-media water and groundwater pollution that occurred because of the regulation. They argue that because of the media-specific focus of the policy, and the lack of cooperation with other organizational structures, a situation was created in which CMP could occur (Fernandez & Dumas, 2009). Hahn and Males (1990) describe a case of cross-media pollution due to wastewater treatment plants in Philadelphia. A study has estimated that these wastewater treatments plants generate twenty-five percent of the region's airborne toxic organics, shifting these toxic organics from water to air (Hahn &

Males, 1990). This example shows that while the plants are successful in removing the toxic organics from the water, they fail to account for the system connections between water and air.

Where previous articles focused on what is wrong with the current framework of environmental regulation, Hohmann (1994) presented a principle that could prevent cases of CMP because of fragmentation. One of the pillars of the integrated control principle is the end of fragmentation, or to be more precise, the harmonization of laws and organization structures. Hohmann (1994) argues that when we maintain the political separation of the environment in three distinct environmental media, we will fail to prevent cross-media transfers to occur.

What all these articles have in common is that the political separation of the environment in distinct problems, media, or other types of narrow understandings leads to inefficient and sometimes negative outcomes. To prevent problems to shift from one domain to another, harmonization of laws and organizational structures is necessary.

#### *Set of indicators*

The second condition resulting from the SLR is the narrow set of indicators that are used to assess the impact and effectiveness of an intervention. An exemplary example of this condition can be found in the case of biofuels. When the impact of biofuels is solely based on their net GHG emissions, it seems like a good alternative to fossil fuels with little downsides (Hjuler & Hansen, 2018; Lecksiwilai & Gheewala, 2020; Martin et al., 2020). However, when a wider set of impacts is considered, the recognized benefits of biofuels might be canceled out, and in certain regions, the situation could be worse than before. New problems can arise from the stimulation of biofuels, e.g., freshwater depletion as biofuel feedstock production requires significant amounts of water, pesticide contamination in areas with intensive agriculture, freshwater and marine eutrophication, and acidification (Lecksiwilai & Gheewala, 2020; Martin et al., 2020). When policy assessments primarily focus on GHG emissions, this steers both the industrial and academic focus onto GHG emissions, which could potentially lead to problem shifting from one environmental impact category to another (Hjuler & Hansen, 2018).

The narrow focus on GHG emissions in the assessment of environmental policy is a problem that reaches far beyond the case of biofuels. According to Venkatesh and Elmi (2013), and Szalavetz (2018), the focus of environmental policy, in general, is too often mainly on GHG emissions, global warming, and climate change. This results in other environmental impact categories being overshadowed, which might create new problems instead of solving problems altogether (Bastos et al., 2019; Wang et al., 2015). Čavoški (2017) adds to this that when a policy is assessed on its impact on GHG emissions and it proves to be successful, it can go on for a long period without question which eventually exacerbates the negative effects. However, cases can also show the opposite, focusing on a specific environmental impact and neglecting impacts like GHG emissions. This is illustrated by the case of wastewater treatment plants, which are successful in protecting the aquatic environment, but by doing so, they fail to recognize the environmental impacts related to energy consumption, solid waste production, and GHG emissions (Wang et al., 2015). The implementation of these treatment plants focused on protecting the aquatic environment, neglecting impacts on climate change and waste production.

Multiple researchers argue that the use of carbon footprints provides a very limited view of the performance of a product or intervention and is not without risk as it could result in problem shifting

(Laurent et al., 2012; Turconi et al., 2013). Laurent et al. (2012) found out that certain environmental impacts, such as emissions of toxic substances, do not often covary with climate change impacts. In such cases, when interventions are aimed at “greening” certain products, using a carbon footprint runs the risk of shifting the problem to other environmental impacts (Laurent et al., 2012). To prevent problems to shift, Turconi et al. (2013) advocate the use of LCA to assess the performance of interventions, as LCA’s can avoid problem shifting from one life cycle phase to another, from one region to another, and from one environmental problem to another. According to Turconi et al. (2013), LCA’s address the problem of assessing an intervention on a too limited set of indicators.

Besides using a narrow set of indicators, choosing the wrong indicators can have negative consequences as well. According to Spicer et al. (2020), choosing the wrong indicators could result in unintended consequences being overlooked, as these indicators might overlook impacts of which the policymakers believed were included in the assessment.

These articles show that when a set of indicators is too narrow, which focuses on impacts like GHG emissions or aquatic protection, or a set of indicators that does not measure what it is aimed to measure, can result in problems to shift from one domain into another. To prevent this, researchers advocate the use of a broad set of indicators that measures the impacts of an intervention beyond the scope of the interventions’ objective.

#### *Short-termism*

The third condition which could enable sectoral problem shifting consists of a focus on urgent problems, accompanied by addressing these problems with short-term objectives, and a lack of an overarching unifying goal. Combined, these conditions are understood as subsets of the overarching condition of short-termism (ST). According to Lecksiwilai and Gheewala (2020), policymakers tend to focus on urgent problems, which may lead to new environmental problems, different than the ones being focused on. In addition, McCormick and Kapustka (2016) argue that current policy is fast-tracked and driven toward answers. This could result in addressing a problem with short-term thinking, not considering the linkages to other parts of the overarching environmental system, and offering solutions that bear unintended consequences that may produce worse situations over the long term (McCormick & Kapustka, 2016).

When policy interventions are aimed at addressing environmental problems employing short-term objectives, without considering long-term sustainability as well, natural resource systems can shift rapidly from one organizational form to another, creating unexpected and unwanted shifts of problems (Scheffer et al., 2001; Golden et al., 2010). Ristic et al. (2019) argue that because of a focus on certain short-term objectives of the European Commission regarding GHG reduction, they fail to account for the additional burden on valuable natural resources of new low-carbon technologies in Europe. This might lead to adverse impacts on the environment and unintended consequences (Ristic et al., 2019).

Related to this, although not entirely, Kim and Bosselmann (2013) argue that the absence of a unifying goal above the international environmental law system has created a situation in which problem shifting is more likely to occur. Such a shared objective would provide a direction for international treaties and institutions, creating agreements that aim to achieve the same ultimate goal (Kim &

Bosselmann, 2013). In a sense, such a shared objective would force policymakers to step away from their short-term results-driven mindset and would engage them in considering the broader long-term implications of their actions.

The current body of literature shows that when policy interventions do not incorporate long-term objectives which aim to protect the overall future sustainability and focus on solving urgent problems using short-term objectives, these interventions can create unintended shifts of problems. Kim and Bosselmann (2013) presented a way that potentially prevents policymakers from focusing on short-term results. Using a unifying goal above the international law system could force policymakers to think beyond the scope and timeline of their own narrow environmental problem.

#### *Power imbalance*

The fourth and least occurring enabling condition of sectoral problem shifting found during the SLR is a power imbalance between the policymakers and the actors receiving the problem(s). According to Lovera-Bilderbeek and Lahiri (2021), environmental policies are not equity neutral and have the risk of placing global and national interests above local interests in land governance. They argue that this is particularly problematic in cases concerned with forest lands, as the people who depend on these lands tend to be more economically and politically marginalized.

In addition, Kiggundu et al. (2017) show that power imbalances result in problem shifting in sub-Saharan African countries. The global interest in biofuels production has resulted in policies in some sub-Saharan African countries which aim to enhance the production of biofuels. As a result, the local environment is negatively affected by impacts leading to deforestation, loss of biodiversity, and loss of total food production in these regions (Kiggundu et al., 2017). The same type of problem shifting is shown by Hazlewood (2012), who identified a rapid expansion of oil palm plantations in Ecuador in favor of biofuel production, encouraged by the Kyoto Protocol. Local communities do not have the economic and political power to fight against such measures, making them susceptible to receiving shifted problems.

#### *Conclusion*

In conclusion, using an extensive systematic literature survey, four enabling conditions of sectoral problem shifting have been revealed. Important to remember is that these conditions are derived from a broad range of environmental literature, not specifically concerned with MEAs. Below, in table 6, the four conditions are presented with a brief description of each condition. Before one of these conditions, short-termism, is elaborated further, the next section will delve deeper into the possibly not so green outcomes of multilateral environmental agreements.

**Table 6.** Enabling conditions of SPS

Condition	Description
<b>Fragmentation of laws and organizational structures</b>	The political separation of the environment in distinct problems, media, or other types of narrow understandings leads to inefficient and sometimes negative outcomes
<b>Set of indicators</b>	A set of indicators which is too narrow or is unable to provide accurate measurements could result in unintended shifting of problems from one domain to another
<b>Short-termism</b>	When policy interventions do not incorporate long-term objectives which aim to protect the overall future sustainability, and focus on solving urgent problems by means of short-term objectives, these interventions can create unintended shifts of problems
<b>Power imbalance</b>	A power imbalance between policymakers and mostly smaller communities could result in the interests of these communities being overlooked, and therefore problems to shift toward these communities

### 2.3 Multilateral environmental agreements – inherently green or not?

Now that the SLR has revealed four conditions that could enable SPS, before addressing the main RQ, we need to gain an understanding of the extent to which SPS takes place between multilateral environmental agreements. This section briefly explains how environmental problems have been addressed by means of international cooperation. Then, the question is raised whether MEAs are inherently green or not, supported with cases of SPS from MEAs.

Currently, international law is routinely called upon to deal with a variety of issues that are not 'bilateral' but are common concerns that require a multitude of actors to come up with a set of collective solutions. As a result, most of the international environmental law is created within multilateral or global regimes, which are anchored by multilateral environmental agreements (Brunnée, 2002). Up until now, over 1300 MEAs have been developed to reduce environmental harm, manage shared environmental resources, and preserve natural habitats (Mitchell, n.d.; Mitchell et al., 2020). For this research, multilateral environmental agreements are defined as actors that interact with other actors, such as different MEAs, national governments, and local communities. MEAs are governed by their Conference of the Parties (COP) or Meeting of the Parties (MOP). These are the supreme decision-making bodies of the MEAs and are considered as part of the MEA. Core of the MEA is a legally binding intergovernmental document aimed at resolving a specific environmental problem (Mitchell, 2003).

In literature, MEAs have been primarily conceptualized as inherently green, addressing environmental problems, and creating collective actions against these problems. This is illustrated by for example the FAO (n.d.) and the European Commission (n.d.), who focus on the green ambitions of MEAs, not questioning the methods of the MEAs. And while the legitimacy of lawmaking under MEAs has been questioned before (Brunnée, 2002), little questions have been raised regarding the not-so-green outcomes of decisions under MEAs. When intentional or unintentional consequences of decisions

under MEAs lead to environmental problems being shifted instead of solved altogether, MEAs might not be as green as we like to believe. The decisions of COPs and MOPs are made by the Parties which have ratified the agreement, and while they do aim to achieve the objectives of the agreement, and thus want to solve an environmental problem, this does not have to imply that they consider adverse environmental impacts outside the scope of their MEA. As a result, by aiming to achieve their own objectives, MEAs can shift environmental impacts to different regions and other environmental domains. In literature, various cases of problem shifting by MEAs have been identified. Besides the well-documented ozone-climate case, more cases show forms of problem shifting.

There is evidence that the Kyoto Protocol potentially shifts problems toward the issue domain of the Convention on Biological Diversity. According to Totten et al. (2003), the Kyoto Protocol failed to adequately include carbon mitigation options that could simultaneously reduce ecosystem and species destruction. At the same time, the KP did encourage mitigation options that could result in adverse consequences for ecosystems and species (Totten et al., 2003). As such, through these mitigation options, addressing climate change could result in negative impacts being shifted toward the health of ecosystems and species. The case of marine geoengineering is another example of an MEA shifting problems. The Kyoto Protocol requires its parties to promote the enhancement of the oceans as carbon sinks, a technique to mitigate climate change. However, as the oceans take up more CO<sub>2</sub>, they become increasingly acidic. This marine pollution is very likely to have adverse effects on marine ecosystems, and therefore the quality and quantity of marine resources (Kim & van Asselt, 2016). The third case of problem shifting by an MEA involves the Kyoto Protocol as well. Through the Clean Development Mechanism, the KP incentivizes the use of energy sources, such as biofuels, that potentially harm ecosystems (Silveria, 2005; Lecksiwilai & Gheewala, 2020; Martin et al., 2020). The production of biofuels can lead to adverse environmental impacts such as freshwater depletion, pesticide contamination, and acidification (Lecksiwilai & Gheewala, 2020; Martin et al., 2020). Finally, the fourth case of problem shifting involves the Minamata Convention on Mercury. This MEA creates regulations that could redirect the flow of mercury, and by doing so, pollute other areas (Lin et al. 2017). Lin et al. (2017) argue that certain articles from the Convention can lead to a transfer from mercury emissions and release to other areas covered by articles with soft obligations or not covered at all. In the end, this could undermine the overall performance of the Convention in terms of broader environmental sustainability.

In conclusion, more than 1300 multilateral environmental agreements have been developed to address a wide variety of global and sub-global environmental problems. The main purpose of these agreements is to manage human impact on the environment and solve environmental issues. MEAs are predominantly understood as institutions that are aimed at creating solely green outcomes. However, the problem shifting cases involving MEAs such as the Montreal Protocol, Kyoto Protocol, and the Minamata Convention on Mercury have revealed that while MEAs are meant to create positive outcomes for the environment, sometimes, they create negative outcomes as well. Therefore, we should question research both the intended and unintended consequences of MEAs, and whether these unintended consequences are anticipated (and therefore could have been avoided) or not.



## 2.4 Short-termism – Relevance & in context of MEAs

The systematic literature survey has revealed four conditions that potentially enable sectoral problem shifting. One of these conditions, short-termism, has been chosen as a key variable to research concerning SPS between the MP and KP. Short-termism has been chosen as a key variable because it describes a specific element of reductionism and because up until now, no research has used it in such a way to explain why problem shifting might have occurred. Reductionism is one of the main underlying phenomena of why approaches used in sustainable development lead to problem shifting (Baumgartner & Korhonen, 2010). It is used in policy development as means to improve the prospects of concluding negotiations successfully by stripping away much of the complexity, simplifying the agenda, and highlighting some key issues (Young & Stokke, 2020). Short-termism results from simplifying a certain situation, stripping away long-term planning. As such, it is a relevant condition for further research. The results of the SLR have shown that when policymakers focus on short-term results and by doing so neglect long-term environmental impacts, their policies could fail to recognize and prevent sectoral problem shifting. In addition, the previous section has shown that MEAs do not produce solely positive outcomes for the environment. Combining these two findings, the following paragraphs aim to explain the relevance of short-termism in the context of MEAs.

According to Fisher (2019), our inability to think about the well-being of future generations is one of the most dangerous traits of our generation. He argues that the environmental damage caused by humanity is largely due to short-termism (Fisher, 2019). Thomas Piketty argues that because of the shortsighted selfishness of the German and French governments, they fail to tackle the fiscal and political problems which face the Eurozone (Caney, 2016). A similar note is made by Wolfgang Streeck, who argues that focusing on short-term fixes gets in the way of long-term solutions. Because we focus on short-term fixes, long-term solutions are even not attempted (Caney, 2016). These statements show the relevance of preventing short-termism when developing solutions to various types of problems.

Nevertheless, in literature, short-termism has predominantly been researched within research areas such as business management, economics, and finance (Bansal & DesJardine, 2014; Porter, 1992; Laverty, 1996), and lacks focus on environmental research. In such cases, the phenomenon is broadly defined as an excessive focus on short-term results at the expense of long-term interests (CFA Institute, n.d.). Other definitions of short-termism can be found as well. Lexico (n.d.) defines short-termism as a “concentration on short-term projects or objectives for immediate profit at the expense of long-term security”. Booth (1999, p. 4), who used short-termism in research to the threat of nuclear weapons, has defined short-termism as “approaching security issues within the time frame of the next election, not the next generation”. These definitions reveal the main element which shapes the short-termism phenomenon, which is the focus on short-term results at the expense of a sustainable future. In terms of environmental governance, little needs to change to formulate an appropriate definition. Within this research, short-termism is defined as a *focus on short-term fixes of environmental problems at the expense of an environmentally sustainable future*. This means that when policymakers focus on fixing an environmental problem in a short time horizon, without considering environmental sustainability, these fixes can lead to sectoral problem shifting. Environmental sustainability is defined as the meeting of services and resources of both present and future generations without affecting the integrity of the ecosystems that provide them (Khan et al., 2021).

While the combination of short-termism and global environmental governance has received little attention, there are good reasons to do so, and it is expected that short-termism could be a key variable in explaining why sectoral problem shifting occurs. One of these reasons has to do with how decisions of MEAs are made. Major decisions of MEAs such as amendments to the agreement need to be ratified by the national governments to be in effect. Because the composition of these national governments changes every few years, their decisions could reflect short-termism instead of a long-term sustainable approach. Spurling (2020) argues that while democracy has many advantages, its pitfalls include a tendency toward short-term return instead of long-term interest. As such, when politicians feel the need to address an environmental problem, they might be more inclined to solve the problem as quickly as possible instead of taking a more long-term sustainable approach.

In relation to Spurling (2020), Seitzinger (2010) argues that policymakers and scientists currently fail to think ahead. Seitzinger (2010) argues that both policymakers and scientists have failed to adequately incorporate the long-term Earth processes into the development of multilateral environmental agreements. He explains that the reason for this is apparent, as the UN's 192 member states are primarily governed by self-interest, narrow perspectives, and short time horizons. As a result, this piecemeal and short-term management of individual environmental issues becomes part of MEA development (Seitzinger, 2010).

A recent interview with Frans Timmermans (Executive Vice President of the European Commission for the European Green Deal), has revealed why policymakers have these short time horizons (Peeperkorn, 2021). Timmermans has argued that the current way in which we practice politics in Europe paralyzes us. The European democracy is trapped in its short-termism. Not one electorate is stable, so politicians are primarily focused on doing nothing that could make them lose the next elections. Only when an issue is deemed urgent enough by a large part of the population, politicians are inclined to act (Peeperkorn, 2021). This shows that major decisions taken by the MEA, which need to be ratified by the national governments, need to reflect this urgency, and without urgency and broad support of the national population, they are not likely to support decisions that focus on long-term results.

Short-termism in the context of MEAs refers to the decision-making bodies, COPs, and MOPs, and how the Parties within these bodies aim to achieve the objectives of the MEA. There are multiple ways in which short-termism could be present within the decisions of the MEA. One key way is shown in how they approach the environmental problem. When they do so fast-tracked, aimed at providing a quick and simple solution while neglecting the long-term environmental impacts, you could argue that short-termism is present. In such cases, the COPs and MOPs take decisions that consist to a large extent of short-term objectives with quick results, while long-term environmental impacts are not adequately considered and included in the decisions.

Based on the expected influence of short-termism during decision-making processes of MEAs, the following hypothesis is tested in this thesis: *When the delegates of the Parties focus on addressing the objective of the MEA as the most urgent issue, sectoral problem shifting between MEAs occurs.* This hypothesis is tested using a case study analysis. The outcomes can reveal evidence which falsifies the hypothesis, or it reveals evidence which does not falsify the hypothesis. The latter suggests that short-termism potentially influences decision-making and enables SPS.

### 3. Case study methodology

Now the potential enabling conditions have been revealed, and short-termism has been selected as the condition to investigate, the methodology of the case study is presented which has been used to test the hypothesis from section 2.4 and answer the main RQ. First, both the independent and dependent variables are operationalized. Then, the criteria that were used to select the case are presented, followed by a brief description of the ozone-climate case. Finally, the data collection method and sources are presented, showing the documents which were used to perform the analysis.

#### 3.1 Operationalization of short-termism (IV) and sectoral problem shifting (DV)

##### *Independent variable: Short-termism*

The independent variable that is used to research the variation of sectoral problem shifting between the Montreal Protocol and Kyoto Protocol is short-termism. The condition of ST is used to assess to what extent this condition was present during the development and evolution of the Montreal Protocol, and how this influenced the shifting of problems toward the issue domain of the Kyoto Protocol. To make the condition of short-termism more specific and tangible, short-termism is formulated as focusing on the problem that is deemed most urgent, and while doing so neglecting impacts on other problems which are perceived less urgent. Two elements are formulated which together indicate whether policymakers consider a specific environmental problem as the most urgent issue, or they have a balanced view on multiple global environmental problems. These elements can include both quantitative and qualitative indications of ST and should not be seen as all-encompassing. Nevertheless, using these two elements provides an accessible first framework to assess whether ST is present within a specific case.

The first element is concerned with the time-horizon policymakers have for achieving the main objective. This could be quantitative, such as '5 years', or this could be qualitative, such as 'as soon as possible'. The interpretation of a qualitative indicator is more subjective compared to a quantitative indicator, but, when data shows clear indications of words like 'urgent' and 'as soon as possible', this could indicate a short time-horizon of policymakers. The second element of ST is the lack of consideration of future environmental sustainability during the policy development process and in the final decisions. Future environmental sustainability refers to the broad environmental security of all environmental domains. When policymakers do not recognize the importance of future environmental sustainability during policy development, it is more likely that the agreement will fail to protect this. Combined, these elements can give insight into whether decisions and agreements reflect the short-termism of the policymakers.

##### *Dependent variable: Sectoral problem shifting*

To operationalize the dependent variable, sectoral problem shifting, I build on the concept of leakage as provided by Lima, Persson, and Meyfroidt (2019). As introduced in chapter 2.1, the main difference between leakage and SPS is related to the spatial focus of leakage and the cross-sectoral focus of SPS. As such, this is the main element that needed to be reformulated to create the following operationalization, which consists of three elements:

1. Sectoral problem shifting occurs as a causal effect from an environmental policy intervention.
2. The issue area which receives the new problem(s) is different compared to the issue area initially targeted by the intervention.
3. The shifting harms the issue area receiving the problem(s).

These three elements dictate that sectoral problem shifting needs to take place as a result of an environmental policy intervention, it creates effects outside the original scope of the intervention, and the shifting harms these affected issue domains. When a case of problem shifting lacks one or more of these elements, a different concept should be used to describe the phenomenon.

### 3.2 Case selection

A single case has been selected to test how short-termism influenced the decision-making of policymakers and whether this enabled sectoral problem shifting. The case that has been selected to focus on during the research consists of a single regime pair, the ozone, and the climate regime. More specifically, the case is concerned with the role of the Montreal Protocol in shifting negative impacts toward the climate regime, with the Kyoto Protocol as a central institution aimed at reducing GHG emissions within the climate regime. Focusing on a single case allowed for an in-depth review of how the short-termism has been present during the different stages of the Montreal Protocol, and how during these stages SPS and ST evolved.

The case has been selected three criteria. First, the case needed to have a clear presence of sectoral problem shifting between two multilateral environmental agreements. After the introduction of both MEAs below, it will become clear how SPS has been occurring, using the three elements of SPS. Second, as this thesis is aimed at researching the SPS phenomenon on a global scale, both MEAs needed to represent an environmental issue with a global character, which is the case for both ozone depletion and climate change. And third, the cases needed to be well-documented. The interactions between the ozone and climate regimes have been well-documented and are broadly discussed in literature, which allowed for a detailed case description. In addition, the negotiations before and during the Montreal Protocol have been well-documented in case studies, reports of the Meeting of the Parties, and reports of the Convention of the Parties. In the next paragraph both issue areas and MEAs are briefly introduced, after which the specific SPS case is described.

The ozone regime is based on the 1985 Vienna Convention for the Protection of the Ozone Layer and its 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (MP). The MP, together with its amendments, creates the governance structure that is aimed to phase out the use of ozone-depleting substances, such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) (Sterner et al., 2019; Oberthür et al., 2019). These ODSs have been used in industries such as air conditioning and refrigerators. The ozone layer prevents radiation damage to, among others, the vulnerable tissues of humans on Earth (Johnson & Urpelainen, 2012). As such, to decrease the harmful effects of radiation on human health and the environment, the ozone layer must be protected (Michaelowa et al., 2019).

Climate change, which is caused by anthropogenic greenhouse gases (GHG), is one of the most critical environmental issues facing mankind today (Böhringer, 2003). International concern about climate change led to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and its 1997 Kyoto Protocol (KP) (Breidenich et al., 1998). The negotiations and both MEAs may have been inspired by the Vienna Convention, and especially its Protocol, as the MP is one of the most successful cases of cooperation on an international level in tackling a global environmental problem (Oberthür, 2001). Like the MP, the KP contains legally binding emission targets for countries, aimed at reducing GHG emissions. However, while the success of the MP was celebrated by many, the KP was considered to be flawed, being both economically inefficient and politically impractical (McKibbin & Wilcoxon, 2002).

This research has focused on a single direction of SPS, which is from the MP toward the issue domain of the KP. During the introduction of the MP, Parties celebrated that the treaty does not only address the problem of ozone depletion, but it also makes an important contribution to climate protection because certain ODSs are powerful GHGs as well (Oberthür et al., 2011). However, these interlinkages between ozone depletion and climate change do not solely result in positive outcomes. Studies have shown that by introducing phasedowns of certain ODSs, the substances that are used as a replacement do indeed have a lower ozone-depleting potential, but do not always have a lower global warming potential. Oberthür (2001) and Oberthür et al. (2011) show that the MP has undermined efforts to mitigate climate change by promoting the use of hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) as substitutes for ODSs, representing substance groups with high GWPs.

In terms of SPS, there have been multiple critical moments regarding the MP in which SPS has been enabled and partially resolved. In 1985, the Vienna Convention was signed, after which Parties started discussing the Montreal Protocol. Then, between 1987 and 1990, both the original and accelerated CFC phase-out strategies created a shift from the production and consumption of CFCs toward the use of HCFCs and HFCs (Oberthür, 2001). HCFCs were introduced as transitional substances, used temporarily until better alternatives would be available. HCFCs have a lower adverse impact on the ozone layer, however, because of the chlorine in HCFCs, these substances are not completely ozone friendly (Wallington et al., 1994). While HCFCs were substitutes for the short-term, HFCs were seen as long-term substitutes and some Parties and industries even stated that they only agreed with the CFC phase-out because of the availability of this substitute (Velders et al., 2012; Oberthür, 2001). In 2007, the accelerated phase-out of the HCFCs resulted in a shift toward the production and consumption of HFCs. HFCs are from an ozone layer perspective a good substitute as they do not negatively affect the ozone layer, however, these substances are also powerful GHGs. The phase-out of HCFCs was expected to bring both ozone and climate benefits, but as HFCs were the most promising substitutes, the net positive climate effects were significantly reduced (Oberthür et al., 2011). By introducing the Kigali Amendment in 2016, Parties decided to significantly reduce the climate impacts of the MP by introducing a phase-down strategy for HFCs (Heath, 2017). As such, through the Kigali Amendment, the MP introduced a step-by-step reduction of SPS toward the KP. These three moments, divided in two periods from 1985 to 1990, and from 2006 to 2016, have been used during the CSA to track the presence and development of ST, and whether this has enabled SPS.

### 3.3 Data collection

The main data collection method for the CSA of this research is a secondary literature review. The literature review considered case studies that provide a detailed analysis of the negotiations which led to the Montreal Protocol, in the period between 1985 and 1987. In addition, to analyze the period after the delegates agreed on the Montreal Protocol, reports of the Meeting of the Parties and Convention of the Parties between 1987 and 1990, and between 2006 and 2016, have been used. Table 8 below shows the authors and types of documents that have been used for both periods. For period 1, two case studies on the negotiations prior to the MP have been used, accompanied with MOP and COP reports from UNEP, and the original MP document. For period 2, the summaries of the COPs and MOPs from the Earth Negotiations Bulletin (ENB) have been used. This is an independent reporting service that offers summaries and analyses of UN environment and development negotiations (Earth Negotiations Bulletin, n.d.). The ENB did not exist in the first period, and thus the UNEP reports have been used for this period.

**Table 7.** CSA data sources

Period 1: 1985 – 1990	Period 2: 2006 – 2016
MP document, MOP & COP reports	MOP & COP summaries (ENB documents)
Goodman, 1992	Barnsley et al., 2006
Litfin, 1994	Ashton et al., 2007
United Nations, 1987	Ashton et al., 2008
UNEP, 1989	Ashton et al., 2009
UNEP, 1990	Ashton et al., 2010
	Ashton et al., 2011
	Benson et al., 2012
	Appleton et al., 2013
	Kosolapova et al., 2014
	Lenhart et al., 2015
	Louw et al., 2016

## 4. Case study results

In 1987, the international community reached a binding agreement to halt ozone depletion, the Montreal Protocol on Substances that Deplete the Ozone Layer. Analyzing the negotiations before the treaty, the treaty text, and the COPs and MOPs between 1985 and 2016 shows that the agreement is aimed at addressing an urgent problem in a limited timeframe using short-term objectives. In 2016, the Kigali Amendment introduced an HFC phase-down strategy, step-by-step reducing sectoral problem shifting to the Kyoto Protocol. This chapter is structured as follows, first the period between 1985 and 1990 is discussed. During this period, the final negotiations toward the MP took place, the MP went into force and the Parties agreed on the London Amendment. Then, the second period between 2006 and 2016 is discussed. Throughout this period, the accelerated HCFC phase-out went into force, and the delegates agreed on the Kigali Amendment. In the end, a conclusion is provided which incorporates the results of both periods.

### 4.1 Period 1: 1985 – 1990

In the period from 1985 to 1990, the Montreal Protocol was signed, entered into force, and the Parties agreed on the first Amendment. The analyzed materials from this period to some extent reflect the focus on one narrow problem, and thus short-termism, among the policymakers (delegates) in addressing ozone depletion. This section summarizes the wordings and statements from this period that have to do with short-termism as operationalized in section 3.1. First, the debate before the MP is discussed, after which the MP itself and the first two MOPs discussing the London Amendment are examined.

In the years before the Montreal Protocol was signed, a lot of negotiations between different actors, such as politicians, business representatives, and scientists, took place. One of these (influential) actors was the Alliance for Responsible CFC Policy, a lobbying organization for the US industry. While this organization mainly lobbied against any regulations concerning the use of CFCs, their chairman Richard Barnett did provide an argument which indicated that even among these actors, the time element was considered to be an important factor in creating effective ozone policy: “We should not rush into short-term regulatory decisions that could result in the use of alternatives that present immediate threats to worker and consumer safety and offer little or no environmental benefit” (Goodman, 1992, p. 3). As such, Barnett stressed that by implementing short-term regulatory decisions, a shift toward alternatives that have serious downsides could be facilitated. This shows that besides the short-term economic focus of the industry, they did understand that short-term regulatory decisions could have adverse consequences, regarding both their interests and the interests of the environment. Simply stated, Barnett tried to extend the timeframe of policymakers, recognizing potential risks from the alternatives.

At first, at the time the MP was negotiated, not all delegates were convinced that they needed to agree with strict measures aimed at quickly reducing the CFC emissions. Litfin (1994) explains that part of this could be explained by the short-term focus of most policymakers, which is a major issue for global environmental problems. As politicians want to stay in power, and this depends on relatively short-term considerations and results, this does not match well with environmental governance (Litfin, 1994). However, while it is difficult, there are ways to extend the time frame of politicians, and by

doing increase the urgency among them to tackle global environmental problems. In the case of ozone depletion, (scientific) experts were able to extend the time frame of delegates in terms of the effects of using CFCs and what ozone depletion would entail. By providing clear arguments based on science, they were able to heighten the sense of urgency in addressing ozone depletion among the policymakers (Litfin, 1994). Eventually, this results in the 1987 Montreal Protocol.

This indicates that in this specific case, by recognizing the long-term impacts instead of focusing on the short-term impacts, delegates acknowledged the potential adverse effects of CFC emissions and ozone depletion, and therefore acted accordingly. However, by 1989, after the MP went into force, the emphasis shifted from ODSs with a long atmospheric lifetime to those with short lifetimes. As a result, they shifted toward a short-term perspective in new measures under the MP. Parties wanted to implement measures of which the benefits would be reaped most quickly (Litfin, 1994). And while this might be understandable, by focusing on these short-term objectives, the risk of neglecting the long-term impacts occurs. This shows that while experts can make politicians acknowledge global environmental problems of which the exact consequences are yet to be seen, eventually, the short-term focus of policymakers is reflected in their following policy decisions.

To understand how delegates want to reach the overarching objective of the Montreal Protocol (through decisions reflecting a short-term or long-term perspective), we need to know what the main objective of the MP is. While the MP itself does not mention one clear overarching objective, it does include statements that together can be considered as the main objective of the Protocol. The Parties are “mindful of their obligation under that Convention to take appropriate measures to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer” (United Nations, 1987, p. 29). In addition, the Parties are “determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination based on developments in scientific knowledge, taking into account technical and economic considerations” (United Nations, 1987, p. 30). In summary, this shows that the Parties are aimed at protecting human health and the environment by taking precautionary measures to control emissions of ozone-depleting substances, focused on protecting the ozone layer.

Important to note is that the literature and scientists who motivated the policymakers to discuss CFC emissions in the first place did not only stress the risk of depleting the ozone layers but focused on the risk of the high GWP of CFCs as well. Nevertheless, in the negotiations leading to the MP, the policy debate focused on the effects of increased ultraviolet radiation, and thus on the ozone depletion problem. Climate change and global warming were not key topics during these negotiations (Litfin, 1994). This could explain why the main objective of the MP is centered around the ozone layer, and there is no mention of climate change, or preventing any type of side effects. The following statement in the MP is the only mention of the link between ODSs and climate effects: “Conscious of the potential climatic effects of emissions of these substances” (United Nations, 1987, p. 29). However, this gives little direction to any measures aimed at preventing climate change and global warming. In addition, it only focuses on the climatic effects of substances that have ODP, and does not refer to substances without ODP but with a high GWP.



The first two Meetings of the Parties in 1989 and 1990 reflected the short-term focus of policymakers, as has been identified by Litfin (1994). While there were actors during the MOP negotiations who tried to stress the importance of taking measures that would protect broader environmental sustainability, the decisions of the delegates show that they were aimed at realizing the objective of the MP as soon as possible. The next paragraphs focus on the various actors trying to extend the time horizon of policymakers and how the policymakers showed little recognition of their arguments.

One actor promoting short-term results while protecting long-term environmental sustainability is UNEP. The Executive Director of UNEP opened the first Meeting of the Parties in 1989. He recommended the total elimination of ODSs by the end of the century. At the same time, UNEP stressed the link between ozone depletion and climate change and argued that the public expected them to take decisions that would protect their future (UNEP, 1989). A year later, UNEP stated that they wanted to combine short-term and long-term objectives to prevent the (unnecessary) use of alternatives with a high GWP and a clear phase-out strategy of alternatives with ODP and/or GWP. A second actor who made a similar argument was Dr. Watson, the chief scientist for the National Aeronautics and Space Administration's ozone project. Watson argued that when the suitability of alternatives to ODSs is reviewed, policymakers should consider the GWP of these alternatives as well (UNEP, 1989). As such, Watson argued that any decisions on an accelerated phase-out of CFCs should reflect not only the aim for short-term results regarding ozone depletion but the protection of long-term environmental sustainability as well.

Did these warnings extend the time horizon of the delegates during the first two Meetings of the Parties? Most of the delegates did to a large extent focus on short-term results without showing clear indications of considering environmental sustainability beyond the scope of the MP. The first MOP was held in Helsinki. The president of the Republic of Finland, Dr. M. Koivisto, made an opening statement, stating that the production and consumption of ozone-depleting substances should be stopped as soon as possible. In addition, he stressed the link between ODSs and greenhouse gases, causing climate change and global warming (UNEP, 1989). The words 'as soon as possible' indicate that they aimed for achieving the main objective of the agreement in a short time horizon. And while he did acknowledge the link between ODSs and global warming, he failed to mention that alternatives that are not ODSs, such as HFCs, have a high GWP as well.

During both MOPs, all delegations called for immediate action toward saving the ozone layer and most of the delegates revealed their support for a reduction of at least 85 percent in the use and production of CFCs. In addition, some delegates argued that a total phase-out of CFCs before the end of the century is necessary (UNEP, 1989; UNEP, 1990). This is supported by the declaration of 13 influential Parties, who stated: "their firm determination to take all appropriate measures to phaseout the production and consumption of all fully halogenated chlorofluorocarbons controlled by the Montreal Protocol, as adjusted and amended, as soon as possible but not later than 1997." (UNEP, 1990, p. 10). This statement shows a strong presence of the both elements of ST, focusing on achieving the MP objective as soon as possible, and a lack of measures protecting future environmental sustainability.

During MOP 2 in 1990, the London Amendment was signed. The main elements of the Amendment are aimed at achieving short-term results, reaching the main objective of the Protocol in a shorter timeframe than the Parties decided on in an earlier phase. This is reflected by Article 2C of the

Amendment, which prescribes that each Party needs to ensure that the calculated levels of consumption and production of CFCs do not exceed zero by the end of 2000 (UNEP, 1990). This gives the Parties ten years to stop using CFCs, without making sure that this rapid shift away from CFCs does not stimulate the use of alternatives that might have other adverse effects on the environment. Using short-term objectives such as this one is not inherently problematic, and could be functional when making a long-term goal manageable. However, it becomes problematic when these decisions affect future environmental sustainability. Shifting the problem to the climate change domain, which is what happened after accelerating the CFC phase-out, affects future environmental security in terms of global warming.

So, were there not any delegates who wanted to make sure that they would not shift the problem to other environmental domains by promoting a more long-term perspective? At MOP 2, Thatcher argued that the targets previously set in the Protocol were not ambitious enough. To adequately reduce and eliminate CFCs and halons, higher targets and shorter deadlines must be set. Thatcher also stressed that the search for safe alternatives should be intensified (UNEP, 1990). This statement reflects the aim for short-term results, including both higher targets and shorter deadlines. Intensifying the search for safe alternatives could protect environmental sustainability. However, when this is not anchored by explicit agreements in the Amendment, as proposed by UNEP, it does provide little concrete prevention of potential sectoral problem shifting.

Toward the London Amendment in 1990, discussions arose about the potential regulation of HCFCs and HFCs. In the final Amendment, a phase-out schedule of HCFCs was included, which was not the case for HFCs. The HCFC phase-out schedule did incorporate the thirty- to forty-year lifetime of equipment that uses HCFCs (Litfin, 1994). This resulted in the following statement in the London Amendment: "To review regularly the use of transitional substances, their contribution to ozone depletion and global warming, and the availability of alternative products and application technologies, with a view to their replacement by nonozone depleting and more environmentally suitable alternatives and as the scientific evidence requires: at present, this should be no later than 2040 and, if possible, no later than 2020" (UNEP, 1990, p. 43). Incorporating an HCFC phase-out by no later than 2040, and preferably 2020, could be explained as forward-thinking, as it looks forward by already including a phase-out of a substance that right now is widely used as an alternative to CFCs. However, this is highly questionable. Incorporating a phase-out over such a long period effectively means that for the coming years, companies can increase their production and consumption of this substance. As such, this shows that delegates were aimed at short-term benefits regarding the ozone problem, instead of implementing a policy that is focused on results over the long term. In addition, delegates probably considered HCFCs as transitional substances because this substance still has some ODP (although less than CFCs). HFCs were not considered to be transitional substances as these substances do not affect the ozone layer. As such, policy decisions were solely aimed at achieving the main objective of the MP as soon as possible, without ensuring that problems would not (excessively) shift to a different environmental domain.

In summary, according to Litfin (1994), policymakers are short-term-minded. However, sometimes, experts such as scientists can try to extend the time frame of policymakers. Although not always successful, in the case of ozone depletion, they did ensure that policymakers felt the urgency of acting on ozone depletion, a global environmental problem of which it was uncertain how much time it would

take before mankind would start to see the negative effects. After the MP went into effect, delegates talked about accelerating the CFC phase-out. Eventually, this phase-out was included in the London Amendment. Some actors did try to warn the policymakers for taking short-term-minded measures in the London Amendment. However, the Amendment does not show any clear considerations of these warnings. As such, the accelerated CFC phase-out reduces the time horizon for achieving the main objective of the MP, without taking appropriate measures protecting long-term environmental security, thus potentially enabling sectoral problem shifting.

## 4.2 Period 2: 2006 – 2016

Between 2006 and 2016, the Parties decided on an accelerated phase-out of HCFCs and a phase-down strategy for HFCs. While the phase-out of HCFCs increasingly enabled sectoral problem shifting, as the alternative to HCFCs were HFCs, the phase-down of HFCs showed that Parties acknowledged the negative impacts created by their former decisions and introduced a step-by-step reduction of this form of SPS. The next paragraphs will explain what happened before these two events.

During MOP 18 in 2006, both the Environment Investigation Agency (EIA) and Greenpeace urged a fully funded accelerated phase-out of HCFCs and HFCs. They argued that such a phase-out is necessary because of the high GWP and expected growth of both substances. Estimations show that these substances could rival the total GHG emissions of the EU by 2015 when no further action is taken (Barnsley et al., 2006). A year later, at MOP 19, when Parties were considering an accelerated phase-out of HCFCs, Greenpeace argued that an accelerated phase-out strategy of HCFCs should ensure that HCFCs are not replaced by HFCs with a high GWP potential (Ashton et al., 2007). In other words, both Greenpeace and the EIA wanted Parties to look beyond the focus on short-term results related to ozone depletion and make sure that aiming for these results would not be at the expense of broad environmental sustainability, especially concerning global warming.

Looking at the statements from various delegates in this period shows that the EIA and Greenpeace have not been successful in extending the time horizon of the delegates. Most delegates focused on short-term results by implementing an accelerated phase-out and did not consider the impacts beyond the MP scope of the alternatives which would arise. This is revealed by John Baird, Minister of Environment in Canada, who stated that “the use of hydrochlorofluorocarbons (HCFCs) was always intended to be a temporary solution and called for an accelerated phase-out of HCFCs” (Ashton et al., 2007, p. 3). Various other delegates, such as delegates of Guinea, Colombia, Brazil, Cambodia, Nigeria, Mongolia, and Liberia, focused on the temporary use of HCFCs and did not mention the potential negative impacts of the HFC alternative. There were some Parties, such as the Maldives and France, who did go further and stressed action to protect the human right to a safe environment, and the interrelationships with ODS, global warming, and biodiversity (Ashton, 2007).

The agreement that followed concerning the accelerated HCFC phase-out schedule focused on reaching this short-term objective. The agreement did not include clear clauses to prevent a shift toward alternatives with negative environmental impacts outside the MP scope, such as HFCs. One clause which was included in the Protocol did reflect some consideration of future environmental sustainability: “to encourage parties to promote alternatives that minimize environmental impacts, particularly climate impacts, as well as health, safety, and economic considerations” (Ashton et al.,

2007, p. 6). While it might seem that the Parties incorporated the risks as argued by Greenpeace, this clause is vague and does not provide any binding commitments to the use of 'safe' alternatives. In addition, the Parties agreed that the Executive Committee should give priority to the funding of projects which focus on phasing out HCFCs with high GWP and adopt alternatives that minimize environmental impacts, including climate, and taking account of GWP (Ashton et al., 2007). Like the previous statement, it provides little concrete commitments to make sure that alternatives will not have a high GWP.

This shows that agencies, such as EIA and Greenpeace, have not been able to extend the time horizon of the delegates in such a way that this is reflected by their decisions. Even though the EIA and Greenpeace stressed that some HFCs have a GWP far greater than HCFCs, and that "reliance on them may create more problems than it solves" (Ashton et al., 2007, p. 13), delegates did not incorporate protecting regulations related to these alternatives (Ashton et al., 2007). As such, decisions of the policymakers of the MP once again facilitated sectoral problem shifting by introducing control measures that are aimed at short-term results, and to a large extent neglect long-term environmental security.

The 2016 Kigali Amendment was the first clear agreement that reflected that the delegates wanted to ensure that their focus on results regarding the ozone problem would not affect other environmental problems, in this case, global warming. This could raise the question of what changed compared to the years before. Were other actors, experts, able to once again extend the time frame of the policymakers? And if so, did this result in the Amendment which initiated the step-by-step reduction of sectoral problem shifting?

There have been some statements that indicate that Parties were more aware of the long-term impacts of their decisions during the MOPs and COPs leading to the Kigali Amendment. One of these examples is Sorenson, delegate of Denmark, who argued during MOP 27 that further delay in an HFC amendment would undermine efforts to mitigate climate change. Later, Sorensen stated that while much has been achieved by the Montreal Protocol, Parties should continue their efforts to address both current and future dangers (Lenhart et al., 2015). The same could be said about India, traditionally an opponent of an HFC phase-out. Their delegate called for a holistic and visionary approach from the contact group, which discussed the potential amendment (Lenhart et al., 2015). In addition, a year later at MOP 28, Parties demonstrated a willingness to take responsibility for the problems they created. Their statements reflected that they wanted to "play a leading role in working towards an environmentally sustainable world where no one is left behind, as called for by the 2030 Agenda for Sustainable Development." (Louw et al., 2016, p. 17). In line with this shared statement, president Kamage of Rwanda urged that the delegates should be ambitious, and not only seek to get the amendment done, but also to do it well (Louw et al., 2016).

Looking at these statements shows that delegates did show more clear signs of long-term thinking, advocating an environmentally sustainable world where no one is left behind, and a visionary approach that would not just get the amendment done, but do it well. Arguably, this shows that delegates of the Parties no longer focused on addressing ozone depletion as the most urgent issue but started to recognize that climate change is an urgent problem as well. As has been the case before the MP was

signed in 1987, by extending the time horizon of policymakers they can be convinced of the urgency of a global environmental problem, and the need to act accordingly.

In summary, in 2006 actors such as EIA and Greenpeace advocated an (accelerated) phase-out of both HCFCs and HFCs. Thus, they tried to extend the time frame of policymakers and make them see the negative impacts of maintaining the use of these substances. In 2007 Parties agreed upon an accelerated phase-out of HCFCs, and even though some actors tried to convince the delegates that new measures should make sure HCFCs are not replaced by HFCs, because of their GWP, this was not included in the Amendment. This reveals that at the time, Parties were more worried about the effects of ozone depletion than the effects of global warming, and thus sectoral problem shifting continued. Leading toward the Kigali Amendment in 2016, some indications can be found of delegates extending their time horizon, wanting to play a leading role in an environmentally sustainable world. This could imply that these delegates started to recognize that there is more to be done than fixing the ozone layer, and policy debate should focus on other global environmental problems as well. Eventually, this led to the 2016 Kigali Amendment, which includes a phase-down strategy for HFCs. As such, this is a step-by-step reduction of this specific case of sectoral problem shifting toward the Kyoto Protocol.

### 4.3 Hypothesis not falsified

In conclusion, based on the results of the case study analysis, the hypothesis as formulated in section 2.4 is not falsified. This means that based on the findings, we cannot reject the hypothesis. As such, I argue that it is likely that when the delegates of the Parties focus on addressing the objective of the MEA as the most urgent issue, sectoral problem shifting between MEAs occurs. Investigating multiple events leading to the Montreal Protocol and some of its Amendments has provided various insights. The delegates of the Parties under the MP, aimed at addressing ozone depletion by means of multiple control measures, have shown disregard of the potential impacts of these measures outside the scope of the objective of the MP. Not including climate change and global warming in the MP negotiations and documents, even though science was clear about the link between the two issue domains, shows that policymakers considered ozone depletion as more urgent and did not feel the urgency to prevent SPS. Then, toward the Kigali Amendment, increased urgency of overall environmental sustainability resulted in an amendment which reduces step-by-step sectoral problem shifting. Influential actors, such as scientists and expert agencies, can try to extend the predominant short-term perspective of policymakers. This case has shown two moments in which these actors might have been successful. However, they have not been able to prevent SPS altogether. Next chapter, the discussion, will discuss the broad theoretical and policy implications of these findings

## 5. Discussion

This section discusses the findings of the research and their implications. First, the results of both the SLR and CSA are compared to the expectations, and especially the deviations from what could have been expected are discussed. Next, the implications for theory and policy are presented. Finally, the limitations of the research methods are discussed, together with suggestions for further research addressing some of these limitations.

### 6.1 Theoretical implications

This research has provided multiple theoretical contributions to the growing body of literature on global environmental governance and environmental problem shifting. First, it highlights the importance of a better understanding of (sectoral) problem shifting at the global level. Kim and van Asselt (2016) argued that problem shifting is about spatial, sectoral, and temporal shifting of problems. Researching the various concepts has revealed that the spatial element, in particular, has received broad attention among the concepts in literature. In addition, the systematic literature review has revealed that currently, little research has been conducted on (sectoral) cases of problem shifting, especially on the global level. Instead, up until now, research has focused primarily on certain cases of SPS on sub-global governance levels. When we leave SPS at the global level, between multilateral environmental agreements, unattended, this could lead to a reduced capacity of mankind to restore and protect the Earth System. Before we can start to closely investigate a specific phenomenon, we need to be able to identify the phenomenon as such. Hopefully, introducing the new concept of sectoral problem shifting, and applying it to a case between two multilateral environmental agreements, will spark further research related to this study area.

Second, this research has provided an overview of some of the most widely applied concepts describing various phenomena related to environmental problem shifting. Based on the definitions of these concepts, a Venn diagram was created to visualize the overlaps and fundamental differences among the concepts. While this exercise has been a useful input to the systematic literature review, some unexpected outcomes need further explanation. One is that based on how it has been applied in literature, the spillover effect is narrower in scope than was expected based on its definition. The spillover cases which were assessed in the first phase of the SLR primarily focused on spatial and behavioral spillovers, and a few cases included the sectoral element of problem shifting. As a result, after the paper reading phase of the SLR, there were no articles left using the spillover concept. In addition, the trade-off concept has not provided as many relevant articles as was expected as well. One explanatory factor is that the concept of trade-off has primarily been used to identify trade-offs between two different disciplines, such as economic-environmental trade-offs. This research looked only for trade-offs within the environmental domain. In addition, the concept has mainly been used to assess the potential trade-offs when a certain intervention would take place, to inform any decisionmaker. A small number of studies focused on trade-offs resulting from clear policy decisions. Further research should take a closer look at the application of each concept in literature, and examine to what extent the Venn diagram (figure 1) corresponds with the use of the concepts in literature.

Third, this research has identified four potential conditions of sectoral problem shifting, one of which has been investigated on global governance level. Besides the condition of fragmentation, which has been discussed in global environmental governance literature before, the other three conditions have not. Johnson and Urpelainen (2012) have shown that when negative spillovers from one issue area to another exist, states pursue regime integration among these issue areas. As such, negative spillovers initiate a harmonization of laws and organizational structures. While fragmentation is often seen as a factor that complicates governance efforts, only a few articles have used the concept to analyze the interface between different issue areas, such as climate and biodiversity (Biermann et al., 2020). This thesis project shows that there is reason to argue that more research on all four conditions is necessary, as they potentially enable sectoral problem shifting on global and sub-global level. As interactions between regimes can be complex, and problem shifting is not caused by just one condition, both the individual conditions and their interactions should be considered in further research.

The CSA has shown that short-termism among decision-makers, in particular, should receive attention when investigating the causes of sectoral problem shifting between MEAs. By not falsifying the hypothesis, the CSA revealed that short-termism indeed potentially enables sectoral problem shifting between MEAs. In general, the findings of the case study analysis support and expand the theory as presented in the theoretical framework. The results support the arguments made by, e.g., Lecksiwilai and Gheewala (2020), McCormick and Kapustka (2016), and Timmermans in Peeperkorn (2021). In addition, based on these arguments, it is likely that short-termism is not limited to the global governance domain. Sub-global environmental governance efforts should receive attention as well. In the ozone-climate case, the delegates of the Parties under the MP focused on what they deemed the most urgent problem, ozone depletion, and while doing so, their decisions shifted the problem to the climate domain. This illustrates how short-termism influences the decision-making process. In addition, McCormick and Kapustka (2016) argued that addressing a problem with short-term thinking could result in policymakers failing to consider the linkages to other parts of the overarching environmental system. Studying this case has shown that this is, to a certain extent, what occurred between the MP and KP.

The findings shed light on the statement made by Fisher (2019), who argued that our inability to think about the well-being of future generations is mainly what has caused damage to the environment. While this might be true, the case of the MP has shown that under the right circumstances, and with enough support, we can step away from this short-term thinking and consider the well-being of future generations as well. Sometimes, actors, such as scientists and expert agencies, can extend the time frame of policymakers, making the policymakers realize that they have to act upon a global environmental problem.

Fourth, results from this research suggest that we need to address multilateral environmental agreements as not inherently green actors, actively pursuing the interests of the MEA, and while doing so sometimes deciding upon measures that have unintended but anticipated negative consequences outside their policy domain. Examples such as the carbon mitigation options under the Kyoto Protocol affecting biodiversity, and the Minamata Convention on Mercury redirection mercury flows polluting other areas, revealed that it is highly questionable whether MEAs are inherently green (Lin et al., 2017; Totten et al., 2003). The case of sectoral problem shifting by the Montreal Protocol has shown that

MEAs are indeed not inherently green. Science was certain about the links between the ozone and climate problems, and the effects of alternatives such as HCFCs and HFCs on climate change were well-understood. Nevertheless, the delegates of the Parties under the Montreal Protocol chose to formulate control measures that would indirectly stimulate the use of these substances and ignore the warnings of UNEP and other actors regarding ODS alternatives with a high GWP. Zwart (2015) introduced a phenomenon that could be used to describe such a situation, called an unintended but anticipated consequence. While the MP regulations were not intended to shift problems to the climate domain, these consequences were anticipated, and policymakers decided to go ahead anyway. Why do they do so? Well, as has been researched throughout this thesis, one explanation could be the focus on problems with the most 'urgency', and the neglect of problems that are not deemed to have this urgency.

## 6.2 Policy implications

One of the main findings of this research concerning policy development has to do with the trade-off between short-termism and sectoral problem shifting. While the findings and discussion so far might suggest that policymakers need to give their full attention to long-term planning and stop focusing on short-term results. However, instead, they need to strike a good balance between these two factors. It is clear what the negative consequences could be of extreme short-termism, solely focusing on short-term results, neglecting long-term consequences. However, when long-term planning lacks short-term objectives, addressing a problem in a manageable way could prove to be difficult. As such, short-term objectives by themselves are not inherently bad. When formulating short-term objectives occurs without consideration of long-term planning and impacts, it becomes a problem.

What could we do to tackle short-termism in policymaking? According to Hillje (2019), a promising option would be to institutionalize farsightedness in our democracy. Hillje illustrates this with the example of the Finnish parliament, which has a permanent committee for the future, controlling and evaluating the long-term planning of the government. And, between 2014 and 2016 in Sweden, the country had its first minister for the future (Hillje, 2019). By translating this to the global context, a global committee for the future could be established. The main task of this committee would be to evaluate drafts of MEAs regarding their long-term planning and impacts on a broad environmental scale. When this committee detects shortsightedness in specific agreements, they could make suggestions on how to improve, suggesting different types of control measures, or to reach out to other MEAs and their domains to come to synergistic instead of conflictive agreements.

New Statesman (2013) published an article in which the option is promoted to use national constitutions to bind governments to respect the rights of both current and future generations. The German constitution includes such a clause, which states that when the constitutional rights of future generations are violated, the culprits can be pursued by the law. However, without a clearly defined institution aimed at protecting the rights of these future generations, the effectiveness of this clause is questionable.



### 6.3 Limitations

There are some limitations to the approaches and the findings in this research. First, the reliability of the narrative review, which was used to identify the concepts that together conceptualize sectoral problem shifting, could be questioned. Because of the subjective way in which a narrative review is executed, it is sometimes criticized as being unreliable, providing biased outcomes (Rumrill & Fitzgerald, 2001). However, as the concepts that resulted from the narrative review are widely used in environmental literature, they represent a broad spectrum of concepts related to environmental problem shifting, and as the results have been informally discussed with an expert in the field of global environmental governance, the reliability of the results increases. Nevertheless, further research is needed to create a more comprehensive overview of problem shifting concepts within current environmental literature, with a more detailed description and comparison. This could create a stronger foundation for the conceptualization of SPS, and additionally a start for new concepts that aim to describe specific types of problem shifting.

Second, critically examining the SLR shows that while it is considered to be a relatively objective literature review method, some elements could raise questions. The choice for which additional keywords were used was subjective, based on what seemed to provide the most appropriate results. In addition, while the steps for inclusion or exclusion are defined, there is during these steps still room for interpretation. When this research would be conducted again, this could result in minor differences in which articles are included. However, as each causal condition for problem shifting is mentioned multiple times, it is not expected that this would provide major variations in the results.

Third, there are some limitations to the findings of the case study analysis. The generalizability of the results of the case study analysis is limited due to the in-depth analysis of a single case rather than a multiple-case study design. This limits the extent to which the conclusions related to short-termism and SPS can be applied to cases with similar characteristics but between different MEAs. However, as the focus on a single case has provided a thorough understanding of how sectoral problem shifting and short-termism were present at the ozone-climate case, it contributed to the limited understanding of this phenomenon in the context of MEAs. Moreover, the data that was used to conduct the CSA was limited. To get a stronger overview of the events which might reveal short-termism, additional data is needed. One main source of additional data could be interviews with multiple key actors in the decision making processes, such as delegates of Parties, representatives of expert agencies, and scientists who tried to steer the debate. Finally, due to the lack of studies working with short-termism as a variable, the operationalization lacks a strong foundation. It should be seen as a first step in using such a condition. Further research should aim to resolve these limitations by using multiple pairs of MEAs in which SPS takes place, using additional data sources such as interviews with delegates, and broadening the understanding of short-termism by introducing more concrete indicators.

## 6. Conclusion

This thesis introduced the concept of sectoral problem shifting to describe the phenomenon of problem shifting from one environmental domain to another and investigated the relationship between short-termism and SPS between multilateral environmental agreements. It did so by conducting a case study analysis on the influence of short-termism on the SPS from the Montreal Protocol toward the Kyoto Protocol. The findings have indicated that sectoral problem shifting indeed occurs between the two MEAs, and short-termism among the decision-makers has likely enabled these problems to shift to the climate regime. The case study revealed that during the first period and the first part of the second period, Parties mainly focused on achieving short-term results regarding the ozone problem, and their decisions did not consider future environmental sustainability. However, toward the Kigali Amendment, more signs of such considerations came to the surface. Eventually, this led to the Amendment which in time phases-down the use of HFCs, decreasing the impacts shifted to the climate regime. As such, the answer to the main research question is that based on the findings of the CSA, short-termism has likely (partially) enabled sectoral problem shifting from the Montreal Protocol toward the issue domain of the Kyoto Protocol.

The conceptualization of both sectoral problem shifting and short-termism in context of MEAs has contributed to the limited theoretical understanding of these phenomena and their relationship. Introducing the concept of SPS and visualizing the broad problem shifting phenomenon in the Venn diagram could motivate researchers to look for more cases of SPS and increase our understanding of this phenomenon and other problem shifting phenomena. Using short-termism in MEA context, and providing an operationalization for this condition, has added to the limited theoretical understanding of short-termism in environmental policy context. Besides short-termism, the systematic literature review has revealed three other potential causal conditions of SPS, which are the fragmentation of laws and organizational structures, a narrow set of indicators that are used to understand the policy effects, and a power imbalance between the problem shifter and the problem receiver. There are ways to deal with short-termism, such as establishing a 'committee for the future'. However, we will need more research on short-termism and the other three conditions to formulate effective strategies to prevent sectoral problem shifting.

We need to be aware that multilateral environmental agreements are not inherently green. Interventions created by these agreements can shift problems instead of solving them altogether, anticipated or not. Throughout designing global environmental policy, policymakers need to be aware of the conditions that could create problems to shift to other environmental domains. When they do so and act accordingly, they might be able to improve our environmental governance system and deal more effectively with the global environmental problems of tomorrow.

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## Appendix 1 – Analytical Framework

**Table 8.** Analytical framework – Elements used to analyze the SLR articles

Analytical elements	Explanation
<b>Concept(s) used</b>	Refers to the type of concept(s) used to define the phenomenon, including the following concepts: problem shifting, cross-media pollution, unintended consequence, spillover effect, and trade-off.
<b>Definition of concept(s)</b>	Refers to the definition of the concept(s) used in the article.
<b>Case</b>	A short description of the main topic of the article, for example, the specific case of problem shifting.
<b>Original problem(s)</b>	The problem(s) which existed before the intervention.
<b>New problem(s)</b>	The new problem(s) which have been affected by the intervention, shifting the impacts away from the original problem(s).
<b>Level</b>	The level on which the intervention and problems take place. Includes subnational, national, international, and global level. Sometimes the case crosses multiple levels, referred to as multi-level.
<b>Who is shifting the problem</b>	The entity that was concerned with the original problem(s) and shifted the problem(s) by means of an intervention.
<b>Which intervention has led to the new problem(s)</b>	The specific intervention that caused the problem(s) to shift from one domain to the other.
<b>Who (or what) is receiving the problem</b>	The entity that receives the new problem(s) created by the intervention.
<b>Condition(s) enabling problem shifting</b>	The condition(s) that enable problem shifting within the article, conditions can be specific to certain cases, or more systematic underlying conditions.
<b>Additional notes</b>	Additional notes to provide context to important elements of the article.

**Table 9.** Analytical framework – Example application to article by Lecksiwilai & Gheewala (2020)

Analytical elements	Explanation
<b>Concept(s) used</b>	Problem shifting, unintended consequences & trade-offs
<b>Definition of concept(s)</b>	-
<b>Case</b>	Biofuels are often understood as having an advantage towards global warming, but study in Thailand regarding biodiesel and E85 shows that other environmental impacts need to be considered as well in order to prevent problem shifting.
<b>Original problem(s)</b>	Global warming (GHG emissions from fossil fuels)
<b>New problem(s)</b>	(1) Effects of land-use change on environment as more agricultural land is required; (2) freshwater depletion, biofuel feedstock production requires significant amounts of water; (3) pesticide contamination in areas with intensive agriculture.
<b>Level</b>	Multi-level: From global impacts like GHG emissions to local impacts like pesticide contamination.
<b>Who is shifting the problem</b>	Government of Thailand
<b>Which intervention has led to the new problem(s)</b>	The Renewable and Alternative Energy Development Plan 2012-2021
<b>Who (or what) is receiving the problem</b>	Local nature and communities
<b>Condition(s) enabling problem shifting</b>	(1) Policymakers tend to focus on urgent problems and disregard the overall impact, leading to unintended negative results; (2) greenhouse gas emissions are seen as the most important environmental impact to consider, neglecting other potential impacts.
<b>Additional notes</b>	-