The drivers of global attention in complex and creeping crises

The cases of antimicrobial resistance and climate change

Zaman, Ahmad Wesal

Publication date:
2022

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Zaman, A. W. (2022). *The drivers of global attention in complex and creeping crises: The cases of antimicrobial resistance and climate change*. Roskilde Universitet. FS & P Ph.D. afhandlinger

ROSKILDE UNIVERSITY
The Doctoral School of Social Sciences & Business

The drivers of global attention in complex and creeping crises

The cases of antimicrobial resistance and climate change

(IStock/imaginimia and Europa, 2022)

Author: Ahmad Wesal Zaman

Main supervisor: Olivier Rubin

Co-supervisor: Erik Bækkeskov

ISSN No: 0909-9174

Abstract - English

Among many other problems, the world faces two enormous existential problems, Climate Change (CC) and Antimicrobial Resistance (AMR). After decades of warnings from experts, the public and policymakers are finally paying attention to the threat of CC; but the threat of AMR, which is just as consequential a threat, remains mostly unnoticed. Multiple global surveys rank CC as one of the top global challenge of our time (Raunio, 2002; Ipsos, 2020; Unesco, 2021; University of Oxford, 2021). AMR is nowhere to be found in these surveys. It does not even make it to the top 10 on the list of the global threats in any of these surveys. It is puzzling to see that a threat that kills more than 1.2 million people yearly, estimated to be causing billions of US dollars of losses to the global economy, has not even made it to the top 10 list of global challenges (Jim O'Neill, 2016; Laxminarayan, 2022). Understanding that AMR and CC are transboundary, complex and creeping global crisis, sharing several characteristic similarities, where CC has successfully achieved strong global attention and AMR is still struggling to achieve a similar global attention, the monograph asks: How can we explain the differences in global attention between Antimicrobial Resistance (AMR) and Climate Change (CC)? In order to answer this RQ, the thesis will investigate the public, expert and political domains at the global level.

Based on a case-oriented most similar comparative research strategy, the thesis relies on mixed methods to analyze media data (print and social), archive and online available data and a limited number of interviews. Combining qualitative and quantitative methods, the monograph carries out a causal process tracing to explain the difference in global attention of the two cases.

Additionally, the monograph iteratively develops an analytical framework, unique to this study and other transboundary, creeping and complex crises, laying the foundation of the framework based on a literature review of studies on global attention. The analytical framework consists of four necessary conditions—namely, *scientific basis, mobilization, popularization* and *polarization*. The existence of all of these necessary conditions will lead to the sufficient condition that this monograph has titled as the *suitable political ecology (SPE)*. The SPE is the defining variable in explaining the difference in global attention between AMR and CC, whereas CC has achieved the *(SPE)* AMR has not.

CC and AMR currently both have solid scientific bases, but the path to arriving at the solid scientific basis are different between AMR and CC. This difference has had implications to the development of global attention. CC's scientific basis has been vague at the initial stages of its emergence as a global problem in the 1950s. The vagueness has fueled scientific debate, increasing expert attention to the problem. The vagueness has also helped mobilized groups to join CC advocates, because there has been room for interpretation and subjective understanding. The initial and vague scientific basis of CC and the successful framing of it have helped in uniting the environmentalists under an umbrella—the umbrella of climate change. Especially after the redundancy of a strong anti-nuclear, anti-population growth and naturalists with aesthetic appeal to nature and many other environmental NGOs and advocacy setups that transformed their core activities toward CC.

CC has received global attention in all three domains, fulfilling all the necessary and sufficient conditions for global attention. AMR does not fulfill all the necessary and sufficient conditions for global attention. AMR lacks public mobilization and popularization. There are almost no major gatherings, protests or demonstrations for or against AMR, while CC has witnesses some of the world's major demonstrations, protests and gatherings over the last decade. Public is unaware of the AMR problem, there is also very little public interest to AMR. Social media engagement to the problem is very limited and Google Trends searches on the topic of AMR are quite limited compared to CC.

Political mobilization and expert mobilization of AMR are different from CC. These domains within the AMR realm work in isolation to one another and are not as cooperative as within the CC. The CC's political and expert domain are not only mobilized effectively within themselves, but they work cooperatively with actors outside, which has resulted in both *shaping the knowledge* on CC and in maintaining political interest to the problem.

AMR lacks expert, public and political polarization. AMR advocates and expert organizations have not been able and nor willing to contribute to polarization. This is because they see polarization as a hinder to effective and efficient response. However, polarization exists because of a few important factors in CC. When polarization exists, it means that groups and people have developed their own understanding to the problem, they have associated their own values and affection to the problem and are willing to take action in favor or against the current believes or political responses to the problem. When polarization does not exist, as in the case of AMR, the language of communication about the problem is still expert driven, difficult for the general public to understand and comprehend.

Keywords: antimicrobial resistance, climate change, creeping crisis, complex crisis, transboundary crisis, mobilization, global attention, public attention, expert attention, political attention, social media

Resumé – Dansk

Blandt mange andre problemer står verden over for to enorme eksistentielle problemer, henholdsvis klimaforandringer (KF) og antimikrobiel resistens (AMR). Efter årtier med advarsler fra eksperter er offentligheden og politiske beslutningstagere endelig begyndt af vise truslen fra KF opmærksom; truslen fra AMR derimod, der er en lige så alvorlig trussel, forbliver langt hen ad vejen ubemærket. Flere globale surveys rangerer KF som en af vor tids højest rangerende globale trusler (Raunio, 2002; Ipsos, 2020; Unesco, 2021; University of Oxford, 2021). AMR er dog ingen steder at finde i disse surveys, og klarer end ikke at komme på top-10-listen af globale trusler i nogle af disse surveys. Det er forbløffende at se, at en trussel, der årligt dræber mere end 1,2 millioner mennesker, samt skønnes at forårsage milliardtab af dollars i den globale økonomi, ikke engang indgår i top-10-listen over globale udfordringer (O'Neill, 2016; Laxminarayan, 2022).

I en forståelse af at AMR og KF er grænseoverskridende, komplekse og snigende globale kriser, der deler flere karakteristiske ligheder – hvor KF med succes har opnået stærk global opmærksomhed, og AMR stadig kæmper for at opnå en lignende global opmærksomhed – spørger denne afhandling: Hvordan kan vi forklare forskellene i global opmærksomhed mellem antimikrobiel resistens (AMR) og klimaforandringer (KF)? For at kunne besvare dette forskningsspørgsmål, vil denne afhandling undersøge det offentlige, ekspert- og politiske domæne på globalt plan.

Afhandlingen er baseret på en case-orienteret, *'most similar'*, komparativ forskningsstrategi og benytter blandede og mangfoldige metodestrategier til at analysere mediedata (print og sociale medier), arkiv- og online-data samt et begrænset antal interviews. Ved at kombinere kvalitative og kvantitative metoder udfører monografien en kausal processporing for at forklare forskellen i global opmærksomhed mellem de to cases.

Yderligere udvikler afhandlingen iterativt et analytisk rammeværk, der er unikt for dette studie og andre grænseoverskridende, snigende og komplekse kriser, og lægger derigennem fundamentet for rammeværket baseret på en litteraturgennemgang af studier om global opmærksomhed. Det analytiske rammeværk består af fire nødvendige betingelser: *videnskabeligt grundlag, mobilisering, popularisering og polarisering*. Eksistensen af disse nødvendige betingelser medfører den tilstrækkelige betingelse, som afhandlingen har betegnet som den *passende politiske økologi* (PPØ). PPØ er den definerende variabel til at forklare forskellen i global opmærksomhed mellem AMR og KF.

Denne Ph.d.-afhandling finder, at den globale opmærksomhed på AMR og KF er forskellige, og at forskellen i opmærksomhed kan forklares med det nævnte antal nødvendige og tilstrækkelige forhold, der eksisterer inden for de offentlige, ekspert- og politiske domæner. KF har opnået den PPØ, AMR har ikke.

På nuværende tidspunkt har KF og AMR begge solide videnskabelige baser, men vejen til at opnå solide videnskabelige grundlag har været forskellig for AMR og KF, og forskellen har haft betydning for udviklingen af global opmærksomhed. KFs videnskabelige grundlag har været vagt i de indledende stadier af dets fremkomst som et globalt problem i 1950'erne. Vagheden har næret den videnskabelige debat og øget eksperternes opmærksomhed på problemet. Uklarheden har også hjulpet mobiliserede grupper til at slutte sig til fortalerne for KF, fordi der har været plads til fortolkning og subjektiv forståelse. Det indledende, vage videnskabelige grundlag for KF samt den vellykkede framing af KF har hjulpet med at forene miljøforkæmpere under en paraply for klimaændringerne. Især efter det blev unødvendigt med en stærk anti-nuklear-, anti-befolkningstilvækstbevægelse og naturforskere med æstetisk appel til naturen har mange miljø-ngo'er og fortalere transformeret deres

kerneaktiviteter i retning af klimaforandringer. Dette har også på flere måder hjulpet med hensyn til popularisering og polarisering, og har hjulpet individer og grupper til at udvikle deres egen forståelse af problemet og visse typer af hengivenhed til det.

KF har modtaget global opmærksomhed inden for alle tre domæner og opfylder alle de nødvendige og tilstrækkelige betingelser for global opmærksomhed – det gør AMR ikke, da AMR mangler offentlig mobilisering og popularisering. Der er næsten ingen større forsamlinger, protester eller demonstrationer for eller imod AMR, mens KF det sidste årti har været genstand for nogle af verdens store demonstrationer, protester og sammenkomster. Offentligheden er uvidende om AMR-problemet, og der er ligeledes meget ringe offentlig interesse for AMR. Engagementet i problemet på sociale medier er meget begrænset, og Google trendsøgninger om AMR som emne er meget begrænsede sammenlignet med KF.

Politisk og ekspertmobilisering i forhold til AMR er forskellig fra KF. Disse domæner arbejder isoleret i forhold til hinanden og er ikke så samarbejdsvillige som inden for KF. KFs politiske og ekspertdomæne mobiliseres ikke kun effektivt i sig selv, men samarbejder også med aktører udenfor, hvilket har resulteret i både at forme viden om KF samt i en fastholdelse af den politiske interesse for problemet. Politisk opmærksomhed til AMR har været begrænset til én bestemt type ekspertpolitikere, herunder sundhedsministre samt ngo'er, der hovedsageligt er aktive inden for offentlig og global sundhed. De politikere, der er involveret i debatten om KF, repræsenterer forskellige politiske partier, grupper, ngo'er og omfatter mange forskellige politiske aktivister og organisationer med hensyn til deres interessefelt, alder, størrelse, osv. Politisk opmærksomhed til AMR optræder mere periodisk og i bølger, mens opmærksomheden på KF er konsekvent.

AMR mangler ekspert, offentlig og politisk polarisering. At polarisering mangler, skyldes det solide videnskabelige grundlag, ineffektive fortalervirksomhed og politiske iværksætteraktiviteter, mangel på effektiv mobilisering samt mangel på samarbejde mellem det politiske domæne og ekspertdomænet. AMR-fortalere og ekspertorganisationer har ikke været i stand til og heller ikke villige til at bidrage til polarisering. Dette skyldes, at de ser polarisering som en hindring for effektiv og virksom reaktion. Imidlertid eksisterer polarisering på baggrund af nogle få vigtige faktorer. Når der eksisterer polarisering, betyder det, at grupper og mennesker har udviklet deres egen forståelse af problemet, har knyttet deres egne værdier og hengivenhed til problemet og er villige til at handle til fordel for eller imod de nuværende overbevisninger eller politiske reaktioner på problemet. Når polarisering ikke eksisterer, som i tilfældet med AMR, er kommunikationssproget om problemet stadig ekspertdrevet og dermed svært for lægmanden at begribe og forstå.

Nøgleord: antimikrobiel resistens, klimaforandringer, snigende krise, kompleks krise, grænseoverskridende krise, mobilisering, global opmærksomhed, offentlig opmærksomhed, ekspert opmærksomhed, politisk opmærksomhed, sociale medier

Table of Content

CHAPTER 1: INTRODUCTION 1

1.1 THE COMPARISON OF THE PROBLEMS 2
1.2 ATTENTION TO COMPLEX CRISES 5
1.3 THE FRAMEWORK AND MAIN FINDINGS 8
1.4 METHODS 12
1.5 THE PHD CONTRIBUTION 12
1.6 PHD OUTLINE 14

CHAPTER 2: THE LITERATURE REVIEW 15

2.1 REVIEW OF STUDIES ON ATTENTION TO CC AND AMR 17
2.2 TRANSBOUNDARY, COMPLEX AND CREEPING CRISIS 23
2.2.1 TRANSBOUNDARY CRISES 23
2.2.2 COMPLEX AND CREEPING 24
2.3 AGENDA SETTING 26
2.3.1 ISSUE DEFINITION, IMAGE CHANGE AND POLICY IMAGE 29
2.3.2 FRAMING/ISSUE DEFINITION AND AFFECTIVE PUBLICS 31
2.3.3 COLLECTIVE ACTION AND ATTENTION TO CC AND AMR 35
2.4 SUMMARY 37

CHAPTER 3: ANALYTICAL FRAMEWORK 40

3.1 GLOBAL ATTENTION 40
3.2 SCIENTIFIC BASES 42
3.3 MOBILIZATION 44
3.4 FRAMING 46
3.5 POPULARIZATION 48
3.6 POLARIZATION 50
3.7 SUITABLE POLITICAL ECOLOGY (SPE) 52
3.8 OPERATIONALIZATION AND IDENTIFICATION OF THE ANALYTICAL CONCEPTS 55

3.8.1 NECESSARY AND SUFFICIENT CONDITIONS 55
3.8.2 IDENTIFICATION OF THE CONCEPTS 57
3.8.3 IDENTIFICATION OF SCIENTIFIC BASES 58
3.8.4 IDENTIFICATION OF MOBILIZATION 58
3.8.5 IDENTIFICATION OF POPULARIZATION 58
3.8.6 IDENTIFICATION OF POLARIZATION: 59

CHAPTER 4: METHODS 60

4.1 DATA COLLECTION 64
4.2 THE DATABASE 65
4.3 COLLECTING INTERVIEW DATA 66
4.4 CODING AND CONTEXTUAL ANALYSIS 67

ANALYSIS 68

CHAPTER 5: SCIENTIFIC BASES 68

5.1 THE PATH TO SOLID SCIENTIFIC BASIS 70
5.2 THE RELATION BETWEEN RESEARCH PUBLICATIONS AND GLOBAL AGREEMENTS 74
5.3 RESEARCH EXPENDITURE, THE RELATION BETWEEN GLOBAL AND NATIONAL LEVEL SCIENTIFIC AND POLITICAL ENVIRONMENTS. 75
5.4 SUMMARY 80

CHAPTER 6: MOBILIZATION 81

6.1 PUBLIC MOBILIZATION 83
6.2 OVERVIEW OF THE TWITTER ANALYSIS AND OBSERVATIONS 89
6.3 POLITICAL MOBILIZATION AND EXPERT MOBILIZATION 90
6.3.1 SUMMARY OF THE SECTION 100
6.4 FRAMING 102
6.4.1 CC FRAMES 102
6.4.2 AMR FRAMES 105
6.4.3 SUMMARY 106

6.5 STRATEGIC AND EFFECTIVE COMMUNICATION BY MOBILIZED GROUPS—COUPLING OF THE PROBLEM WITH A PERCEPTIBLE CRISIS **107**

6.6 SUMMARY **114**

CHAPTER 7: POPULARIZATION **115**

7.1 PUBLIC POPULARIZATION **115**

7.2 POLITICAL POPULARIZATION **118**

7.2.1 NGOS AND CLIMATE CHANGE 121

7.2.2 NGOS AND AMR 123

7.3 EXPERT POPULARIZATION **124**

7.4 SUMMARY **124**

CHAPTER 8: POLARIZATION **125**

8.1 PUBLIC AND POLITICAL POLARIZATION IN CC **127**

8.2 LACK OF PUBLIC AND POLITICAL POLARIZATION IN AMR **129**

8.3 EXPERT POLARIZATION IN CC AND LACK OF IT IN AMR **133**

8.4 SUMMARY **134**

CHAPTER 9: SUITABLE POLITICAL ECOLOGY **136**

9.1 ANTI-NUCLEAR MOVEMENTS AND THEIR ROLE IN CLIMATE CHANGE AGENDA **139**

9.2 EXISTENCE OF ADVOCACY SETUPS: COALITIONS, NETWORKS AND/OR GROUPS SEARCHING FOR NEW AGENDAS **141**

9.3 LACK OF SIMILAR REDUNDANT COALITION SETUP FOR AMR **143**

9.4 SUMMARY **146**

CHAPTER 10: THE DISCUSSION **147**

10.1 THE DEVELOPMENT OF ANALYTICAL FRAMEWORK AND ITS INFLUENCE ON FINDINGS **147**

10.2 THE SUBJECTIVE AND OBJECTIVE UNDERSTANDING AND CHALLENGES ASSOCIATED TO THEM **149**

10.3 DATA TYPES AND THEIR STRENGTHS AND WEAKNESSES **150**

10.4 AMR AND CC AS TRANSBOUNDARY, COMPLEX AND CREEPING CRISES **150**

10.5 THE OTHER PERSPECTIVE ON POLARIZATION **151**

10.6 THE FOCUS **152**

CHAPTER 11: CONCLUSION **153**

11.1 FURTHER REMARKS AND RECOMMENDATIONS **158**

CHAPTER 12: BIBLIOGRAPHY **159**

LIST OF FIGURES

Figure 1.1. The analytical model of the PhD monograph 8

Figure 1.2. Presents the findings of the PhD monograph, illustrating the existence and lack of the necessary and sufficient conditions 10

10

Figure 1.3. Visualizing the PhD outline 14

Figure 2.1. Review of studies on attention to CC and AMR 17

Figure 2.2. Review of studies on agenda setting and collective action relating to climate change and antimicrobial resistance until February 2022 35

Figure 3.1. The analytical framework 40

Figure 3.2. The mobilization concept and its elements 44

Figure 3.3. The popularization concept and its elements 48

Figure 3.4. The polarization concept and its elements 50

Figure 3.5. Suitable Political Ecology and its necessary elements 52

Figure 3.6. The truth table and Venn-diagram visualizing the necessary and sufficient conditions 56

Figure 4.1. Visualization the research process of the PhD monograph 60

Table 5.1. Historical overview of scientific publication on AMR and CC until April 2021 70

Table 1. Shows the cumulative contributions (in CHF) of donors to the IPCC from 1998 to 2004 and annual contributions from 2005 to 2016 77

Table 6.1. Elements of mobilization for AMR. 82

Table 6.2Elements of mobilization for CC. The green color represents their existence 82

Figure 6.2. AMR Social media network analysis based on directed graph 84

Figure 6.1. CC social media network analysis based on directed graph 85

Figure 6.1. AMR modularity class highlighting the highest mentioned user on twitter within the AMR dataset after data clean-up 86

Figure 6.3. Modularity class analysis, visualizing the highest mentioned user on twitter within the CC dataset after data clean-up 87

Figure 6.2. AMR World Tree visualization from codes demonstration and protest from 10.000 newspapers 88

Figure 6.3. Sample CC codes for protests and demonstrations retrieved as World Tree from Nvivo from the analysis carried out on 10000 randomly selected newspapers 88

Table 6.3. Number of review comments on fifth Assessment report 94

A simple coding of the major treaties and declarations on CC and environmental problems shows a transition from using the term environment to climate change as it can be noticed in the following results from Nvivo. Figure 6.4. 103

Table 6.4. The use of term "environment in four major treaties and declarations on Climate Change and environmental problems 1972 to 1997 103

Figure 6.4. Visualization of AMR and its frames 105
Figure 6.5. Overview of newspaper publications from 1980s to 2020 of CC and AMR 107
Figure 7.1. Google Trend comparison of "climate change" to "antimicrobial resistance", antibacterial resistance" from 2005 until 2022 115
Figure 7.2. The Graph illustrates climate change newspaper publications over time (1980–2020) 116
Figure 7.3. The graph illustrates AMR newspaper publications overtime (1980–2020) 116
Figure 7.4. Public interest AMR 117
Figure 7.5. Public interest CC 117
Figure 7.6. AMR social media data from November 2019 until January 2022 119
Figure 7.7. CC social media data from November 2019 until January 2022 120
Figure 7.8 Statistics on participation in-session engagement at Conferences of Parties extracted from UNFCCC's official page (UNFCCC, 2021b) 121
Figure 7.9. Pie chart visualizing the constituency of NGOs from UNFCCC's database (UNFCCC, 2021b). 122
Figure 7.10. Illustrates the percentage of NGO constituencies created by the author of the monograph 123
Figure 9.1. Illustration of the existence of the necessary and the sufficient conditions 136
Figure 9.1.Number of nuclear tests 140
Figure 9.2. Number of observer participants in COPs 143
Figure 11.1. Visualizes the conclusion of the PhD monograph, explaining the difference in global attention between AMR and CC 154

Abbreviations

- ABR: Antibiotic resistance
- AMR: Antimicrobial resistance
- API: Application Programming Interface
- CC: Climate Change
- CDC: Center for Disease Control and Prevention
- ECDC: European Center for Disease Control and Prevention
- EMEA: European Medicine Agency
- FAO: Food and Agriculture Organization of the United Nations
- GAP: Global Action Plan
- GDPR: General Data Protection Regulation
- INGO: International Non-governmental Organization
- IO: International Organization
- IPCC: Intergovernmental Panel on Climate Change
- NAP: National Action Plan
- NGO: Non-governmental Organization
- UN: United Nations
- UNFCCC: United Nations Framework Convention on Climate Change
- UNEP: United Nations Environmental Programme
- OIE: World Organisation for Animal Health
- SB: Scientific Basis
- SBSTA: Subsidiary Body for Scientific and Technological Advice
- SPE: Suitable Political Ecology
- STAG: Strategic and Technical Advisory Group
- TB: Tuberculosis
- T-CAT: Twitter Capture and Analysis Toolset
- WAAAR : World Alliance Against Antibiotic Resistance
- WEF: World Economic Forum
- WHA: World Health Assembly
- WHO: World Health Organization
- WMO: World Metrological Organizaiton

ROSKILDE UNIVERSITY
The Doctoral School of Social Sciences & Business

Chapter 1: Introduction

Among many other problems, the world is facing two enormous existential problems: climate change (CC) and antimicrobial resistance (AMR). After decades of warnings from experts, the public and policymakers are finally paying attention to the threat of CC; but the threat of AMR, which is just as consequential, remains largely unnoticed. While multiple global surveys rank CC as one of the top global challenges of our time (Raunio, 2002; Ipsos, 2020; Unesco, 2021; University of Oxford, 2021), AMR is nowhere to be found in such surveys; it does not even make it to the top 10 on any of them. It is puzzling to see how a problem that is already killing more than 1.2 million people annually and estimated to be causing billions of US dollars of losses to the global economy has yet to even make the top-10 list of global challenges (Jim O'Neill, 2016; Laxminarayan, 2022). CC and AMR deal with different matters and stem from different root causes—the former being an environmental problem and the latter a health issue—but they share similar characteristic dynamics, not least being that they are both transboundary, complex and creeping crises. Moreover, they are both future threats that are already producing adverse consequences; they are both collective problems and super-wicked problems, suffering from the tragedy of the common (Levin *et al.*, 2012; Hollis and Maybarduk, 2015; Harring and Krockow, 2021).

Despite waves of attention from policymakers since 2015, the AMR problem has yet to attract consistent attention similar to that of CC among the public and policymakers. The Global Action Plan (GAP) on AMR was adopted by World Health Organization (WHO) member states in 2015. WHO member states have been developing National Action Plans (NAPs), and The Tripartite Joint Secretariat on Antimicrobial Resistance has been established, which was the result of a political declaration at the United Nation (UN) high level meeting in 2016. However, the AMR problem has yet to attract attention as consistently among the public and policymakers as has CC. Despite many other urgent crises, CC has been on the global agenda for the last two decades. Global attention to the problem has not only remained strong, it has also become more imbedded in the different layers of global society. In contrast, attention to AMR has mainly remained within the scientific and expert domain. There are massive differences in the attention levels of the two global crises. Global attention to CC exceeds that of AMR many times over in the three domains that define global attention: the

public, political and expert domains. Newspaper articles on CC are far more numerous than on AMR, as are the scientific publications. Public engagement in the CC issue on social media and in demonstrations is also many times greater than AMR. Finally, more global agreements, treaties, and organizations deal with CC than AMR.

This monograph therefore argues that if the nature of the problems are rather similar and the global attention to them very different, then the answer to this puzzle should perhaps not be found in the nature or dynamic of the global challenges themselves, but rather in how key global actors/domains have reacted and positioned themselves relative to the problems.

Understanding that AMR and CC are transboundary, complex and creeping global crises that share multiple similar characteristics, where CC has received massive global attention and AMR is still struggling to receive global attention at all, the monograph asks the following research questions.

Research Question

> *How can we explain the differences in global attention between Antimicrobial Resistance (AMR) and Climate Change (CC)?*

In order to answer this RQ, the thesis investigates the public, expert and political domains at the global level. The thesis compares the dynamics involved in the actors' interactions and engagements within and outside of the three domains of the two selected cases. In this process, it also identifies the explanatory variables that are important in understanding the drivers of global attention that have led to the difference in *global attention* of AMR and CC.

1.1 The comparison of the problems

AMR and CC are both future threats with consequences that are already being felt today. Many of the changes observed currently with CC (e.g., rising sea levels) will take decades of extensive action at different levels to stabilize, and we might never be able to reverse these impacts (IPCC, 2021). Global temperature is expected to rise 1.5 degrees Celsius over the next 20 years. If serious action is not taken, the temperature could rise above 2 degrees Celsius. This could cause extensive damage to our planet, potentially challenging the very existence of humanity. If no action is taken, climate change is expected to result in increased natural disasters (e.g. floods, droughts) and cause

unprecedented damage to humans, animals and nature (ibid.). Similarly, AMR has already shown dangerous signs of being disastrous for humans, and while the current signs are already dangerous, experts argue that the future threats posed by the problem are apocalyptic and ultra-hazardous (Brown and Crawford, 2009; O'Niel, 2014; Laxminarayan, 2022).

AMR and CC are characterized as transboundary crises that suffer from the tragedy of the common. The tragedy of the common is understood to pose social dilemmas as well. The benefits from using fossil fuels and antibiotics—some of the main factors that cause the CC and AMR problem—are beneficial at the local and individual levels while the costs are incurred at the global level (Hollis and Maybarduk, 2015; Harring and Krockow, 2021). Burning fossil fuels is beneficial for individuals and companies, as it provides easy and comfortable transport for travelers and goods, and thereby also massive profits for private companies. So the use of fossil fuel can be considered rational at local levels. Conversely, these local actions cause greater problems and costs at the societal level, as the increase in greenhouse gases causes an increase in global warming that individuals often do not recognize. Similarly, the use of antibiotics for individuals (often as part of a quick fix for a minor ailment for which antibiotics may not even be necessary), the extensive use of antibiotics in intensive animal farming and elsewhere are contributing to the increase of AMR that potentially harm us at the collective level, while possibly benefiting the individuals (Denyer Willis and Chandler, 2019; Baekkeskov *et al*>, 2020). Similar to the use of fossil fuels, many such actions may seem rational at the individual or local level but can cause catastrophic results at the global level (Halpern and Law, 2010; Shankar, 2016; Harring and Krockow, 2021).

AMR already kills more than 1.2 million people globally every year, and that pace shows no sign of slowing down (Laxminarayan, 2022). By 2050, another 10 million people are expected to die of AMR complications, resulting in further billions of dollars in losses to the global economy (Jim O'Neill, 2016; Harring and Krockow, 2021). We are already experiencing high rates of bacterial resistance to antibiotics around the globe, rendering many infectious diseases almost impossible to treat. Even a minor infection from a simple cut in the kitchen can become life threatening. Giving birth in the 21st century could become as dangerous as in medieval times. Already, 10-15% of maternal deaths are being caused by sepsis—a systematic infection caused by microbes, which has a very high mortality rate. Many of the infectious bacteria causing sepsis have displayed high resistance to several antibiotics, making sepsis even more deadlier (Zhang *et al.*, 2006; Graham *et al.*, 2016; WHO, 2020). Nonetheless, the public is largely unaware of the AMR problem and the policymakers only deal with AMR in spurts, as the problem has been on an off of the global agenda since 2001. The experts find

it challenging to explain the problem to the public and to convince politicians to take more consistent and stronger action to stop this global crisis. Already today, AMR is having detrimental consequences that should be receiving consistent and higher global attention. Nevertheless, we do not see the satisfactory and suitable global attention to it that experts demand.

Conversely, even though there is still much more to be done to resolve the CC problem, it has been successful in establishing a *suitable political ecology (SPE)* that has provided the problem with enough global attention to keep it on the global agenda for the last few decades. The CC problem has experienced challenges similar to those of AMR in the initial stages of its emergence as a global problem. It has taken decades for experts and mobilized advocates and activists working with the CC problem to arrive at this point. Captivated by these differences in global attention between CC and AMR, enthused by the CC problem's journey to this stage and puzzled by the lack of global attention being paid to AMR, this monograph explores three different domains—political, expert and public—to explain the differences in the global attention to these two crises.

AMR is one of the leading slow-burning and complex global health crises of our time, posing an imminent existential threat to humanity (Baekkeskov *et al*>, 2020; Engström, 2021; Harring and Krockow, 2021). The nature of the problem, with its many faces and dimensions and perceptions in the public and political domains about AMR as a future problem, establishes it as a slow-burning and complex crisis (Prestinaci, Pezzotti and Pantosti, 2015; Gil-Gil *et al.*, 2019). AMR and CC are transboundary and complex at the same time, and they can also both be characterized as *super wicked* problems in that any solutions to them entail an array of complexities, and the multiple conflicting value systems involved in containing the threats (e.g., *who* is to take *what* action and at whose cost) can create conflicts among the actors involved in dealing with the respective problems (Lazarus, 2009; Levin *et al.*, 2012; Baekkeskov *et al.*, 2020).

In addition to all of the above mentioned similarities between AMR and CC, AMR is a global health problem and CC an environmental one. Comparing them provides valuable knowledge and lessons learned from CC to AMR, as seen in other studies (Rogers Van Katwyk *et al*>, 2020). CC studies often focus on the challenges and inadequacy of CC policies; however, most of these studies do not address the massive attention that CC has received. The study of this success can provide invaluable lessons for AMR advocates and policymakers.

AMR comparative studies tend to remain within the realm of health, comparing, for instance, AMR to tuberculosis (TB) or other infectious diseases, because the global health environment seems to be

unique and has its own conditions of global policymaking (Shiffman, Beer and Wu, 2002; Shiffman, 2016; Naylor *et al*>, 2018).

While there is little tendency to compare global health problems to other global matters, comparing AMR to CC could provide those concerned with AMR with new knowledge.

CC and AMR share many similarities but have achieved very different outcomes regarding global attention. Due to the recent dominant success of the CC problem in terms of global attention and the indecisive and periodic global attention to AMR, the comparison of the two cases unfolds the nuances existing in the process of generating and maintaining global attention to these two problems. Attention generation to these problems—which are categorized as transboundary, complex and creeping and as lasting over a long time period—is challenging, but necessary. Since these types of problems also last over a lengthy period, attention generation is not enough to result in consistent action; but it is also necessary to maintain attention for as long as a consistent and effective response is achieved. While neither CC nor AMR has achieved the response necessary to eradicate the problem, the CC problem has at least succeeded in generating and maintaining global attention. The comparison of the problems will identify and explain the key drivers that have led to the differences in the global attention for CC and AMR, which is useful in helping the AMR advocates and policymakers to understand the main obstacles thwarting the AMR global agenda. The findings of this thesis will also shed some light and contribute, limited to the two cases, to our understanding of the processes of global attention generation regarding transboundary, complex and creeping crises.

1.2 Attention to complex crises

As indicated above, the monograph analyzes the difference in global attention toward the two otherwise similar crises: CC and AMR. One of the arguments made in this monograph is that attention is a necessary condition for successful policymaking that deals with complex, creeping and slow-burning crises; but attention is not sufficient, and many other aspects of the policymaking process are vital to successful policymaking. Attention is a necessary condition, because it is difficult for complex and creeping crises to generate attention; and since these crises last longer and are observed in waves, they periodically require longer, more consistent attention.

Together with the literature on agenda setting, the literature on creeping and complex crises that studies attention argues two important points: Authors studying agenda setting argue that no matter

what type of a problem we are facing, the attention toward it will eventually end (Downs, 1972; Kingdon, 2003; Jones and Baumgartner, 2005). Moreover, attention to complex, creeping and slow-burning crises is difficult to generate (Boin, Ekengren and Rhinard, 2021b; Engström, 2021). While these two points are extremely vital, as stated above, it is also important to realize that problems like CC and AMR require decades, sometimes generations, to be resolved. Without multi-domain and long-term attention to them, there is a high risk of other competing agendas or other urgent crises replacing them, which poses a challenge to the consistent and continuous response.

Furthermore, in an era, where information travels fast, global disasters strike continuously, and problems and issues change rapidly for both public and political organizations, it is extremely difficult to get the public and politicians to maintain focus on an issue. This is not least due to how public and political attention spans are short, and organizational attention spans are challenged by issue crowding; demand for solutions to several problems at once (Jones and Baumgartner, 2005; Downs, 2016). With limited attention spans and because of other emerging urgent crises in a changing world—and keeping in mind that any significant crisis may receive very high global attention in public, political and/or scientific domains at a specific time—attention to the issue will eventually wane (Zhu, 1992; Jones and Baumgartner, 2004a; Downs, 2016).

While all global problems are inevitably challenged to attract global attention, attracting attention during slow-onset crises or slow-burning and complex global crises is much more complex than is the case for rapid-onset crises (Boin, Ekengren and Rhinard, 2021b). Attention to rapid-onset crisis (e.g., COVID-19) is more or less straightforward, since the crisis can be felt, seen and understood by both public and policymakers due to, in the case of the corona pandemic, the dramatic increase in the number of infections and the consequent loss of life in large numbers. However, the nature of slow-onset and complex global crises often renders it difficult for the public and policymakers to comprehend the associated risks, as the consequent losses are not clearly observed and/or evidently understood (Boin, Ekengren and Rhinard, 2021b). Apart from this, the understanding that complex and slow-burning crises are a crisis or problem in the future, combined with limited resources and organizational capacities, makes it challenging to address them at any level, be it local, regional or global. This makes the justification of resource-allocation difficult for policymakers and donors, and it potentially poses governance challenges.

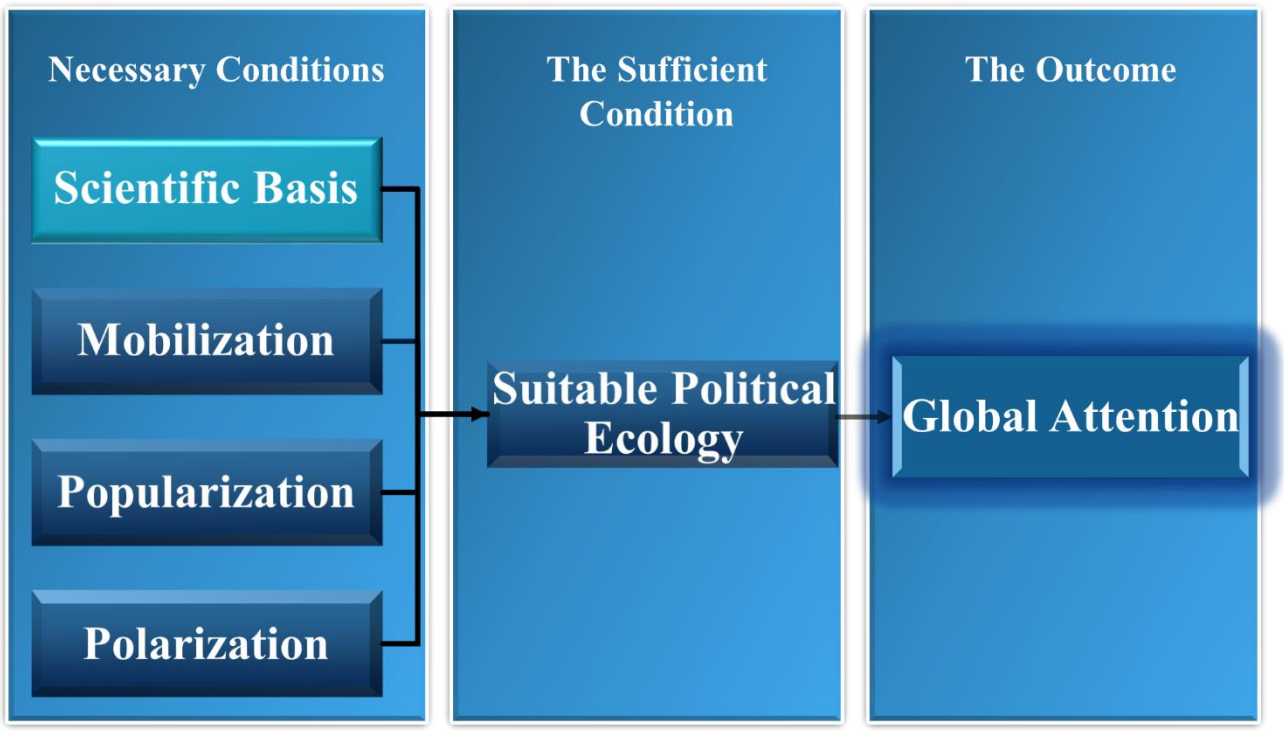
Although the PhD does not discuss policy implementation, but this research does argue that attention is important for long-term and effective policy response. While attention might not be sufficient for

effective and long-term policy response, without it, policy responses to transboundary boundary, complex and creeping crises are extremely difficult (Sabatier *et al.*, 2014; Downs, 2016; Zahariadis, 2016). Here, the fundamental argument is that attention is more important for complex, slow-burning and creeping crises that have a long-lasting nature and require responses possibly unfolding over decades, because without constant attention and multi-domain attention—attention from the public, political and expert domains—other competing agendas could replace them (Kingdon, 1995; Berkhout, 2008). Another aspect is that creating attention to these sorts of problems is also more challenging than rapid-onset crises that can be easily observed, as argued in many of the creeping-crisis studies (Boin, Ekengren and Rhinard, 2021b; Engström, 2021). Because of the complex and creeping nature, there is a need for constant attention to these sorts of problems, as generating attention to them is difficult and they can easily lose attention due to their creeping, complex and slow-burning nature (Boin, Ekengren and Rhinard, 2021b).

1.3 The framework and main findings

Despite all of the challenges that future threats, complex and creeping—slow-burning—crises might face when trying to generate attention, CC has been successful in obtaining more and stronger global attention than AMR. This PhD monograph finds that the success of CC in generating and obtaining strong global attention is because it has achieved all of the necessary conditions to generate and maintain global attention, whereas AMR has yet to do so. These necessary conditions are presented in an analytical framework. The analytical framework, which defines the necessary and sufficient conditions, is a tool that has been developed through an iterative process in this project, which explains the difference in global attention of these two global crises.

Figure 1.1. The analytical model of the PhD monograph



The existence of all four necessary conditions—namely, *scientific basis, mobilization, popularization* and *polarization*—establishes *the suitable political ecology (SPE),* which is sufficient for global attention. CC has achieved the SPE, fulfilling all four of the necessary conditions in all three domains: the expert, public and political domains. AMR has not achieved this SPE, which explains the global attention gap between AMR and CC.

Global attention results when there is some level of collective concern about an issue among the public, politicians and experts, and this level of concern is then combined with some form of engagement. The level of concern ranges from a basic understanding of the threatening nature of the problem to expertise about it. The level of engagement ranges from a display of curiosity about the problem to engaging in advocacy and contributing to institutional responses. However, such engagement does not capture the institutional response in the form of policy implementation in its entirely.

The analytical framework argues that for global attention to be achieved, the existence of the SPE is sufficient. For the SPE to exist, the existence of scientific basis, mobilization, popularization and polarization are necessary.

A scientific basis is necessary for both the objective and subjective understandings of the problem, which is necessary for the issue to be considered a problem. An issue is an objective understanding of a phenomena, and this objective understanding is not relevant for global attention unless the issue is understood as a problem. Some form of scientific basis is therefore necessary for any issue to emerge as a problem. Both AMR and CC have achieved the scientific basis necessary to emerge as problems, although the routes to achieving their respective scientific bases have been different. From its initial stages as an issue, AMR has had a solid scientific basis and expert consensus, whereas CC emerged as a problem with a vague scientific basis and has achieved a solid scientific basis over relatively many years. This long and challenging journey for CC, which has spanned decades, has contributed to the establishment of the SPE. This challenging journey has contributed to the development of scientific discussions of CC, it has deepened and broadened the expert interest in the problem, and it has helped the public and policy domains to develop their respective understandings of the problem. In contrast, despite a solid scientific basis, AMR experts have struggled to make the problem understandable and comprehensible for the public and policymakers.

Figure 1.2. Presents the findings of the PhD monograph, illustrating the existence and lack of the necessary and sufficient conditions

Scientific basis	
Climate Change	Antimicrobial Resistance
√	√*

The necessary conditions	**Mobilization**		**Popularization**		**Polarization**	
The problems / **The domains**	**AMR**	**CC**	**AMR**	**CC**	**AMR**	**CC**
Expert	√	√	√*	√	**X**	√
Public	**X**	√	**X**	√	**X**	√
Political	√*	√	√*	√	**X**	√

Suitable Political Ecology	
Climate Change	Antimicrobial Resistance
√	**X**

Global Attention	
Climate Change	Antimicrobial Resistance
√	√*

1

[1]

- (√) Presents the existence of a condition
- (X) Represents the non-existence of a condition
- (*) Existence or non-existence with important remarks and differences

CC has active mobilization in all three domains: expert, public and political. The initial mobilizations from existing and redundant global problems (e.g., the nuclear movement, environmental movement) have immensely contributed to enhancing the SPE, which has in turn resulted in global attention. A cooperative and engaging mobilization among the political and expert domains within the UNFCCC (United Nations Framework Convention on Climate Change) and IPCC (Intergovernmental Panel on Climate Change) setups have contributed to shaping the knowledge on CC, which has contributed immensely to the establishment of SPE. These have also led to a stronger public mobilization in the form of protests, demonstrations and media engagement, which has been helpful in bringing political attention to CC.

Conversely, the AMR domain completely lacks public mobilization, which is a result of the ineffectiveness of the mobilization of the expert and political domains. The expert and political domains of AMR function irrespective of one another; even within the WHO setup, the presence of politicians who are not within the immediate scope of the problem (e.g., health ministers) is lacking. The political and public domains are being treated as an external actor that must be convinced of the AMR problem. In contrast, the CC global setups deals with these domains more cooperatively, especially in relation to the political domain.

Expert popularization exists in the AMR problem. This expert popularization is also limited to scientific experts with backgrounds in the natural sciences. Public popularization is almost non-existent, however, and political mobilization can only be observed periodically. The existence of all three types of popularization is a necessary condition for the establishment of the SPE; and since they do not exist, AMR has received less global attention than has CC.

Polarization is the condition that is probably the lowest in AMR in relation to CC. Public polarization, political polarization and expert polarization are almost non-existent within the AMR problem. In contrast, the CC problem entails public, political and even expert polarization. The existence of polarization is necessary to increase and maintain attention to a problem outside political institutions and policy venues. The analytical framework argues that without the existence of polarization, the problem at hand risks being forgotten in the public and there would be less interest in the topic in the political domain.

1.4 Methods

Based on a case-oriented most similar comparative research strategy, the thesis relies on mixed and multiple method strategies to analyze media data (print and social media), archive and online-available data and a limited number of interviews. Combining qualitative and quantitative methods, the monograph carries out a causal process in an attempt at explaining the difference in the global attention paid to the two cases. First, the outcome of global attention (the explanatory variable) of both cases is identified and mapped to illustrate the differences in the global attention paid to the two issues. These explanatory variables are then presented as necessary and sufficient conditions to explain the differences in global attention between AMR and CC. Although the monograph sometimes discusses the *degree* of these conditions, which is helpful to understand the dynamics of the three domains, the aim is only to carry out the analysis of the existence of the necessary and sufficient conditions in *kind*. These explanatory variables were identified over several steps of going back and forth between the theories of agenda setting, collective action and media studies etc., together with the observations. The observations started with three main types of data: social media, newspaper data and archive data; conference papers, political speeches and online available data on websites; and reports. The project later also added secondary literature as data for analysis and for the purposes of triangulation. The necessary and sufficient conditions are presented above in Figure 1.

1.5 The PhD contribution

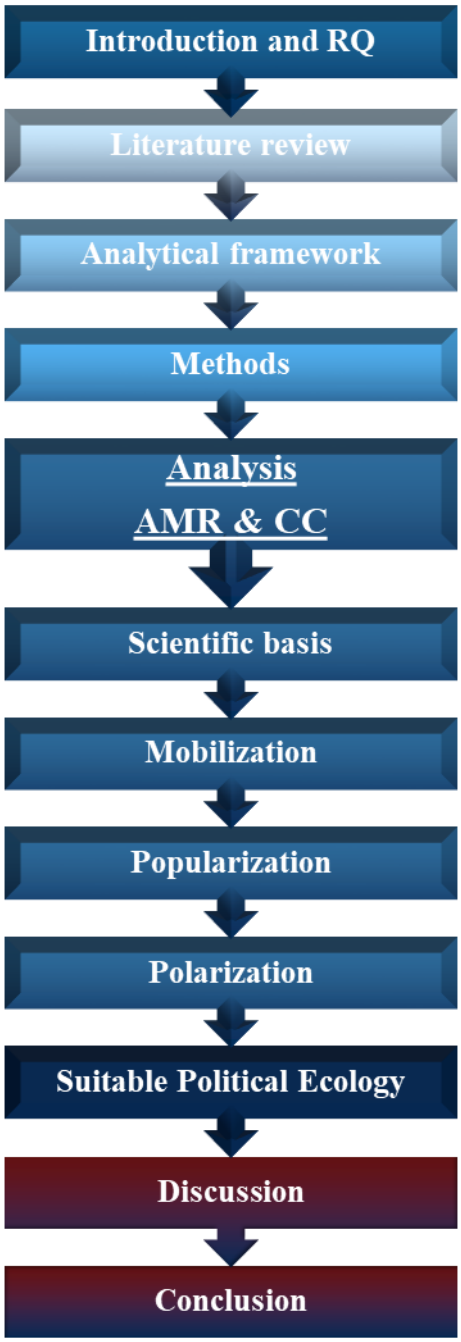
Explaining the differences in the global attention paid to AMR and CC, the monograph contributes both theoretically and empirically with several academic aspects. Theoretically, the monograph adds to existing understandings of the processes of global attention to transboundary, complex and creeping crises. The monograph develops an analytical framework by combining agenda setting and collective action theories with concepts borrowed from studies based on emotional aspects of attention. The analytical framework is one of the very few that has been developed to study global attention to transboundary, complex and creeping crises. The framework also takes both the objective and subjective understandings of a global problem and crisis into consideration, which can serve as a bridge between the natural scientific studies and social sciences studies of AMR in particular. The monograph makes the greatest contribution to the social science research on AMR, especially looking

at what AMR problem is lacking in terms of the processes that have led to CC successfully attracting and holding global attention.

Furthermore, the monograph studies all three domains—expert, public and political—together at the global level, and there are very few studies that approach all three together. This adds to the already existing literatures on both CC and AMR. The literature studying global attention to CC is expansive, but still lacks these sorts of studies combining all three domains. While the majority of CC studies focus on the inadequacy of CC global and national level policies, this monograph is examining the success of CC generating and maintaining global attention, which is often ignored. The rise of the CC issue and its domination of the global agenda in recent decades entails much positive and enriching knowledge that is often ignored in the academic literature. Unfolding these successes will provide a wealth of knowledge to other problems, including AMR, which continue to struggle to receive similar global attention. Empirically, the monograph contributes immensely to the CC and AMR studies, while adding data from media outlets. The monograph has collected data on the attention devoted to AMR and CC in social media using a streaming Application Programming Interface (API), which has collected data in real time for three years. The existence of such expansive and real time data does not exist for AMR studies and it is still a new, but rapidly developing phenomenon within the CC issue. The social media data contains a lot of new information regarding the expansion of global networks and groups that is very holistic, both in terms of actors and the information provided on social media platforms. These types information are important for understanding newly emerging platforms that play an important role in generating and maintaining attention to crisis.

1.6 PhD outline

Figure 1.3. Visualizing the PhD outline



After presenting the research puzzle, problem formulation and research question in the introductory chapter (as presented above), the PhD monograph then presents a literature review that is carried out to position the research in a broader literature, together with the main arguments and main authors within the study of attention and agenda setting, after which gaps in the literature are identified. The literature review presents the overview of the literature relevant to this study and the literature gaps, after which it lays the foundation for the development of the analytical framework. The analytical framework chapter presents the concepts developed through an iterative process in this monograph and presents the main theoretical arguments capable of explaining the differences in the global attention paid to the two cases.

The methods section describes and reflects on the methodological choices made in this project. It presents the research design, research strategy, data collection and methods of analysis. The methods section describes the methods applied and choices made in this project, which are based on a most similar case comparison research strategy and mixed methods research methods, applying causal process tracing (CPT) to the study of the AMR and CC cases. This section also presents reflections regarding the choices made describing the weaknesses and strengths of each of the methods applied.

After the methods chapter, the analysis is unfolded over five chapters. The analysis is structured in accordance with the analytical framework and its concepts. A discussion of the PhD monograph is then presented, followed by the conclusion.

Chapter 2: The Literature Review

The literature review below presents an overview of the literature relevant to this study. The aim of this review is twofold: to identify literature gaps and to lay the foundation for the development of the analytical framework presented in this monograph.

Accordingly, the review is divided in two main sections. The first section is an overview of the academic literature that has studied attention to climate change (CC) and antimicrobial resistance (AMR), respectively. This part of the literature review identifies a lack of social science research that analyzes attention to AMR from various perspectives. Even though the research has developed momentum in recent years, the studies remain quite limited when it comes to describing the drivers of global attention, in particular. Although the academic literature on attention to CC is much more expansive, both on the national and global levels, the research tends to be siloed in studies of political, public or expert attention to CC. Few investigations have studied these three domains together and over a decades-long timespan. These studies shed light on different aspects of attention to CC, analyzing the roles played by different actors and structures on multiple levels. The majority of this literature focuses on media analysis, national level governments and global institutions, which covers expansive dynamics of relations, interactions, happenings and synergies relating to attention to CC. The contribution of this monograph to this specific body of literature is that it studies the three mentioned domains altogether over a longer timespan. Moreover, the social media literature studying attention to AMR and CC has first gained momentum recently, and a unique and enriching body of literature in this field is already being established. Despite the growth of this new body of literature, most of these studies are still explorative in form and present mappings of the social media domain, but they fall short of explaining the drivers of global attention. Only a couple of studies utilize social media data (studying AMR), and even these do not engage in studying attention to AMR. One of the main contributions of this monograph is also to add to this body of literature by carrying out both an explorative and explanatory study of the social media domain.

Last but not the least, studies comparing AMR to CC have also gained momentum in the last decade, where social scientists have unfolded the nuances existing between these two cries. However, fewer studies focus on global attention to CC and AMR in a comparative manner, and especially taking the longer temporal aspects of the two crises as well as the three domains into consideration.

The second section goes beyond the cases and presents a broader overview of some of the main theoretical debates on attention. The second section contributes more to laying the foundations of the

framework. Two major theoretical approaches have dealt with attention in a manner relevant to this study; namely, collective action theories (CATs) and agenda setting theories (ASTs). While these two theoretical fields are very expansive and capture multiple dimensions of attention, they still have their respective strengths and limitations. ASTs are generally very useful for analyzing aspects of the decision-making process, such as prioritization, issue definition and problem formulation or issue emergences in relation to institutions and organizations. Even though they also engage extensively with expert and public domains, their strength mainly relies on explaining political agendas and institutional decision-making. Agenda-setting theories have a weakness in terms of explaining the processes outside of institutions and organizations, especially with the problem definition and the process that leads to certain problem definitions among the general public and outside of political institutions and organizations. Conversely, the main strength of CATs (also one of the most well developed theories in studying attention) relies on explaining the processes outside of political institutions. This is not to argue that CATs do not attempt to explain institutional and organizational aspects relating to attention, which authors like Andersen and Pierre (2010), Hoffman *et al.* (2015) and Kim *et al.* (2022) have studied extensively. However, the main strength of collective action approaches is in its ability to explain bottom-up processes, with a stronger focus on actors outside of the political institutions and organizations. These sets of approaches are useful tools for understanding the rationale behind collective action, which is very helpful when trying to explain the why question presented in the PhD monograph focusing on understanding the group dynamics within the public and political domains. Combining arguments from these two different theoretical approaches sits well with the aim of this study, both because this study has a global approach that includes multiple actors (inside and outside political institutions) and also because it aims to answer both the how and why questions. To answer both questions, it is not enough to know the process of how CC has received more attention. One must also understand why, which requires examination of the inner developments within the three domains. The monograph combines these two perspectives and uses them to analyze and understand the two transboundary, complex and creeping crises cases.

Both bodies of literature also have an elusive understanding of attention and approach it in different ways; both how attention is to be understood as well as how it is to be observed and measured. The definitions of attention range from mere interest to a full-scale response. This study contributes to a clearer understanding of attention and sets boundaries for the concept of attention that go beyond mere interest and falling short of an organized and institutional response, but which is a necessary

condition for a response. The “attention” section presented after the literature review chapter presents this discussion.

2.1 Review of studies on attention to CC and AMR

Three different combinations of keywords for each of the cases were used to carry out this particular literature search on the Scopus search engine. The keywords were: 1. “Attention” AND “climate change,” “attention” AND “antimicrobial resistance” OR “antibiotic resistance.” 2. “Agenda setting” AND “climate change,” “agenda setting” AND “antimicrobial resistance OR “antibiotic resistance.” 3. “Framing” AND “climate change,” “framing” AND “antimicrobial resistance” OR “antibiotic resistance.” These keywords were selected after a broader literature review using Web of Science, Scopus and Dimensions.ai. “Climate change” AND “global warming” and “antimicrobial resistance” AND “antibiotic resistance.” These broader search terms were used in this monograph to understand the fields of study as well as part of the data to understand scientific attention to AMR and CC, which is presented in Chapter 5 as well as in a published research article, which was carried out in collaboration with three other scholars (Baekkeskov *et al.*, 2020). However, this particular literature review only focuses on the three specific combinations of keywords stated above and in the table below. These keywords were developed to narrow down the review in accordance with and of relevance to the focus of this monograph.

Figure 2.1. Review of studies on attention to CC and AMR

Review of studies on attention to CC			
No.	**Keywords**	**Number of Publications**	**Ultimately reviewed**
1	"Attention" AND "climate change"	14000	173
2	"Agenda setting" AND "climate change"	177	177
3	"Framing" AND "climate change"	1960	150
Review of studies on attention to AMR			
No.	**Keywords**	**Number of Publications**	**Ultimately reviewed**
1	"Attention" AND "antibiotic resistance OR antimicrobial resistance"	3720	10
2	"Agenda setting" AND ""antibiotic resistance OR antimicrobial resistance"	36	5
3	"Framing" AND ""antibiotic resistance OR antimicrobial resistance"	41	41

Obviously, the number of publications on attention to CC is far more extensive than on attention to AMR. The number of CC publications is 14000, 177 and 1960 for the three combinations of

keywords, respectively, and 3720, 36 and 41 for AMR. A review of the total number of publications for this monograph was avoided, because not all of the literature retrieved was of relevance to this study. A further narrowing down of the literature review was therefore considered important, both to make the focus of this review more vivid and to make the identification of gaps plausible. The two first search queries for AMR and CC that included the keyword "attention" have undergone a rigorous cutting-down process. Although the numbers from 14000 to 173 and from 2720 to 10 might seem a rather radical narrowing-down, in reality this cutting-down process was necessary, as "attention" is also used interchangeably for the words focus, emphasis and concentration, which is a very common word in academic abstracts. "Attention" does not usually refer to "global attention" or public, expert and/or political attention. Almost every academic abstract uses the term attention. That is why this particular part of the literature review was even more narrowed down by use of three other keywords "public attention," "political attention" and "expert attention," Whereas "public attention" AND "climate change" had 125 hits, "political attention" AND "climate change" had 48 hits and "expert attention" AND "climate change" had only 3 hits. Similarly, only 10 studies within AMR were identified to refer to public, political and expert attention relevant to this study. The review presented below is the result of the final narrowing-down.

Attention to climate change has been well studied in social sciences, especially within policymaking studies, international and environmental politics, and communication studies, focusing on different aspects and levels of public, political and expert attention. While studying public attention to CC, the literature scrutinizes the factors that generate attention, especially focusing on issues related to emotions (O'Neill & Nicholson-Cole, 2009; Chapman, Lickel & Markowitz, 2017; Bryan, 2020; Brosch, 2021; Schneider, Zaval & Markowitz, 2021). The literature looks at the positive and negative impacts of emotion in the CC debate, especially in the communication of the CC problem within the public domain and in relation to the other two domains. For instance, O'Neill and Nicholson-Cole (2009) argue that although fear as an emotion could attract attention, it does not produce effective action. The author argues that fearful communication about CC makes the discussion of CC unscientific and hinders constructive discussions and effective action. The authors argue that newspapers and advocates often portray the CC problem in an overly dramatic and fearful manner, and they magnify the problem more than they should (O'Neill & Nicholson-Cole, 2009, p. 358). Although fear brings attention to the issue, the authors argue that fear-inducing appeals will not last long, because of them are superficial and unrealistic. Schneider, Zaval and Markowitz (2021) argue along similar lines, stating that positive emotions are more effective in bringing about attention to the

CC. However, O'Neill and Nicholson-Cole (2009) mainly look at the British context, whereas Schenider, Zaval and Markowitz (2021) only focus on the commercial aspects of attention, especially looking at consumer behavior in the analysis. Despite the limitations of these studies, they (and this body of literature in general) realize the importance of emotion in attention, as do Bryan (2020) and Brosch (2021) and the rest of the studies mentioned above. Emotions are an important aspect of this monograph, which strongly agrees with the fact that emotions play an important role in bringing about public attention. But as can be seen in the chapters analyzing polarization, emotions last long within the public domain, and especially if they are triggered and maintained by advocacy groups and policy entrepreneurs. Emotions play a particularly vital role when it comes to social media engagement and public mobilization, and this body of literature is mostly used in the analysis sections dealing with the mobilization and polarization of CC and AMR.

Another body of literature within attention to CC looks at perception of risk and its impact on behavior (O'Connor, Bord & Fisher, 1999; Weber, 2010; Bohensky & Leitch, 2014; Aydogdu & Yenigün, 2016; van Eck, Mulder & van der Linden, 2020; Wu, Zheng & Fang, 2020; Schneiderbauer *et al.*, 2021; Wang, Geng & Rodríguez-Casallas, 2021). This group of studies associates the perception of risk to action, arguing that the greater the perception of risk among public or political groups, the higher the level of action. This body of literature also argues that major events such as natural disasters increase the risk perception of the CC and enforces some level of action. Based on this body of literature, the perception of risk becomes an important aspect of global attention. The literature on the relation between risk perception and action forms the basis for understanding the subjective nature of conern, which is the most important aspect of attention. Many of the studies carry out surveys to measure perception of risk, but makes this monograph diffetrent is how the analysis is based on social media, newspaper and archive analysis, and semistructured interviews. The combinition of these sources of data enriches the understanding of relation between risk perception and action even more, which adds immensely to our knowledge on global attention.

Both this body of literature (which discusses the perception of risk and attention) and the one that was previously reviewed (which discussed emotions) identify two major points upon which parts of this monograph are based: the fact that emotions matter in attention and that the sense of concern about a problem is important in bringing about attention. The only difference btween some of these literatures and this monograph is that this monograph views attention as a combinition of sense of concern and some level of action. However, most of the literature reviewed has no clear definition of attention; most of the individual works either completely separate attention from action or sometimes

mix them to the extent that it is difficult to understand their understanding of the attention concept. Another aspect that is improtant to notice in these studies is that most of the studies focus on one (two, maximum) domains of actors—public or political, expert and public, or expert and political domains. They are also mostly limited to national-level analysis (e.g., China, the UK, US). The monograph in hand also goes one step beyond, both in terms of the level of analysis being global and in terms of the domains (i.e., combining all three domains).

Another body of literature that discusses attention to CC mainly focuses on media analysis of and polarization within the CC debate (Antilla, 2005; Mccright & Dunlap, 2011; Corner, Whitmarsh & Xenias, 2012; Painter & Ashe, 2012; Bohensky & Leitch, 2014; Hart *et al.*, 2015; Reed, 2016; O'Neill, 2020; Ruiu, 2021; Maltby, Simpson & Turner, 2021; Augé, 2022). This body of literature points out the existence of a high level of polarization within the CC debate. Many of these studies focus on national level analysis, looking at the US and UK in general. This body of literature points out a few important issues. They argue that there has been a biased representation of CC in newspaper analysis that has exacerbated a polarized debate and the skepticism to CC that started increasing around the year 2000, implying that the overall increase in the CC debate since 2000 in newspapers has also contributed to increased skepticism (Corner, Whitmarsh & Xenias, 2012; O'Neill, 2020). The studies make no clear identification of whether one caused the other: Whether the increased newspaper attention triggered the increased skepticism or whether the skepticism and polarization resulted in increasing newspaper attention. This body of literature points out that the CC debate became popular around the years 2000 in the media domain and that this popularization was accompanied with skepticism regarding the CC problem. The studies do not engage clearly in the analysis of this process. While they mostly focus on national levels (e.g., the UK, US), they often neglect the importance of the popularization-polarization relation in bringing about attention. In this monograph, this process is analyzed more thoroughly by studying the global level, and the causal impact of popularization and polarization is more robustly unfolded, as described in the sections below.

There were 177 hits for "agenda setting" AND "climate change" and 1,969 hits for "framing" AND "climate change," all of which study attention to CC in one way or the other, making them relevant to this study. Academic literature studying "framing" AND "climate change" mostly focus on the relation between frames and public perception and/or political understanding of climate change.

These studies focus both on the process of communication as well as the outcome of the communication between the expert, public and political domains (Demeritt, 2001; Spence & Pidgeon, 2010; Wolf & Moser, 2011; McEvoy, Fünfgeld & Bosomworth, 2013; Bohensky & Leitch, 2014; Benjamin, Por & Budescu, 2017; Hendricks, 2017; Anwar *et al.*, 2019). Focusing on the process, the studies consider how climate frames have developed and have been communicated to the public and politicians (Demeritt, 2001; Badullovich, Grant & Colvin, 2020; Maehle *et al.*, 2021). Focusing on the communication outcome, the academic literature mainly studies the impact of frames on perceptions and behavior, both before and after policymaking. In particular, the literature focuses on the impact of frames on public and political actors (Demeritt, 2001; Spence & Pidgeon, 2010; Bohensky & Leitch, 2014; Hart *et al.*, 2015; Wiest, Raymond & Clawson, 2015; Krantz & Monroe, 2016).

However, the academic literature studying attention to AMR remains quite limited. There are 41 hits for keywords "framing" AND "antimicrobial resistance," and very few are within the social sciences and relevant to this study. Although there are 900 hits for "attention" AND "antimicrobial resistance" on Scopus, very few studies consider public, political and expert attention in a manner relevant to this study (Head *et al.*, 2014; Laxminarayan, 2016; Collins, Jaspal & Nerlich, 2018; Davis *et al.*, 2018, 2020; Steede *et al.*, 2019; Baekkeskov *et al.*, 2020; Lu, Sheldenkar & Lwin, 2020; Overton *et al.*, 2021; Engström, 2021; Munkholm *et al.*, 2021; Hawkins *et al.*, 2022). Overton *et al.* (2021) is one of the recent studies that studies attention to AMR through frames and brings a systematic analysis of international policy reports on AMR. The paper argues that the geographical and ecological shift in AMR risk scenarios framing AMR as a One Health problem and a southern risk has played an important role in bringing about meaningful global-level action. Munkholm *et al.* (2021) also highlight the importance of One Health. Overton *et al.* (2021) acknowledge how there have been waves of attention to AMR in recent decades and show how framing has played an important role in bringing political attention to AMR. The paper does not engage in-depth with the attention concept and has no clear definition of it, which is similar to many studies reviewed above in CC. Nevertheless, one can extract from the study how Overton *et al.* (2021) see international activity and, in particular, publication of policy reports and the adaptation of agreements as international attention, and that this attention is influenced by a specific shift in the framing of the problem. Most of the literature that studies attention to AMR deals with expert, institutional or organization attention. These works either study the activities and policy responses of international organizations or scientific attention to AMR in terms of social science publications. Public attention and political attention that goes beyond

institutions and organizations (e.g., NGO attention) is very rarely noticed in the AMR literature, and has first gained momentum in the last couple of years. Liao *et al.* (2021) have written one of the very few studies to focus on global media attention by looking at newspaper publications from English and Chinese news articles. The study finds that newspaper attention to AMR has fluctuated around official reports and scientific discoveries and that AMR awareness weak was not very influential in newspaper publication fluctuation. Overall, literature studying attention to AMR is very limited, especially regarding public and political actors outside of political institutions (e.g., NGOs, advocacy networks). There is also a lack of studies addressing the role of emotions in the public in AMR communication. More importantly, there is a lack of the analysis of the subjective sense of concern or risk associated to AMR. The literature on attention to AMR is highly situated in the objective understanding of the AMR problem. Although studies like Gröndal (2018) and Liao *et al.* (2021) try to study public concern to some extent, they still obtain the objective notion of the AMR, seeing it as a global health problem. This is where the monograph contributes immensely, looking at how the lack of emotions in AMR communications and lack of understanding of the subjective sense of crisis and concern have hindered attention generation to AMR.

A literature search using the keywords "climate change" AND "antimicrobial resistance" OR "antibiotic resistance" within the 14,000 literature on "attention" was further carried out on Scopus, producing 376 hits. Only 20 of these studies are particularly relevant when comparing AMR and CC (Torjesen, 2013; Freeman *et al.*, 2016; The Lancet Respiratory Medicine, 2016; Sheikh, 2017; Turner, 2018; Harvey, 2019; Rogers Van Katwyk *et al.*, 2020; Burnham, 2021; Harring and Krockow, 2021). Even though these studies compare CC to AMR, their main focus is either comparing the hazardous nature of CC to AMR or using CC as a positive example from which AMR policymakers can learn. Only a couple of these studies examines attention to CC and AMR in as extensive manner as does this monograph. Using this body of literature as the basis of comparison, the monograph fills the gap that exists in explaining the drivers of global attention in a comparative manner between CC and AMR. This monograph is an add-on to the very limited body of literature comparing AMR to CC, arguing that the lessons learned from the progress of CC over in recent decades is invaluable and useful to AMR researchers, policymakers and advocates.

While the section above examined the literature studying attention to CC and AMR, the section below goes beyond the cases and adds from some of the broader existing debates while studying attention with a special focus on the agenda setting literature and collective action literature.

This section of the review lays the foundation for the analytical framework. This necessitates a literature review of the main debates feeding into core academic concepts. The review focuses on six distinct academic concepts of relevance for the subsequent analytical framework: transboundary crisis, creeping crisis, agenda setting, collective action, affective collective action, framing and issue definition.

2.2 Transboundary, complex and creeping crisis

2.2.1 Transboundary crises

The keyword "transboundary crisis" produces over 268 hits on Scopus. These studies tend to fall within the fields of crisis management, governance studies, policymaking studies and many more. Many of these studies focus on the challenges of policy development, management and policy response. Since this monograph only focuses on the phases prior to policy response, many of the studies dealing with the challenges and inadequacies of policy responses are not fully taken into consideration. A large body of this literature deals with transboundary water crises, which is the most dominant area of study within the transboundary crisis area, but since these studies do not fall within the scope of this monograph, they have also been removed from the review. This section of literature review focuses narrowly on studies that conceptually define transboundary crises and analyzes attention to transboundary crises. Sixty-five of these studies define transboundary crisis in one way or the other. All of these studies somehow share a similar definition of transboundary crisis as a crisis that crosses or spreads beyond political boundaries horizontally and/or vertically (Boin, 2009; Hermann & Dayton, 2009; Ansell, Boin & Keller, 2010; Boin, Rhinard & Ekengren, 2014; Christensen, Lægreid & Rykkja, 2016). A vertical crossing is when lower levels of government within national borders require assistance to solve a crisis from higher levels of government. The horizontal crossing or spreading happens when crises occur between two or more political jurisdictions. Only 17 of the literatures listed on the search engine study attention to transboundary crisis (Duda, 2003; Forsyth, 2014; Kwansah-Aidoo & George, 2015; Blondin & Boin, 2017; Weible *et al.*, 2020; Wolbers, Kuipers & Boin, 2021). Both CC and AMR are defined as transboundary crises, as they both cross-political horizontally and vertically. Transboundary crises cause many conflicting value systems and pose governances challenges, especially when with at the global level. This is because while the problems caused are local, the consequences are global (Scheffran, 2015; Baekkeskov *et*

al., 2020; Harring & Krockow, 2021). This body of literature therefore enhances the definition of the two cases as transboundary and sets the stage to unfold the characteristics of these two cases beyond merely being transboundary, as they are also complex and creeping.

2.2.2 Complex and creeping

Both AMR and CC have previously been studied as a complex and creeping crisis (Boin, 2009; Acar & Moulin, 2012; Navracsics *et al.*, 2015; Timmerman *et al.*, 2017; Kenton, 2018; Islam, Aldstadt & Aga, 2019; Anyanwu, 2020; Baekkeskov *et al.*, 2020; Boin, Ekengren & Rhinard, 2020; McGregor, 2020; Engström, 2021; Jakobsson, 2021). Complex and creeping crises can be characterized as hiding in plain sight; despite a large body of literature on the phenomenon, it still remains ill-defined (Boin, Ekengren & Rhinard, 2020). The periodic emergence of the problem with bursts of disasters that are not always consistent, whether in the form of natural disasters (e.g., flooding) or disease outbreaks, renders it challenging to comprehend the scale of the threat posed by such crises (ibid). These crises often last long, sometimes for decades. When the problem is creeping and complex but it continues for decades, attention becomes extremely important, because of the fact that public and political domains have short attention spans and they tend to forget a problem as soon as a new one emerges (Downs, 1972; Petersen, 2009; Boin, Ekengren & Rhinard, 2021b). It is sometimes also difficult to see the direct relation between a disaster and outburst of crisis with the problem at hand. For instance, it is difficult to relate AMR to the deaths caused directly, because AMR is not always the direct cause of death of a patient and it happens in a much more complex manner, where infections caused by other diseases and/or incidents (e.g., Tuberculosis (TB), a cut, childbirth, lack of access to antibiotics) could lead to the death of a patient. Therefore, and because of their creeping and complex characteristics, the consequent losses from such problems are not evidently understood by the public and political domains (Boin, Ekengren & Rhinard, 2021b). Most importantly, generating attention to these types of problems is extremely challenging, and when generating attention becomes difficult, the justification of resource allocation also becomes challenging; consequently, they pose a governance challenge (Boin, Ekengren & Rhinard, 2020, 2021a).

When the public and politicians struggle to understand such problems—especially when experts fail to convey the message in a manner that makes the problem comprehensible for other actors—attention generation and maintaining that attention over a longer period to such problems becomes highly important and challenging at the same time (Boin, Ekengren & Rhinard, 2021b). This is because attention is a scarce commodity, both in terms of the allocation of resources by political institutions to a problem and in terms of public drawing attention to a problem by either discussing it

or expressing their opinion about it; and most importantly, attention to any problem eventually dies out (Downs, 2016). These bodies of literature have provided one of the most important aspects and challenges entailed by such crises, especially where the attention to them is concerned. This body of literature has also helped with the formulation of the puzzle of the monograph and the development of the analytical framework.

Other than the public and political spheres, the expert or scientific communities also play a role in keeping and shaping the global attention to a problem. The scientific communities play roles as advisors, knowledge shapers, problem identifiers or problem definers, whose roles are subject to change in accordance with the *type of problem* and in relation to *other parties* in shaping the agenda (Spruijt *et al.*, 2014).

In summary, the transboundary, complex and creeping nature and characteristics of these crises have some important consequences regarding global attention. First, the transboundary crisis emerges from local settings and could then potentially spread beyond political boundaries. This spreading challenges the political institutions within the different political boundaries, as solving problems is costly. While the problem comes from local settings and the costs are to be paid collectively or globally, the perception of risks about the problem becomes vital. Without perceiving the problem as a threat, the high costs of resolving the problem become highly challenging. Conversely, since the complex and creeping nature of the crises make it difficult to understand and perceive the risk associated with the problem, it poses a governance challenge. This is why this monograph becomes vital. The monograph unfolds these challenges while studying attention to CC and AMR. One of the main contributions of this research is that it adds to the understanding of the drivers of the global attention to the problems that are characterized as transboundary, complex and creeping, where attention is one of the necessary conditions for long-term policy response.

2.3 Agenda setting

Multiple definitions of "agenda setting" can be found in the policymaking literature. It is referred to as "the process by which problems and alternative solutions gain or lose public and elite attention" (Birkland, 2017). It can also be the process of transforming public issues into government priorities (Zahariadis, 2016). Agenda setting is also concerned with agenda change and agenda stability, mainly looking at political institutions and their subsystems to investigate how issues enter the political agenda and how they remain there. The focus of the final strand of literature is on institutional aspects and institutional power (Baumgartner & Jones, 1993; Jones & Baumgartner, 2005).

The term *agenda* was first used by Roger Cobb and Charles D. Elder (1971), focusing mainly on where public controversies came from and how some of them made it onto the political agenda (Zahariadis, 2016, p. 10). *Issue conflict expansion* is the main concept upon which they rely to explain how some issues make it to the political agenda, and they have argued that the perquisite for an issue to be considered for the formal agenda is the expansion of an issue within the public (ibid). Additionally, they add that ambiguous issues that are broader in scope and less technical are more likely to reach to larger groups of public and, henceforth, the larger the public, "the greater the likelihood will be to gain access to the intuitional agenda" (ibid, p.10). Other scholars, like Perry and Kingdon (1984) and Kingdon (2003), argue that the issues that reach the top of the agenda often undergo a "softening up" process, also referred to as redefinition by actors such as advocates, policy entrepreneurs, etc. (Zahariadis, 2016, p. 11). The process of arriving on top of the agenda is not merely because of conflict expansion within the public; it also depends on the role played by other actors, who push the agenda and redefine it as a problem that is feasible to be addressed. The process of arriving at the top of agenda is also argued to depend on the context or political environment. Kingdon (1984) argues that making it to the top of the agenda also depends on what else is happening in the political domain that makes it plausible for an issue to do so.

All three theories of agenda setting focus on how an agenda from the public and/or expert domain arrives at the top of political agenda. For Cobb and Elder, the greater the public attention, the greater the chance of an issue making it onto the political agenda. For Perry and Kingdon (1984) and Kingdon (1984, 2003), it is more than mere public attention. The role of policy entrepreneurs, policy actors and the overall context of what else is happening is important. All issues must undergo a softening up process involving multiple actors, from experts and the public domain to the political domain, until it has its spot on the political agenda. Even though Jones and Baumgartner also focus on issue

attention, they focus more on institutional power and the roles played by actors within the political domain. To them, several issues gain public and expert attention, and several issues undergo issue definition or a softening up process, but not all of them make it to the political agenda. Issue crowding results when multiple issues compete for the political agenda and only one or few make it. This is because political actors play an important role in defining and framing an issue, and it is first once an issue is defined as an important problem by political actors within political institutions that the issue makes it to the political agenda. While in the former two theories, actors and the overall context play an important role for an issue to make it onto the political agenda, Jones and Baumgartner argue that the political institution and political actors within these institutions play the important role.

Global crises (e.g., AMR, CC) pose long-term existential threats to our planet and its inhabitants, and they potentially require long-term global attention (Lo & Thomas, 2018; UN, 2018). However, with *limited attention spans in* political institutions and the public, *agenda crowding* and the complexities and limitations of the *public agenda,* it is challenging to allocate long-term attention disproportionate to the longevity and nature of the crisis (Jones & Baumgartner, 2004b, 2005). The *limited attention spans* of political institutions indicate the carrying capacity of the institution, referring to the amount of time and resources designated by an institution to prioritize a problem at a particular time. While discussing limited attention spans in terms of the public sphere, it implies to the *attention* that the public attends to an issue at a particular time. Despite some of the differences between the public and political agenda (e.g., public agenda is referred to as the set of issues that the public attains, and does not include policy solutions), the public agenda is also constrained regarding attention. "While the public holds many generalized positions on issues, only a few of those issues are relevant at any particular time" (Jones & Baumgartner, 2004a, p. 2). *Agenda crowding* occurs when the public attends to one problem and the political institution to another, or when both the public and political institutions juggle multiple issues simultaneously and crowding occurs. A*genda crowding* therefore indicates less responsiveness to all issues and or greater responsiveness to some problems than to others. This also implies that issues gain and lose attention, both in the political and public spheres, and keeping attention on a particular problem for an extended period is therefore challenging but vital when dealing with complex global crises requiring long-term attention. The long temporal period is relative to the nature of the problem and the existence of other problems at a particular time. Consequently, this temporal period is not a specific time period; for some crises, it can be months or years, whereas for others (e.g., CC, AMR), the long term possibly implies generations of attention.

The agenda setting literature, especially Baumgartner and Jones (1993; 2005), Kingdon (1995, 2003) and (Perry & Kingdon, 1984) contribute with the politics of information and attention. This body of literature is used to lay the foundation for the analytical framework, especially when dealing with the process of how information travels from outside the political domain into the inside. One of the main issues in the agenda setting literature is how most of these theories and literature focus on national level politics, with a disproportionate focus on U.S. political institutions. Authors such as Shiffman *et al.* (2002), Di Ruggiero *et al.* (2015a) and Lundgren, Squatrito and Tallberg (2018a) are among the very few who have applied this theory to the international level, and Shiffman *et al.* (2002) is one of the very few to apply this theory to the context of global health. According to Lundgren, Squatrito and Tallberg (2018b), even though there are distinct characteristics between the policymaking processes on the national and international levels, there are also similarities that will allow ASTs to explain the international level policy processes. Reinalda and Verbeek (2004, p. 11) argue that decision-making in international organizations takes place (either implicitly or explicitly) amid tensions between member states and international organizations. This tension is referred to as the principal-agent relationship, and they argue that this poses structural constraints on the decision-making of the International Organizations (IOs). Despite the tension marking the principal-agent relationship, IOs are arguably policy venues that are able in most cases to make autonomous decisions as "[i]nternational organizations have gained varying degrees of policy autonomy" (Reinalda & Verbeek, 2004, p. 11). Moreover, they are situated at the international level, which is subject to constant demands for policy responses to problems. The problems of concern to IOs and national level policy venues are often similar to those of governments, such as pandemics, environmental disasters, migration flows, technological shifts, financial system tumbles, famines etc. Like governments, however, IOs also have a limited capacity, even though these limitations might be different at these different levels. Nevertheless, the mere fact that these limitations exist along with the above-mentioned features implies that PET can be applied to study IOs (Lundgren, Squatrito & Tallberg, 2018). Conversely, the differences between the two levels suggest that ASTs cannot be automatically extended to the international level. The international level is more decentralized than is the government level. The decentralization at the international level means that decisions are made more collectively, implying that IOs are less hierarchical than governments, they are less exposed to public pressure, and they have "more fluid and overlapping mandates" (Lundgren, Squatrito & Tallberg, 2018, p. 552). It is important to mention that this monograph is not concerned with the

second phase in policymaking (post-decision making), as it is concerned instead with the pre-decision making phases, where attention is central (Majone, 2009).

Despite some studies that apply ASTs at the international level, this field of study has yet to mature, and an automatic transition and application of the ASTs to the global level is neither possible nor useful. The monograph has therefore developed a distinct analytical framework that combines theories of agenda setting and collective action to capture the nuances and complexities at the global level. The ASTs and concepts feed different aspects of the analytical framework, especially within mobilization and framing.

2.3.1 Issue definition, image change and policy image

Scientific communities or specialists within their area of expertise know an issue more comprehensively than do the public and policymakers; "they know the issue better, they are sometimes able to portray the issue in simplified and favorable terms to non-specialists" (Baumgartner & Jones, 1993, p. 25). Since actors are only interested in some of the aspects of an issue and because the political actors within a policy venue usually understand issues in symbolic and simplified terms, specialists must communicate in symbolic and simplified terms. These symbolic and simplified terms are used to explain an issue, to justify and simplify it, and they usually target a population strategically and purposefully. This changes the image of an issue to a problem (Baumgartner & Jones, 1993).

While information regarding an issue can be objective, as soon as the issue is turned into a problem, the information becomes subjective. This process of turning an issue into a problem will ultimately bring about an image change, which often determines if and how an issue receives attention (ibid). "People translate situations into problems when they think the situation is relevant to their well-being. The raising of emotions in politics is essential to the prioritization of problems, because emotion governs the allocation of attention" (Jones & Baumgartner, 2005, p. 12). Information has color and it raises emotions. Political information has bright colors. The implication of labeling something a problem adds color to signal or information about a situation or issue, and indeed, much of politics involves getting people to see a situation or an issue as a problem by adding color to it (Jones & Baumgartner, 2005; Peterson, 2018). A signal that is transferred into political information that generates image change by influencing public emotions and which has the ability to transfer an issue to be seen as a problem is therefore considered a strong signal. Strong signals have the potential to

gain political attention and, as stated above, strong signals are achieved through problem definition or image that is subjectively developed by actors in one of the environments.

The information process in either one of the environments has unique characteristics (e.g., in the political sphere); whether this information is supplied to a political institution through either advocacy networks or policy entrepreneurs or whether it is demanded by the institution through consultancy meetings and expert advice, the receptiveness of the political institution is important (Jones & Baumgartner, 2005). As a theory of information processing, PET argues that when political institutions receive information or a "signal" from the outside regarding an issue that demands political attention, they necessarily do not respond to it proportionately, as they either overreact, ignore or respond to only some aspects of it (Jones & Baumgartner, 2005). The disproportionate response to scientific information is more due to the *reverberations inside* a political institution than a change outside of it, although the change outside of the political institution cannot be ignored (ibid.). In this case, scientific discoveries and knowledge production are considered a "signal," and the change outside the institution, prioritization of an issue, interpretation, framing and presentation and other activities carried out by the political institution until a policy outcome is provided are all considered reverberations within the political institution. According to PET, policy-generating political institutions are mostly over-supplied with information from the outside via interest groups, think tanks, policy entrepreneurs etc. In very rare cases, the information is undersupplied. In such cases, the institutions invite expert groups to provide them with the necessary information. If the scientific advisory boards generate knowledge that has not been published previously and is only generated and presented during these advisory meetings, then this information is not considered as a change outside, but rather a reverberation inside the institution.

Jones and Baumgartner (2005, p. 5) argue further that "punctuations in policy outcomes reflected an interaction between change in the environment and reverberations inside the political system." They focus in particular on subsystems, where interest groups, committees and experts interact to find and equilibrium of interest. This equilibrium of interest broadens the political process, adding those excluded from the process, and this mobilization acts to "destroy and alter the prevailing and powerful arrangements among privileged interests" (p. 5). In other words, scientific discoveries without certain interactions within the political institution or the subsystems of an institution may not bring an issue to the attention of policymakers. When the information or signal is received by the political institution, the important step then becomes prioritizing the issues and allocating the attention necessary to the issue with which the information is concerned (ibid). While this process might appear

fairly straightforward, the reality is very complex and the aspects involved in this information processing often determine if an issue receives attention. Conversely, there are distinctive characteristics with the public sphere that influences attention allocation.

2.3.2 Framing/issue definition and affective publics

While discussing issue definition and framing within the process of agenda setting, it is important to note that there are two separated (but interconnected) instances that framing occurs. a) Framing and policy definition in the outside environment of a policy venue and another b) within the policy venue. Outside the policy venue, framing and problem definition is a processes that evolves from the transformation of an issue to a problem, where newspapers, policy entrepreneurs, communities and others try to define an issue in accordance with their interest, and motivation that is influenced by limitations in terms of participation and resources. Within the policy venue, however, while the same indicators also apply, crowding of problems or competing agendas, interpretation of them that is influenced by organizational interest and capacity and its limitations in terms of resources—whether it be human capital or financial resources that play a role—and policy definition outside an institution is defined in terms of the political color of an issue (the sharper the color, the more attractive it becomes to policy attention) (Jones & Baumgartner, 2005; Peterson, 2018). The issues receiving most attention are those that are often described as "bright red," which is sharp to the eye and more visible than other colors. The idea of problem definition in, for instance, the media domain or social media domain is twofold—that it attracts attention and that it survives for as long as it is allocated attention (Jones & Baumgartner 2005). While mapping the different frames in the external environment, it is not only the different frames that are identified and presented, but also the processes that have developed those frames and the notions that have kept them alive in public debate. For instance, the coupling of CC with natural disasters was one of the frames that became popular within the advocacy domain in the 1960–70s (Weart, 2015). Not only is this frame identified, the reasons for this framing are also studied. For example, the increase in natural disasters during the aforementioned decades and their visualization in the media and their relation to global warming had made the CC problem more visible to the general public and policymakers (Bohensky & Leitch, 2014; IPCC, 2014b; Wiest, Raymond & Clawson, 2015). In addition, the framing language and the appeal that these frames make to their targeted audiences is also studied. These are considered necessary, since emotions, apart from political or financial interests, play a major role in bringing a problem to the attention of the general public and policymakers alike (Jones & Baumgartner 2005). Emotions are understood to be difficult

to measure in this project, but identifying them is argued to be possible, which is how the role of emotion in attention allocation will be applied. Therefore, the theoretical arguments applied here only aim to identify the emotions and make implicit causations regarding their impact on the public and policymakers. On Twitter, for instance, emotions can be detected by looking at the polarization of debate between the believers and deniers of the CC debate. The polarization in public opens up for the interference of opportunistic politicians (Beniers & Dur, 2007). Polarization keeps issues alive in the public domain, and polarization is intensified within the affective public. The affective public intends to bring about change; to do so, they produce statements and strategies based either on opinions or scientific knowledge. The increase in the production of the political expressions within the public intensifies the debate connecting those with the same opinion and divides those who share a different one. Either way, this keeps the debate alive between different groups (e.g., the left and right) (Roelvink, 2010; Papacharissi, 2016). "Affective publics are powered by affective statements of opinion, fact, or a blend of both, which in turn produce ambient, always on feeds further connecting and pluralizing expression […]." (Papacharissi, 2016, p. 316).

In this monograph, while studying the roles of scientific knowledge, media and social media and policy entrepreneurs, each domain is first mapped to understand what sort of signal exist by first studying the nature of the signal. For instance, when studying the science-policy relation, scientific knowledge based on natural scientific findings is mapped, where the production of this scientific knowledge is investigated to determine the vagueness or certainty of the information. The issue definitions or framing of the matter within the scientific domain are also investigated to understand how both the actual findings and how they are framed has influenced attention allocation from a policy venue. Conversely, while studying the relation between media and policy attention, the different frames and issue definitions existing in the domain are first mapped; for example, framing climate change as a security matter (or as a matter that has direct impact on polar bears, which has been extremely influential in terms of generating emotions among children) and framing AMR as an apocalypse or the end of medicine as we know it. The reason for these mappings must then be investigated, such as why U.S. newspapers would frame CC in two different and opposing manners, and how such framing influences attention allocation. Or why is the CC social media debate more poised in terms of polarization than AMR, and how does that influence policy attention? The internal network dynamics existing in the social media environment, policy entrepreneurship and media domains are studied more using the concepts from CATs. These concepts have been used to understand why participants contribute to these networks and how these interactive processes

influence attention allocation, where the reward for participation in collective action, the role of polarization in digital collective action and policy entrepreneurship are studied.

While some authors investigate the direct relation between media and policy attention, others study the relation between media and public policy. The answer to the question of whether mass media influence political agenda is mixed and contradictory (Walgrave, Soroka & Nuytemans, 2008). Cook *et al.* (1983) argue that the media have influenced public views regarding an agenda without leading to a change in policy. According to them, the change in policy has been more due to collaboration between governments and journalists. Whereas Baumgartner and Jones (1993) argue that policy images influence public opinion and public opinion influences policy change, policy image in media cannot "singlehandedly" bring about policy change, and the role of policy actors within an institution is also important. Baumgartner and Jones (1993) argue that, "the receptivity of an institutional venue is also critical in policy development" (p. 25). If there is no interest from the institutional venue, then policy image alone is unable to *break-path* or result in *positive feedback* that will ultimately bring change, and the complex relation between policy image and policy venue could then ultimately result in attention allocation and consequently policy change (Baumgartner & Jones, 1993, p. 25). Conversely, Walgrave, Soroka and Nuytemans (2008) conclude that there is something of a direct influence of mass media on policy change. While studying the role of media on the Belgian parliament, they conclude that newspapers have more influence on the parliament within the areas of law, order and environment, as the members of parliament tend to follow the news on these matters more.

Liu, Lindquist and Vedlitz (2011a) argue that *problem indicators*, *focusing event*, and *information feedback* enhance issue attention. While studying climate change, they argue that high-profile international events and climate-science feedback influence the media, but they add that these factors may work differently "across agenda venues." Based on Jones and Baumgartner (2011a), they argue that the "relevant information surrounding an issue […] is important to decision makers' attention, but so too is the significant event that provides sudden information shock to the policy system" (2011a, p. 405). In that sense, it is not the media alone that influence attention allocation or policy attention; relevant information and the significance of an event also influence media and consequently policy attention. They conclude that "[h]igh-profile international events in the climate change field had very significant attention-grabbing power for both the media and […] agendas" (ibid. p. 415). Their finding is further strengthened by authors such as Schäfer, Ivanova and Schmidt (2014), who apply the same model to climate change, but in other national settings (Australia, Germany, India).

Liu, Lindquist and Vedlitz (2011a), define high-profile events as symbolic, landmark and international events, and refer to it as *International Focusing Events* (IFE). In their words, an International Focusing Event (IFE) in the climate change field is defined:

> *As a historical and highly publicized event that involves many countries and/or international institutions. More specifically and operationally, an event must meet at least one of the following four criteria to qualify as an IFE: (1) creation of an unprecedented international agreement, protocol, or treaty on mitigating global warming and climate change; (2) establishment of a new international or intergovernmental institution on climate change; (3) occurrence of a worldwide, high-profile convention or conference on global warming and climate change; or (4) release of a new, landmark-type, scientific assessment on climate change by a highly reputable international scientific organization.* (Liu, Lindquist & Vedlitz, 2011b, p. 411)

Even though the relation between media and agenda setting is well studied, there is still little information regarding the relation between media and global agenda setting. Only a few studies, such as Werder (2002) and Grasland *et al.* (2016), have touched on the matter. This chapter studies the relation between media and global agenda setting by applying PET theories and concepts at the international level, which are traditionally otherwise used on the government or national level (Shiffman, Beer & Wu, 2002; Di Ruggiero *et al*., 2015b; Lundgren, Squatrito & Tallberg, 2018b).

2.3.3 Collective action and attention to CC and AMR

Figure 2.2. Review of studies on agenda setting and collective action relating to climate change and antimicrobial resistance until February 2022

Review of studies of "agenda setting" and "collective action"			
No.	**Keywords**	**Number of publications**	**Ultimately reviewed**
1	"Collective action" AND "climate change"	851	71
2	"Collective action" AND "antimicrobial resistance" OR "antibiotic resistance"	44	2

This section examines the main debates within the CATs relevant to this project. More specifically, it also looks at the CATs used to study attention to CC and AMR. While the general literature on collective action is immense, there are 851 studies of collective action investigating CC and 44 focusing on AMR. Of these, only 73 look at attention to CC and AMR, where only 2 of the 73 are related to AMR. There is a clear indication that a literature gap exists within the collective action approaches of AMR; and even though the CC literature is immense, a need remains for further studies to cast light on the impact of collection action on global attention.

Founded on ideas stretching back to Hobbes, Locke, and Rousseau, the modern origins of CAT are found in the writings of the economist Mancur Olson (1965), who asked how and why individuals (persons and organizations) decide to collaborate as a group, given that individual self-interest often fails to coincide with that of the wider collective (Ostrom, 2009). The theory of collective action explores the incentives and contexts of the different networks and groups involved in the action (Hamlin & Reisman, 1991). There are four different types of collective action models: "single-actor models, models of the interdependent aggregation of individual choices into collective, models of the collective decisions of individual with different interests and models of dynamic interactions among collective actors and their opponents" (Oliver, 1993, p. 272). Other than these, the project also focuses on digital collective action and affective collective action.

At first glance, the term "collective action" appears to refer to the idea of a group of people doing something together; however, as the term and the different models developed since the 1960s are unraveled, it becomes more complicated (Oliver, 1993). The dichotomy between individual and group interests has been a vital discussion among collective action theorists, where the idea before the 1960s was that there are no points of collision between the individual and collective interest. Mancur Olson (1965), the single-actor model pioneer, challenged this idea. Using mathematical models, he argued

the opposite. He redefined the term collective action as action that provides collective good, where non-excludability or the "impossibility of exclusion" became the vital criteria and the freeriding problem became important (Oliver, 1993, p. 273). According to Olson, if the benefits of collective action are not limited to only those who contribute, then the freeriding tendency becomes favorable among rational individuals. He adds that collective action entails rewards for those who participate and punishment for those who do not, which is what renders collective action rational (if it is not the case, then collective action is irrational). The relation between personal interest and action has been another important discussion among theorists of the matter. Others have challenged the action-interest relation as merely being economic. The fact that people cannot take action or do not want to take action is not merely an economically rational decision or choice, at it could also be a matter of apathy (e.g., an issue of organization, solidarity, education or resources) that prevents people from taking action. These authors argue that lack of action for collective purpose, even when there is common interest, could be due to problems related to "mobilization" (McCarthy & Zald, 1977, 2017; John & Mayer, 2018) and "political opportunity" (McAdam, 1996; Suh, 2001; Della Porta & Parks, 2018)) (Oliver, 1993, p. 274). Olson's theory of collective action has been heavily criticized by a range of authors arguing that interdependence and coordination can influence individual decision making, and the public goods provided by a few can sometimes benefit those beyond the group who have contributed to it; the non-excludability criteria becomes less relevant in such cases (Oliver, 1993). Olsen also formed a discussion around the idea that the number of the group participation influencing the success of the group; adding that larger groups are more likely to fail than smaller groups because of the lack of contribution and the free-rider problem. He also adds that contributions in larger groups are not noticeable. His critics argue that if contributions in larger groups are not noticeable, then the idea that the lack of contribution in larger groups by individuals leads to group failure is wrong; it is not just the number of the group but the context in which the collective action is situated that can influence the success and failure of collective action (Oliver, 1993, p. 275). Another model relevant to this study is based on Massumi and Roelvink (2010), who focus more on the politics of collective action and how "ideological effects" [are created] through non-ideological means. Massumi and Roelvink (2010) look mainly at the politics of affect, analyzing anti-globalization movements. Their main argument is that the politics of affect, which is different from uncovering and resisting neoliberal ideologies and goes beyond that by focusing on mass movements and mass gatherings aimed at bringing about change. The politics of affect is an important part of many parts of this monograph,

especially those showing how affection has helped in terms of both problem-framing and mobilization leading to a suitable political ecology.

However, there are two problems with CATs. The first is that they have a rational approach to collective action despite not all actions lending themselves to rational explanation, and the second is that collective action often sees attention generation because of a collective homogenous understanding about a problem. The analysis in this monograph is slightly different from many of the mainstream CATs, as it adds emotions to the collective action debate, challenging the rational understanding. The monograph also shows how heterogeneous understandings and heterogeneous interests are even more important in attention generation than homogenous ones.

2.4 Summary

The literature review above has presented an overview of the literature relevant to this study, which was carried out for two purposes: (i) to identify literature gaps (ii) and to lay the foundation of the development of the analytical framework of this monograph.

The literature review shows how AMR is understudied in terms of global attention. Even though CC is well studied, few studies focus on all three domains (public, political and expert at global level) when studying attention to CC. One of the main contributions of this monograph is to contribute to the understanding of global attention to AMR and CC by examining the three domains altogether at the global level. This will help understand the global political dynamics of AMR and CC better.

A large body of literature studies attention in relation to emotions, which becomes even more evident in studies of CC, and there are hardly any in AMR. The role of emotions in bringing about attention is well established in the literature, while some differentiate between positive and negative emotions and their impact on attention. While both those focusing on positive and those focusing on negative agree that emotions in the communication of a problem play an important role, some say negative emotions do sometimes hinder action. The problem, however, is the definition of attention and action and the boundaries between attention and action. Emotions (and especially emotions causing polarization) are mostly noticed in CC studies, and while most of these studies merely conclude that emotion and polarization exist, very few analyze the causal relation between them. On the other hand, the causal relation between frames and attention is studied in both CC and AMR (CC having a vast body of literature on this and AMR only very limited). Especially when it comes to studying the

relation between frames, emotions and attention in AMR, the academic literature is almost non-existent.

Attention and in particular global attention is defined loosely and distinctively, different scholars having different understandings. Although many of the studies try to explain or explore attention at different levels and attention from different actors, very few studies define attention clearly. Most studies take the definition of attention for granted and do not even try to define it. Those that try to define it range from defining attention as a mere interest shown to an issue, to being concerned about a problem, and to taking action to resolve it. This monograph also tries to add to the definition of global attention, as it presents a clearer definition of global attention and sets clearer boundaries for what global attention is, which could be more helpful in further studies (and drivers) of global attention.

Despite the fact that the authors define attention loosely and distinctively, the literature review above reveals that attention is one of the necessary conditions for institutional and organized action. Without it, resource allocation, decision-making, and sometimes even policy implementation are hindered, which poses a governance challenge. Attention becomes extremely important when dealing with transboundary, complex and creeping crises. These crises are able to hide in plain sight, and it is sometimes difficult to comprehend the consequent threat posed by them and the losses they cause. Both AMR and CC have been characterized as transboundary, complex and creeping crises, but AMR is still understudied within this field, as both the field and the study of AMR in this filed have newly emerged and are expanding.

Attention is also studied in agenda setting studies and collective action studies. These two bodies of literature are extremely broad and expansive. Although they both cover the process outside and inside political institutions and policy venues, the strength of the former lies in explaining the processes of attention from within political institutions, whereas the latter has useful analytical tools for explaining bottom-up processes focused on the dynamics outside of political institutions. The agenda setting literature has a very strong focus on attention and the politics of attention, which is more suitable for the analysis of reverberations inside policy venues or when issues and problems enter a policy venue. Collective action studies have their strength in explaining group dynamics (the rationale behind actions) and are mostly suitable for explaining the actions of actors outside these venues. The agenda setting literature tends to focus more on national level dynamics and politics of policymaking; it combines agenda setting with collective action as well as adding to the theoretical understanding of

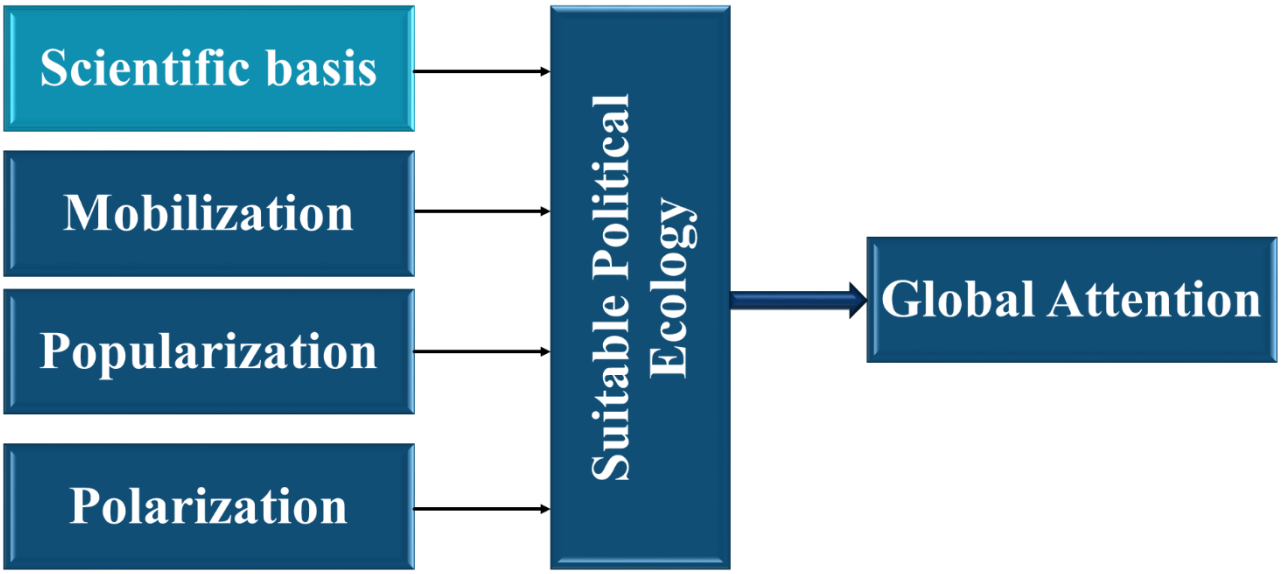
the pre-decision making phases of policymaking. On the other hand, CATs are highly based on rational decision making and the homogenous understanding of networks and collective actions, but by adding emotions to the analysis of global attention, the monograph also adds a new dimension to CATs.

Chapter 3: Analytical framework

This chapter presents the analytical framework for this PhD monograph. It starts by defining "*global attention*" and then proceeds to define the analytical concepts. The chapter defines the concepts of "*scientific basis*," "*popularization*," "*mobilization*" and "*polarization*" as the necessary conditions for the existence of a "*suitable political ecology (SPE)*." *SPE* is defined as the sufficient condition for "*global attention*." These concepts have been developed through an iterative or abductive process, whereby the literature review presented above has laid the initial foundations for their development, after which these concepts have been further developed by moving back and forth between the concepts and observations.

Apart from defining the analytical framework, the chapter argues that the existence of the four necessary conditions altogether leads to being a sufficient condition, which is entitled *suitable political ecology*, which ultimately generates and maintains *global attention* to the problems.

Figure 3.1. The analytical framework



3.1 Global attention

Attention exists when there is some level of concern about an issue among the public, politicians and experts, and the level of concern is combined with engagement (Hafner and Shiffman, 2013). Two aspects are important when defining attention in this monograph: the existence of concern and some

sort of concern-driven engagement. The existence of concern is equivalent to the association of risk to a problem, and it means that actors share some sense of crisis and an understanding of the issue as a problem (Boin, Ekengren and Rhinard, 2021b). There can, however, be a difference between how actors see and understand a crisis and what the crisis actually is. This study consider both aspects: that which Boin *et al.* (2021) refer to as subjective and objective understandings of a crisis. This study mainly gauges the subjective understanding as the dependent variable. The subjective understanding of a crisis is how and to what extent actors associate threat with an issue; then, based on this risk association to the issue, how much action they are willing to take. It is the combination of this subjective understanding and engagement that define attention. The objective understanding of the crisis is applied in this study to define the nature of the cases. "The objective definition emphasizes the importance of accumulation of threat potential. In this objective perspective, a crisis is best understood as a developmental process with root causes, an incubation phase, an acute phase, and an aftermath" (Boin, Ekengren and Rhinard, 2021b, p. 4). Even though the objective understanding of the crisis plays an important role when defining a problem, one of the main arguments that this monograph makes is that the subjective understanding of the crisis as a threat is what leads to engagement, especially in the event of creeping and complex crises. Subjective concerns among actors combined with some engagement is understood as attention.

The monograph has global attention as its dependent variable, which is a collection and combination of subjective understandings of a crisis by actors in the three domains and their engagement. This collective understanding is not necessarily homogenous, as it can occasionally also be rather heterogeneous in the sense that the collective understanding does not mean that all global actors are concerned with the crisis in the same manner and level, and not all global actors understand the problem as one, but they all do share a sense of concern about the problem and, henceforth, they are willing to engage with the problem. It is also important to understand that while engagement is also action, this action is not stretched to policy implementation in this study, but any engagement that can lead to policy adoption before policy implementation. This study sees attention as a phase before policy implementation and a necessary condition for a political response, and the monograph therefore does not fully engage in scrutinizing policy implementation, but does engage with resource-allocation and knowledge-generation aspects of treaties and policies that contribute to generating attention.

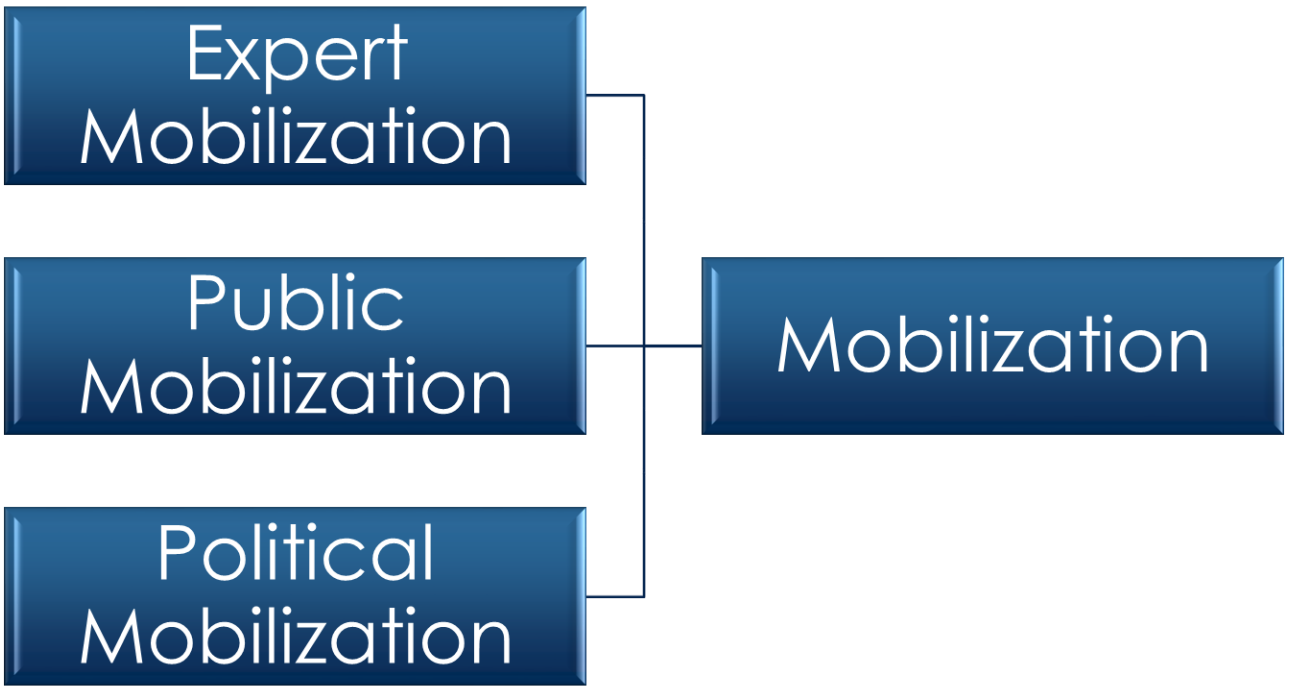
3.2 Scientific bases

Scientific bases are scientific discoveries or findings that contribute to understanding the nature, extent and consequences of a given problem. The existence of a scientific basis is a pre-condition for the emergence of any transboundary, complex and creeping crisis to be realized as a problem, and its development adds to the understanding of the problem. Emergence is the process whereby an "issue" comes to be understood as a "problem." Scientific bases are not static, as they can develop and evolve over time, depending on new findings and discoveries. As stated above in the literature review, the nature and characteristics of transboundary, complex and creeping crises could lead to a lack of understanding about these types of crises among the general public and politicians, and it affects the risk perception from these threats that we might have. These problems are also associated with being long-term and as having the ability to hide in plain sight, where even experts can have difficulty communicating the risks associated with them to the general public and political domains. Conversely, while generating and maintaining attention to these problems is very challenging, it is also extremely important; without generating attention and maintaining it, there is the risk that public and political domains will forget about these complex, long-term problems, possibly resulting in inaction or lack of response. A scientific basis therefore plays an important role as a pre- and necessary condition for the emergence and development of the problem, as it triggers the initial signals for transferring an issue to a problem, which would require expert, political and public attention. A Scientific basis is important for both comprehension and the realization of these types of problems. Scientific bases range from scientific observations to scientific publications and scientific consensus in the scientific community. In this monograph, this concept is exclusive to the expert domain, as the main point of this concept is that without the existence of this pre-condition, the issue at hand cannot be considered a problem for the long term, which makes it vital for long-term transboundary, complex and creeping crises. Public and political perception of the level of threat regarding a problem is a matter of how this scientific basis is communicated, which will be discussed later, in the framing. It is important to recognize how the accuracy and reality of scientific findings and discoveries can differ (i.e., from being scientifically solid to rather vague). "Scientifically solid" means that there is consensus on the scientific findings and discoveries as far as the science is concerned and that the threat from the problem is similarly perceived by the expert domain. Scientifically vague means that scientists disagree with fundamental aspects of the research and findings. This monograph argues that a solid scientific basis can produce expert attention, whereas a vague scientific basis can potentially lead to more public and political attention. This is no

straightforward matter, however, as the communication of a problem from the expert domain to other domains becomes important (as presented below) during mobilization and framing. Furthermore, scientific basis is a combination of both objective and subjective understanding of the problems. The objectivity of the scientific basis contributes to the understanding of the problem in terms of its character, incubation period and consequences from it, but the subjective understanding comes into play when scientists and/or experts try to portray the problem as a threat and risk. Both the subjective and objective understandings are vital for the emergence of the problem, which is a precondition and necessary for global attention.

3.3 Mobilization

Figure 3.2. The mobilization concept and its elements



Any organized and purposeful gathering or action that occurs consistently or periodically and includes more than one person can be categorized as mobilization. This can be a onetime gathering or systemic and consistent actions over a period. The gathering and action of the group must have a purpose (e.g., awareness, warning, protest) and some form of organization (e.g., leader(s), organizers, some sort of active engagement with persons outside the group). Such engagement can be in the form of communicating a message by either simple signs, chants and/or more established reports and statements. Mobilization plays many important roles regarding attention: It increases the interest, curiosity and understanding both inside and outside the group, and it helps to simplify and "translate" the problem at hand. One of the main aspects of mobilization is the need to communicate both within and outside of the group to increase attention. Framing a problem in a simplified manner that is understandable and impactful both within and outside of the group becomes important, because collective actions and understandings of a problem are necessary for mobilizations to form. Whether these understandings are homogenous or heterogeneous impacts different aspects of the mobilized group. The homogenous understanding of a problem increases interest and collective action more

within the group, and the heterogeneous understanding increases the interest and collective action outside of the group. Ultimately, the increase in both internal and external group mobilization contributes to the development of a suitable political ecology, which is necessary for global attention. Mobilized groups demand some sort of action or response from either the general public, politicians or experts, either to resolve a problem or at the very least to apply pressure and shift focus to the problem. Such pressure is either generated through acts of revelation, such as revealing the secrets of oil companies in the case of CC, or the pressure could also be categorized as affective action, where revelation is not enough but change is demanded. The latter form could demand behavior change from public but mainly targets the political domain for the purpose of political change.

Mobilization can be at the local level but can also go well beyond, all the way to the global level. The impact of mobilization on attention is not always immediately visible and is sometimes first realized after a certain period; the shaping of knowledge about a problem that is necessary for mobilization can in some contexts occur in an instant, but it can take decades to develop in relation to other issues. The concept is then divided into public mobilization, political mobilization and expert mobilization. Public mobilization is when the public actively engages and takes action. Such action can be either physical or digital in the form of protests, demonstrations and/or active engagement in discussions on digital media. Political mobilization is when political groups and NGOs actively engage in the problem, ranging from advocacy activities, organizing protests and demonstrations, to organizing conferences and international forums and even treaties. Expert mobilization is when scientists who reach agreement on a problem issue warnings or systematically engage in advocacy regarding said problem.

The most important aspect of mobilization in terms of creating a suitable political ecology for complex and creeping crises is that all three forms of mobilization must be present; in other words, it is not an additive process, where either one or the other could be present to establish a suitable political ecology. The existence of all three forms of mobilization are necessary conditions for creating a suitable political ecology, which can then be sufficient for global attention when all of the other necessary conditions exist.

Mobilization is discussed in both the collective action and agenda setting literature in various ways. It is understood as group formation that can occur on many different levels to advocate for an issue to receive attention or to push for policy change (Birkland, 1998; Bekkers *et al.*, 2011). Jones and Baumgartner (2005, p. 5) state that mobilization happens to “destroy and alter the prevailing and

powerful arrangements among privileged interests." Mobilization is a systematic and established collective action (Gram, Daruwalla and Osrin, 2019). Here, the development of the mobilization concept is inspired by the literature review presented in the second part of the review and a number of studies within agenda setting and collective action theories. The work of Birkland (1998), Jones and Baumgartner (2005) Kingdon (2003) and Amenta *et al.* (2010) with the political consequences of social movements; Bekkers *et al.*'s (2011) work with New media, micromobilization and political agenda setting; and crossover effects in political mobilization and media usage and studies by Walgrave and De Swert (2004) and Cunningham-Burly (2006) have inspired the development of this concept.

3.4 Framing

While mobilization is a necessary condition for a suitable political ecology, there is one aspect of mobilization that is vital to increase attention: framing. Mobilized groups must communicate both internally and externally to increase attention, and framing influences the impact of this communication.

Framing is a simplified, attractive and/or symbolic way of defining and presenting an issue. It focuses either on one aspect of a problem, defining a problem in a more comprehensive way, or simply by labelling it more simply and easily than its original scientific title or name.

Framing and issue definition refer to the process by which experts communicate scientific findings to public and political domains. Scientific findings alone are argued by scholars within agenda setting to be an "issue," which is also considered to be objective, but an "issue" is never considered to be relevant to respond to or be concerned with in agenda setting as long as it is not understood as a "problem" (Baumgartner and Jones, 1993). Framing has also been defined as "'schemata of interpretation' that enable actors to 'locate, perceive, identify and label' specific events and occurrences" (Allan and Hadden, 2017, p. 602) and "in essence it is concerned not with what is being communicated but more with how it is being communicated" (Badullovich, Grant and Colvin, 2020, p. 2).

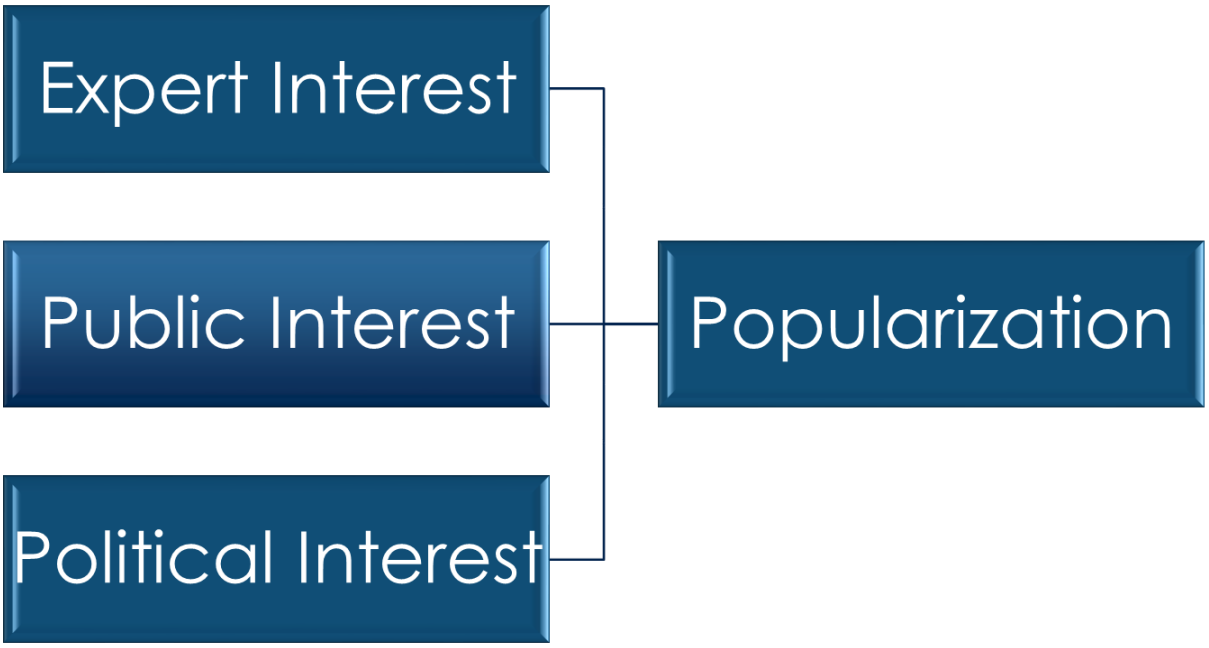
Scientific communities and specialists within their area of expertise know an issue more comprehensively than do the public and policymakers. Since "they know the issue better, they are sometimes able to portray the issue in simplified and favorable terms to non-specialists"

(Baumgartner and Jones, 1993, p. 25). Since actors are interested only in some aspects of an issue and because political actors within a policy venue usually understand issues in symbolic and simplified terms, specialists must communicate in symbolic and simplified terms. These symbolic and simplified terms are used to explain an issue, to justify and simplify it, and they usually strategically and/or purposefully target a population, which changes the image of an issue to a problem (Baumgartner and Jones, 1993).

Framing and policy definition outside an institution are defined in terms of the political color of an issue, where the sharper the color the more attractive it becomes to policy attention (Jones and Baumgartner, 2005; Peterson, 2018). The issues receiving the most attention are those that are often described as "bright red," which is sharp to the eye and more visible than other colors. In this monograph, two terms are used to mainly define the frames: simplicity of frames and attractiveness of frames. "Simplicity" means that they are present in a common language that is marked less by the use of scientific terminologies. "Attractiveness" refers to the ability of the frame to catch the interest of different actors, either because they are presented in the right manner or at the right time through symbolic communication.

3.5 Popularization

Figure 3.3. The popularization concept and its elements

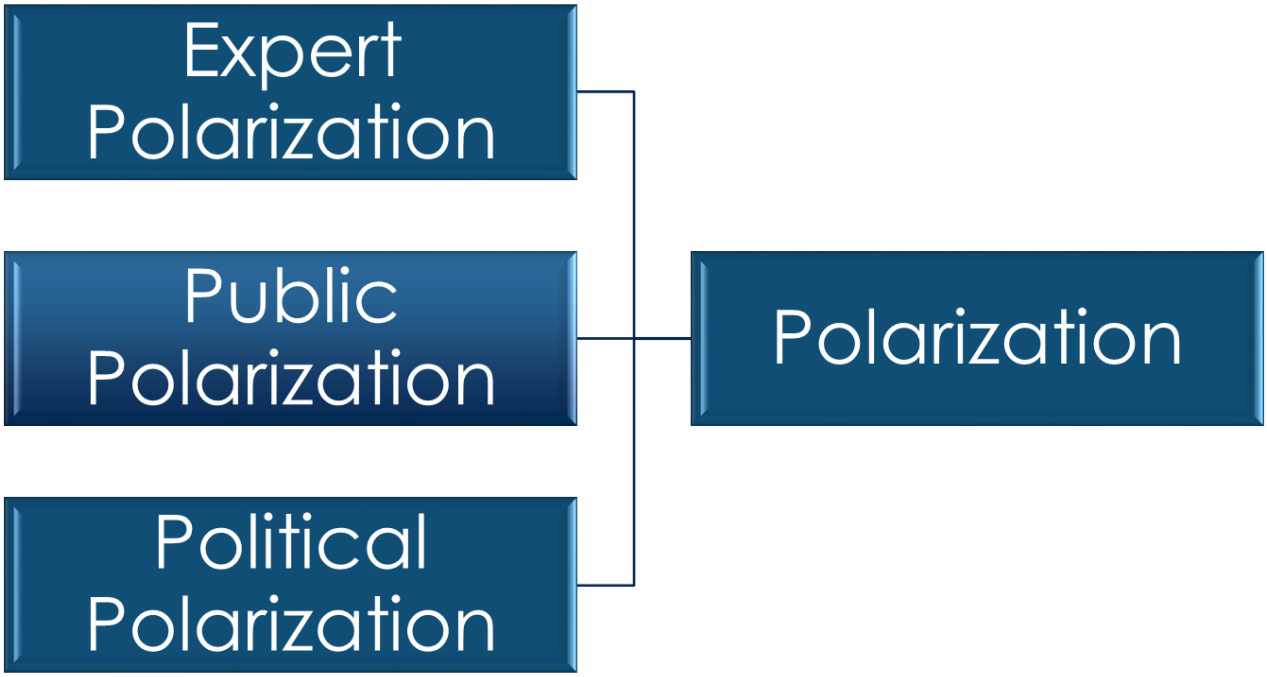


Popularization is another necessary condition for a suitable political ecology (SPE) in this monograph. Popularization consists of three main elements: expert interest, public interest and political interest. The existence of all three elements together is the vital aspect of popularization, which will then lead to SPE, which is a sufficient condition for global attention. Any sign of engagement with a topic can be considered interest, whether it is to understand the problem by reading, searching or inquiring about it and/or engaging on social media by commenting, sharing, retweeting etc. Interest is therefore an important aspect of popularization. In this project, popularization is both noticing a problem and expressing interest in some form of the problem. Popularization happens when a scientific matter is communicated and simplified for the public to show interest in (Scharrer *et al.*, 2017); the greater the interest, the more popular the matter. While interest includes both negative and positive reactions to a problem, it is not the same as attention. Interest shows how well known a problem is. While attention is a subjective and objective understanding about the risks associated with a problem or the level of threat that it poses plus engaging with the problem, popularization is only about arbitrary interest shown to the problem. Popularization is important, because it shows the effectiveness of mobilized communications and actions on actors who are outside the immediate scope of a problem.

In this monograph, popularization is the concept that shows the level of interest shown in a topic. The popularization concept has been studied in many different fields within the social sciences, including policymaking and communications (DiMaggio, 1988; Scharrer *et al.*, 2017; Liu *et al.*, 2019; Vrana, Milovanović and Salopek, 2021), but it remains underexplored. Two types of studies deal with popularization: those that study how an issue becomes popular and those studying the impact of popularization. In this monograph, both aspects are valid. What leads to popularization in this project is a direct result of how the problem is communicated by mobilized groups through framing or issue definition and the like (Scheufele and Tewksbury, 2007; Weaver, 2007; Baumgartner, 2015). One of the arguments in this monograph is also that strategic framing is key to leading to successful popularization. This means that for an issue to become popular, it must be strategically framed by mobilized groups in such a manner that it intrudes into an already popular global matter in which the public and politicians are interested. Scharrer *et al.* (2017, p. 1003) argue that popularization leads to less dependence on experts, because, in their words, "laypeople" or the ordinary public rely more on their own "epistemic capabilities when making judgements," but it helps them to make judgements and to take action. Based on this argument, popularization does contribute to the suitable political ecology. The path to public popularization is different from expert and political popularization.

3.6 Polarization

Figure 3.4. The polarization concept and its elements



Polarization is understood as divisions among actors. It exists when actors on different sides or poles disagree, dislike and oppose one another (politically, ideologically and opinion-wise). Polarization is argued to be a necessary condition for SPE in this monograph. The existence of expert, public and political polarization as main elements of polarization is considered necessary for polarization to be effective and fully active. Polarization is generated when actors develop affection for a problem. Affection is more of an emotional state that attributes personal or group values to a problem. When such affection is presented in the form of opinion or a political or ideological statement, it provokes an opposing group. This divides actors into two poles, opposing, disliking and disagreeing with one another. Affective polarization refers to the actions of actors on opposing poles against one another; they take action against one another, either engaging in discussions or undermining one another more systematically. Effective polarization can manifest itself in debates, demonstrations or even violent protests (Roelvink, 2010; Papacharissi, 2016; Robison and Mullinix, 2016; Iyengar *et al.*, 2019; Hernández, Anduiza and Rico, 2021; Wagner, 2021).

Affective opinions and political expressions are based either on opinions and/or on scientific information. The increase in the production of the political expressions within the public intensifies the debate connecting those with similar opinions and divides those with conflicting opinions. Either

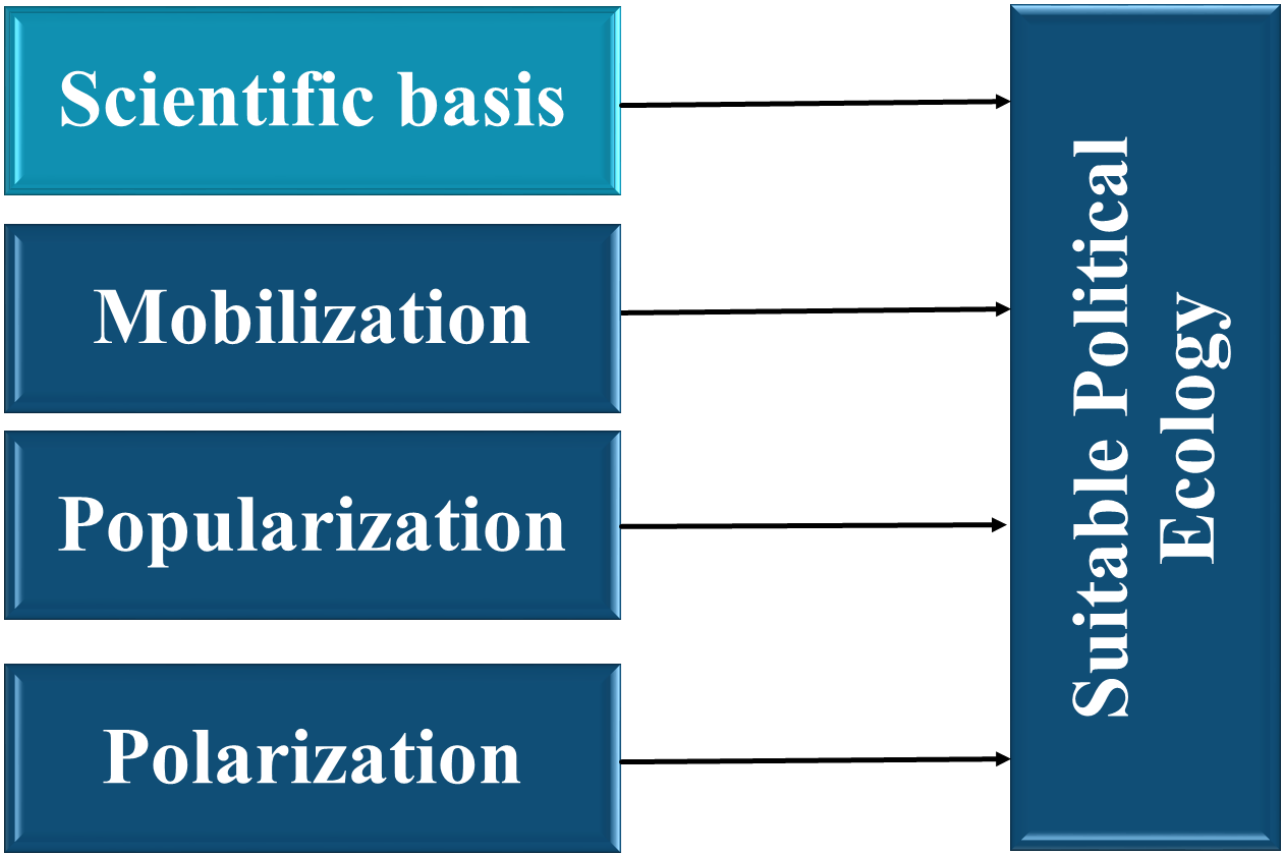
way, it keeps the debate alive between different groups (Roelvink, 2010; Papacharissi, 2016). Affective public, political and expert polarization are referred to in this monograph using the polarization concept, and they are used interchangeably.

Affective polarization is generally created by affective publics. "Affective public" does not refer to the public domain described in the methods section of this monograph, as the concept of affective public can also refer to political and expert actors. "Affective publics are powered by affective statements of opinion, fact, or a blend of both, which in turn produce ambient, always on feeds further connecting and pluralizing expression […]" (Papacharissi, 2016, p. 316). These publics have a performative, theatrical or aesthetic approach to politics, where these approaches, either in the form of visualizations, the presentation of ideas or opinion and dramatic statements, will pluralize the debate (Roelvink, 2010, p. 85). Digital affective publics are those that use social media platforms as a mean to bring about change or at the very least shape the debate on a topic with the same characteristics of traditional affective publics (Bruns and Burgess, 2011; Papacharissi, 2016; Dehghan, 2020).

While polarization is often viewed as a negative phenomenon, it is seen in this monograph as an important aspect that contributes immensely to the SPE and thereafter to global attention to a problem. A few issues are important when analyzing polarization, and especially when considering affection in this monograph. The first is that affective polarization only exists when actors have developed some sort of affection for a problem, which can assume many forms. It can be either believing or denying the existence of a problem, supporting or rejecting a political response to a problem, or simply hating or loving a political ideology or a personal opinion. Second, affection can only grow if an actor understands a problem. While the understanding of a problem among scientists must be based on some sort of scientific fact or argument (even though they can be on the opposing sides of the debate), this understanding does not need to be scientifically correct or based on any scientific fact within the public or political domains. While scientific facts remain important, polarization and affection in the public and political domains are often purely based on political ideology, interest or simply opinions. The main argument that the polarization concept makes in this monograph is that, in the transboundary context, creeping and complex crises, with their long-term temporal characteristics, render polarization a necessary condition for a suitable political ecology. This is because polarization keeps the debate and discussion of the problems animated and alive; especially within the political and public domains.

3.7 Suitable Political Ecology (SPE)

Figure 3.5. Suitable Political Ecology and its necessary elements



When *scientific basis, mobilization, popularization and polarization* exist actively, effectively and most importantly synchronously, SPE is achieved. The existence of SPE is sufficient for definite global attention. The SPE is a sufficient condition for transboundary, complex and creeping crises.

Although *scientific bases* are important for any of these types of problems to emerge, some vagueness in the initial stages of the emergence of a complex and creeping problem is more effective, as it activates the expert domain, drawing experts into discussions and arguments about fundamental scientific findings and research processes. The vagueness of the scientific basis also leaves room for some interpretation of the problem by actors outside the expert domain, which helps with mobilization and popularization. Here, it is argued that a grueling and challenging route to achieving solid scientific basis and consensus among the expert community is more effective in generating and maintaining global attention than a straightforward path to solid scientific basis and consensus among the expert domain on fundamental aspects of a problem. Scientific findings and scientific discoveries play an

important role in increasing the debate on a problem. When the fundamental aspects of the problem have already been discovered, are known and the expert community has developed consensus around the problem, then an interactive discussion amongst experts does not take place. However, when such discoveries and findings keep emerging over longer periods—especially when there is vagueness in the science—then both the scientific domain and outside of it are activated, increasing discussions and generating attention.

Public mobilization, expert mobilization and political mobilization must all exist for mobilization to be considered active and effective in SPE. The existence of one without the other can generate global attention, but it cannot maintain it. While the expert domain can contribute with the emergence of the problem and contribute to explaining the problem to other domains through framing, the efforts of this domain are not enough to generate and maintain global attention; public and political mobilization are necessary to maintain global attention. A coordinated and cooperative political and expert mobilization is more effective than any isolated mobilization of the two domains, since the coordinated and cooperative mobilization leads to shaping the knowledge and increasing attention beyond the immediate scope of the problem.

Public mobilization accompanied by public polarization is akin to the fuel that keeps an engine running. They are extremely important to keep the discussion about a problem alive outside of the policy venues. They are also helpful for increasing political interest by applying pressure and attracting political investment. They can put pressure on political institutions and policy venues through protests, demonstrations and the like, and they attract political investment. At the national level, they attract political interest due to their power to vote for and/or support a political party. This could also increase national and global funding to actions aimed at resolving the problem. At the global level, since IOs are the most prominent decision makers, the public domain helps them with popularity and legitimacy. When funding, popularity and legitimacy is achieved, IOs can proceed their work at the global level. This is why all three types of mobilization are necessary for mobilization to be active and effective, which then leads to generating and maintaining global attention to the problems.

Expert, public and political popularization are necessary conditions for achieving popularization. Expert popularization that goes beyond the immediate scope of the problem, such as from the natural sciences to the social and behavioral science in cases of global and environmental problems, is necessary. This is because it generates a wide range of knowledge and information that is useful both

in terms of understanding the problem, its scope and consequences. Public popularization can develop when people understand a problem and show interest in it. Public popularization reduces they need for scientific knowledge, which can be considered a flaw. In this monograph, however, the argument is that public popularization increases interest and the will to take action. Political popularization is equivalent to political interest, which is necessary if any political response is needed.

Global attention generation and maintenance is important for transboundary, complex and creeping crises with a long timespan. Without it, a consistent, long-term response or effective action is not possible. Although, the path to achieving SPE could be long and at times different, depending on the problem, the main argument is that without achieving it, the problem risks either being forgotten or ignored, hindering the consistent and regular action necessary to resolve it.

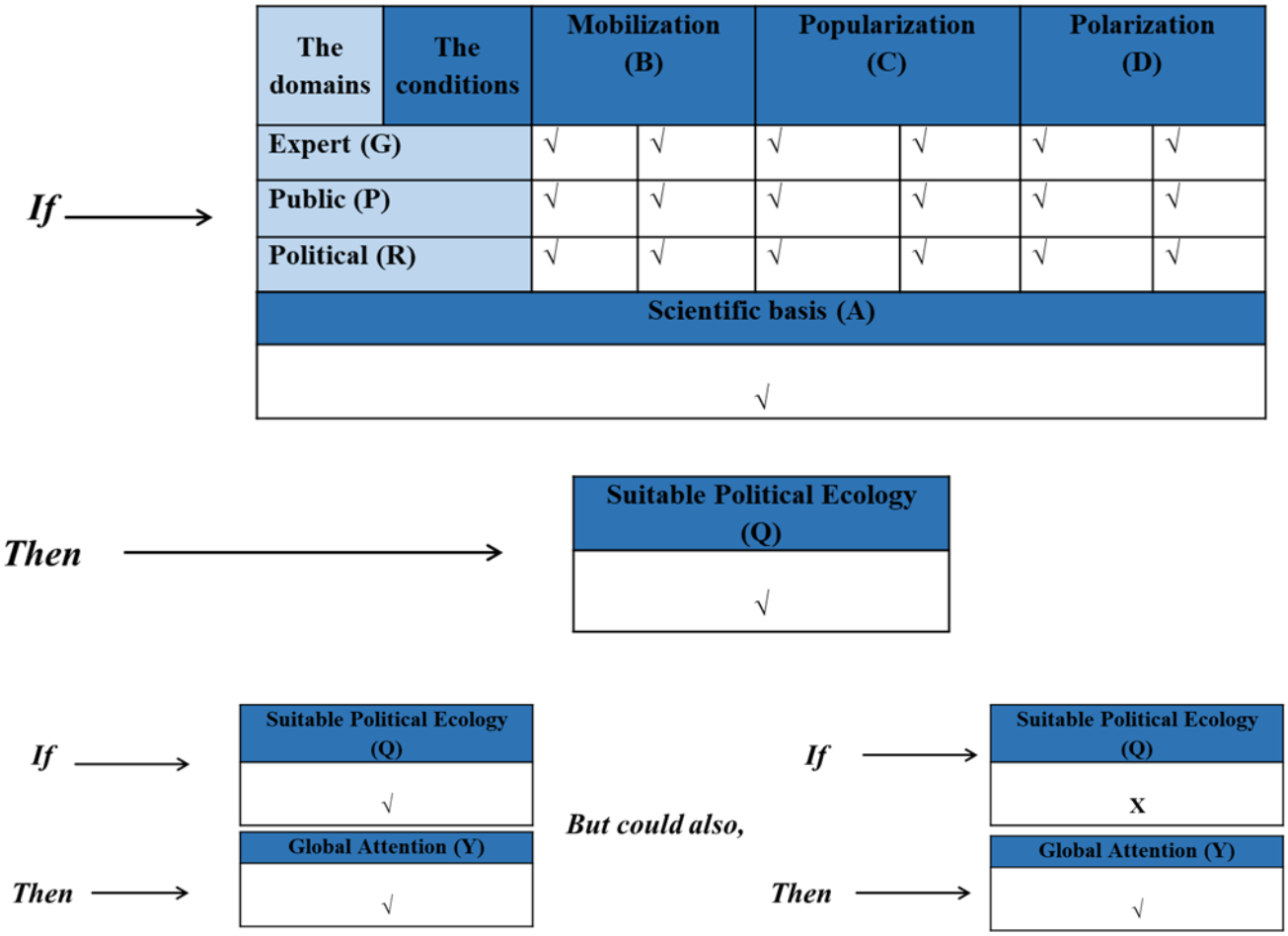
3.8 Operationalization and identification of the analytical concepts

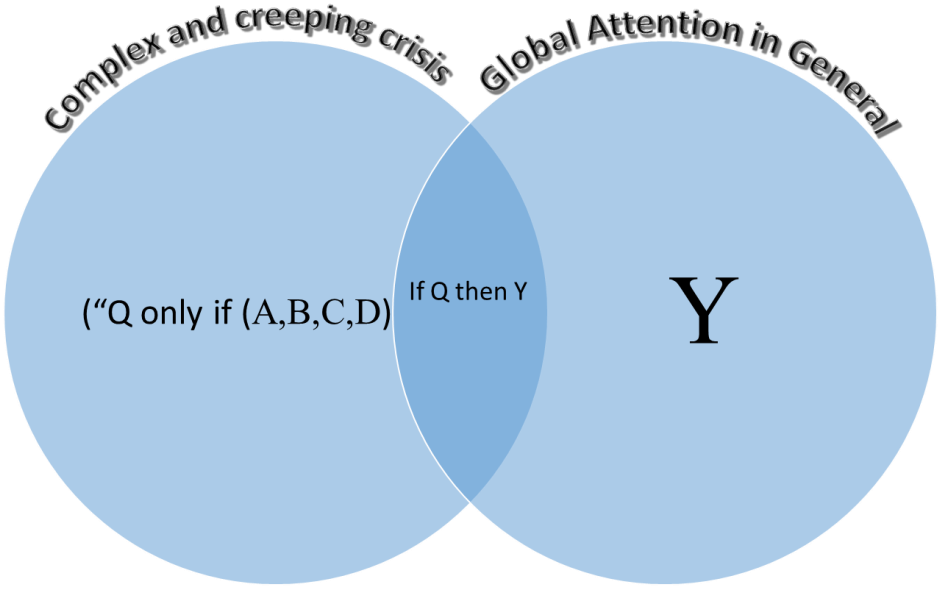
This section presents an operationalization of the concepts used as analytical tools to identify each of the concepts within the data. The analytical concepts are dealt with as necessary and sufficient conditions, used to explain the difference in global attention between CC and AMR.

3.8.1 Necessary and sufficient conditions

Carrying out a case-oriented comparative analysis, the monograph also identifies a number of necessary and sufficient conditions. These conditions were identified through the analytical process and include the explanatory variables of the project, explaining the difference between the two cases. *Scientific basis, mobilization, popularization* and *polarization* are the four necessary conditions, and *suitable political ecology (SPE)* is the sufficient condition for *global attention*. These conditions are the explanatory variables in this monograph, explaining the outcome variable, which is *global attention*. Let us assume that the outcome—global attention—is Y, The SPE is Q, Scientific basis A, Mobilization B, Popularization C and Polarization D. The following expression then illustrates the model: Q exists only if, A, B, C, and D exists. "Q only if (A, B, C, D)." Furthermore, if Q exists so does Y. However, Y can exist without Q in other cases. Indicating that global attention can exist without the SPE but the SPE cannot exist without any one of the (A, B, C, D) conditions. There is also another layer to the necessary conditions, since each one of the conditions (A, B, C, D) has their own necessary conditions. Other than the scientific basis, the rest of the three variables must be present in all of the three domains to be true. The three domains are expert, political and public. For example, if expert mobilization is G, public mobilization is P and political mobilization is R. Then "B only if (G, P, R)," meaning that B exists only if G, P and R all exist together. This is the same with both popularization and polarization. Therefore, ($Y \Rightarrow Q$, "Q only if (A, B, C, D)). The following figures visualize the statements.

Figure 3.6. The truth table and Venn-diagram visualizing the necessary and sufficient conditions





The following statements summarize the points and tables above.

- If all the four necessary conditions (*scientific basis, mobilization, popularization, polarization*) exist along the three domains, then *SPE* also exists. Bearing in mind that this is only applicable in the context of the context of global and complex crisis.
    - A, B, C, D are necessary for Q = If A, B, C, D then Q === If –Not –A, -B, -C, -D then Not-Q
- If global attention exists, then SPE also exists, but global attention can exist without the SPE, especially in other contexts and cases outside complex and creeping crisis.
    - Q is sufficient for Y = If Q then Y, but === If Y then + -Q

3.8.2 Identification of the concepts

After presenting the statements above that present the basic idea of understanding the necessary and sufficient conditions, the section below presents the codes that were used to identify each concept. These codes were developed in two processes. First, the random number of newspapers on both AMR and CC according to their relevance in the search engine, 100 random Tweets on both AMR and CC were selected. Then, taking the concepts in mind, these data were read and certain keywords, which would identify each one of the concepts, were selected. In the second step, these codes were then designed and applied in Nvivo for all of the available data. After identifying these codes in the data, they were then first read within a paragraph or an entire Tweet. If that was not enough to provide the contextual understanding, the codes were then read in the context of the entire newspaper article (or entire thread on Twitter). For some analysis, where the general identification of AMR and CC in archive material was required, then the more inclusive terms "antimicrobial resistance," "antibiotic resistance," "AMR," were used for AMR. "Climate change" and "global warming" were used. For instance, in analyzing the World Health Assembly reports to understand the scale of attention to AMR, the keywords relevant for AMR were used. There are sections below in the analysis, such as "strategic and effective communication strategy by mobilized groups," where besides these keywords it was also required to understand how the mobilized groups communicate, then specific keywords to those sections were identified as a separate process. These keywords were developed using the keywords presented below in the framing section first, but then some codes (e.g., "the end of Kyoto Protocol") were identified, which provided more understanding of the debates when there were higher and lower newspaper publications. This is to clarify that, since the monograph deals with different types of data, it is not enough only to use these specific keywords and apply a single approach to all of the data. For instance, the social media data is a large data set, but there are simpler tools available

to identify polarization. Still, the more general keywords and codes applied in the monograph are presented below.

3.8.3 Identification of scientific bases

In this monograph, scientific bases are measured by studying the scientific publications on the topics of CC and AMR. IPCC reports, WHO Reports and secondary literature, especially historical studies of scientific findings for CC and AMR, are mostly used to identify the key scientific findings and discoveries relevant to this project. After identifying these key scientific findings and discoveries, the historical development of these discoveries is investigated, which has provided a context for a better understanding of the role of scientific basis.

3.8.4 Identification of mobilization

The following terms were used for the coding of mobilization. The findings were then examined in the context of the observation, which could be the newspaper article or a Tweet, as well as in relation to the broader context of CC and AMR, so that these mobilizations are directly linked to AMR and CC problem. "Protest/s," "demonstration/s," are used as codes to identify public mobilization. "NGO in protest," "NGOs mobilize," "NGOs issue warning" are used as codes to identify NGO mobilization. As a form of political mobilization, "Heads of state gather" ("international conference" AND "politicians/presidents/ministers") and "leaders of the world issue warning/statement" are used to identify political mobilization.

3.8.5 Identification of Popularization

Popularization in this monograph is identified by identifying the level of interest shown in the AMR and CC topics. The public interest in a topic is gauged using Google searches about the topic, social media engagement and newspaper engagement. Google Trends and social media are used to identify public interest since 2006, while before that newspaper analysis are used, where keywords such as "public concern," "public interest" and "public are worried" are used to code the newspapers retrieved from the 1960s until 2021, and the same codes were also used to analyze social media data. The same data is also used to show political interest. Codes for identifying political interest are "politicians say," "head/s of states warn/say," "president warns/says," "Minister warns/says." For expert

popularization, the number of scientific publications is used to show the general popularization of the topic among scientists and newspaper quotes retrieved from newspapers used codes “experts warn,” “scientists warn,” “scientists say” and “experts say” are used.

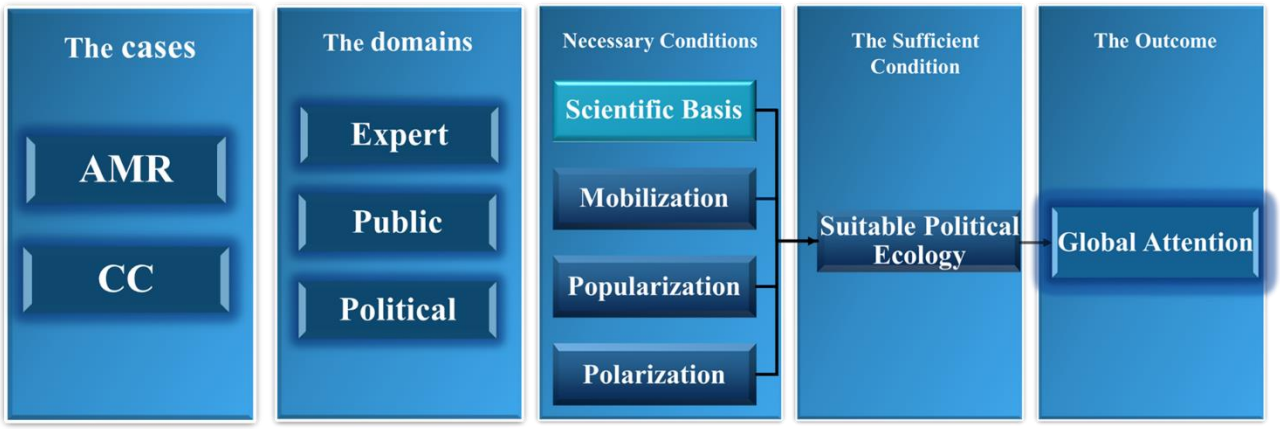
3.8.6 Identification of polarization:

“Politician” AND “hoax,” “president” AND “hoax,” “believer,” “denier,” “expert denies,” “expert criticizes climate science” and (“scientific research” AND “climate change is a hoax”) and “expert warns about misinformation/conspiracy theories on climate change” are the terms and phrases coded for the polarization of CC. Where the “hoax,” “denier” and “believer” highlight general polarization in the newspaper data that includes public, politicians and experts. The terms “president” AND “hoax” and “politician AND hoax” highlight political polarization. “Expert denies climate change,” “expert criticizes climate science,” “scientific research finds climate change is a hoax” and “expert warns about misinformation/conspiracy theories on climate change” and “expert devotes his life” identify expert polarization for CC.

Chapter 4: Methods

This chapter presents and reflects on the methods applied in the project. It starts by presenting the research design and strategy, followed by aspects of case selection, data collection, coding and contextualization and research delimitations.

Figure 4.1. Visualization the research process of the PhD monograph



This monograph is based on a case-oriented, comparative strategy, carrying out a pragmatic causal analysis to compare the differences between two most similar cases (Timberlake & Ragin, 1989; Imbrogno, 1994; Ragin, 2014; Taguchi, 2018; Fraser, 2021). Case-oriented research strategies are carried out when the interest of the research is on a specific case, the interest is in certain outcomes, and the approaches to the evidence are flexible (ibid). In this case, the interest of this research is mainly antimicrobial resistance (AMR). This research is part of a broader project funded by Independent Research Fund Denmark, and the aim of the project is to investigate the global political dynamics of AMR. The AMR case was therefore given from the outset of the project. Although the comparison of AMR to climate change (CC) was also part of the initial project, the researcher had the freedom to drop it, to choose another case, or to carry out a single case study. However, I chose to carry out a comparative case-oriented analysis, comparing AMR to CC.

Carrying out a comparative analysis has two benefits for this project: (i) it provides enough information on the single cases, contributing to the understanding of the cases as whole. (ii) The comparison is helpful in identifying factors and explanations that are outside of the spectrum of each of the respective cases, which could easily be neglected in single case studies. This study achieves both of these important aspects. It provides valuable new knowledge on both AMR and CC and

identifies a set of key necessary and sufficient conditions to explain the difference in the global attention paid to the two cases.

The second important choice was whether to compare AMR to CC or to another global health problem. Comparing AMR to another global health problem would have been very helpful in understanding more about global health problems and policies, but that is not the only focus of this study. The focus of this study is broader, and it is to understand the limited nature of the global attention to AMR, which scholars and advocates of AMR are finding difficult to comprehend given that it is already killing millions of people and causing billions of dollars of losses to the global economy. I therefore needed to choose a case that captures a much broader perspective on global attention and which was not limited to global health policies.

To explain the minimal attention to AMR through a comparative study, a set of criteria were selected based on the aim of the research project and the PhD monograph. The aim of the PhD monograph is to explain global attention to AMR and to explain global attention to the AMR problem, I could either choose a case that is different from AMR characteristically but has the similar outcome or a case that is similar to AMR characteristically but has a different outcome. Selecting a case that has the same outcome will only identify the failures of the processes to produce the limited global attention, but it does not provide any information on the positive drivers of global attention. I therefore needed to find a case that not only explains the differences in global attention but also provides the study with both negative and positive aspects of the processes producing global attention. In so doing, the study not only explains why AMR is receiving minimal attention, it is also adding information on what is different in the other case, which has rewarded it with maximum or higher global attention, from which AMR scholars and advocates can draw lessons learned. The first criteria was therefore that the selected case must have characteristic similarities to AMR, but different a outcome in terms of global attention. This could have been achieved only if the other case was more successful while sharing characteristic similarities with AMR. CC has become one of the most prominent debates of this generation and is usually ranked as one of the top global challenges of our time in global surveys (Ipsos, 2020; Unesco, 2021; University of Oxford, 2021). CC is not only ranked as one of the top global challenges in surveys, it has been the focus of the most prominent discussions among global leaders at many intergovernmental global gatherings, international conferences, international forums and the like in the last few decades. The success of CC in terms of global attention is undeniable, which is why comparing AMR to CC serves the purpose of this project. It is not only the difference in the outcome of global attention of CC to AMR that makes it the most suitable case to which to

draw comparisons, but also the fact that CC and AMR share many characteristic similarities. Both AMR and CC are future threats with consequences that are already being felt today. They are both characterized as *super wicked* problems, since any solutions to them are highly complex, and there are conflicting value systems involved in containing the threats (Lazarus, 2009; Levin *et al.*, 2012; Baekkeskov *et al.,* 2020). They both produce other transboundary disasters, such as pandemics and climate-induced disasters. Finally, both challenges suffer from the tragedy of the commons, as the related benefits from them are local but the costs are global (Hollis & Maybarduk, 2015). CC therefore fulfills all of the criteria for a comparison to answer the RQ.

Case-oriented comparison studies are also characterized as one of the research strategies that is more evidence-oriented and has a flexible approach to evidence (Ragin, 2014b, p. 53). Since the aim of the case-oriented comparison strategy here is to explain the differences in global attention to CC and AMR, a multimethod or mixed methods approach was applied to explain the differences between the cases. The quantitative analysis is used to show the difference in attention and to identify major peaks of attention, and the qualitative analysis (which is more dominant in this study) is used to explain these peaks of attention and to find explanatory factors that contribute to the change in the dependent variable. The idea is to observe change over a long period of time, both for descriptive and explanatory purposes (Bryman, 2006; Creswell, 2014; O'Cathain, 2014). The reason for the application of a multimethod and mixed methods approach is that it serves the purpose of the project and provides valuable information for both cases. The quantitative method provides general trends and an overview of data, whereas qualitative methods go more in-depth with the observations. For example, the degree centrality measures, density measures with regards to social media data provides a good overview of the social media networks, while the qualitative analysis delves deeper regarding some of the major events and Tweets on Twitter to understand more about the roles of the respective actors. Although this is not a consistent pattern in all of the chapters, the choice between when and where to use qualitative and/or quantitative methods is based on the type of data and purpose of the analysis. Newspaper and social media analysis have mainly required some form of quantitative analysis, which helped to identify patterns, important events or an overview of networks and groups. Archive data was mainly retrieved after identification of major events that had influence on newspaper peaks. The archive data was therefore mainly used for qualitative analysis. The multimethod and mixed method approach has served the purpose of the monograph well, since it has given the research the flexibility and robustness to capture many different aspects that contribute to

driving global attention and explaining the differences between the global attention paid to AMR and CC.

4.1 Data collection

There were two phases of data collection, the first one early in the research process, whereas the next phase was spread out over the entire research project timeline. The data collection from the first phase still forms the bulk of data for the analysis, and the second body of data was pragmatically gathered, gathered only if a data gap was observed.

Frist, a keyword search was used to collect social media data from Twitter and newspaper data from ProQuest with a focus on newspaper articles. The keywords used for these two types of data were "climate change" and "global warming" for CC and "antimicrobial resistance" and "antibiotic resistance" for AMR. AMR as a keyword search was also used in the initial stages of data collection, but since the term also corresponded to extremely popular names in Indian- and Arabic-speaking countries, a huge number of irrelevant data was collected. The keyword (AMR) was deleted.

For the newspaper search, the dates available in the database were 1960 to 2021. However, there were no significant publications until the 1980s on both CC and AMR. The graph representations in the analysis chapters therefore show the dates from the 1980s to 2021.

The archive data in the first stage was collected from the UNEP digital archive, UNFCCC and IPCC online archives, and the WHO online archives. For the UNEP archives, the data was limited to conference material, meeting minutes and meeting reports relating to climate change only (and not other environmental problems). This was similar to the documents collected from WHO on AMR, as only documents related to AMR were collected from their archives, the particular focus point being the Global Action Plan on AMR and then the conference papers, meetings minutes and meeting reports leading up to that event. The IPCC reports and meeting documents leading to each of the reports were collected from the online IPCC archives. The UNFCCC documents are from major global events, especially the Conference of the Parties (COP) meetings, since the establishment of the organization until the last conference, which was the UN Climate Change Conference COP25 (December 2–13, 2019).

The second phase of data collection entailed around 25 items of secondary literature on CC and AMR, almost 80% of them CC-related. This was used to identify some historical moments and historically significant events for the purposes of this research. The second phase also included data about specific organizations and advocacy groups, from many different archives such as the data from 1972—UN

archives, United States Environmental Protection Agency, these included documents on advocacy groups, NGOs and civil society organizations to analyze expert attention to AMR and CC. The second phase also included another round of newspaper data collection using a different set of keywords, such as "environment" AND "public," "environmental concern" AND "public" to analyze the events in 1972, when climate change and global warming were not the main terms being used.

4.2 The database

Four databases in ProQuest were selected to make the newspapers as inclusive as possible, which would include international newspapers from around the globe. These databases are as follows.

- *Global Breaking Newswire* is the library news product providing timely newswire content available from around the globe. The database includes 63 news agencies from around the world, such as Agence France-Presse (AFP) from France, Xinhua News Agency from China, and Sputnik from Russian Federation.
- *International Newsstream* provides the most recent news content internationally. This database includes 1,518 news agencies, including different branches of the *BBC monitoring*, *Bahrain News*, *the Daily Telegraph*, *The New York Times* and many more.
- *US Newsstream* entails achieves from news published in the US stretching back to the 1980s. The database includes around 1,100 different news agencies, both local and international, including *The Washington Post*, *Los Angeles Times* and many more.
- *Canadian Newsstream*, which includes 190 Canadian newspapers from Canada's leading publishers and around 591 newspapers from around Canada, including both international and local newspapers. (ProQuest Search Databases)[2]

The four databases include both local and international newspapers, and while the focus of this chapter is mostly on international news, some local papers discussing international issues are also included in the data set. Only English language newspapers were used for the analysis, which of course is a limitation, as other languages are excluded. Even so, however, the existing dataset provides a satisfactory amount of information to carry out the analysis intended for this chapter.

[2] https://search-proquest-com, the search criteria was limited to newspapers and afterwards the four data bases that are specific and exclusive to news were selected

4.3 Collecting interview data

The initial idea of this project was to be heavily based on expert interview data from both the AMR and CC domains. However, the project was significantly influenced by the COVID-19 pandemic and the lockdown in Denmark and around the globe, limitations on travel and the uncertainties during the pandemic hindered the process. This project was hit double by the pandemic, as many of the experts (especially within the AMR domain) who were mostly affiliated with the health sector were busy dealing with COVID-19. The pandemic not only kept the targeted interviewees busy, it also limited the research to build networks through conferences and seminars, through which many of the interviews could have been arranged. Despite the challenges related to the interviews, four interviews with practitioners within WHO and UNFCCC were carried out, which is not considered enough for the whole project, but it does serve the purpose for the social media analysis sections. However, the pandemic also opened other doors of opportunity. The social media aspect was added as an alternative, which led to the discovery of a wealth of information and knowledge.

The two interviews collected were semi-structured, where both interviewer and interviewee had some freedom in terms of the discussion flow. An interview question guide was prepared, which served as the basis of the interview, but there was some measure of flexibility in terms of the topics being discussed. All of the interviews were carried taking the General Data Protection Regulation(GDPR) rules and Roskilde University's norms into high consideration. Interviewees' identities are kept anonymous; where they have agreed to be recorded and quoted, the recording will only be heard and the transcription only read by the researcher and his supervisors. The quotes can be made public under the condition of anonymity.

4.4 Coding and contextual analysis

The coding in this project has been carried out on newspaper data and archive data using Nvivo software. The newspaper data collected from ProQuest has all been uploaded to Nvivo in bulks of 100 publications per file. Since the amount of newspaper publications on CC was extremely great, 10,000 publications were randomly selected. Since the database only allowed the downloading of 10,000 publications, the first coding was carried out on these 10,000 randomly selected newspaper articles. The codes that have been used are mentioned in the operationalization of each concept and/or the measurement sections. For instance, the codes extracted for popularization in the public domain were "public concern," "public worry," "public interest" and "public interest." These codes were designed through an iterative process. The terms "public" and "climate change" were initially used, but after carrying out the initial coding on Nvivo, it was noticed that "public" and "climate" are very broad terms that cannot represent public interest, and it keeps mixing up with other concepts such as mobilization and polarization. In the second stage of analysis, more specific codes were therefore developed, which are written at the end of the description of each concept in the analytical framework section. This process was repeated in all of the code developments in each of the sections of the analysis that included coding.

Afterwards, for longitude analysis and to understand the causality, specific newspaper data were collected from different time periods, which were illustrated in the general linear visualization of newspaper publications as peaks of attention. Then similar coding was carried out on those.

These similar codes were also used for Twitter data, which were extracted using the Twitter Capturing and Analysis Toolset (TCAT) Application Programming Interface (API) Tweet exports function.

For social media analysis other than using the T-CAT, Gephi was also used as software to carry out some of the analysis and prepare some of the visualizations.

The codes were then connected to broader contexts of the analysis. These broader contexts were both extracted from the literature review and from the observations. For example, the code "denier" was not only seen in the sentence that it was coded, but was also connected to the literature on CC polarization as well as the newspaper and social media analysis discussing polarization. The codes were then discussed in relation to these broader contexts but still adjusted to fit the analytical frameworks and its concepts.

Analysis

The following five chapters present the analysis of the monograph. Starting with the scientific basis and ending with the suitable political ecology (SPE). The analysis below show that AMR and CC have had different scientific basis, but enough to help them emerge as global problems. Mobilization, popularization and polarization of AMR and CC are also different. While CC has these active in all three domains – the expert, public and political, AMR is lacking some of the necessary conditions. Public mobilization is almost non-existent when it comes to the AMR problem, while it is very noticeable in the CC problem. Expert and political mobilizations of AMR is weaker than CC in terms of both the numbers and volumes. The expert and political mobilization of AMR have travelled a different path and in the later years they have more of a cooperative mobilization setup. Whilst the AMR expert and political domain still functions in isolation. Expert, public and political popularization of CC is also extremely greater than AMR. While AMR shows some popularization within the expert and political domains, it is very low within the public domain. Ultimately, polarization within the AMR problem is almost non-existent, while it is a major aspect in attention generation of CC. The analysis below shows that the SPE exists and has been achieved within the CC problem. On the contrary, AMR is yet to achieve that. Therefore, the existence of the SPE, along with its necessary conditions can explain the difference in global attention between AMR and CC.

Chapter 5: Scientific bases

Both AMR and CC have had enough scientific basis that has contribute to their emergence as global problems. CC's scientific basis has started with vagueness and has become more solid over the last five decades. This vagueness has also meant that there has been a lack of consensus within the scientific domain. This lack of consensus has led to protracted scientific discussions and debates over the decades on CC, which has contributed to CC receiving further expert attention and the research interest in it expanding over the years. In contrast, AMR has had a much more solid scientific basis since its emergence. There is a strong consensus among experts about the nature of the problem, its consequences and the threat that it poses. The research carried out on AMR over the last 5 to 7 years aims at verifying the threat posed by AMR through surveillance and data collection. Apart from adding to scientific understanding of AMR, the aim of the research has been to provide some sort of fundamental and breakthrough findings, which would serve as a proof of the threat to non-expert domains. While during the initial stages of CC's scientific basis and even to some extent today,

experts try to engage in opposed debates about CC, the CC discussion has shifted from being a discussion about the characteristics and nature of the problem, to more discussions about the different solutions suggested by experts. AMR research is all about surveillance and finding more data on the number of people and animals being effected by the problem. The history of CC has already been well studied by other authors. That is why this part of the analysis mostly relies on secondary literature with some add-ons from own observations.

Table 5.1. Historical overview of scientific publication on AMR and CC until April 2021

Scientific publication difference between AMR and Climate Change			
Topics	**Climate Change**	**Antimicroial resistance**	
Keywords	"climate change" or "global warming"	"Antimicrobial resistance" or "antibiotic resistance"	
Search dates	8/4/2021	8/4/2021	
Data base name	**Number of publications for CC**	**Number of Publications of AMR**	**Difference**
Web of Science	300000.00	81708.00	367%
Scopus	1081110.00	368581.00	293%
Dimensions.ai	431932.00	111029.00	389%
Estimated research funding	$1,300,000,000,000	$37,688,965,700	3449%

3

5.1 The path to solid scientific basis

A simple observation on three different search engines (Web of Science, Scopus, dimension.ai) reveals that 367%, 293% and 389% more academic literature is published on topics of climate change and global warming than antimicrobial resistance and antibiotic resistance since the 1950s. All three search engines indicate that scientific attention in terms of academic publications is higher with regards CC than with regards AMR. While AMR publications have started to increase since 2001, publications on CC have drastically increased earlier and since the late 1990s. Most of the publications on AMR are within the natural sciences sphere dominated by microbiology, there is very limited scientific research in other fields, such as social sciences (Frid-Nielsen, Rubin & Baekkeskov, 2019; Baekkeskov *et al.*, 2020). On the contrary, even though the climate change literature is dominated by environmental science, multidisciplinary research forms a significant amount of research within the field. From the observations above, two things can be easily concluded: CC has received more scientific attention in terms of publications than AMR, and CC has expanded into multidisciplinary research, going beyond environmental science (even though the majority of research funds still go to the natural sciences) (Overland & Sovacool, 2020). On the contrary, natural science still dominates AMR studies, and the social science publications have first begun to gain momentum in earnest since 2013, notwithstanding the calls from social scientists for more studies to understand the social and political aspects of AMR (ibid.).

[3] (Overland and Sovacool, 2020) has been used as the main source to calculate the climate funding and they have used more keywords than “climate change” and “global warming”. For details about the keywords, refer to the original study.

While looking at the CC scientific literature, the research from 1910 until the 1950s is purely based on natural sciences. Some of these research are skeptical of permanent changes in climate and also the influence of human on climate change (see, e.g., Lockyer, William. S., 1910; Richards, 1938). The quotes below are some of the common indications from the debates from this period.

> *The main difficulty met with in dealing with a long series of observations is that those made in the early days are not so accurate as those made more recently with modern instruments and methods. Thus while the data may show a change in the meteorological elements, such a variation may be purely fictitious, and due to either the instruments, the methods, the observers, or a combination of all three.* (Lockyer, 1910, p. 178)

> *Pleistocene marine fossils are abundant along both the east and the west coasts of Florida, but have not been found higher than 25 feet above sea level. Most of these species are still living in the coastal waters of the State, and thus no significant climatic change is indicated.* (Richards, 1938)

It is also worth noting how most of the studies in this period have focused on studying lakes and the rising and falling water levels in lakes, which is very different from the methods applied after the 1960s, where the studies focus more on sea levels and much larger forms of data collection from different sights—not just lakes. After 1958, the articles supporting long-term metrological climate change and its impact on nature start appearing more (see, e.g., Flint, 1959). The scientific consensus on CC started growing since one of the very few undisputed findings in the 1960s about the greenhouse problems. The consensus on CC science has grown since the introduction of the Keeling curve, which showed how the atmospheric concentrations of CO_2 are in fact increasing (Keeling, 1960; Keeling, Bacastow & Bainbridge, 1976; Darkin, 2003).

Scientific knowledge of CC started with uncertainties and disagreements among scientists, but with the development of new technology, computerized models, new findings consensus over root causes of CC has kept growing (Bolin, 2007; Schneider *et al.*, 2010; Weart, 2015). More on scientific polarization of CC can be read on the section "scientists'" affection to CC in the chapters below. However, since the beginning of the first observations of the bacteria developing resistance to penicillin, the scientific domain of AMR has formed consensus on the problem.

Much of the scientific debate on CC in the late 1800s and early 1900s was whether the earth was becoming warmer or cooler, followed by years of debate on whether humans are playing a role or if

it is a natural phenomenon beyond human control. It was first in the late 1970s and mid-1980s that the majority of the scientific community came to agreement that the earth was warming and that humans were causing most of it. This was influenced by Guy Stewart Callendar's findings in the 1950s and Roger Revelle's findings in 1957, where technological improvements and computer models in the 1970s played a major role in strengthening the findings (Weart, 2015). The major scientific discovery was made in the 1980s, however, by a group under Veerabhadran Ramanathan and followed by more evidence from the Greenland and Antarctic ice caps, proving that global warming was taking place faster than had been expected (ibid.). This was followed by a series of warnings from the scientific community that the world must take urgent action.

In contrast, the threat of AMR and warnings about it can be traced to Alexander Fleming's 1945 Noble Prize acceptance speech for developing penicillin. He pointed out the resistance development of microbes saying: "Then there is the danger that the ignorant man may easily under-dose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant" (Fleming, 1945). Even though Fleming's speech was concerned with the amount of penicillin usage, his speech nonetheless made it clear that the development of penicillin made the evolution of resistant bacteria imminent.

Fleming speaks only about one type of AMR, which is the antibiotic resistance resulting from the use of the antibiotics (ABR), but it is important to remember that there are several other types of microbes that can develop resistance to antimicrobials. It is also important to point out that the AMR problem is not only about the development of resistant bacteria, but it also includes the problem with lack of access to antimicrobials. When we speak about the scientific basis of AMR in this chapter, it is mostly concerned with the development of resistant bacteria and scientific basis related to it. The rest of the matters that are associated with AMR is analyzed and discussed in the other different parts of the monograph.

Podolsky, in his paper entitled 'The evolving response to antibiotic resistance' from the years 1945 to 2019, touches on issues of global attention of AMR. He describes that the responses to AMR have been dependent to certain factors. The evolution of resistant microbes, the capacity to identify the resistant microbes in terms of technological development, the projection of AMR's impact on different aspects such as: social, economic and medical, the global perception and context of AMR and coordination of efforts, availability of funding, and development of infrastructure. The

identification of new microbes, development of new technology and the projection of AMR's impact on different aspects are all based on scientific research and mostly peer-reviewed publications. He adds that the evolving responses to AMR have been ascribed to five different eras from 1945 to 2018: the era of optimism (1945–63), era of recovery (1963–81), global problem framing era (1981–92), the era of attention (1992–2013) and the collective action era (2013–present) (Podolsky, 2018). The beginning of the era of optimism, when the end of infectious diseases was being hailed, focused mostly on issues of universality of antibiotics, development of new antibiotics and market development of the medicine. However, the last period of the era was engulfed with concerns about the rise of resistant microbes and specially bacteria, which were only believed as failure of treatment in individual patients not a phenomenon that could happen in populations (Gradmann, 2013; Podolsky, 2018a)). It was only in the 1950s that antibiotic resistance acquired the epidemic character, but still at hospital levels. It was observed then that resistant bacteria had become general inhabitants of hospital environments. The trends were also observed at hospitals globally as patients acquired resistant bacterial infections from hospitals, even though they had visited hospitals for matters unrelated to ABR (Gradmann, 2013). During this era, there was little coordination among the different responses both at local and global levels, and it was first in 1959 that WHO held its first small meeting of experts on AMR and initiated minor studies of the matter. Nevertheless, the general trust and hope in pharmaceutical industries ability to keep developing new antibiotics to combat resistant bacteria was still very high (Gradmann, 2013; Podolsky, 2018a).

However, the 1960s dashed the optimism that ever existed, as new Japanese discoveries revealed that bacteria not only develop resistance vertically, but also horizontally across strains and species by plasmids. However, the pivotal moment for AMR to receive global attention was in 2013, when the statement by Dame Sally Davies, the English Chief Medical Officer at the time, framed AMR in terms of being as "large [a] threat to human health as climate change" (Podolsky, 2018b, p. 2).

Even though the social science studies gained momentum in 2013, they drastically increased after the adaptation of Global Action Plan on AMR in 2015 (WHO, 2015). The social science research on AMR has increased rapidly since 2016, and "the number of publications have tripled from 77 in 2016 to 197 in 2019" (Lu, Sheldenkar & Lwin, 2020, p. 3). The U.S., England and Australia are among top three countries in terms of publication contributions.

5.2 The relation between research publications and global agreements

As also stated above, even though the social science studies gained momentum in 2013, they drastically increased after the adaptation of the Global Action Plan on AMR in 2015 (WHO, 2015). The social science research on AMR has increased rapidly since 2016, and "the number of publications have tripled from 77 in 2016 to 197 in 2019" (Lu, Sheldenkar & Lwin, 2020, p. 3). U.S, England and Australia are among top three countries in terms of publication contributions.

The GAP outlines five objectives, one of them being directly targeted at expanding the area of study into other fields than natural science research. The GAP aims to: "Strengthen the knowledge and evidence base through surveillance and research" in its objectives, but the difference from the 2001 strategy is that GAP directly emphasized on social science research that urges national governments to support:

> *Understanding social science and behaviour, and other research needed to support the achievement of Objectives 1, 3 and 4, including studies to support effective antimicrobial stewardship programmes in human and animal health and agriculture.* (WHO, 2015, p. 9).

The natural science research on AMR has been growing steadily since 2001, when the WHO Global Strategy for Containment of Antimicrobial Resistance was published, urging national governments to understand;

> *"The need for further research directed towards filling the existing gaps in knowledge"* and *"allocate resources to promote the implementation of interventions to contain resistance. These interventions should include the appropriate utilization of antimicrobial drugs, the control and prevention of infection, and research activities.* (WHO, 2001a, pp. 2, 5).

It can be observed that after the Global Strategy for Containment of Antimicrobial Resistance in 2001, the natural science research on AMR started to increase and, after endorsement of the GAP, both natural and social science research have gained momentum, while 2016 has witnessed an unprecedented increase in social science research on AMR. The CC publications have been rising since the late 1990s, and even though a direct connection between the publications and international agreements cannot be noticed, it can be implicitly concluded that after the Kyoto Protocol, scientific publications on CC have continued to grow in an unforeseen manner. More on CC publications and funding will be presented below.

5.3 Research expenditure, the relation between global and national level scientific and political environments.

While the publications are at around 293–367% higher in CC, the research expenditure on CC stands 3000% higher than AMR. Secondary literature and dimensions.ai show expenditures of $1.3 trillion[4] on climate research since 1950. In contrast, AMR research, based on JPIAMR data, dimensions.ai and documents from WHO, has only been limited to $3.7 billion (although this difference is lower if private R&D funding into new antibiotics is added). However, the problem is the lack of availability of information on private funding. Mapping research grants awarded to CC and AMR is no easy task, as several funding organizations at local, national and global level carry out these tasks without providing online portfolios with standardized tags, which are not often listed in data basis or are listed in several data bases which causes overlapping of information. On the other hand, an all-inclusive interdisciplinary database that will include all fields of research is not available. The two data bases that entail estimated budgets spent on the two topics are dimensions.ai and The Joint Programming Initiative on Antimicrobial Resistance (JPIAMR). Dimensions.ai has budgeting and finances data on both CC and AMR, while (JPIAMR) is exclusive for AMR. Unfortunately, JPIAMR only has budgeting and finances data on JPIAMR member countries and not all. Other resources (e.g., WHO) are used to produce an overview of the AMR budget.

Research expenditure and publications on climate change have started increasing drastically since the 1990s, and as can be observed on Scopus, the top 15 funding organizations have increased their funding drastically on CC since 1990 and hence publication on the topic have also increased. Meanwhile, national expenditures within the developing world on climate research have also increased drastically since the 1990s. Based on these databases and a number of research publications, over 4.3 million research grants amounting to an estimated $1.3 trillion have been awarded to work on topics related to climate change by 333 organizations from 37 countries since the 1950s (Overland & Sovacool, 2020). The peak of funding for CC research can be observed to be between 2007 until 2009, where most of the funding have been allocated to natural sciences. The United Kingdom (UK), United States (US), Germany, China and France are the leading funding countries for research projects related to CC.

The IPCC as an organization that filters scientific information and purposes simplified policy initiatives to politicians was initiated at global level in 1988, and since then it has inspired several

[4] All amounts referred to in dollars are US dollars.

national level initiatives to carry out similar task as the IPCC, but at national levels. For instance, the Climate Science Program (CSP) in the US and Met Office Hadley Centre in the UK[5] and the Climate Enquête Commission in Germany were established as similar institutions on CC science at national levels. Then in return, (CSP) or GCRP and UK-based scientific centers and others like Climate Enquête Commission in Germany (Watanabe & Mez, 2004) have contributed both in knowledge sharing in terms of scientific publications and direct expert advice to IPCC reports.

After the establishment of the IPCC, the US Global Change Research Program (USGCRP) (which later became the Climate Change Science Program) was established in the 1990s in the US and henceforth became part of U.S. legislation and has spent billions over the years have on CC research (Pielke, 2000). The US has financially supported climate research and climate change related programs[6] with billions of dollars since its establishment.

When the U.S. Global Change Research Program Act and its budgeting was being proposed to the U.S. Congress, the IPCC was directly mentioned as a similar inspirational organization that bridges science and policy on climate change, which indicates that it was inspired by the IPCC (Pielke, 2000, p. 135). Furthermore, the Kyoto Protocol has also specifically focused on research in articles 2 and 10 of the treaty, where national governments and parties to the agreement agreed on;

> *[r]esearch on, and promotion, development and increased use of, new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies" and "Cooperate in scientific and technical research and promote the maintenance and the development of systematic observation systems and development of data archives to reduce uncertainties related to the climate system.* (UNFCCC, 1997, 2020)

One thing that both the IPCC and Climate Science Program share in common is their interaction with politicians. Both organizations have been in close contact with politicians, while IPCC has been involved with politicians from around the globe, CSP has directly dealt with U.S. congress, while reporting on their budgets or while trying to approve organization's budget. The interactive way of dealing with politicians have not only secured finances for both IPCC and CSP from US government, but has also made the process of science and policy more interactive between scientists and politicians

[5]Refer to the following page for more information on Met Office Hadley Centre for Climate Science: https://www.metoffice.gov.uk/weather/climate/met-office-hadley-centre/index
[6] Refer to https://www.globalchange.gov/ to estimate U.S. climate change finances

(Pielke, 2000). One of the uniqueness of these negotiations have been that despite the political debates with politicians, the scientific reports, especially those of the IPCC, have been presented in simplified terms, but "without compromising the basic scientific analyses" (Bolin, 2007, p. 248).

Ultimately, the close cooperation between IPCC and U.S. experts have both secured funding for research and have potentially developed the community's interaction ability with politicians and these among other factors have therefore increased scientific attention to climate change studies.

Table 1. Shows the cumulative contributions (in CHF) of donors to the IPCC from 1998 to 2004 and annual contributions from 2005 to 2016

Country	1998-2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australia	1,667,404	0	100,000	100,000	79,040	111,864	111,952	111,040	113,460	113,568	127,470	85,656	157,476
Belgium	80,000	0	80,000	80,000	0	160,000	77,034	80,784	79,077	0	80,000	0	240,000
Canada	2,634,097	143,547	166,365	166,914	195,484	0	146,561	94,801	404,865	0	126,381	156,572	111,787
China	57,600	12,800	12,100	11,600	9,970	10,890	10,410	9,220	9,070	9,300	8,830	9,480	9,820
Denmark	1,307,950	0	211,663	221,361	205,533	201,772	177,971	161,635	161,220	823,240	140,482	0	0
European Union*	1,442,083	0	760,627	0	0	(64,246)	777,510	650,499	0	920,812	0	146,371	137,222
Finland	97,896	61,330	54,919	0	0	52,785	21,065	80,550	12,013	18,512	54,655	58,631	49,438
France	1,387,664	184,619	218,826	466,549	317,458	301,957	273,010	462,662	216,428	185,428	145,405	214,489	87,273
Germany	4,164,626	463,209	511,739	629,049	450,698	441,772	684,067	1,416,363	0	0	0	320,727	321,859
Japan	2,019,550	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	162,000
Korea, Rep of	0	0	36,600	36,600	47,400	32,760	113,706	110,769	110,231	121,314	127,116	121,915	134,250
Mauritius	10,210	1,000	3,930	7,320	3,428	3,276	3,076	2,448	2,871	2,790	2,730	2,847	0
Netherlands	1,278,916	100,000	50,000	50,000	50,000	50,000	25,917	0	0	104,008	51,675	86,595	0
New Zealand	135,495	12,822	22,789	0	31,489	13,739	19,835	16,884	15,100	30,789	0	31,952	17,969
Norway	763,055	39,270	37,352	16,337	78,004	391,837	446,492	460,397	78,413	225,211	515,835	62,682	54,887
Pakistan	9,030	362	3,400	0	2,919	3,063	6,003	0	2,684	2,634	2,722	2,778	2,848
Sweden	766,637	60,000	110,355	60,000	60,000	60,000	60,000	70,000	70,000	70,000	70,000	80,000	80,000
Switzerland	2,005,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
UNEP**	2,333,450	131,852	143,000	132,000	109,670	113,300	(3,190)	0	46,300	46,500	0	0	0
UNFCCC	5,091,650	416,500	444,500	427,000	0	757,750	0	617,109	293,946	300,498	299,551	252,769	243,245
United Kingdom	3,796,040	250,203	0	0	750,000	250,000	190,000	250,000	0	450,000	250,000	252,498	138,961
USA	23,096,976	2,322,000	2,113,208	2,129,040	1,425,000	1,578,900	2,063,704	1,903,602	2,030,560	1,860,000	1,956,500	1,944,000	1,964,000
WMO	2,446,916	158,150	158,150	131,792	105,400	122,100	129,400	129,200	112,100	102,117	118,750	130,995	83,476
Total	**56,592,245**	**4,637,664**	**5,519,523**	**4,945,562**	**4,201,493**	**4,873,519**	**5,614,523**	**6,907,963**	**4,038,338**	**5,666,721**	**4,358,102**	**4,240,957**	**4,096,511**
Total IPCC Income	58,185,621	4,833,597	5,769,043	5,249,361	4,612,322	5,063,847	5,797,382	6,921,111	4,113,698	5,709,909	4,409,700	4,328,947	4,382,840

(IPCC, 2017).[7]

While looking at the activities of organizations established to filter climate change science in the US, Germany and UK in the 1990s, it can be observed that they all share two important similar characteristics. One, they have been established to filter scientific information for policymakers and, second, they have been successful in integrating politicians in the debate. The filtering of scientific knowledge is aimed to identify reliable knowledge and to simplify the climate change problem to policymakers. This indicates that in the 1990s, the political domain besides being concerned with CC, were also concerned with uncertain scientific information (Le Treut, Cubasch & Allen, 2005, p. 118; Quiggin, 2008). This uncertainty may have potentially established a platform like that of IPCC, GCRP and UK-based scientific centers and others like Climate Enquête Commission in Germany. However, other authors like Bolin (2007) argue that the existence of uncertainties in early stages of the climate

[7] The table is extracted from the AD HOC TASK GROUP ON FINANCIAL STABILITY OF THE IPCC (Prepared by the Ad Hoc Task Group on Finance) (Submitted by the Secretary of the IPCC) Link: https://www.ipcc.ch/site/assets/uploads/2018/04/150820170305-Doc.-8-Report-on-the-Financial-Stability-of-the-IPCC.pdf

agenda, had become an obstacle in taking swift action. Therefore, even though the uncertainties in scientific knowledge have contributed to the increase in scientific and political attention, it has necessarily not helped with taking action.

On the other hand, compared to available data collected by The Joint Programming Initiative on Antimicrobial Resistance (JPIAMR), approximately 1,940 grants with a total value of $2 billion have been allocated to AMR at the EU level since 2013. From 1997 to 2010, 102 million British pounds in the UK (Head *et al.*, 2014). The Joint Programming Initiative on Antimicrobial Resistance (JPIAMR) has spent $80 million in research projects to date. Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator (CARB-X) has spent $455 million. New Drugs for Bad Bugs (ND4BB) has spent $860 million. The Global Antibiotic Research & Development Partnership (GARDP) has spent $69 million, and the Novo REPAIR Impact Fund, established in February 2018 by Novo Holdings and commissioned by the Novo Nordisk Foundation, has spent $165 million. (IACG, 2018). The Center for Disease Control and Prevention in the United States has also spent millions of dollars on AMR initiatives, but since it is unclear how much of it has been spent on research, this has been left out of the table above.[8]

Based on JPIAMR report the majority of grants have been within natural sciences—mainly, focusing on therapeutics (1182 projects), diagnostics (267 projects) and transmission (260 projects) (JPIAMR Secretariat, 2017). On Scopus, the keyword searches for "antimicrobial resistance" or "antibiotic resistance show 361,581[9] hits and on web of science as stated above there are only 81,760 hits that are shown for the same keyword searches, and since Scopus also includes books and is more inclusive than Web of Science, the number of hits is higher. The overall number of publications has drastically increased after 2001 in all search engines, but a sharp collapse can be noticed in 2020. For instance, on Web of Science the number of publications from 2019 to 2020 have decreased from 13,693 to 3,000, most likely due to the COVID-19 pandemic. Looking at the documents by funding sponsors on Scopus, top four of the research institutions are national institutions; namely, National institute of Allergy and Infection (U.S.), National Institutes of Health (U.S.), National Natural Science Foundation of China. Indicating that most of the research sponsors whose works have been published are nationally based in the U.S. and China.

[8] For details on how much the CDC has spent in the U.S. on AMR, please refer to the link: https://arinvestments.cdc.gov/

[9] Search queries on Scopus and Web of Science was lastly updated March 2020

As observed above, in the 1990s, when CC was gaining more attention in political and scientific environments, organizations politicians were specifically established at the global and national levels to filter scientific knowledge for both reliability and simplification to policymakers. However, with AMR, the approach has been different. Scientific knowledge on AMR is quiet clear and certain from the onset (Fleming, 1945; Prestinaci, Pezzotti & Pantosti, 2015; J O'Neill, 2016; Center for Disease Control and Prevention, 2020). Therefore, the global action plan 2015 has set the following goals, none of which point toward an establishment of an organizations similar to IPCC.

- *to improve awareness and understanding of antimicrobial resistance;*
- *to strengthen knowledge through surveillance and research;*
- *to reduce the incidence of infection;*
- *to optimize the use of antimicrobial agents; and develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions* (GAP 2015)

The focus has been on awareness, surveillance, reduction of infections etc. Therefore, national governments have been asked to develop their National Action Plans (NAPs) on tackling antimicrobial resistance based on the guidelines from GAP. As a result, the establishment of national and global organizations has been different. Most of the countries (e.g., Norway, Sweden, UK) have smaller organizations, often called AMR centers (ESCMID, 2012; ReAct, 2016; Council, 2017). These centers mainly work with surveillance, innovation, research and advocacy. It difficult to have since of unity or an understanding of a common goal by these centers, other than the main goal of reducing the threat of antimicrobial resistance. It is difficult to understand how much they are involved with the political environment, but it is clear that none of these centers has been able to secure national and global level funding equivalent to that of CC. Most of the centers carry out activities at the local level (or even hospital level) or carry out scientific research for publication purposes, but their role is not the same as the CC organizations like that of IPCC and national level organizations in the US, UK and Germany that are mentioned above. WHO collaborating centers for antimicrobial resistance in countries such as Norway, Sweden and Japan are also working at the local level with drug monitoring or surveillance and even they are not active at national levels. The engagement of political environments at national level with the scientific environments, at least concerning these centers, is very limited. However, these centers have provided direct comments during the development of GAP against AMR. For example, organizations like ReAct (Action on

Antibiotic Resistance) and its founder Otto Cars have been directly involved in STAG meetings and the process of development of GAP.

5.4 Summary

Both AMR and CC have enough scientific basis that has helped them emerge as problems important enough to be addressed at the global level. While the CC science was initially vague and entangled with scientific disagreements in the early 1900s, the science on CC has developed to be more solid since the 1960s and onwards. The scientific basis for AMR has always been solid, since its emergence; there has been little disagreement over the evolution and development of resistant bacteria and microbes. Despite the fact that AMR was known in the expert domain, and scientists have been cautioning of its consequences since the 1940s, the first global action plan (GAP) on the matter was adopted in 2015, almost 70 years after Fleming's speech. The same with CC, which has been debated over decades within the scientific community and it was only in the early 1990s that serious global steps were taken to tackle the problem. Therefore, the scientific basis, although important for the emergence of the problem, cannot immediately bring about global attention and other aspects are important in this progress, which is presented in sections below.

Chapter 6: Mobilization

This section of the analysis analyzes the existence of mobilization as a necessary condition for the creation of the *suitable political ecology* (SPE). The section will compare public, political and expert mobilization by applying the concept of mobilization on the newspaper, social media, archive material and interview data. Mobilization is one of the necessary conditions for SPE. Mobilization, along with popularization and polarization, completes the SPE, which is sufficient for global attention. It is important to mention that the existence of all three elements of mobilization is a necessary condition here. Public, political and expert mobilizations are required to exist altogether to form the necessary condition for the SPE for a transboundary, complex and creeping crisis, which is characterized as a problem that can last for decades and even generations. The chapters shows how the CC problem has all three elements of mobilization switched on that has contributed immensely in the creation of the SPE, which has then not only generated attention to CC, but has also maintained it. The two figures below reveal the existence of the elements of mobilization within the CC and AMR problem, where the green color represents its existence (as being switched on) and the dark blue shows its non-existence and lack of impact and the dark blue and green pattern illustrates a lower degree of existence of the elements. On the contrary, expert and political mobilization are the only element of mobilization that is observed to exist, to a lower degree than CC, within AMR. More importantly, public mobilization is almost non-existent with the AMR problem, whereas it is one of the most prominent elements of mobilization within CC. Expert domain and political domain within AMR function more in isolation to one another. The closest cooperation between the experts and political domains is noticed with the World Health Organization's (WHO) setup, but the politicians involved are ministers of health or they have expertise within health, which can still be compartmentalized within the expert realm. In contrast, the CC domain (and especially the IOs dealing with CC) is marked by much greater cooperation, both in terms of developing political responses and communicating the scientific knowledge. This mixed mobilization, along with popularization and polarization, has provided CC with the suitable political ecology that has generated and maintained global attention to CC.

Table 6.2Elements of mobilization for CC. The green color represents their existence

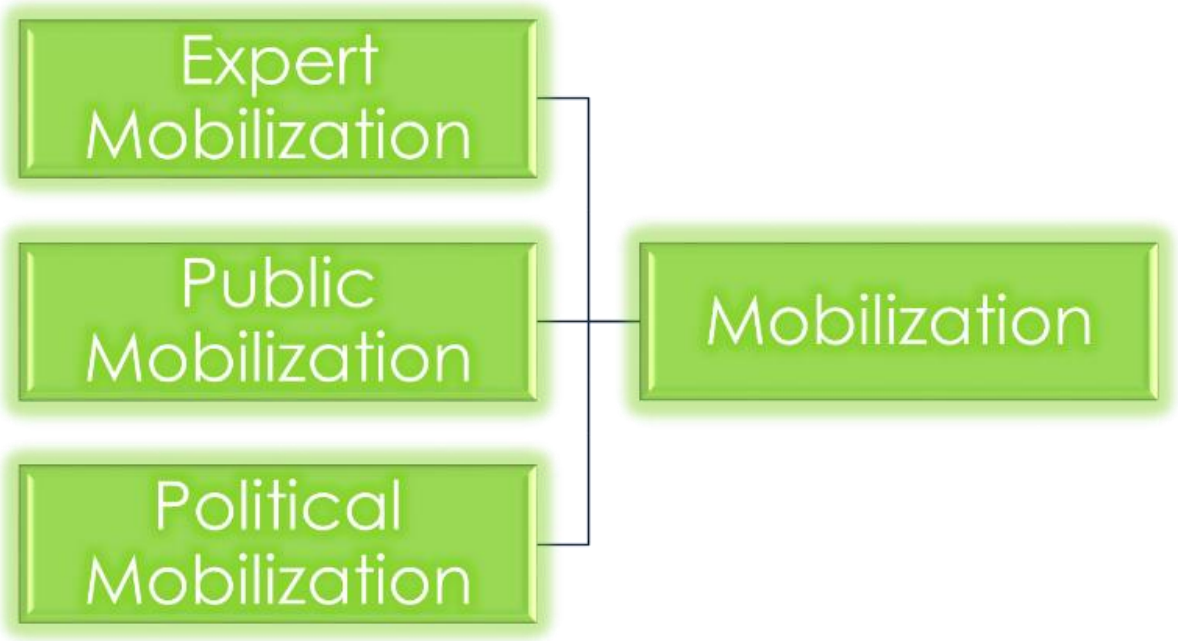
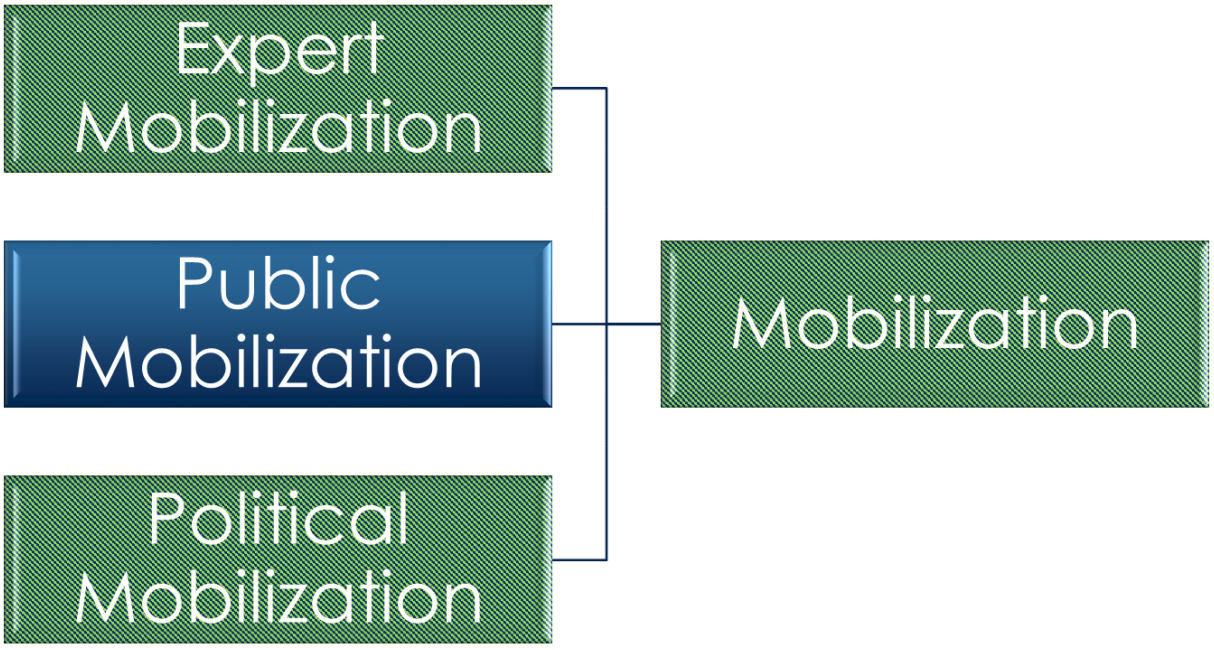


Table 6.1. Elements of mobilization for AMR.

[10]



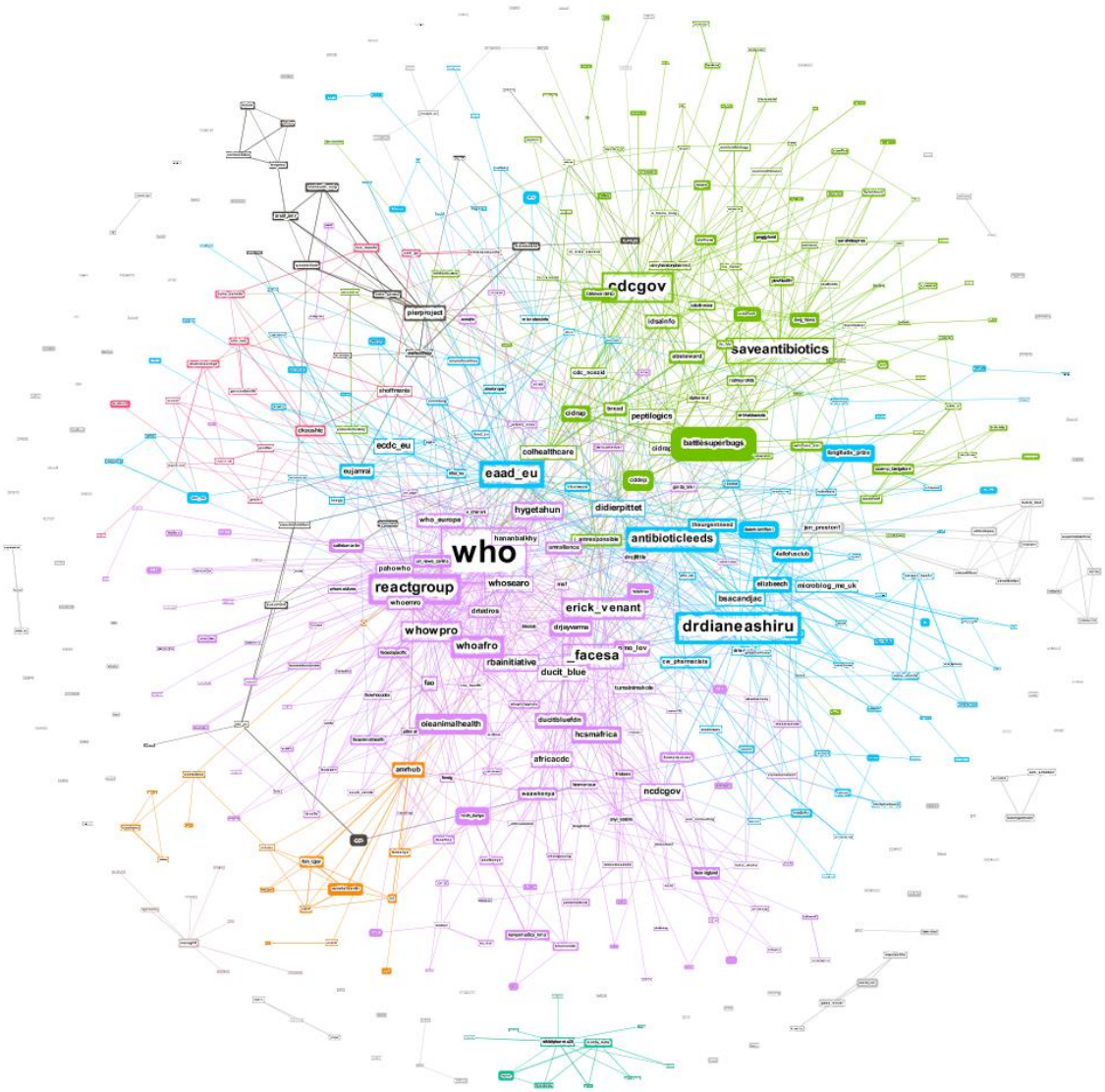
[10] The green dark blue pattern presents partial existence of the elements and the dark blue represents non-existence or non-effectiveness.

6.1 Public Mobilization

“Protest” was coded 176 times, “demonstration” was coded 104 times, and “people” AND “gather” 10,056 times in the CC newspaper data. Many of the codes observed in phrases show that the public mobilization within the CC are mostly large ones. Most phrases refer to “the largest protest,” “the biggest demonstration,” “storm of protests” and “popular protests,” as shown in the Word Tree analysis formed using Nvivo below. There are also references to the number of participants in these protests (e.g., “2 to 5 million people gathered”) and many more references that illustrate how the public mobilization of CC are mostly large protests and demonstrations. There are also smaller demonstrations, such as “40 people … morning walks for Climate Change,” “480 people have signed the petition” and similar codes revealing public mobilization on a smaller scale. Some of these can be noticed in Figure 11 below, which is one of the samples of analysis out of a range of codes carried out using the keywords mentioned above. This sample shows a World Tree map for codes “demonstration,” “protest.” There are also codes showing public mobilization against the CC agenda, but in the codes it is observed that the mobilizations for the CC agenda are larger than the mobilizations against it. Many of the codes referring to climate-denier mobilizations, such as “Thousands of climate deniers gather,” are not noticed to mention people above thousands.

Regarding AMR, “Protest” was coded only 12 times, “demonstration” coded 26 times, and “people” AND “gather” 2,881 times, none of which referred to people gathering, referring only to infections in gatherings, so the code was changed to “people gather,” and only one code was observed in all of the 10,000 sample newspapers (and even that was not referring to gathering in the form of mobilization). Looking closely at the codes in phrases, almost none of them refer to any public mobilization or gathering. Moreover, there is also no indication of public protests and demonstration regarding the number of participants. This analysis clearly indicated that, at least in the 10,000 newspaper samples used for the analysis in this section, there has been no public mobilization on AMR.

Figure 6.1. AMR Social media network analysis based on directed graph



11

[11] The graphs above are based on modularity test carried out on Gephi that is based on directed graphs in terms of mentions on twitter

Figure 6.2. CC social media network analysis based on directed graph

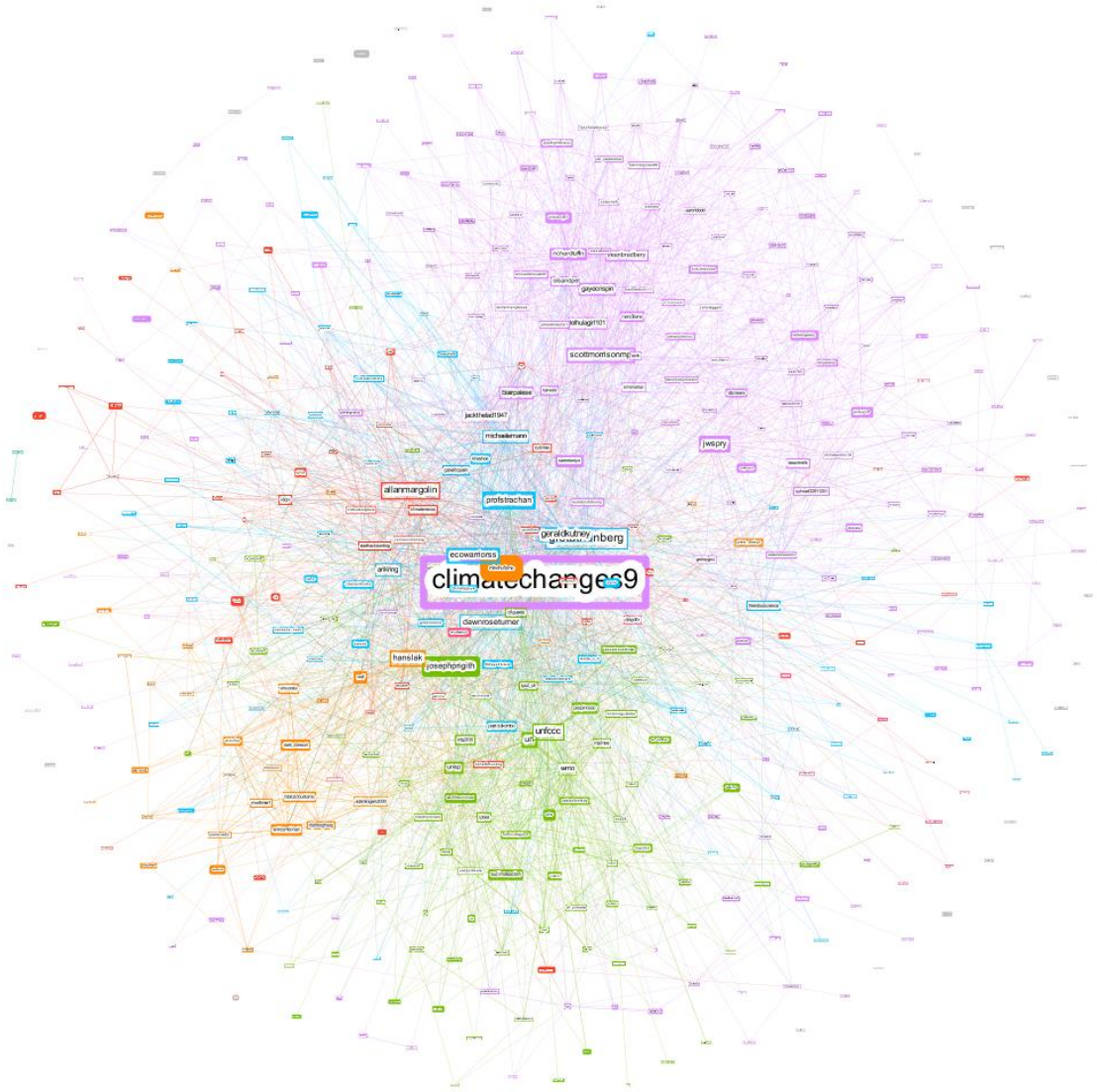


Figure 6.1. AMR modularity class highlighting the highest mentioned user on twitter within the AMR dataset after data clean-up

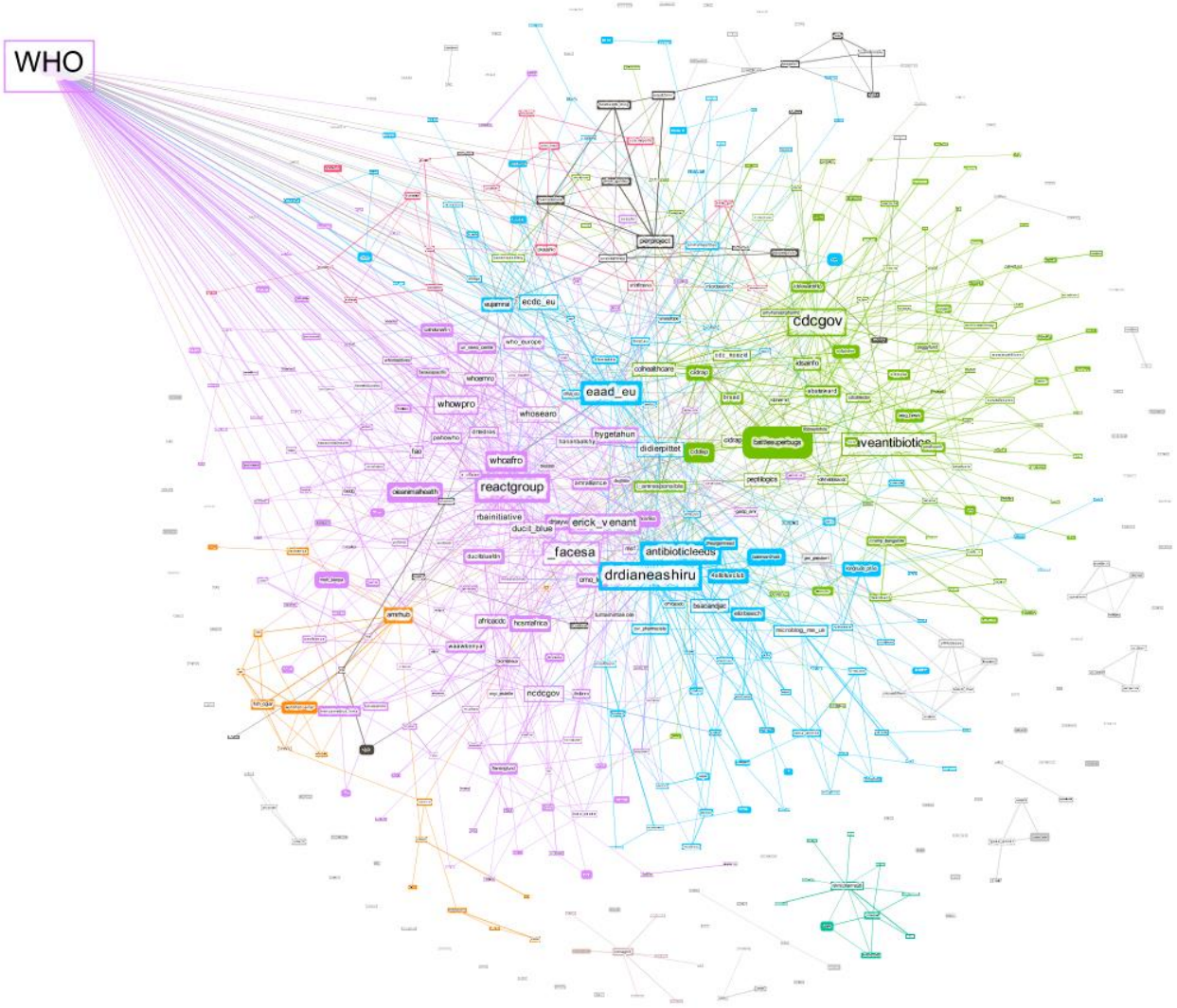
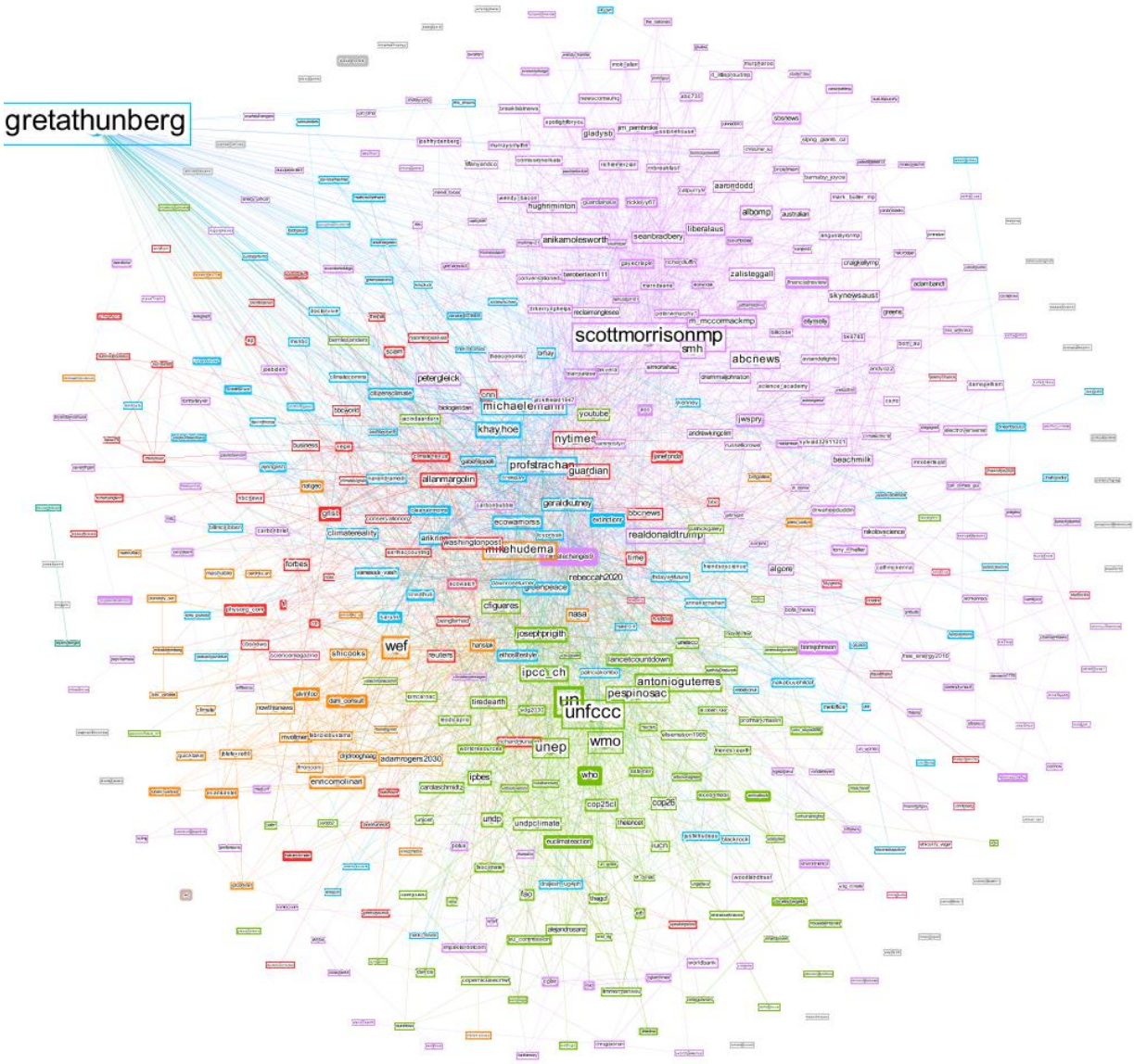


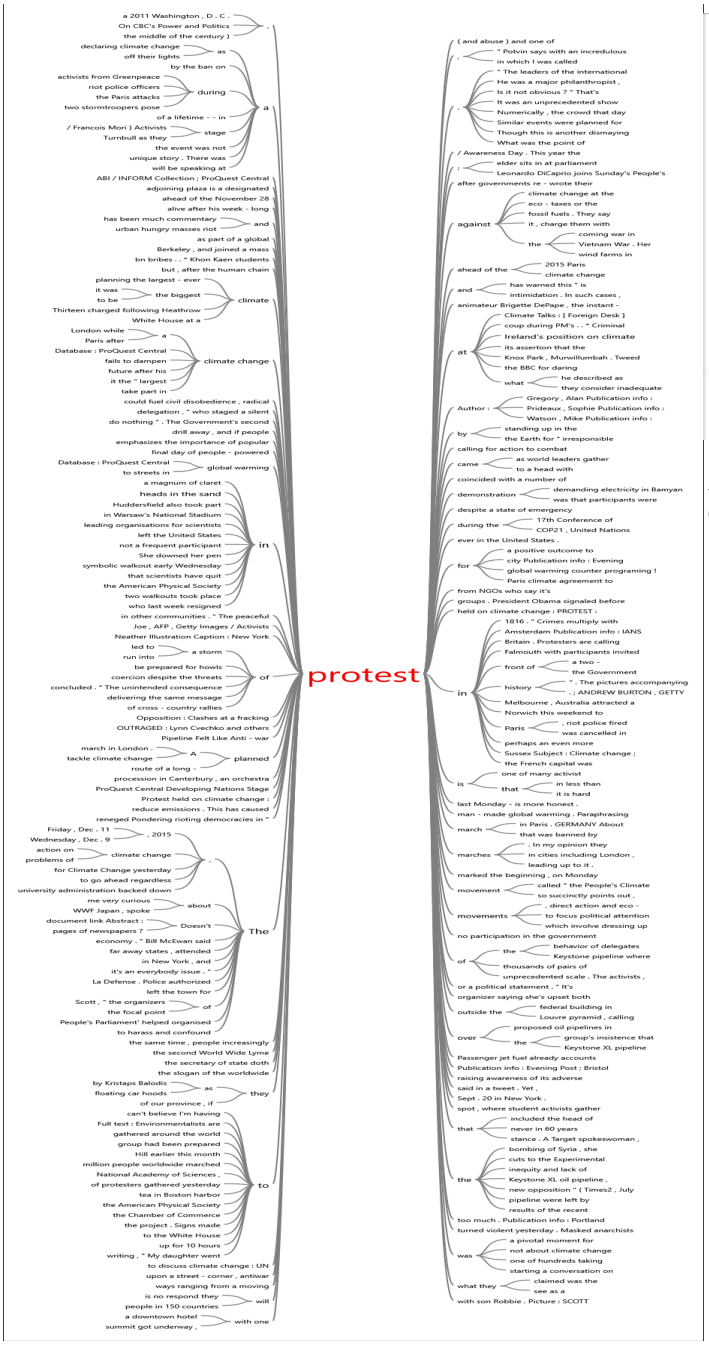
Figure 6.3. Modularity class analysis, visualizing the highest mentioned user on twitter within the CC dataset after data clean-up



12

[12] The graph above is presented after a clean-up process, focusing on the giant component and removing unconnected nodes

Figure 6.3. Sample CC codes for protests and demonstrations retrieved as World Tree from Nvivo from the analysis carried out on 10000 randomly selected newspapers



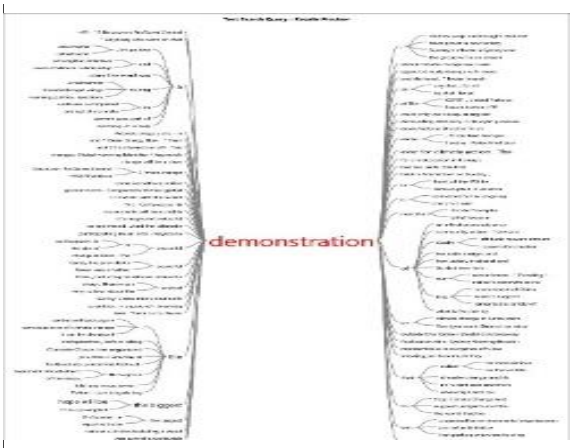
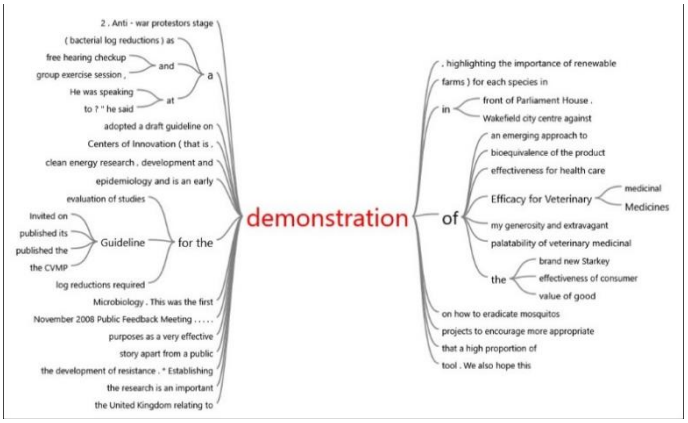
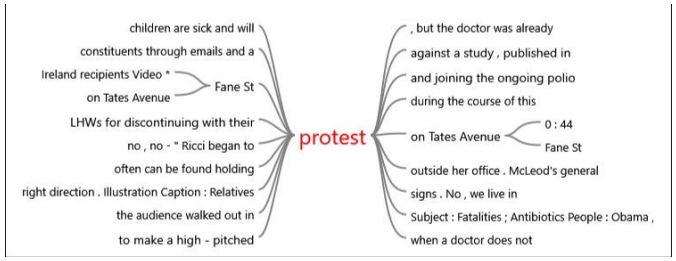


Figure 6.2. AMR World Tree visualization from codes demonstration and protest from 10.000 newspapers





Social media data on AMR and CC and network analysis carried out on the data retrieved from Twitter also clearly indicates that public mobilization on AMR is almost none-existent, while public mobilization on the digital level is extremely high in relation to CC. This can be seen from the network visualization below. The visualization of Twitter analysis can be observed in Figure 10, shown above.

6.2 Overview of the Twitter analysis and observations

Data collected through T-CAT API shows that, from November 2019 to August 2021, CC's social media domain, limited to the hashtags #climatechange and #globalwarming, has triggered approximately 3,553,948 Tweets from approximately 1,039,421 Twitter users. For comparison, AMR, limited to hashtags; #antimicrobialresistance #antibioticresistance, has produced approximately 71,552 Tweets from approximately 34,727 users for the same period. The average overall Tweets per source is 126.84 on AMR and 594.95 on CC, which shows how the CC nodes are almost five times more active on Twitter than users discussing AMR.

The network analysis was set to identify the top 500 users in the data. After *clustering coefficient or modularity test* for approximately 1.5 million Tweets, 37 different communities were identified within the CC. Using similar parameters on Gephi that were applied to CC analysis, the AMR analysis was carried out on 28,000 Tweets obtained from T-CAT, which ultimately only identified 13 communities. The CC network is also denser than the AMR (the density score for AMR is 0.007, 0.015 for CC), implying that the CC network is more than twice as dense as the AMR network.

The two largest modularity classes or communities of CC are mostly individuals, and the third largest community consists mostly of organizations. Even though there is interaction between the three communities, most of the interactions occur within the first two among individuals. In contrast, the largest community on AMR mainly consists of organizations, and almost no community was identified as being formed by ordinary individuals interacting with one another (like the CC communities). While looking at the AMR nodes, every individual in the network is either a natural scientist, medical doctor, or someone somehow related to an organization or company working with AMR-related matters.

The most influential nodes in the two networks are the World Health Organization (WHO) in the AMR network (the most mentioned node with 4,808 mentions) and Greta Thunberg (18,073 mentions in the CC network).

The brief overview here establishes that the AMR Twitter engagement is extremely low compared to CC on Twitter. The CC topic has gone beyond the immediate scope of the problem, as many individuals without direct ties to CC research or political organizations interact with one another on the topic. However, the AMR is still only limited to the individuals and organizations within the immediate scope of the problem. The following sections "deepen" the analysis by supplementing the quantitative data with qualitative analysis.

In summary, public mobilization is almost none-existent within the AMR, as seen in both the newspaper and social media analysis. Compared to AMR, the CC public mobilization is not only stronger than AMR, but there are also many types and levels of mobilization within CC.

6.3 Political Mobilization and Expert Mobilization

The section below presents the analysis of political and expert mobilization of AMR and CC. The reason that the chapter presents these two together is because the cooperation between these two domains has been vital for CC's establishment of the suitable political ecology that has resulted in generating global attention and has contributed to maintaining it.

One of the very first expert mobilizations that can be found on the issues of CC and global warming that also attracted media attention was a survey published in 1978, when 24 climate experts from seven countries published a report by the Pentagon Advanced Research Projects, which was published by the National Defense University, which first issued warnings collectively on global warming and climate change, as we now know it (O'Toole, 1978; The Globe and Mail, 1978).

While back in 1978, the scientific mobilization of CC was similar to that of AMR, meaning that it was very highly expert driven. The last five decades on CC's expert mobilization is very different. As it happens more in cooperation with the political domain.

UN organizations dealing with CC have developed a different approach to knowledge processing within the policy venues than have the UN bodies dealing with AMR. Intergovernmental Panel on

Climate Change (IPCC), for instance, has assumed the role of a "knowledge shaping" institution instead of merely serving as a knowledge sharing institution. IPCC's knowledge shaping strategy has not only affected how the public perceives CC, but also how policymakers respond or allocate attention to the issue. This chapter argues that, in contrast, WHO has not only played a role as knowledge shaper, but even more as a Global Health Authority that shares knowledge and develops necessarily guidelines. The WHO set up and the process of developing the GAP has not been as inclusive as IPCC. The manner in which external information has been handled by the IPCC and WHO has influenced attention to CC and AMR, respectively.

IPCC has been successful in broadening the equilibrium of interest by developing a negotiation process between scientists, politicians and interest groups on different levels and in different phases of the process—starting from author selection for report writing purposes to feeding the report into actual policy. On the contrary, the WHO process has only managed to broaden the equilibrium of interest within the scientific and expert community.

For instance, IPCC author selection goes through political filters, as the call is made to governments and IPCC observer organizations and they are the ones who nominate scientists. This author selection strategy involves actors from outside the UNFCCC and IPCC in the very early stages of IPCC report writing. As discussed further below, the IPCC and UNFCCC continue this strategy regarding the inclusion of actors from outside their institution until a policy is generated. On the contrary, the WHO directly invites experts and scientists working with AMR to be part of the Strategic and Technical Advisory Group (STAG) group, which is the only subsystem that facilitates knowledge intrusion during the drafting of the GAP. This was made clear in the first STAG meeting:

> *Members of the STAG-AMR will be selected and appointed by the Director-General on the basis of their technical expertise and scientific and public health experience. In the selection of the members, consideration will be given to attaining an adequate technical distribution of expertise, geographical representation and gender balance.* (STAG1_Meeting_report, 2013)

The IPCC brings together the actors from outside and inside the institutions as well as involving politicians and interest groups from the very beginning of the knowledge generation phase until they have been able to generate policy. Experts invited to STAG are obligated to act autonomously, as individuals separated from their designated institutions. No such obligation was identified during the selection and appointment of experts who were part of the IPCC report drafting. Other than permanent

staff members and permanent UNFCCC and IPCC advisors, all other experts and government representatives have the freedom to act either as individuals or as representatives of their institutions and they are not obligated to take IPCC or UNFCCC's interests into consideration.

When it comes to the selection of scientific publications, WHO has randomly selected the scientific knowledge available during STAG meetings and presented it in its actual form in their meeting reports. They have not involved any political or non-expert interest groups in the STAG committees, nor have the STAG members questioned the nature of the scientific knowledge presented in their meetings. These processes play an important role in generating easily digestible knowledge for the public and non-expert actors, as presented later in this chapter. However, while WHO has played little or no role in knowledge shaping when it comes to AMR, as they have been more of an organization facilitating the presentation and gathering of knowledge through an internal process that allows little chance for outsiders and government representatives to become extensively involved in the AMR debate.

The IPCCC engages government politicians in the process of knowledge development, knowledge shaping and policy development more than the WHO. Three main UN organizations work with the climate change issue, namely, the UNEP, UNFCCC and IPCC. All of the organizations have been praised for their roles as "knowledge producers" (Andresen & Rosendal, 2009) and "knowledge shapers" (Weiss, 1977; Livingston, 2018).

"The IPCC has different levels of endorsement for IPCCC reports including "approval," "adoption" and "acceptance." All of these processes must be endorsed through a governments-scientists dialogue. The "approval" includes line-by-line discussion between scientists, authors of reports and politicians, and the aim is to ensure agreement among member countries and scientists and to ensure that the message is direct, clear and unambiguous. This procedure serves two purposes. Firstly, it brings the issue to the attention of the politicians, where they will invest politically to influence the writings as much as possible, not just for the sake of science and saving the planet, but also for their own interest. Many politicians in these discussions are not forced to be independent and are not asked to take the interest of the IPCC into consideration, but have a freedom to discuss their political interest.

Second, this procedure shapes the knowledge being presented to public. This shaping of the knowledge has significant consequences for how the public perceives the issue. When this is combined with the political interests of the politicians involved in these debates (who are already aware of what triggers their own citizens and what does not), the knowledge presented in the reports

generates more public attention. Attempt is made to keep the terminology used in the IPCC as simple as possible while at the same time respecting the factual basis of scientific findings.

The adoption process is reviewed section by section and line by line, also by governments, authors and scientists, to ensure that the material from Working Group assessment reports and special reports are affectively integrated into the reports. The term affective is important here, as the focus is not on being accurate, but rather affective; affective in the sense that it is presented in a language comprehensible to politicians and the public, but also that it catches attention efficiently.

The acceptance process "is the process used for the full underlying report in a Working Group Assessment Report or a Special Report after its summary for policymakers (SPM) has been approved."[13] The aim is for the report to present a comprehensive, objective and balanced view of the subject. It is important to realize that there is no line-by-line debate in the acceptance process between scientists and governments, and it is also very interesting to consider the term "balanced." Balance in this sense represents a political connotation for agreement, meaning that the reports, despite being scientifically accurate, must also be balanced, taking most of the stakeholders' interests into consideration.

These processes put more pressure on the scientists to find ways not only to communicate their findings to the politicians and public, but also to engage in political discussions with politicians, and in so doing becoming more like politicians than scientists. This forces climate change scientists out of their comfort zone and pushes them into political games.

Before 2015, the IPCC had published five assessment reports, all of which have been carried out to assess scientific knowledge on climate change and present it to policymakers. Assessment reports are often lengthy reports carried out by hundreds of scientists and based on thousands of scientific reports. For instance, the fifth IPCC assessment report, which was released in four parts from September 2013 to November 2014 and now considered the most comprehensive assessment report on CC, was carried out by the IPCC. The fifth IPCC assessment report is carried out in three working groups (WG). WG I assessed the physical sciences contribution to CC studies and was released September 2013; WG II discussed impacts, adaptation and vulnerability and was released in March 2014; WG III was centered around CC mitigation and was released on April 15, 2014, and the Synthesis report was released November 2014. Over 830 authors were involved in preparing the report. Besides the working groups

[13] IPCC fact sheet: https://www.ipcc.ch/site/assets/uploads/2018/02/FS_ipcc_approve.pdf

involved in the process, external advisors and experts have also contributed to the report. The Task Force on National Greenhouse Gas Inventories has also played an important role in the drafting of the report. The table below shows the number of review comments that the fifth assessment report has received within the working groups.

Table 6.3. Number of review comments on fifth Assessment report

		Number of comments	Experts	Governments
Working Group I	First Order Draft	21,400	659	-
	Second Order Draft	31,422	800	26
Working Group II	First Order Draft	19,598	563	-
	Second Order Draft	28,544	452	33
Working Group III	First Order Draft	16,169	602	-
	Second Order Draft	19,554	444	24
Synthesis Report	First Order Draft	5,944	85	42
Total		142,631	-	-

Note: some experts register for more than one Working Group.

14

The WG reports, despite being under strong negotiation from experts and governments politicians, are still considered to be technical, as they include scientific language and detail scientific methods that have been used by academic writers. The report has included approximately 9,200 scientific peer-reviewed publications (IPCC, 2014c, 2014d, 2014e).

The fifth IPCC assessment report was strategically published in time to influence the 2015 Paris Climate Agreement. Despite the fact that the WG reports include technical discussions and technical language, the SPM is simplified and presented in a language that is different from the actual reports. The quotes below have been chosen to exemplify the simplicity of the language in the policymaker summary compared to the actual WG report.

[14] IPCC, Activities 5th assessment report, Link: https://archive.ipcc.ch/activities/activities.shtml

> *Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems. {1}*
>
> *Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. {1.1}* (IPCC, 2014d)

While the two quotes above were presented in a simplified manner in the SPM of the IPCC report, the quote below is one example of the language in the IPCC WG I that has presented the physical science basis.

> *It is very likely that anthropogenic forcings have made a substantial contribution to increases in global upper ocean heat content (0–700 m) observed since the 1970s (see Figure SPM.6). There is evidence for human influence in some individual ocean basins. {3.2, 10.4} • It is likely that anthropogenic influences have affected the global water cycle since 1960. Anthropogenic influences have contributed to observed increases in atmospheric moisture content in the atmosphere (medium confidence), to global scale changes in precipitation patterns over land (medium confidence), to intensification of heavy precipitation over land regions where data are sufficient (medium confidence), and to changes in surface and sub-surface ocean salinity (very likely). {2.5, 2.6, 3.3, 7.6, 10.3, 10.4}* (IPCC, 2014a, p. 17)

The examples above are the results of a lengthy negotiations process among experts and government representatives, and the quotes demonstrate a shift from the use of terms such as anthropogenic forcings or anthropogenic influences to human influence. This is an example that represents similar changes that have resulted from negotiations between physical scientists and government representatives. Other examples include the use of terms such as global warming and even climate change. Scientific papers in the natural sciences only use these terms in their title, abstract or subtitle, and there is very little use of these terms when engaging in actual analysis and scientific research; instead, for instance, they prefer the term global climatic disruption (Schneider *et al.*, 2010). Such examples can be noticed in every part of the report; scientific and technical language keeps changing to a simpler, more common language. The Paris climate agreement does not include any of these technical terms, as there is little focus on scientific knowledge and the justification of scientific

climate change arguments; rather, the focus is on implementation. One of the issues that has directly transferred from IPCC to the Paris Agreement is in article 2 of the agreement:

> *Holding the increase in the global average temperature to well below 2C above pre industrial levels and pursuing efforts to limit the temperature increase to 1.5C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.* (UNFCCC, 2015)

The agreement to prevent the global average temperature from rising more than 1.5C represents an example of a direct transfer of an issue from scientific work to the agreement through the works of the IPCC and UNFCCC. The first time the 1.5C was discussed was in the Cancun Agreement,[15] which was adopted at COP16 in 2010. Since then, the IPCC and UNFCCC have been discussing the issue with government representatives in several of the meetings leading up to the Paris Agreement. The primary concern for the majority of governments was how to achieve this goal; therefore, even after Paris, the IPCC was tasked with producing a special report[16] on it, which was released in 2018. What is important to note is how the IPCC and UNFCCC have successfully simplified global goals to the 1.5C objective and how, through this process, they have modified the language in the IPCC reports (and, especially, the summary for policymakers): from hardcore scientific and technical language to a simplified, commonly understood language. During the meetings and even in reports after and before the publication of the fifth IPCC assessment report, some of the scientists have not been in total agreement with their use. Schneider *et al.* (2010), for instance, argue that the terms "climate change" and "global warming" are not the most accurate terms to use for this global matter. Nevertheless, the IPCC managed to keep these terms, even making them the most common terms used in the general public debate of the matter, as described in the Twitter analysis chapter of this monograph. One of the reasons for the IPCC to have been successful in communizing these terms among policymakers and the general public could be that they have included more inclusive discussions between scientists, advocacy networks and government representatives.

While the part above examined the CC developments and the knowledge-shaping role of the IPCC, from here on, the development of the Global Action Plan (GAP) against AMR is presented.

At the Sixty-eighth World Health Assembly in May 2015, the WHO member states endorsed the GAP. The process of drafting the GAP included a series of STAG meetings, meetings of the Who

[15] Cancun Agreement 2010, https://unfccc.int/process/conferences/the-big-picture/milestones/the-cancun-agreements
[16] Global Warming of 1.5 ºC: https://www.ipcc.ch/sr15/

Secretariat, executive board meetings, meetings between WHO member states, and a single round of web-based consultation. However, the most influential and important group throughout the GAP drafting process has been the STAG. Although the task of writing and preparing of the first draft fell on the secretariat, the STAG also plays an important role in this process, which could be argued to be similar to the IPCC's role in climate change. The differences are of course dramatic, since STAG only entails members who are experts in AMR or medical science, and STAG is an advisory group and not an organization as large as the IPCC. The process and the manner in which they work is different than the IPCC and resembles more the Subsidiary Body for Scientific and Technological Advice (SBSTA), which supports the work of the Conference of the Parties (a permanent advisory body at UNFCCC). STAG is a very small body compared to the UNFCCC, IPCC and their SBSTA set up. It is smaller in terms of resources, personnel and budget. While WHO has consistently displayed concern regarding budget limitations throughout the GAP process, the UNFCCC and IPCC have not brought these concerns to the meetings in such a manner. In other words, the STAG has focused narrowly on drafting the GAP and providing scientific advice to the WHO headquarters; they have not played any role in shaping the knowledge of the AMR, nor have they played any identifiable role in shaping public discourse concerning AMR.

The WHO process is highly expert-driven, with little room for debate between the scientific community and politicians. In fact, the WHO STAG members dealing with the AMR act not as partners to politicians, but as a different actor who believe that they must convince the politicians on their own terms—not as partners. They leave little room for politicians to capitalize on the reports and invest in them by adding or inserting their interests; in other words, there is nothing for politicians to gain politically from the WHO reports. The WHO acts as the sole leader and legitimized authority when it comes to health issues, and they treat politicians as an actor outside the realm of health issues. Examples of this behavior can be found in the STAG meeting reports.

1. Communications: Awareness, understanding and education

> *There will be a continuing need to reach audiences that range from heads of governments to policy developers, professions, prescribers and associated professions, and from businesses to public, patients and civil society, across all sectors. Significant efforts need to be made to describe the problem, its magnitude and consequences in an understandable way for different audiences and in different contexts. The main*

> *objective will be to change behaviour and social norms (e.g., the recognition of antibiotics as a "public good"), and to secure continuing engagement and commitment.* (Second STAG meeting April 2014).

As can be seen in the above recommendation on awareness, the experts still insist on reaching out and describing the issue instead of involving politicians in the knowledge development process. The WHO reports and STAG meeting reports also reveal how scientific knowledge is presented true to the form in which it was originally produced, although it is used selectively. Where the interests of WHO and experts—and at times some private companies—are evident, there is little or no involvement of politicians during the process. When scrutinizing the STAG meeting participant lists, for example, every single government representative is an expert in AMR or a medical scientist.

The main issue to be observed here is the lack of attention—even within WHO—that AMR has received. There has been a lack of resources to the process of drafting the GAP, as AMR is but one of the issues that WHO deals with among a range of issues. As a matter of fact, AMR is not even mentioned as a main challenge in the latest WHO list of 13 urgent global health challenges, which was released in 2020 (it is merely mentioned as part of the challenge regarding "stopping infectious diseases"[17]). Contrast this to 2015, where AMR was among the top WHO priorities and one of the main topics discussed at the 68th WHA in 2015 (Assembly, 2015). Despite the fact that AMR was one of the major issues in 2015, air pollution and epilepsy, immunization gaps and malnutrition, emergency and response programs, polio, improving surgical care, Malaria and other issues were also given substantial attention. The fact that AMR has always been an issue among a range of WHO issues implies that AMR is yet to achieve status as *the* issue at the WHO level. As compared to climate change, this was only the case in the 1980s, when WMO and UNEP were dealing with CC in relation to other environmental issues. Not only have they succeeded in creating UN organizations that are only dedicated to CC (e.g., UNFCCC, IPCC), they have also been more successful in bringing the issue to public attention. One of the reasons that WHO has been unable to carry AMR as one of the main issues at the global level could be its attempts to own the AMR issue. In addition to limiting global attention to AMR, these attempts at issue ownership have also undermined other important matters that the scientific community had been trying to address within the GAP. This can be observed in the first STAG meeting reports and its final report. In the agenda for the meeting held September

[17] Urgent health challenges for the next decade: https://www.who.int/news-room/photo-story/photo-story-detail/urgent-health-challenges-for-the-next-decade

19–20, 2013, a range of issues were presented, including knowledge about AMR and its evolution, optimal use of antimicrobials, and the development of national policies, programs etc. (STAG-AMR, 2013). However, the summary of the final report of the meeting centers around the issue of WHO's leadership of the matter. In a two-page summary, the WHO leadership is central and mentioned repeatedly.

> *Dr Chan called on the Advisory Group to provide her with the best possible advice to enable WHO to take the lead in responding to this crisis.*
>
> *The Advisory Group specifically recommends that WHO should lead and support Member States at global, regional and national levels in developing and implementing a global action plan for AMR.* (AMR_STAG1_Summary, 2013)

Despite the fact that most of the first STAG meeting was devoted to scientific matters (despite being mostly influenced by individuals present at the STAG meeting as opposed to the existing scientific knowledge), what ultimately became the most important matter was the WHO leadership. What Jones and Baumgartner (2005) argue in their theoretical framework is that institutional and individual interests—as part of the reverberations within a political institution of policy venues—determine if an issue receives attention or not. Here, the WHO leadership is a direct institutional interest that receives more attention than the scientific matters discussed in the first STAG meeting.

Throughout all of the STAG meetings, it can also be observed that there is no systematic way of including scientific knowledge in the GAP process. Indicating a selection bias in the scientific materials used during the STAG meetings, most of the information discussed in the STAG meetings is based on scientific findings that the individuals who have been selected as part of WHO or STAG have worked on previously. Some of the reports referenced to in the first AMR STAG meeting are (ECDC and EMEA, 2009; WHO, 2011; WEF, 2013). The ECDC and EMEA report entitled "Joint technical report: The bacterial challenge: Time to react" is a report to which STAG member Otto Cars contributed, and the WHO 2011 report, "The world medicines situation 2011," is produced by WHO. This shows a very random selection of scientific materials based on an individual selection of the reports. Although there is no direct indication that Otto Cars suggested this, he referred to it in his presentation, which was then used in the final meeting report. Compare this to CC, where 9,200 peer-reviewed scientific publications were selected through a systematic selection process. Hundreds of scientific experts and government representatives in different working groups then assessed the 9,200 peer-reviewed scientific publications. In the STAG, however, the scientific papers are randomly

selected and no systematic process of filtering this information can be seen. Nevertheless, the main findings and scientific matters regarding AMR have not been challenged in any of the meetings. No disagreements on the scientific basis of AMR were observed during STAG meetings. There would appear to be general consensus regarding the dangers of AMR and the risks it poses to humanity.

6.3.1 Summary of the section

AMR entirely lacks public mobilization, and both expert and political mobilizations are limited and different from CC. While CC has a mix-mobilized and highly coordinated global setup between the political and expert domains, the expert and political AMR domains function somehow in isolation from one another. The AMR mobilizations are mostly expert-driven, expert-oriented and expert-decided. Although this type of mobilization was somehow successful around 2015, it could potentially be short-lived. Since, AMR is understood to be a transboundary, complex and creeping crisis that would have a long-term temporal span, expert-driven mobilization alone might not be sufficient to generate and maintain global attention.

While the IPCC was initially established as an organization to filter and simplify climate science for policymakers, the organization has surpassed that role. Over the years, its unique strategies and distinctive interactions with the public and politicians on different levels have contributed to developing its role as knowledge shaper. Even though it is argued that the IPCC has not compromised basic scientific findings while still being successful in its interactions with the polarized political environment, the organization has managed to engage scientists and politicians in climate science and the policy debate, which has resulted in increased political, public and scientific attention to CC. These reports have been at the core of the debates regarding global agreements on CC. Since there is no similar organization corresponding to the IPCC playing a role in shaping the AMR knowledge and forming the foundation for the debate on AMR, the processes contributing to the development of the Global Action Plan (GAP) against AMR were followed to understand how the scientific domain engaged with the political environment. The development of the GAP included STAG meetings, meetings of the Who Secretariat, executive board and between WHO member states, and a single round of web-based consultations. STAG is identified as the closest global body in AMR, relatively similar in potentially playing the role that the IPCC plays in CC. However, STAG is a very small body compared to both the IPCC and UNFCC. It shares similarities with the Subsidiary Body for Scientific and Technological Advice (SBSTA), which was established by the CC. The WHO-led process developing the GAP is highly expert-driven, and there is no corresponding platform found in CC, where politicians and scientists engage to debate AMR. The aim to filter or simplify scientific

knowledge for politicians is also nonexistent within STAG (or any other processes in the GAP development). The GAP processes have lacked resources and have been discussed within the WHO structures, an organization dealing with an array of global health problems. In contrast, the IPCC and UNFCCC are dedicated solely to the CC debate and have many more resources for policy development, conferences and scientific research. WHO owns the AMR issue, but it does not treat AMR as a high priority for the organization, and this is argued to be one of the main factors preventing AMR from receiving attention in the global political domain as well as in the public and scientific domains.

6.4 Framing

When it comes to understanding a problem, it important to look at how it is communicated within and outside these domains. Framing is used to see how mobilized groups have communicated the AMR and CC problem. This section first presents a brief mapping of some of the prominent frames of AMR and CC and then presents the different strategic presentation of the problems by experts and other mobilized group of actors that has contributed in establishment of a SPE. Framing in this monograph is a simplified, attractive and/or symbolic way of defining and presenting an issue. Therefore, simplified language, symbolic presentation and strategic communication such as coupling the problem to a more perceptible crisis are presented in this section. Since, the frames, their development and the strategies of their presentation by mobilized groups play an important role in establishment of the SPE and ultimately generating and maintaining global attention.

6.4.1 CC frames

Climate Change has been framed in many different ways, but has also developed by a variety of different actors. The CC frames are also attractive to different actors and these frames have been successful in attracting public, political and expert attention. The AMR frames on the other hand have been mainly developed by actors from medical science and consequently have received more attention in form of popularization from the expert community, as it is shown in the following chapter. However, AMR frames have not been successful in gaining the attention of public at all, but has had some success around 2013 in gaining some popularization among politicians.

Simplicity of frames and attractiveness of frames of CC have been the most important aspect that has caught the attention of many actors. While there are many frames for CC, which have played important roles attracting attention to CC, such as CC as an environmental problem, CC a security problem, CC a health problem, CC as global justice problem and many more. However, the three most important frames that have been pivotal in attracting attention to CC have been the terms "Climate Change," "Global Warming" and the CC frame as an environmental problem. The first two terms are frames because they have simplified the scientific language for non-expert audiences. The second one has been influential because it has put merged CC to an already existing problem that had been one of the dominant problems at the early stages of the CC emergency. More on this will be presented in the suitable political ecology analysis below. The CC frame as an environmental problem played an important role in the early stages of CC, which was immensely contributing to bringing attention to environmental problems. Framing CC as an environmental problem caught the attention

of environmental activists, policymakers, and also environmentally concerned public. The terms “climate change” and “global warming” are frames that not only simple to understand, but have played an important role in uniting many of the environmental problems under these umbrellas.

A simple coding of the major treaties and declarations on CC and environmental problems shows a transition from using the term environment to climate change as it can be noticed in the following results from Nvivo.

Table 6.4. The use of term "environment in four major treaties and declarations on Climate Change and environmental problems 1972 to 1997

Name	In Folder	References	Coverage
Kyoto	Files	2	0.02%
Rio	Files	19	0.99%
Stockholm	Files	313	0.69%
UNITED NATIONS FRAMEWORK CONVENTION	Files	10	0.10%

Figure 4. The term “Climate change” use in the first four major treaties from 1972 to 1997

Kyoto	Files	26	0.33%
UNITED NATIONS FRAMEWORK CONVENTION	Files	49	0.61%

The term “global warming” in first four major treaties and declarations on environmental and climate change

Kyoto	Files	3	0.04%

The term “environment” was used 313 times in the Stockholm Declaration in 1972 and 19 times during the UN General Assembly—Rio Declaration on environment and development in 1992. The term “climate change” was never used at Stockholm and Rio. The term “environment” almost disappeared from the Kyoto Protocol in 1997 and in the UN Framework Convention on Climate Change in 1992. The term climate change was used 26 and 49 times, respectively in the Kyoto Protocol 1997 and in the UN Framework Convention on Climate Change in 1992. The term global warming was only mentioned three times at the Kyoto Protocol and it was never used in any other one of the major treaties and declarations from 1972 to 1997 (UNFCCC, 1992, 1997; United Nations, 1992).

So, a clear shift from using the terminology “environment” to “climate change” can be observed in the major treaties from 1972 to 1997.

The terms “global warming” and “climate change” were not common terms to be used either by scientists or by public or politicians in the 1970s and prior to that. The initial term for them were mainly, “inadvertent climate modification” and the scientific term used mostly by scientists after the 1970s was “atmospheric greenhouse gas concentrations” (Eisenbud, 1972; Anderson, 2014; Rhone,

2019). The “atmospheric greenhouse gas concentrations” has only been used 4 times in the 10,000 newspapers on CC and not only once in Twitter data, and the “inadvertent climate modification” is only used three times in newspapers and not only once in social media data. While the term “climate change” is coded 66,728 times and term “global warming” is coded 31,270 times.

The newspaper search on ProQuest shows that the term “global warming” was first used in 1978 by *The Globe and Mail*, and *Washington Post* the same articles also used “climate change” as a term for climate patterns change that we know today (O’Toole, 1978; The Globe and Mail, 1978). Both reports were based on an event where experts issued their first opinion collectively on global warming in a report published by National Defense University. However, the term “global warming” and “climatic change” (now climate change) were first used in scientific publications by Wallace S. Broecker (1975), and it was in 1978 that it was used in newspapers and later in 1992 in official global treaties. So, a clear pattern can be observed that the terminologies, which is identified as frames, travelled from scientific domain to media and then to global political domain.

There only 4 hits for the “inadvertent climate modification” term on Web of Science and 179 hits on “atmospheric greenhouse gas concentrations.” There is little evidence of these two terms being used in public and political domains, but scientific domain has used as 179 hits in scientific and peer reviewed papers show that the term is commonly used in scientific papers. The term “inadvertent climate modification” is only referred to as a historical phenomenon in grey literature and newspapers, but there is no direct evidence that it was used as phenomenon to refer to climate change, but the term atmospheric greenhouse gas concentrations is still used in scientific publications since 1993, while referring to global warming in scientific terms.

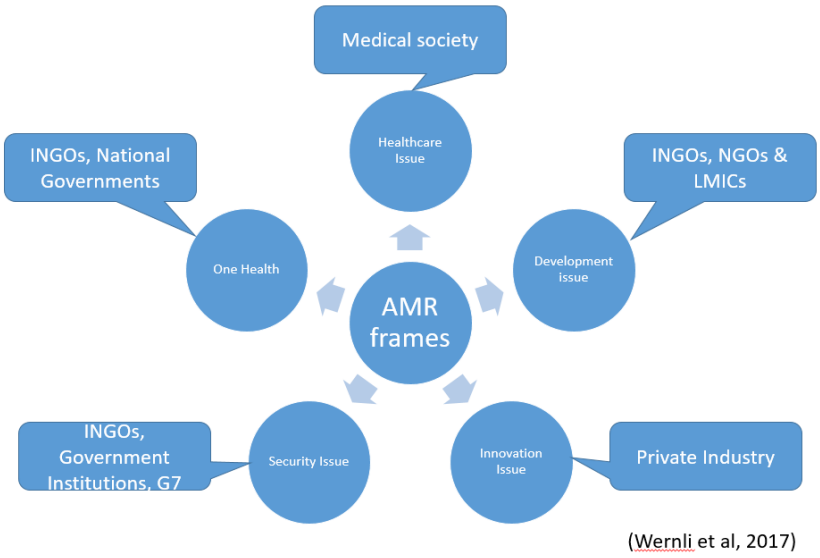
The term climate change is mentioned in almost all 4 million Tweets collected for this study and global warming also in 4 million Tweets.

It is obvious that the term “climate change” and “global warming” as frames for atmospheric greenhouse gas concentrations” has been extremely effective in attracting more attention to the CC debate, as observed both in newspapers and in social media. Since frames can also be a simplification of the language and labelling it differently than its original scientific title, the terms global warming and climate change have been categorized as frames here.

One of the major problems with the fact that AMR NGOs and experts within the advocacy realm has not been able to succeed is because of the way AMR is framed.

6.4.2 AMR frames

Figure 6.4. Visualization of AMR and its frames



(Wernli et al, 2017)

Wernli et al. (2017) have mapped the frames existing within the AMR policy discourse. The five frames that were identified are AMR as a health care problem, AMR as a development problem, AMR as an innovation problem, AMR as security problem and AMR as a one-health problem. NGOs have played a major role in the development framing of AMR, which the most dominant frame still is AMR as a healthcare issue advocated by the medical society. Around 70 NGOs identified in the mapping mostly find AMR as a healthcare or global health issue. Looking at the actors involved in the development of these frames, it is evident that the medical society has the largest influence on the AMR framing issue. Looking at the members of the 70 AMR organizations it is also evident that majority of the employees of these organizations are medical scientist, epidemiologists, specialists in pharmacology, experts from public health and other fields within natural sciences (e.g., all of the members of the ReAct group in all of their regions). Wernli et al. (2017) finds direct relation between the frames developed by these actors and the policies developed at the global level. These frames developed reflects the interest of actors and the advocacy groups have been able to push the agenda to global level. The policy outcomes are also in favor of these actors who have been involved in advocating. The fact that GAP and NAPs are focusing on AMR as a global health issue is because it has been pushed to the agenda by the medical and natural scientist societies. As it can be seen that the role of NGOs have been more dominant only in one of the frames—namely, AMR as a development problem, but the ultimate outcome in GAP for this frame was advocates of this frame was the matter of access antimicrobial medicine. “The GAP underlines that ‘the aim to preserve the ability to treat serious infections requires both equitable access to, and appropriate use of, existing and new antimicrobial medicines” (WHO, 2015; Wernli *et al.*, 2017, p. 4).

Climate Change frames have been vastly designed by many actors, NGOs, researchers, businesses, governments international organizations and many more actors have all contributed to development of different frames. Based on a literature search more than 200 different frames have been identified by actors like researchers, NGOs, journalists, politicians at national and global level (IPCC, 2014d; Broadbent *et al.*, 2016; Allan and Hadden, 2017; Maehle *et al.*, 2021).

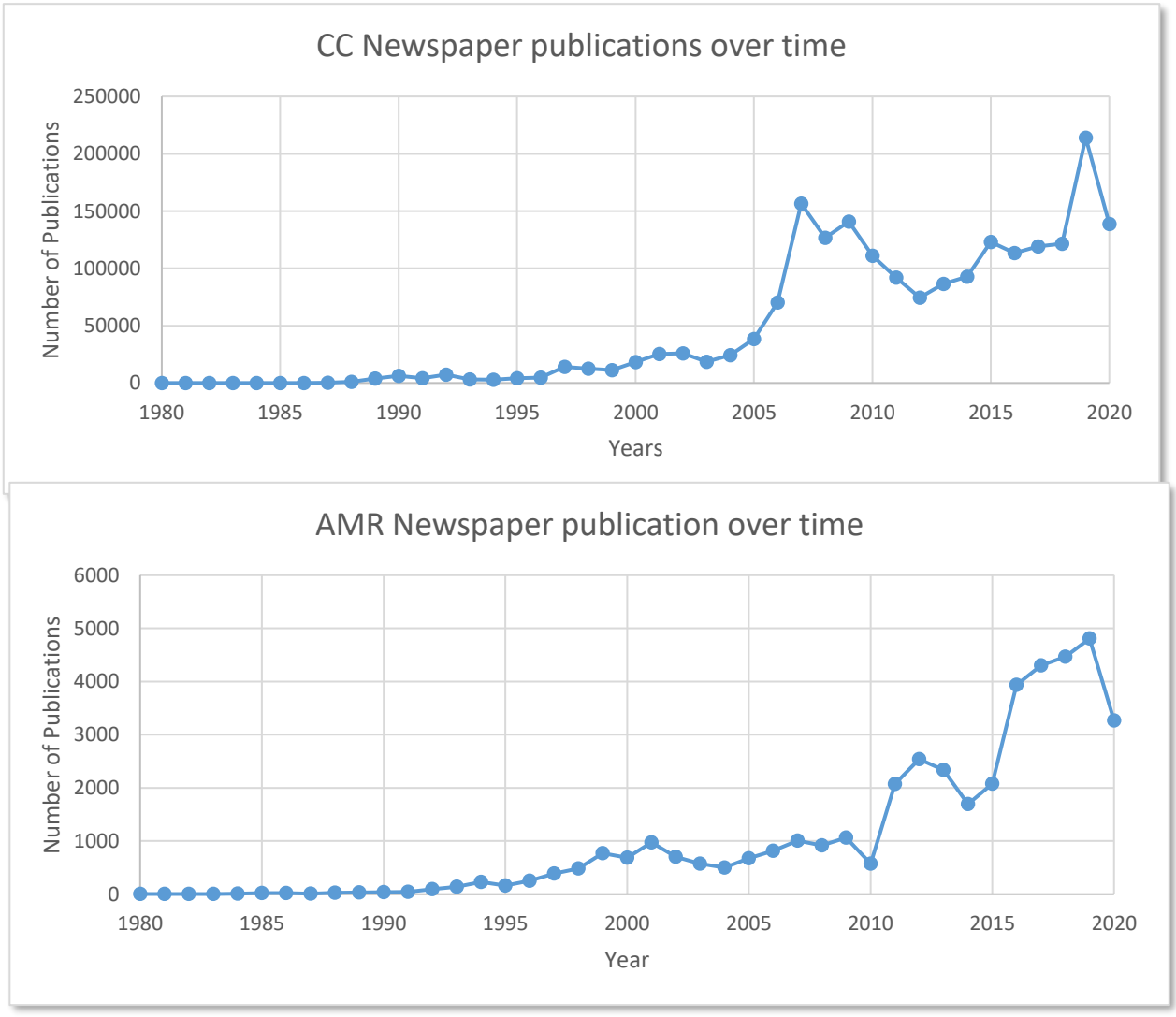
6.4.3 Summary

CC frames are different from AMR in terms of the process of their development, the simplification of language and their strategic positioning and timing. The AMR frames are developed by the expert community, and there is no simplified version of the terminology that would label AMR in an effective manner to attract more interest from actors beyond the scope of the problem or to non-expert audience. Initially, in the years before 1978, CC was framed as an environmental problem, but it had a different name, often referred to as "atmospheric greenhouse gas concentrations" or "climate patterns change." The framing as an environmental problem has made CC popular among advocates of the environment. Once that was established, the new titles "climate change" and "global warming" framed the problem as a new, specific problem with its own boundaries and characteristics. The use of these terms has become very popular since the 1980s.

6.5 Strategic and effective communication by mobilized groups—Coupling of the problem with a perceptible crisis

CC newspaper publications are approximately 440 times more than AMR publications on the print news. According to the keyword search in ProQuest newspaper database using “climate change” or “global warming” and “antimicrobial resistance” or “antibiotic resistance, from the 1960s to now, there are approximately 20 million news articles on CC and only 45,000 on AMR. A staggering of almost greater by a factor of more than 400 more publications related to topics of CC is noticed over AMR. The AMR topic starts to appear on newspapers from 1980s, even though experts have been cautioning of its threat since 1945 (Fleming, 1945). In contrast, the CC debate can be found in newspapers since the 1960s. Both the high number of newspaper publications and the establishment

Figure 6.5. Overview of newspaper publications from 1980s to 2020 of CC and AMR



of CC as one of the debates in media for a longer period make CC news attention extremely different from AMR, which is due to the combination of different occurrences.

One of the reasons why CC has received more newspaper attention can be attributed to *affective coupling of the problem with a perceptible crisis*. The news on AMR has mostly been dominated by scientific findings, where coupling of the crisis with epidemics such as SARS, H1N5 in the early 2000s and coupling with CC in the 2010s and coupling with COVID-19 pandemic in 2019–20 can be observed. Other than these, AMR is coupled with individual cases of deaths due to AMR related issue and another health problem such as failure of heart, TB related infections and etc. However, it can be observed that AMR couplings are either at meta-levels—abstract and vague, or extremely specific to different resistances. None of the two types of coupling have been more effective in terms of portraying the AMR as perceptible crisis as the CC. On the contrary, the CC couplings have not been just relating the CC to a disaster or catastrophe, but the timing and in manner that this coupling has happened have been more effective. These couplings have been happening at a time when an important or relevant event has been taking place and a natural disaster has occurred either at the time of the event of close to that that has been brought to people and policymakers' attention, which has made these couplings perceptible to both public and policymakers. The number and regularity of CC IFEs have also been high and persistent than that of AMR, where there is almost one major IFE every year and IPCC reports have also been combined with these events every three or four years.

The first publication on CC in this database was observed to be in December 1969 in the *Pittsburgh Tribune* stating, "birds can be vulnerable to the effects of human activity and climate change on those habitats."[18] The paper shows how, by 1969, where the AMR debate had not even established itself in newspapers, CC scientists had already started to appeal to public by relating CC to vulnerability of birds—a well-established and timed frame that appeals to people who had just witnessed the birds in tropical islands during their summer holidays. Contrary to that of CC, the first AMR newspaper publication found in this data search was published in the *Boston Globe* in 1981 with the titled "untreatable strain of syphilis feared."[19] The article stated that there are still uncertainties about this

[18] In January, with the holidays behind us, the gray reality of winter sets in. it's a time when many people dream of an escape to a tropical island paradise [derived headline]. (1969, Dec 31). Tribune - Review / Pittsburgh Tribune - Review Retrieved from https://search-proquest-com.ep.fjernadgang.kb.dk/docview/2334573297?accountid=13607

[19] Press, A. (1981, Jul 29). UNTREATABLE STRAIN OF SYPHILIS FEARED: [FIRST EDITION]. *Boston Globe (Pre-1997 Fulltext)* Retrieved from https://search-proquest-com.ep.fjernadgang.kb.dk/docview/294166694?accountid=13607

specific type of resistance happening in real world, but raised cautions that this could lead emergence of uncontrollable form of sexually transmitted disease, if it happens in real world.

Already in the first newspaper articles, two different ways of presenting the crises can be observed. Whereas the CC newspaper has focused more on the matters than appeal to emotions, such as birds and holidays and the AMR is framed as a health problem and as a problem that could happen in the future. The article discussing CC is vague in terms of direct consequences of CC on birds, while the AMR article is scientifically based on the fact, that resistant bacteria to penicillin had already been identified in the labs, but the occurrence of this in real life was a thing of the future and with uncertainty. The idea is not to go too much in-depth with these two newspaper articles, but to illustrate the different forms of communication that has existed in the newspaper environments of the two crises. There is not just a difference of 11 years between the first articles of each phenomenon, but a very different language in presenting the two phenomenon. These differences will be further highlighted in the coming sections, where matters related to different issue definition or framing and their influence on policy attention will be discussed.

A range of codes show that every time there is an IFE on CC and a natural disaster, the disaster is used as an example during the IFE. Almost every major conference on CC and especially the Conference of the Parties (COP) have this trend, where they couple CC to an ongoing or a recent devastating natural disaster. For instance, the Indian Ocean Tsunami, which occurred in late 2004 and killed approximately 227,898 people and resulted in material losses of over $10 billion was used as an example both in the newspapers before the G8 Summit and during the summit in 2004-05 (CNN Library, 2018; Bayne, 2020). Scotland also faced heatwaves leading up to the G8 Summit hosted there, and the heat waves were also used by media outlets as another example, which couples CC to a perceptible crisis. The following quotes can been seen as examples of such debates present in newspapers and also during the G8 summit in 2005.

> *“What is happening in the Indian Ocean underlines the importance of the earth's system to our ability to live safely.” And what we are talking about in terms of climate change is something that is really driven by our own use of fossil fuels, so this is something we can manage." […] The prime minister, Tony Blair, has pledged to make action on climate change a priority during the UK's chairmanship of the G8 group of industrialised nations, which begins tomorrow.*

> *"The way the natural world operates means that terrible things like the tsunami will always be inevitable," said John Wright, a Birmingham University expert in climate change, global warming and weather patterns. […] "No-one in the world is safe," said Mr Wright. "The recent Asian tsunami was caused by an earthquake under the sea.'Such an event is unlikely to take place off the coast of Britain. We aren't close enough to the tectonic plates that shift under the earth, causing such quakes." But there is a distinct possibility of a volcano collapsing in the Canary Islands.*
>
> *A G8 statement reviewed measures to give better early warning of disasters like the tsunami in the Indian Ocean in December 2004, reduce the impact of such disasters and improve humanitarian responses. The G8 promised support for action in hand in existing international bodies, such as the UN and its agencies, rather than proposing measures of its own.* (Bayne, 2020)
>
> *CLIMATE change will bring thousands of deaths to Scotland later this century unless urgent changes are made now to prepare for rising temperatures. Professor Paul Wilkinson of the London School of Hygiene and Tropical Medicine is to warn at a conference next month that in less than half a century the UK will endure the kind of heatwaves that killed tens of thousands across Europe in 2003.*

Chennai floods were another example, which was discussed during COP 21, the Paris conference, in 2015. The newspapers were also full of debates about the Chennai floods, while some argue that it was a result of CC and others disagreed. The newspaper debates before COP21, which argued that the Chennai floods are a good example of the impact of the CC, were also present during the COP21. However, news after the COP21 and during it was different, as there were polarized debates that criticized this coupling. These couplings have not just been used as a case to promote the CC narrative, but they have also been the center of criticism from those who oppose the CC narrative. While the newspapers before COP21 mainly speak about the nature of the flooding with some relation to CC, but it is only after the COP21 that the debate increases and becomes polarized.

Sample quote from news before COP21:

> *The increase in carbon emissions has been causing rapid warming and expansion of this warm pool in the recent decades. "The warm pool has expanded to become double its size, from 2.2 × 107 km^2 during 1900-1980 to 4 × 107 km^2 during 1981–2018," says*

the study. The rate of expansion is concerning—covering an area equal to the size of Japan every year. Why is the Northeast monsoon, which is the lifeline for Tamil Nadu, becoming erratic? Are we witnessing an increase in frequency of tropical cyclones, extended dry periods, and extreme rainfall events? A new study suggests that the Indo-Pacific Ocean is warming rapidly, and there is a 'near tw0-fold' expansion of warm pool covering most parts of Bay of Bengal, which is affecting climatic patterns. The study, led by Roxy Mathew Koll of the Indian Institute of Tropical Meteorology, and published in the journal Nature, reports a two-fold expansion of the Indo-Pacific warm pool—the largest expanse of the warmest ocean temperatures on Earth. The study has found that the expansion of this warm pool has altered the Madden Julian Oscillation (MJO)—a major fluctuation in tropical weather.

Sample quote from COP 21:

In recent years, what we used to think of as extreme weather has become the new normal. It's hard to even turn on the news without hearing about a particularly devastating storm, a drought, a flood, or a wildfire. And some of those storms are storms that we used to experience once every 500 years. Now they've become once every 25 years or even more frequently. In November, the city of Chennai in India experienced the rainiest month in its history. Nearly 300 people died as a result of those floods, 18 who perished after a generator—a generator at a hospital flooded and damaged the facility's oxygen supply. So let me just make it clear the United States stands with our Indian friends and we have extended support and assistance to help address the devastating impact of these floods. (Kerry, 2015)

Sample quotes from newspapers after COP21:

At the COP21 talks in Paris, Chennai has been brought up as an unfortunate exhibit of the perfect storm created by climate change and shoddy urban planning.

Days after the Chennai floods caught global attention during the just concluded Paris conference where world leaders linked such extreme weather conditions to climate "change, the government on Monday said the unusual rainfall that occurred in Tamil Nadu was a "highly localised" event and its attribution to global warming is "not established."

Both 2005 and 2015 saw an increase in CC newspaper attentions and this has been the case in most of the other points that this study has focused on, where newspaper increase and debates within the international conferences have been using couplings as such. These couplings, as seen above, have increase-polarized debate between those in favors and against the CC agenda. The coupling followed by an increase in the debate and a polarized debate in the news is what forms an affective coupling of the problem within the CC debate.

Coupling of AMR is characterized with either too extreme meta-level comparisons or extremely context and individual specific. The meta-level examples of coupling could be AMR's coupling to CC. The coupling of AMR for instance with CC is seen to have gained momentum in 2015 and 2019. Coupling AMR to CC has been one of the most affective couplings for AMR than coupling it with terrorism, or other infectious diseases. Despite that, the coupling had not been as *affective* as those of the CC couplings with natural disasters like the Tsunamis, earthquakes and floods, which can be observed and felt immediately.

The reason they have not been as *effective* is that these couplings have not resulted in a domino effect like that of in the case of CC. The couplings have been used by advocates of AMR agenda like Sally Davies, who is one of the most influential individuals appearing in news on AMR and these examples have been present during the development process of GAP in 2015 as well.

Which shows an intrusion of information from news domain into the policy domain. However, any polarized debate, which would create waves of discussions in media, during or after the relevant events, have not been observed. These couplings have happened for two purposes; one, to define the issue of AMR as a problem similar to CC, which would bring attention to AMR. And second, to guide policy makers in AMR to learn from CC. Bringing the issue to attention of policy makers and the public could happen through the process of issue attribution that links the problem to a solution (Baumgartner and Jones, 1993, p. 27). While comparing AMR to CC the comparisons in the news often apply to similar solutions to CC's global initiatives. For instance, asking for similar organization like IPCC and arguing for binding treaties that have been happening within the CC field.

However, these debates have not created any visible domino impact and have not increased the news publications. Therefore, it cannot be categorized as an affective coupling. CC advocates and scientists use natural disasters as a coupling tool to CC in order to present CC as an easily understood phenomenon, this means that CC by itself is still a complicated phenomenon. Or a phenomenon that many feel it will not impact them. Therefore, comparing AMR to CC does not serve the purpose of

presenting an issue easily to public, even though it does make it easier to understand, but enough to be felt. Since, CC is not one single event that would cause deaths and destructions like that of a Tsunami and flood. Lineman *et al*. (2015, p. 1) also describe the use of terms such as Climate Change and global Warming as vague and they argue that people make sense of these words if they have original understanding and are aware of it. "[H]aving awareness or knowledge of a topic is strongly related to its public exposure in the media, and the emotional context of this relationship is dependent on the context in which the relationship was originally established." So comparing AMR to CC is not just vague, but it also does not establish an appeal to emotions because of the difference in context.

Note the following sample quotes. Newspaper quotes on comparing AMR to CC:

> *The threat to humanity from drug resistant infections is worse than that of climate change, a group of Britain's most eminent medical experts warned yesterday as they called for a global body to be created to tackle the crisis.* (2014)

> *"This is a problem at the scale of climate change in terms of urgency," said Laxminarayan. "But we don't have anything close to the architecture of science to look at this problem, to look at solutions, to look at where the problem is the worst."* (2014)

> *Protests against climate change should be extended to the other greatest threat facing humanity, according to England's chief medical officer, who says an Extinction Rebellion-style campaign is needed to save people from antibiotics becoming ineffective in the face of overuse and a lack of regulation. The threat of antibiotic resistance is as great as that from climate change, said Dame Sally Davies, and should be given as much attention from politicians and the public. "It would be nice if activists recognised the importance of this," she said. "This is happening slowly and people adjust to where we are, but this is the equivalent [danger] to extreme weather."* (Harvey, 2019)

Quotes from the process of developing GAP

> *Some analysts have compared the threat of antimicrobial resistance with the threat from climate change. Both are already here. Both are caused by human activities. And both are global threats that demand global solutions, including solutions to problems that are caused by entrenched industry practices.* (WHO, 2016)

> *There are lessons from other major "public" challenges (e.g., contagious diseases and infections and environmental issues such as climate change—or even clean water and air) that are likely relevant for AMR. The "public" nature of such issues does not, it is evident, imply that sustainable solutions can be delivered by the government sector alone. Public investments that reward and incentivize investment by the private sector, and public-private partnerships are often necessary to tackle major challenges.* (So *et al.*, 2014)

> *Urgent consideration must be given to the structure of a successful international multi-stakeholder initiative. Lessons can be learnt from previously successful models, including the Intergovernmental Panel on Climate Change (IPCC), UNAIDS, Medicines for Malaria Venture (MMV) and HIV Vaccines Trial Network.* (WelcomeTrust, 2014)

6.6 Summary

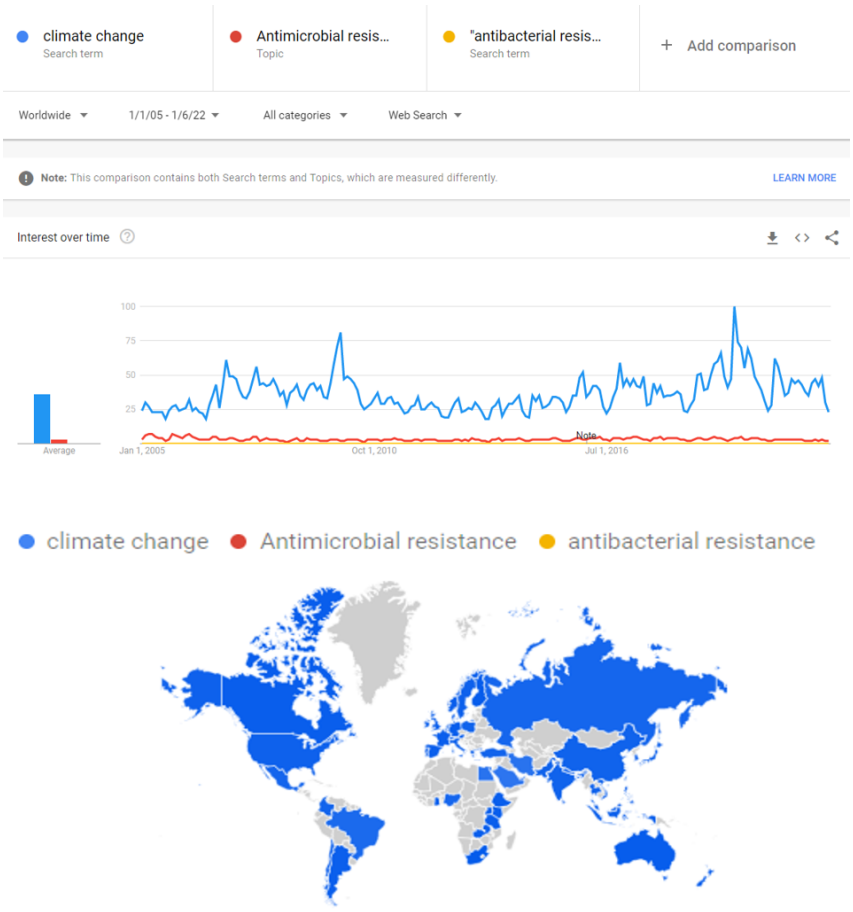
Newspaper publications increase in connection with every Conference of the Parties (COP) held on CC, showing a direct relation between international focused events (IFE) and newspaper publications, especially relating to CC. Moreover, the mobilized CC groups—both political and expert—use the coupling of the CC problem to a perceptible crisis as a strategy in almost every conference, in many instances communicating the problem to public. Although it was difficult to find a direct relation between the coupling strategy and an increase in the number of newspaper articles, this strategy clearly shows this technique to be used in CC communications. Some of the couplings above are not even related to CC, and instead of clearly communicating the effect of CC on natural disasters, they actually create more doubt. However, the newspaper articles are full of discussions about these natural disasters and CC before, during and after every COP. AMR advocates have also tried to apply this coupling strategy. However, there are not yearly IFE on AMR similar to the CC's COP, which does not provide the AMR advocacy networks or individuals a suitable platform to apply this strategy more frequently and effectively. The AMR problem is mostly coupled with CC, which is not as effective when it comes to comparing it to concrete disasters that people can easily perceive.

Chapter 7: Popularization

As stated in the analytical framework, popularization involves noticing a problem and expressing interest in some form of the problem. Popularization is equivalent to interest in this monograph. In this monograph, popularization in all three domains (public, political, expert) is necessary to exist in order for popularization to be considered to exist. The section below first highlights the public, political and expert popularization of AMR and CC, showing the difference in the interest shown to these two topics. Google Trends, newspaper data collected from ProQuest database, and social media data collected through the TCAT API. Keywords ("climate change" or "global warming") and ("antimicrobial resistance" or "antibiotic resistance") were used to obtain data. The section shows how the CC topic is more highly popularized than AMR in almost all categories and all domains.

7.1 Public popularization

Figure 7.1. Google Trend comparison of "climate change" to "antimicrobial resistance", antibacterial resistance" from 2005 until 2022



A Google Trends comparison of AMR and CC that shows interest over time on the topics, starting in 2005, when Google Trends became available, until January 6th 2022 illustrates that the interest to CC is at an average of 36 searches per day, while AMR averages only three. According to Google Trends, the numbers that represent interest over time are: "*Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term.*"

Figure 7.2. The Graph illustrates climate change newspaper publications over time (1980–2020)

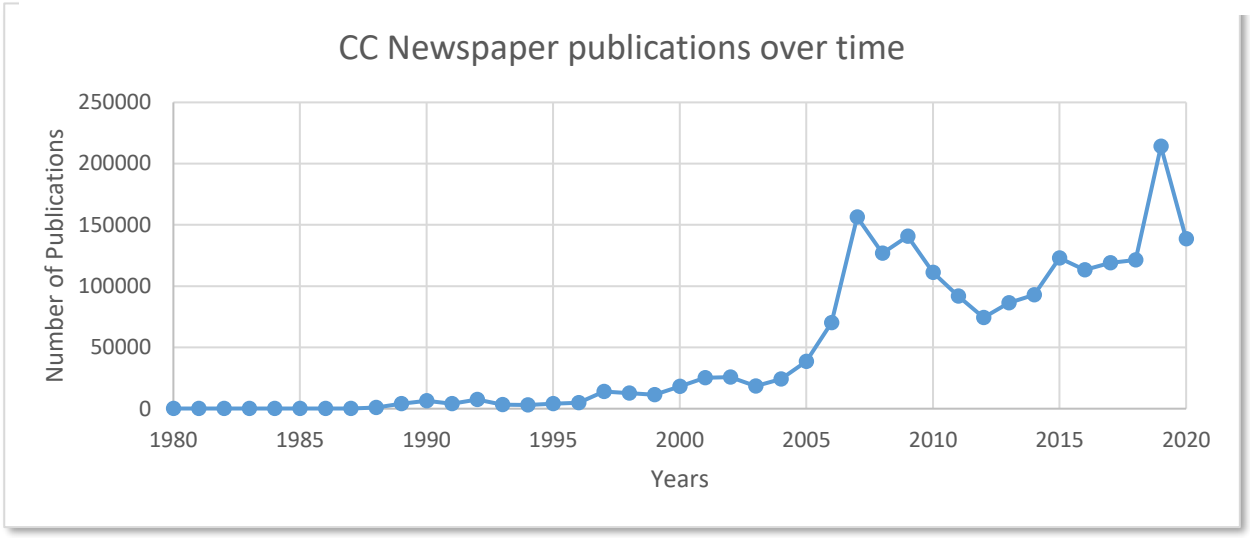
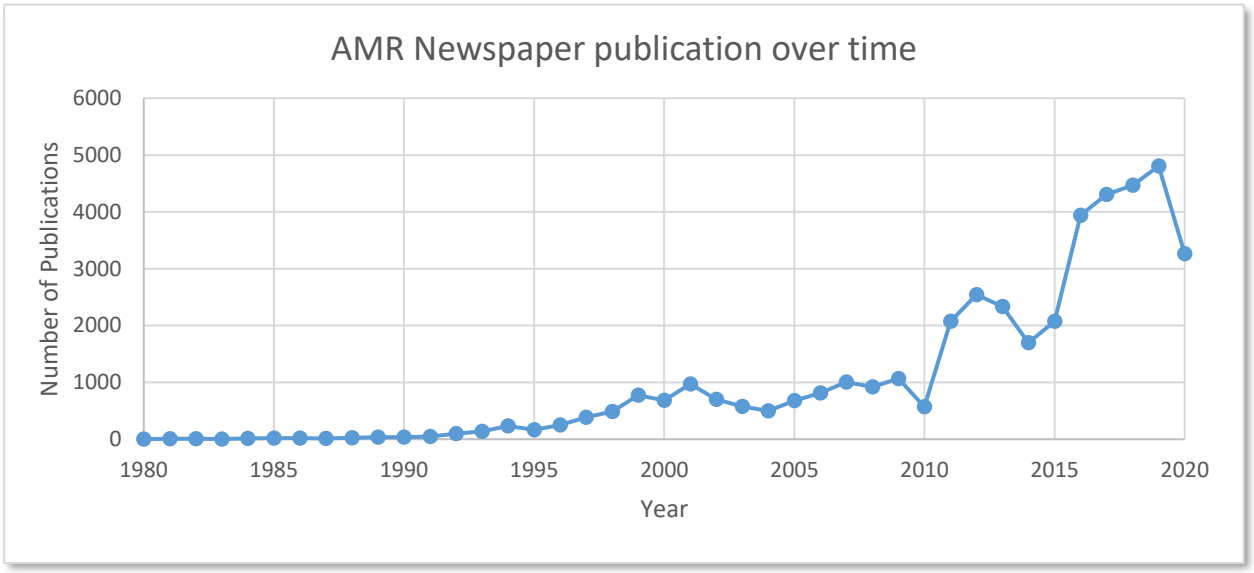


Figure 7.3. The graph illustrates AMR newspaper publications overtime (1980–2020)



The graphs above show the number of newspaper publications on CC and AMR since 1980 until 2020. The increase in number of newspaper articles, including editorials, features and opinion pieces indicates the popularity of the two problems in Media, which represents public, political and expert popularization. The word 'public' is mentioned 4580 times in the 10,000 randomly selected newspaper from the total newspapers extracted on CC. The word 'expert' is mentioned 695 times and 'politician' 1456 times. These are just general terms showing that the newspaper data can represent public, political and expert interest on the topic of CC, but further specific codes are used for each one of the domain's popularization, because these three terms cannot identify public popularization.

After carrying out a coding on Nvivo on terms that define public popularization—namely, “Public concern,” “Public worry” and “Public interest.” “Public concern” was found to have been mentioned 53 times, where the most mentioned phrase was “Public concern about climate change.” “Public interest” was mentioned 38 times, where “Public interest in Climate Change” was the most mentioned phrase and “public worry” was only mentioned three times.

“ Public” in mentioned 6467 times within the AMR data, Expert is mentioned 575 times, Politician was only mentioned seven times. “Public concern” is mentioned only six times, “public worry” was not even mentioned once and finally “public interest” was mentioned 64 times. While the term public interest is mentioned higher than any other terms, a closer look to the phrase shows that the term is mostly referring to Public interest group and public interest advocacy groups. Therefore, it is not equal to the phrase “public interest about AMR” or “Public interest in AMR.”

Figure 7.5. Public interest CC

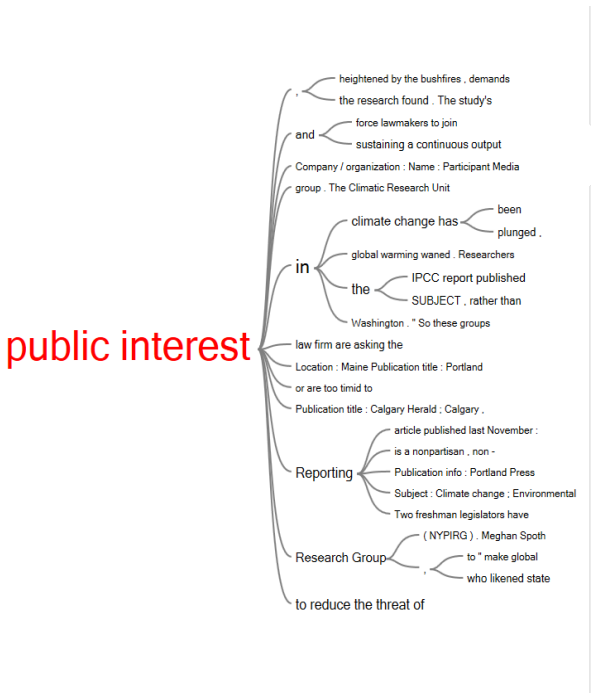
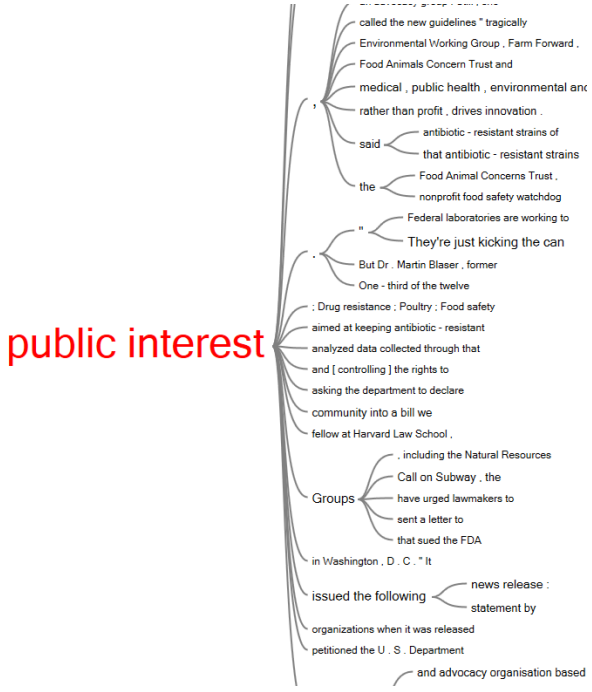


Figure 7.4. Public interest AMR



Overall, this brief analysis clearly indicates that “public interest” in CC extracted from newspaper data is stronger than AMR.

7.2 Political popularization

Political interest codes on CC described in the analytical section that is used to indicate political interest and consequently political popularization shows that the term “politicians say” was coded 1291 times in the randomized gathered number of newspapers. “Heads of states say” was coded 13 times and “the president says” was coded 4528 times and when looked at the codes in broader context of the data, the president is mostly used to a state’s president like John Kennedy, Joe Biden, Barak Obama, Jim Yong Kim, George W. Bush, and many other presidents. The term president is also refers to presidents of other political institutions like UNFCCC and etc. The codes do show political interest as majority of the codes are directly quoting a president of a country or are referring to a president of a county within the topic of CC and most of the other codes that is referring to “the president say” is still speaking about a political position. “The minister says” was coded 3479 times on Nvivo and when observed closely within larger phrases the term refers to several ministers who have participated in CC negotiations at international conferences, climate ministers, and many other ministers such as minsters of agriculture, ministers for environment, minister for energy, minister for culture and sports, minister for ecology and sustainable development, minister of communications and many more ministers.

“Politicians say” is coded 54 times in the AMR newspaper data. “The president says” was coded 1173 times in the newspapers. Although many codes did refer to “the president of a state such as Barak Obama, but the term is mostly used in AMR data as the president of an expert group or institution and president of a company and business For example, “the president for emergency plan for Aids Relief”, “president and CEO for National Psoriasis Foundation”, “president of ASHP Research and Education Foundation. So, even though the 1173 times code is high, it is still not the same as the CC codes, since the majority of codes refer to the presidents of an expert group of institution and not politicians. “The minister says” was coded 382 times. This coding shows political interest to AMR more than “the president say” code. Even so, the minister of health says consists more than half of the codes in this coding as well. Showing that mostly ministers of health’s interest is high in the topic of AMR. When it comes to political interest, politicians have shown more interest in CC than AMR, as shown in the above quotes. While only one specific type of politicians – those who are ministers of health have shown high interest to AMR, the ministers quoted in newspapers for CC are a broad range of ministers, which shows a much greater popularization of CC among politicians.

“Experts say” is coded 2014 times on the CC newspaper data, “experts warn” is coded 25 times, “scientists warn” is coded 85 times on CC newspaper data.

“Experts say” is coded 1148 times on AMR newspaper data, “experts warn” is coded 61 times and “scientists warn” was coded 19 times. While looking at expert interest on AMR, it is observed that the only domain that is somehow close to CC is the expert domain, where the term “experts warn” is 61, which is higher than CC.

While the two above analysis showed Public interest on CC and AMR through a Google Trend search and newspaper analysis, the following section shows public popularization on AMR through a social media analysis.

Figure 7.6. AMR social media data from November 2019 until January 2022

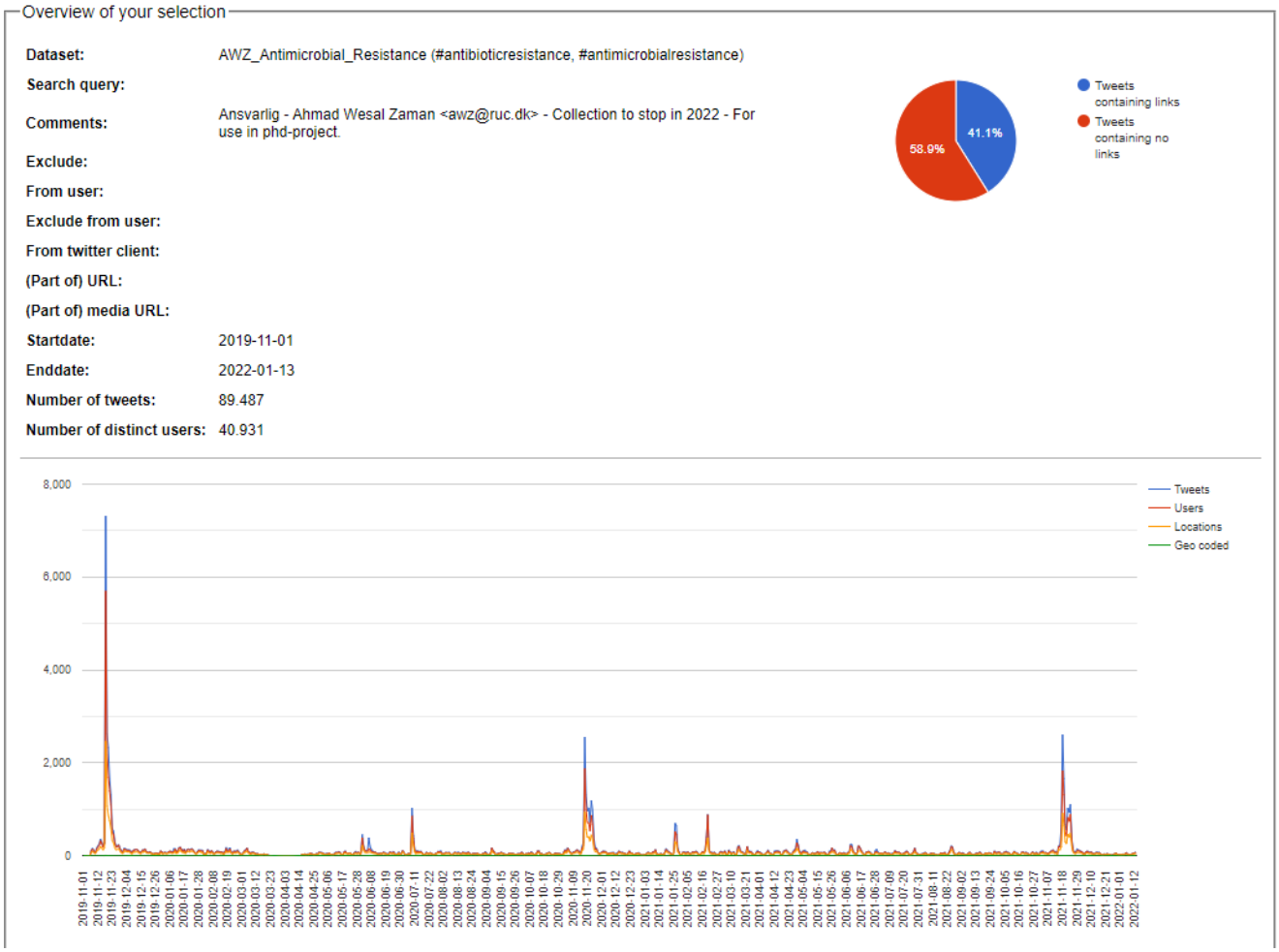
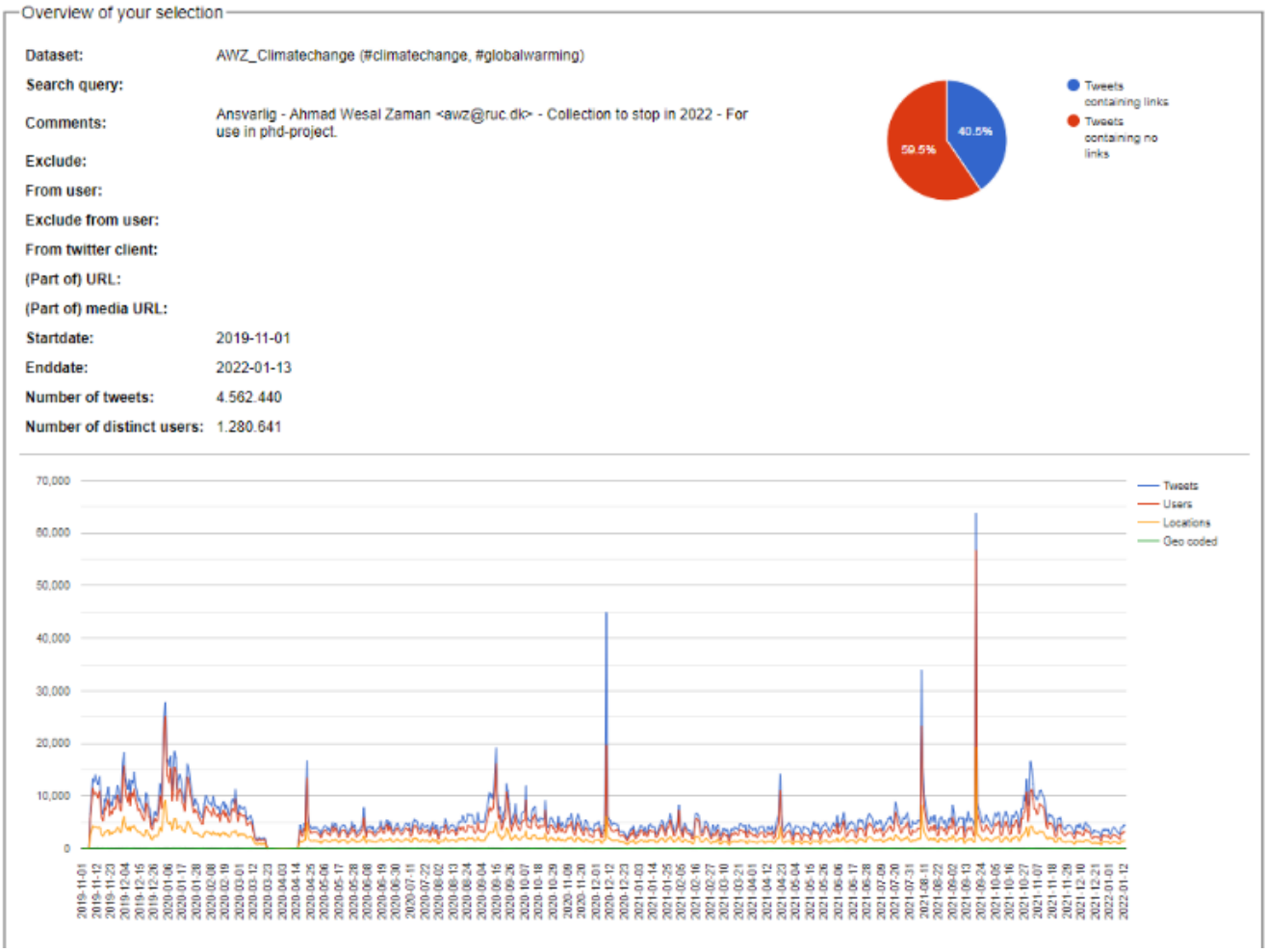


Figure 7.7. CC social media data from November 2019 until January 2022



As illustrated in the two figures above, shows that over the period from November 1, 2019, until January 13, 2022, 40,931 users have engaged in AMR debate and have twitted 89,487 times over all. While 1,280,641 users have engaged in CC debate and have Tweeted 4,562,440 times. The overall view of the social media data shows that CC has received higher popularization, as more users have shown interest in engaging with the topic of CC than AMR.

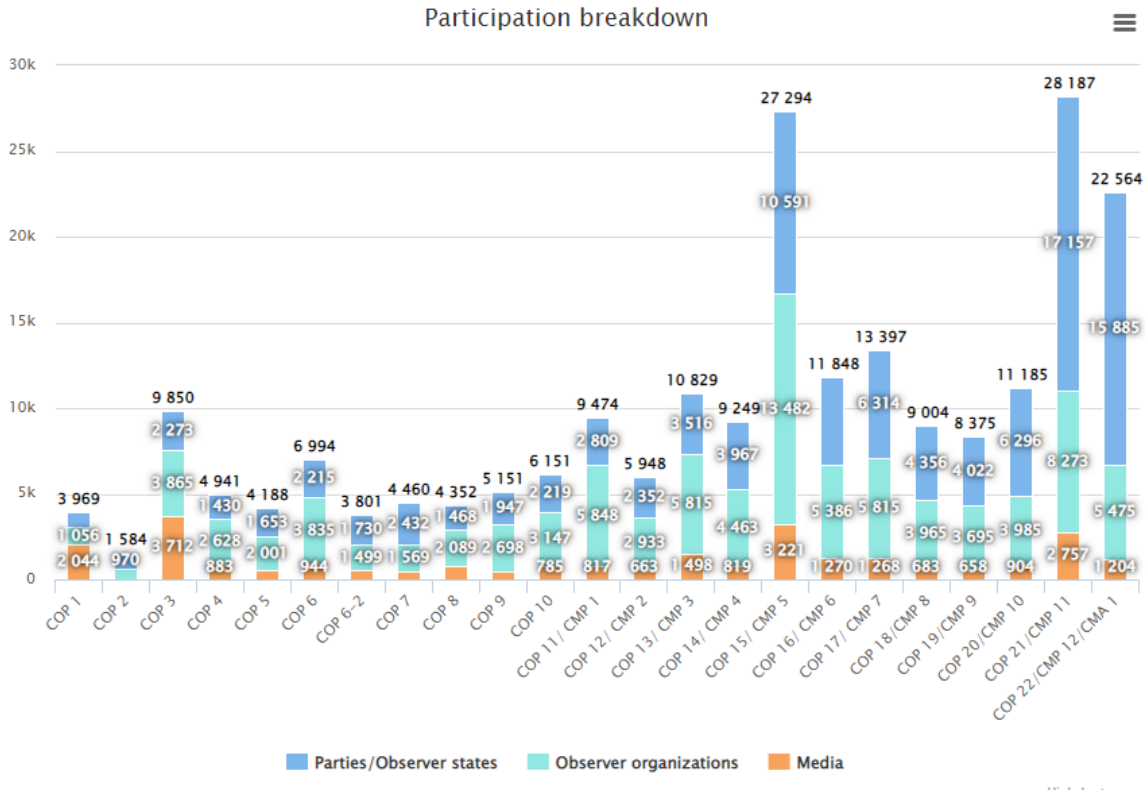
A mapping of NGOs that are interested in the topics of CC and NGOs that are interested in AMR show a highly increased popularization of CC within NGOs than AMR. These NGOs are categorized as being part of the political domain. Although they do not have any decision making power, they

still have strong influence in political decision making, especially at the global level (Thrandardottir, 2015; Morgan, Gomes and Perez-Aleman, 2016).

7.2.1 NGOs and Climate Change

At the UN Conference on the Human Environment in Stockholm in 1972 around 250 NGOs participated as observers (Willetts, 1996; Nasiritousi, 2019). This was the largest of its kind until then and marked the beginning of the NGOs interest into climate agenda. Today that list is around 4766 according to UNFCCC's admitted list of observer NGOs (UNFCCC, 2021). The total number of NGOs working with issues related to climate change is higher than what is mentioned here and it was not identified, because there are many more NGOs that work at different levels from small to medium in terms of their scope of activities.

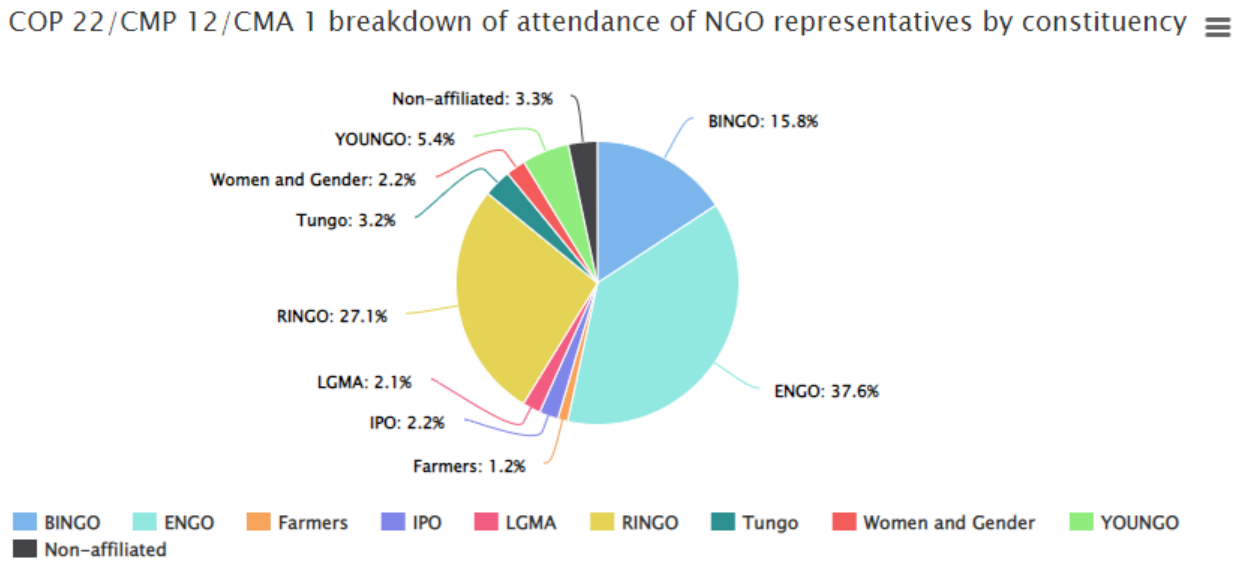
Figure 7.8 Statistics on participation in-session engagement at Conferences of Parties extracted from UNFCCC's official page (UNFCCC, 2021b)



Even based on this incomplete list of NGOs in simple mathematical terms, the number of Climate Change NGOs are almost 68 times more than AMR NGOs. The difference is even more staggering, since CC organizations are both larger in magnitude, (e.g more staff, larger scope of activity) and also

the CC NGOs are more diverse in terms of their activity and also in terms of their involvement with different sectors of society and different sectors of expertise as it can be seen in the figure below. 37% of NGO organizations are Environmental NGOs, 27% are Research and Independent NGOs, 15% Business and Industry and the rest are Women and Gender, Youth Organizations and etc.

Figure 7.9. Pie chart visualizing the constituency of NGOs from UNFCCC's database (UNFCCC, 2021b).



The CC list of NGOs includes youth organizations, businesses and the private sector, gender-based organizations, environmental organizations, indigenous populations, animal protection, farmers' associations and many more (UNFCCC, 2021). NGOs have played a major role in many multi-lateral and multi-stakeholder actions and agreements of the climate change over the years—"from raising awareness of environmental issues and getting them on the international agenda, to influencing outcomes, implementing decisions, and monitoring state commitments" (Raustiala, 1997) (Nasiritousi, 2019, p. 330). While many authors, such as (Willetts, 1996; O'Niel, 2014; Nasiritousi, 2019) study the role of NGOs or INGOs in climate agenda, this chapter adds on to that and takes one more approach by trying to understand how did the issue of climate change expand to these organization.

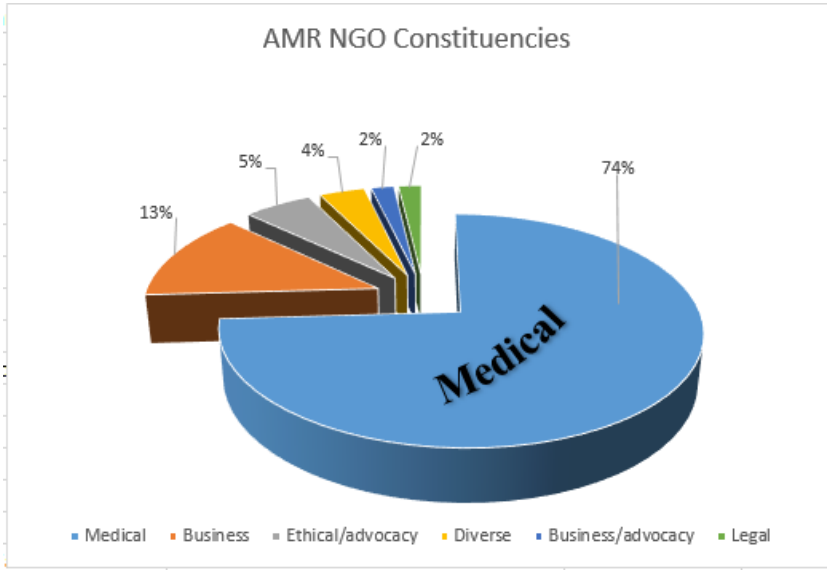
AMR NGOs have also played instrumental role in bringing the issue of AMR to the global agenda, especially since 2013 (ReAct, 2016; Podolsky, 2018b). However, the issue of AMR attention expansion within the expert field and especially NGOs is still quiet insignificant compared to CC.

While the expert community of AMR has been able to bring the AMR issue to the political attention, especially from 2013 and onwards, they have failed in two important matters. One, they have not been able to engage public domain to the discussion of AMR, second, they have not been able advocate for a global agenda and policy implementation that would attract attention as much as other global issues like that of CC.

7.2.2 NGOs and AMR

A mapping of NGOs and civil society organizations carried out in this research was only able to identify around 70 NGOs working with AMR (ESCMID, 2012; Small, 2014; So *et al*>, 2014; WHO, 2015; European Commission, 2016b; ReAct, 2016; Council, 2017). The activity of these organizations are dispersed but can be categorized within Medical, business/advocacy, diverse, ethical advocacy, legal and medical. As it can be seen in the figure below 74% of the NGOs are

Figure 7.10. Illustrates the percentage of NGO constituencies created by the author of the monograph



categorized as medical, as they are either led by medical doctors or work within medical settings that can include human, animal and environmental health settings. Approximately 40 NGOs commented on the Global Action Plan's drafting process in 2014 (WHO, 2015, p. 7). The number of NGOs identified here are even less than the first Climate Conference on Climate Change in 1972, which was about 250.

7.3 Expert popularization

Expert Popularization can be observed by looking at the scientific basis of AMR and CC in the initial section of the analysis. The conclusion to that section is that CC is extremely popularized among experts than AMR. Although expert popularization exists in both, the CC popularization has gone beyond the natural sciences and has become popular among scholars from many different fields. AMR has only recently gained popularity among social scientists and even now it is still limited to popularity among natural scientists and especially those with interest in global and public health studies.

7.4 Summary

Expert, public and political domains display very high interest in the CC problem. While public interest in AMR is almost non-existent, expert and political interest to AMR, despite existing, is very low compared to CC. Therefore, since not all elements of popularization are active and existing, this necessary condition is argued to be missing from the AMR. The lack of popularization is another condition that is hindering the SPE for AMR.

Chapter 8: Polarization

As stated above in the analytical framework, polarization is understood as divisions among actors. It exists, when actors on different sides or poles, disagree, dislike and oppose each other - politically, ideologically and opinion wise. Polarization is argued to be a necessary condition for a suitable political ecology (SPE) in this monograph. The existence of expert, public and political polarization, as main elements of polarization, is considered necessary for polarization to be effective and fully active. Polarization is important because it keeps the discussions of a topic alive and active outside political institutions and policy venues. Without which, the problem could risk being forgotten or ignored, which would hinder maintaining attention. Polarization in AMR is non-existent, while it is an important part of the CC problem. The existence of polarization in the CC problem has contributed in establishing the suitable political ecology (SPE), which has influenced generating and maintaining attention to CC over decades.

The term "hoax" is coded 447 times in the 10,000 newspaper samples. "President" AND "hoax" is coded 4,507 times, "Politician" AND "hoax" was coded 496 times. "Denier" was coded 276 times for CC newspaper publications.

> *A Republican candidate for congress in Louisiana has released a campaign video, subtlety titled "Global Warming is a hoax" that is, unexpectedly, about her belief that global warming is a hoax.* (Nuzzi, 2014)

Social media data collected through T-CAT API reveals how, from November 2019 to August 2021, CC's social media domain, limited to the hashtags; #climatechange and #globalwarming, has registered approximately 3,553,948 Tweets from approximately 1,039,421 users. In contrast, AMR, limited to hashtags; #antimicrobialresistance #antibioticresistance, has only registered approximately 71,552 Tweets from approximately 34,727 users for the same period. The average overall Tweets per source is 126.84 on AMR and 594.95 on CC, indicating that the CC nodes are almost five times more active on Twitter than users discussing AMR.

The network analysis was set to identify the top 500 users in the data, and after conducting a *clustering coefficient or modularity test* on approximately 1.5 million Tweets, 37 different communities were identified within the CC. Using similar parameters on Gephi that were applied to CC analysis, the AMR analysis was carried out on 28,000 Tweets obtained from T-CAT and, ultimately, only 13 communities were identified. The CC network is also denser than the AMR:

The density score for AMR is 0.007 and 0.015 for CC, implying that the CC network is more than twice as dense as the AMR network.

The two largest modularity classes (CC communities) mostly consist of individuals, and the third largest community is mostly made up of organizations. Even though there is interaction between the three communities, most of the interactions occur in the first two of them, among individuals. In contrast, the largest AMR community mainly consists of organizations, and almost no community was identified to be formed by ordinary individuals interacting with one another like in the CC communities. When studying the AMR nodes, every individual in the network is either a natural scientist, medical doctor, or someone who is somehow related to an organization or company working with AMR-related matters.

The most influential nodes in the two networks are the World Health Organization (WHO) in the AMR network, which is the most mentioned node (4,808 mentions), while Greta Thunberg (18,073 mentions) is the most mentioned node in the CC network.

The brief overview here establishes that the AMR Twitter engagement is extremely low compared to CC on Twitter. The CC topic has gone beyond the immediate scope of the problem, as many individuals without direct ties to the CC research or political organizations interact with one another on the topic. However, the AMR is still only limited to the individuals and organizations within the immediate scope of the problem. The sections below take the analysis deeper with qualitative analysis.

A 2015 country survey carried out by WHO states that the average person does not fully understand what causes antibiotic resistance and what to do about it (World Health Organization, 2015). The survey from 2015 and the observations above clearly indicate that antibiotic resistance (ABR) and AMR advocacy networks and organizations have not been able to engage actors effectively beyond the immediate scope of the problem.

8.1 Public and political polarization in CC

This section looks at how polarization in relation to the CC problem has contributed to increasing engagement to CC debate.

With 18,073 mentions, Greta Thunberg is the most mentioned node within the CC network. Thunberg, a teenage Swedish environmental activist and founder of the Fridays for Future movement, joined Twitter in 2018 and has since collected more than 4.1 million followers. Her most infamous Twitter interaction was with U.S. President Donald Trump, which resulted in a so-called tweetstorm. After Time Magazine named Thunberg their Person of the Year for 2019, Trump Tweeted:

> *So ridiculous. Greta must work on her anger management problem, then go to a good old-fashioned movie with a friend! Chill, Greta, chill!*

Immediately after this Tweet, Thunberg changed her Twitter bio to:

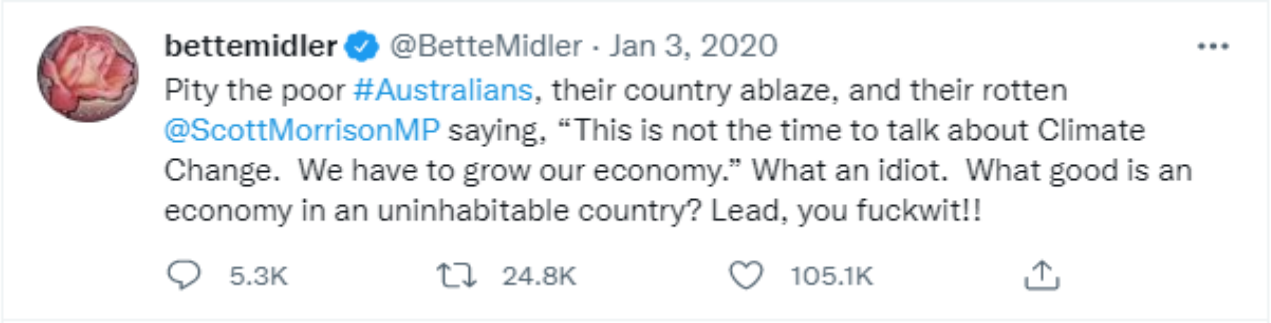
> *A teenager working on her anger management problem, currently chilling and watching a good old-fashioned movie with a friend.*

This interaction followed a number of Tweets between Thunberg and Trump, resulting in millions of Twitter interactions (Tweets, Retweets and likes). The matter transcended social media and became an issue that was even discussed on popular traditional media outlets like *The New York Times*, and several Television programs in the US and around the globe (e.g., CNN, BBC). Both individuals also attended the Climate Action Summit in September, where the US did not even make a statement whereas Thunberg delivered a full, emotional speech, at one point saying:

> *You have stolen my dreams and my childhood with your empty words. And yet I'm one of the lucky ones. People are suffering. People are dying. Entire ecosystems are collapsing. We are in the beginning of a mass extinction, and all you can talk about is money and fairy tales of eternal economic growth. How dare you!* (Thunberg, 2019)

Thunberg's 2019 clash with Donald Trump attracted Tweets from her supporters and opponents alike. Hashtags like #climatcriminal, #climatesaviors and #tiredearth are common among her supporters, whereas #climatehoax and #climatebrawl are examples of the hashtags common among her opponents. There were more than 100,000 Tweets and Retweets of their (Re-)Tweets from a mix of their respective supporters (and opponents). Even though Thunberg was named Time Magazine's Person of the Year, what actually created the tweetstorm was the fact that Trump, the former U.S. President, attacked her on Twitter. The Trump-Thunberg interaction also dragged millions of their respective followers into the debate. This resulted in increased attention not just to the two individuals but also the CC issue. The fact that Thunberg changed her Twitter bio in response to a Trump attack can be viewed as both creative and politically skillful. Likewise, Trump's attack on Thunberg, which

his followers and opponents alike find catchy and provocative, also attracted extensive attention. Both Trump and Thunberg can therefore be considered *digital individual advocacy entrepreneurs*, and members of the *affective public* who have contributed to the increase of debate on CC on Twitter. The heterogeneity of the network and the division in political ideology have indeed resulted in higher participation and, thus, higher public and political attention.



Scott Morrison (Twitter ID @ScottMorrisonMP), the Australian Prime Minister at the time when the data for this chapter was collected, is the second most-mentioned user in the network above. He has been mentioned 14,255 times using the #climatechange and #globalwarming hashtags. Morrison faced a backlash after his comment that "this is not the time to talk about Climate Change" in 2019 during the Australian bushfires. He argued that there is no direct link between Australia's greenhouse gas emissions and the unprecedented Australian bushfires (Karp, 2019). Morrison's comments were not well received by many on social media, and while the backlash provoked thousands of Tweets, where many ordinary users, mainly people who were affected by the bushfires, including celebrities, took to Twitter to condemn his words. For instance, the Tweet above by American singer Bette Midler received over 130,000 reactions within hours of being posted. One week after the Twitter backlash, Morrison's senior ministers discussed how to reposition climate policies in a cabinet meeting (Martin, 2020). Although no solid CC policy was proposed immediately after the backlash, combined with the Australian bushfire disaster, the Twitter backlash did result in bringing the issue to the attention of both the public and the Australian cabinet. Morrison also criticized Thunberg's stance, stating that it caused "needless anxiety" for Australian children (Murphy, 2019). Every one of Morrison's Tweets on CC provokes many reactions from his supporters and opponents alike, much like with the Bette Milder Tweet. [20]

[20] One example of Scott Morrison's Tweet on CC: https://mobile.twitter.com/ScottMorrisonMP/status/1193419641705492480

8.2 Lack of public and political polarization in AMR

Most of the top Twitter users who engage with the hashtags #antimicrobialresistance and #antibioticresistance are international organizations. WHO is the most mentioned organization, with 13,540 mentions, the U.S. Center for Disease Control (CDC) (@cdcgov) is the second-highest mentioned, with 2,065 mentions in the AMR network. The only two individuals making the Twitter top-10 in the AMR network are Tedros Ahdanom Ghebreyesus (@DrTedros), who is the director general of the World health Organization, and Ángel Rod-Villodres (@1797angel), who is a clinical microbiologist. While Dr. Ghebreyesus is mentioned 2,000 times and RodVillodres 1,300, none of their AMR-related Tweets has ever generated more than 100 reactions.

Even the most prominent AMR advocate, Professor Dame Sally Davies (@UKAMREnvoy), who was formerly the Chief Medical Officer for England, has not generated significant reactions. While looking at the AMR network above and the users, there are almost no individuals outside the immediate scope of the problem who are able to establish a large network. Most of the users within the AMR network are either an organization or an individual working with AMR.

Twitter users working with AMR engage in scientific debates to persuade people and policymakers of the dire consequences of AMR. Their Tweets do not leave any sense of a polarized debate, nor do they make statements that could possibly trigger any ideological or dramatic debate. Only those within the medical community or those within the natural sciences, who are either working with AMR or are affiliated with a project directly, engage in social media debate on AMR.

What is interesting here, however, is how, while there is less interaction among the network itself within AMR, the AMR advocates are primarily targeting WHO. Even though AMR policy advocates have not been successful in terms of building the network beyond the immediate scope of the problem, they have been successful communicating directly with WHO. However, during the interviews with the WHO social media team in their regional offices, interviewees stated that they mostly focus on information dissemination and external communication to the public rather than receiving information on social media. The only times in which they focus on information received is when they are looking for post performances to get a general view of the WHO's reputation and to clarify health messages to public (Interviewees 1 and 2). Both interviewees insisted that they do pay attention to information from "well-known individuals," especially if it is controversial.

Interviewee 1 stated:

> *If a well-known individual kind of puts out information that might be against what we would advise, or attack us or maybe something like that, then we will definitely be kind of tracking to see what's going on and what kind of rumors are circulating. We might not necessarily reply to it on social media, but we will definitely be checking it internally.*

Interviewee 2 stated:

> *We mostly use social media for information dissemination. But if there is false information or rumors that are putting WHO's reputation at risk—and especially if it is coming from a popular social media figure—then we do take that into consideration and look at ways to approach it.*

Both interviewees from WHO confirm their use of social media for information dissemination and communication among partner organizations. However, the only time they pay attention to the received information is when it is from a "well-known individual" and there is some sort of controversy. The interviews also make clear that Twitter performance also matters to WHO, so if a Tweet receives more likes and Retweets, they do pay attention to it and monitor it.

Interestingly, no independent advocate or person who is not affiliated with any of the organizations dealing with AMR or not an expert in microbiology or medicine was identified in the network. This reflects how the AMR discussion on Twitter has not gone beyond the expert domain, and the general public is not yet engaging with the topic. The AMR debate is highly technical and limited to experts and AMR practitioners from different disciplines rather than ordinary people with moral, ideological and political concerns, as can be observed in the CC debate.

None of the top 200 AMR hashtags has been able to spark any controversial debate that includes the ordinary public or affective publics. The only time the use of the hashtags #antimicrobialresistance, #antibioticresistance or #amr has increased has been during the WHO's AMR awareness week. Even looking at the Tweets in that period, no major controversy or polarization can be identified. The only slightly polarized discussion of the AMR issue has been between the human and animal industries using antibiotics. Taking 1,000 randomly generated Tweets from the 28,000 total Tweets shows how the opposition between those working in the animal business industry and human sciences is the only major controversy on Twitter regarding AMR. The following Tweets are examples of this slight polarization.

> *@FAO: Healthy animals 🐄🐓🐐 do not need antibiotics or other antimicrobials. #AntimicrobialResistance #WAAW2019 https://t.co/hNUKGEzAn0*

This Tweet has triggered 55 Retweets and 106 likes on Twitter, which is still a very high number compared to other FAO posts concerning AMR. Nevertheless, there is no debate with opponents, and the Tweets have not triggered any significant tension between the two opposing groups.

Another Tweet shows how the food industry, which relies heavily on animal farming, occasionally interacts with the topic, but even this does not produce any major increase in the network engagement.

> *RT @ConsumerReports: When food animals like cattle are given antibiotics they don't need, it contributes to #AntibioticResistance that threatens public health. How does your favorite fast-food chain fare on our latest #chainreaction scorecard? #USAAW2019 https://t.co/MaHJbovpNN*

This Tweet led to a very brief discussion between Twitter users, where two users have criticized the @ConsumerReports claims without receiving any reply, Retweet or the like from other users. In contrast, when looking at CC, a high number of Tweets engaging with the two polarized groups, as witnessed by the Greta Thunberg Tweet above, the Tweet has received thousands of likes, Retweets and replies, generating a debate and hence increasing the number of participations in the network and in the CC debate.

In summary, as observed above, the Tweets have been dramatic, highly emotional, and they have further polarized the CC debate. It is also worth noting how politicians on both the national and global levels respond to social media controversies.

As one of the most leading global health crises of our time, AMR has received less social media attention than the leading environmental crisis of our time: climate change. The AMR advocates are limited to expert-oriented individuals and groups, who have been unable to bring AMR to the attention of the public outside of the immediate scope of the AMR problem on Twitter. The very scientific nature of both the advocates' communication with the public and organizations has prevented any dramatic and aesthetic presentation of the AMR problem, which could otherwise possibly result in any ideological and controversial debate that could increase Twitter engagement among "ordinary" users. This has prevented AMR from receiving more public attention on social media as well as from failing to capture the attention of the WHO social media team. The team

monitors Twitter and other social media outlets on a daily basis, and they pay attention to the information received on social media only if a post performs well or if a controversy goes against WHO recommendations. AMR networks can be identified as issue publics that are clear of any affective action that might cause ideological debate. This has resulted in smaller communities, since the communication among the nodes is very low, but communication directed at organizations like WHO and CDC remain high.

In contrast, the CC digital policy advocacy has been dramatic and aesthetic in presenting the CC problem, and they have therefore been successful in stimulating attention to the problem. Individuals like Greta Thunberg and Donald Trump, who have been on the opposite poles of the debate, have contributed immensely to the increased CC debate on social media. The digital policy entrepreneurs of CC have been able to build polarized networks that go beyond the immediate scope of the problem.

Ideological interactions among the CC believers and deniers have formed affective publics that have resulted in increased interactions among the ordinary public on Twitter. The heterogeneity of the communities in terms of ideology has contributed to increased attention to CC on Twitter.

8.3 Expert polarization in CC and lack of it in AMR

Newspaper data shows how, especially in the 1980s and 1990s, scientists were polarized in the climate science debate. There were two (or three) main groups of scientists discussing climate science. On the one side were those arguing that their scientific findings about climate change and global warming were accurate and who presented their findings as "facts." On the other side, were two groups of scientists, the first consisting of climate-change deniers and the second consisting of those who were in doubt about the findings. There were scientists who were still doubting the climate science, but were not denying the findings. There were scientists who were showing strong opposition to the findings. The latter group were presenting the climate findings as "theories" and avoiding the term "fact" (Monbiot, 2009; Keane, 2019; Powerll, 2021). Marty Hoffert was one of those scientists who used to work for major oil industries back in the 1980s. They found models that strongly contributed to the argument that the use of fossil fuels was causing changes in the climate. After his company's (Exxon) reaction to his findings, which were not to Hoffert's satisfaction, he became a strong CC advocate (Keane, 2019). There are several examples of scientists like this who have turned against their companies in the newspaper data (Monbiot, 2009; Keane, 2019; McGreal, 2021). There is also large evidence in grey literature, which has not been systematically analyzed for this project; but a lot of reports from organizations such as Greenpeace, Friends of the Earth and many other NGOs claim to reveal that many funding organizations have supported anti-climate research over the years.[21]

The newspaper data includes a lot of quotes from people claiming to be experts who either deny Climate Change or argue for it. Although it is difficult to show the exact level of this polarization, it is certain that there is a rift or polarization between CC experts, and there are scientists (or self-proclaimed scientists) displaying strong affection in the CC debate.

In contrast, there is no evidence of such polarization in the newspaper data, social media or archive data revealing any such rift between scientists on AMR. Although many names were associated with AMR research, including Assistant Professor of Medicine Cesar A. Arias, M.D., Ph.D, Dame Sally Davies, Otto Cars, Ramanarian Laxminarayan and many more, who have received recognition for their work, either in the form of awards or mention as main expert-advocates who have strongly warned of the dire consequences of AMR. However, there is very little evidence of any soft political or emotional affection to the AMR problem. Although the Twitter data on AMR does show some of

[21] For these refer to these organizations websites: e.g., https://docs.google.com/spreadsheets/d/1JOcU8NPZYCshtxXJJb6hTlPAAhdP-g8yn8_J52Fauek/edit#gid=1558376028

the language used in Twitter engagement to raise attention to AMR. For instance, words such as "ticking time bomb" and "the silent pandemic" have been used, but the Tweets do not produce the same reaction as is the case with CC.

8.4 Summary

In summary, as observed above, the Tweets have been dramatic, highly emotional, and they have further polarized the CC debate. It is also worth noting how politicians on both the national and global levels respond to social media controversies.

As one of the most leading global health crises of our time, AMR has received less social media attention than the leading environmental crisis of our time: climate change. The AMR advocates are limited to expert-oriented individuals and groups, who have been unable to bring AMR to the attention of the public outside of the immediate scope of the AMR problem on Twitter. The very scientific nature of both the advocates' communication with the public and organizations has prevented any dramatic and aesthetic presentation of the AMR problem, which could otherwise possibly result in any ideological and controversial debate that could increase Twitter engagement among "ordinary" users. This has prevented AMR from receiving more public attention on social media as well as from failing to capture the attention of the WHO social media team. The team monitors Twitter and other social media outlets on a daily basis, and they pay attention to the information received on social media only if a post performs well or if a controversy goes against WHO recommendations. AMR networks can be identified as issue publics that are clear of any affective action that might cause ideological debate. This has resulted in smaller communities, since the communication among the nodes is very low, but communication directed at organizations like WHO and CDC remain high.

In contrast, the CC digital policy advocacy has been dramatic and aesthetic in presenting the CC problem, and they have therefore been successful in stimulating attention to the problem. Individuals like Greta Thunberg and Donald Trump, who have been on the opposite poles of the debate, have contributed immensely to the increased CC debate on social media. The digital policy entrepreneurs of CC have been able to build polarized networks that go beyond the immediate scope of the problem.

Ideological interactions among the CC believers and deniers have formed affective publics that have resulted in increased interactions among the ordinary public on Twitter. The

heterogeneity of the communities in terms of ideology has contributed to increased attention to CC on Twitter. Expert polarization can also be observed within the CC, but not within the AMR problem.

Chapter 9: Suitable Political Ecology

This chapter presents the analysis of the suitable political ecology (SPE), summarizing some of the main findings of the previous chapters and then adding the analysis of the most notable events and factors consequential to the existence of the SPE. The SPE is the determining factor in explaining the difference in global attention between antimicrobial resistance (AMR) and climate change (CC). Global attention between AMR and CC is different due to the difference in the SPE.

For SPE to exist, all of the conditions—*scientific basis, mobilization, popularization* and *polarization*—must exist in the three domains. The analysis chapters above show how CC has achieved SPE where all of the necessary conditions exist, and because of which the three domains are activated, working either homogenously or heterogeneously, and contributing to *global attention*.

Figure 9.1. Illustration of the existence of the necessary and the sufficient conditions

Scientific basis	
Climate Change	Antimicrobial Resistance
√	√*

The necessary conditions	**Mobilization**		**Popularization**		**Polarization**	
The problems / **The domains**	**AMR**	**CC**	**AMR**	**CC**	**AMR**	**CC**
Expert	√	√	√*	√	**X**	√
Public	**X**	√	**X**	√	**X**	√
Political	√*	√	√*	√	**X**	√

Suitable Political Ecology	
Climate Change	Antimicrobial Resistance
√	**X**

Before presenting the analysis in this chapter, it is important to indicate that global attention can exist without the SPE in other cases. However, when it comes to transboundary, complex and creeping crises, SPE is sufficient for achieving *global attention*. Since global attention to both AMR and CC exists, the SPE also exists. However, global attention to AMR and CC is different, and this difference is explained by the difference in the SPE.

As stated in the previous chapters, a scientific basis is necessary for a complex and creeping crisis to emerge as a problem. Scientific facts are not the only thing that contributes to the emergence of a problem, as aspects like framing also play a role; an issue that exists, even if it is scientifically sound, does not warrant attention until it is considered to be a threat, a concern and ultimately a problem that must be addressed or resolved. CC and AMR have scientific bases, not just as issues but also as problems. The respective scientific bases of CC and AMR verify the threats that need to be addressed. Currently, both AMR and CC have solid scientific bases, although the paths to arriving at these bases have been different for the two areas. Since its emergence in the 1940s, AMR has witnessed little contestation or divisions among the experts in the relevant field. Expert consensus on the AMR problem existed from the very beginning, and there has been little or no scientific disagreement, neither regarding the nature of the problem nor the threat it poses. In contrast, experts have been divided over the scientific basis of CC, the threat it poses and the responses to it.

One of the most important events to zoom in on is the emergence period of both AMR and CC and the role of redundant advocacy networks and groups during their emergence. The analysis shows that when CC was emerging as a problem, there were several redundant advocacy setups from other movements, which have joined the efforts to tackle the CC problem. These redundant advocacy setups have played an important role in making the mobilizations more effective, contributing to popularization and planting the seeds that have fueled later polarizations. The AMR problem, despite being scientifically very solid, has not been successful in terms of effective mobilization that goes beyond the immediate scope of the problem. The limited advocates of AMR, who are mostly expert advocacy networks (unlike the CC advocacy networks, which are much more inclusive and diverse at the same time), have struggled to achieve the SPE.

The 1970s was the decade that paved the way and provided the perfect kick-off for the current strong global attention paid to CC.

Four main events contributed to the initial stages of the emergence of CC as a global problem: A) Major concerns about the environment existed, which scholars also refer to as the rise of environmentalism (Beeman, 1995; Aidt, 2005). B) A strong advocacy coalition of antinuclear movements (especially nuclear disarmament groups) were searching for new agendas (Wittner, 2003). C) The demand for global action against environmental concerns was increasing, where large public demonstrations to protect the earth were taking place around the world (Library of Congress, no date). D) The willingness for global cooperation among many national level governments existed, mainly because of increasing pollution, use of chemicals etc. AMR has been missing a similar setup to the aforementioned events. Since the very beginning and despite the discovery of penicillin, initial indications of resistant bacteria and constant warnings by medical experts, the AMR problem has stumbled out of the gates, so to speak.

AMR first began receiving significant attention around the year 2013, but even that was short-lived compared to CC. As COVID-19 and other global problems emerged, attention to AMR seems to have waned. A willingness to tackle the AMR problem had been created at the global level, but that was due to the efforts of the expert advocacy coalitions and policy brokers, who are considered as the immediate scope of the AMR problem. What had been missing during this period was the existence of a similar setup like that of the CC in its early stages. A setup of advocacy coalitions, individuals and organizations who are well established advocating for another major global problem, whereas either their goal has been achieved or there is not more they can do; a redundant but transformable setup that could be moved toward the AMR problem.

When the United Nations (UN) was formed after World War II in 1945, there was little concern about environmental matters at the UN level; as a matter of fact, environmental matters were dealt with in many different UN agencies (Polletta, Keck and Sikkink, 1999, p. 122). It was not until 1969 that the first Committee on Problems of the Environment (SCOPE) was created (ibid.). However, the 1970s witnessed an astonishing surge of environmentalism at the national and global levels. The first Earth Day was observed in 1970 in the US, where an estimated 20 million people attended the event, the largest of its kind at the time (Library of Congress, no date). Germany's first green movements started appearing in the 1970s (Papadakis, 2014), the UN Conference on the Human Environment was held in 1972, where 122 countries participated and 250 observer NGOs took part (UN, 1972), and the final

outcome of the conference was the establishment of United Nations Environment Programme (UNEP) 1972 (UNEP, 2021).

In contrast, larger concerns were growing on issues relating to air pollution, where Europe faced the acid rain controversies (Rosencranz, 1986). Moreover, huge concerns existed among the public over the testing of nuclear weaponry; consequently, antinuclear movements surged in different parts of the globe, which some scholars argue to have directly impacted the establishment of green parties in the 1970s (Barry & Frankland, 2002).

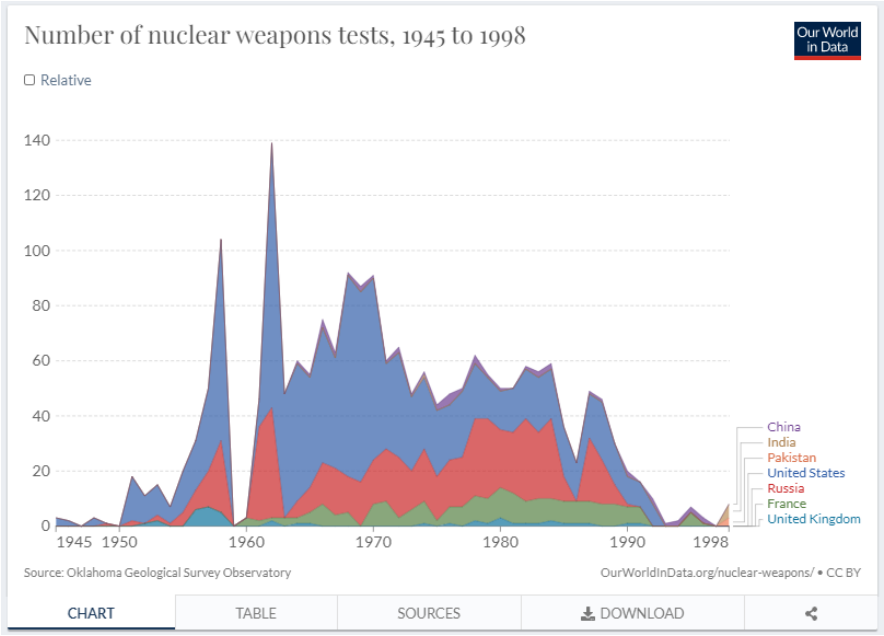
Overall, three important factors have resulted in a strong suitable political ecology for CC: 1. Public concern about the environmental problems, 2. Existence of advocacy coalitions, networks and/or groups searching for new agendas and finally, 3. Willingness for international coordination among countries on the topic of CC. The following sections will go through each one of the conditions in CC first, then a comparison of the CC suitable political ecology will be presented to AMR.

9.1 Anti-nuclear movements and their role in Climate Change Agenda

The initial suitable basis for the CC agenda consisted of the anti-nuclear movements and the anti-nuclear agenda in general, concerns regarding the impact of nuclear weapons on the environment, funding scientific studies of the effects of nuclear weapons testing, combined with the individual interests of experts.

One of the most important events that at least concerned German politicians in the 1980s was the Chernobyl nuclear crisis (Watanabe & Mez, 2004). The Chernobyl crisis led the German government to discuss climate change when Montreal Protocol negotiations started in December 1986. The Ministry of Environment, Nature Conservation, and Nuclear Safety of Germany was established to address issues concerning the environment, both from natural disasters and nuclear disasters like that of the Chernobyl. The German initiatives and the push to protect the earth's atmosphere led to the establishing of the Climate Enquête Commission in Germany. These were the years that formed the basis for climate change political agenda in Germany. These years also witnessed an increase in green parties in Germany. The committee and the dawn of the climate agenda in Germany later played major role in the establishment of the UNFCCC, as they contributed scientifically and politically to the establishment of the organization. Angela Merkel was then the German Minister of the Environment and became one of the central political figures to support the climate agenda at the global level (ibid).

Figure 9.1.Number of nuclear tests



After World War II, there was an increase in nuclear weapons testing by the US and USSR. Consequently, there were also growing worries over the impact of these tests on the sea, atmosphere, earth and etc. During this time, several research projects studied the impact of nuclear weapons testing on the environment, but one of the research teams contributed immensely in setting the scientific findings on Climate Change.[22]

These findings were of Roger Revelle's team, built on Guy Standing Callendar's previous research. What Guy Standing Callender and in particular Roger Revelle discovered was that "the average lifetime of a CO_2 molecule in the atmosphere before it is dissolved into the sea is of the order of 10 years" (Revelle & Suess, 1957). These findings bascially showed that the oceans will not be able to absorb the porportionate amounts of CO_2 at the speed that it is produced, which could then lead to the warming of the planet. This finding was only reached because there was an increasing interest in studying the impact of nuclear testing on the fishing industry, espcially in Japan, and research teams were busy studying the area. However, Revelle had a personal interest in studying the greenhouse gases, and he appointed only a small number of researchers within the larger team to study the impact of nuclear testing on Japanese fishing (Weart, 2007, 2021). Up until this period, the general scientific belief was that the sea will be able to absorb the human-produced CO_2.

[22]Data obtained from Our World in data https://ourworldindata.org/nuclear-weapons

9.2 Existence of advocacy setups: coalitions, networks and/or groups searching for new agendas

In the 1970s, three different advocacy setups—conservationists/naturalists, anti-nuclearists and environmental networks—were some of the largest at the time and working both at the national and global levels with a machinery that did not have to travel along their previous paths. This was because the problems that they were advocating for were either dealt with appropriately, or new discoveries and technological developments proved that they are not as serious as once thought or that the public interest was increasingly moving toward another issue. Conservationists/naturalists included organizations concerned with global threat of over population, protection of wildlife and migration birds and concerned with aesthetic beauties of nature, which by the 1970s changed course and turned into environmentalists. Antinuclear movements either moved toward supporters of nuclear for peace and use of nuclear energy for electricity purposes or they fully changed course and moved toward environmentalism by advocating against big business, especially crude oil and oil extracted from whales, which was still a major business back in the late 1970s (Herring, 2001).

The antinuclear movements lost some momentum in the early 1970s, as the nuclear agenda became one of the most regulated ones at the time. Two political narratives—nuclear for electricity production and nuclear for deterrence purposes—together with strong national level government regulations within the nuclear sector changed the course of antinuclear movements, which left them with options of either supporting the use of nuclear energy for peaceful ends, such as electricity generation and for deterrence purposes, or changing course to new agendas, such as environmentalism. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) signed in 1968 also played an important role as well in easing the intensity NGO and civil society organizations against anti-nuclear movements. Therefore, when the Stockholm Conference was held in 1972, 30% of the observer NGOs were either fully anti-nuclear movement or had anti-nuclear or nuclear as part of their agenda. Although there were several types of NGOs, some NGOs (e.g., family planning, overpopulation) were also among those that were significant.

However, from the late 1970s to the late 1980s, the nuclear agenda started building up again in the wake of incidents like the Three Mile Island Nuclear Accident in the US and the Chernobyl crisis. While there were concerns of a nuclear war throughout much of the Cold War and concerns regarding nuclear weapons testing on the environment during this time, when the Soviet Union collapsed in 1989s, the interest in anti-nuclear movements also fell. During the 1970s and until 1989, many anti-

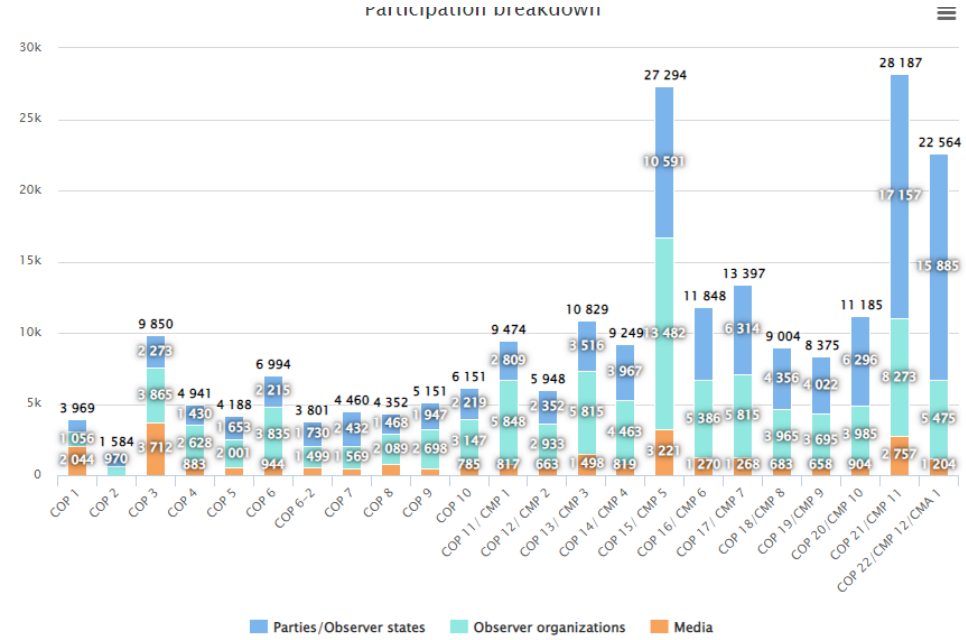
nuclear movements such as *Don't Make a Wave* and *Friends of Earth* moved back and forth between anti-nuclear agenda and environmental concerns. But after the 1990s, several of the anti-nuclear movements that have played major roles in the translation and mobilization of the CC agenda re-tooled their organizations to address climate change (Powaski, 1999; Uekötter, 2019; Kalb, 2020).

Greenpeace was one of the movements that evolved from an anti-nuclear movement called "Don't Make a Wave." The movement was formed officially in 1969 (Lindell, 2010). David McTaggart and Ben Metcalfe, who worked together to bring the negative impacts of nuclear testing in Canada and Europe to public attention, were the ones to become famous for establishing the movement and they were fully engaged with "Don't Make a Wave," which was initially a campaign in the early 1960s and officially became a committee in 1970 (Watts, 2003). When the first famous boat ride was taken in 1972, sailing from Vancouver, British Colombia, to stop a US nuclear bomb test in Alaska, the organization was not called Greenpeace, but was part of the "Don't Make a Wave Movement." The name Greenpeace first appeared in newspapers in 1977 in a fish-oil controversy (Gray, 1977). Already from the 1960s to 1977, a major shift in "Don't Make a Wave" could be detected. The movement changed its name from "Don't Make a Wave" to "Greenpeace" in 1972. Even though there is still considerable debate about who actually founded Greenpeace, there is enough evidence in newspapers that those who founded the "Don't Make a Wave Committee" were also the main founders of Greenpeace. The name change from "Don't Make a Wave" to "Greenpeace" is no coincidence. In 1972, the UN Conference on the Human Environment was held, which laid the foundation for environmental movements (UN, 1972).

Apart from anti-nuclear movements, a number of movements that were mostly concerned with overpopulation, birth control and also those groups that were mostly interested in the beauty of nature also shifted toward climate change. As for the former groups, there was little concern with population growth, and birth control was later argued to be harmful to economic development. And for the latter ones, climate change was more attractive than only human action that was destroying natural beauty. The climate change agenda proved a much stronger case for these organizations, and they therefore shifted in this direction. The exact number of these organizations is difficult to trace because of the limited data available from the 1970s until the 1990s on these organizations, but from the 1990s onwards, when organizations like UNEP and UNFCCC collected data, the rise in the number of observer NGOs in every COP becomes quite evident, as shown below. In contrast, studies reveal a

drastic decline in the number of anti-nuclear movements since the late 1980s (Joppke, 1991; Koopmans & Duyvendak, 1995; Powaski, 1999; Wågström, 2021).

Figure 9.2. Number of observer participants in COPs



From 250 observers in Stockholm to over 1,000 at the first COP and almost 4,000 at COP3, when the Kyoto Protocol was signed, the number of observer NGOs increased steadily. Since Kyoto, a decline in the number of NGOs can be witnessed until the largest climate conference at the time, in 2005 called COP11. COP15 would later mark the largest number of observer NGOs, with more than 13,000.

9.3 Lack of similar redundant coalition setup for AMR

AMR has never had this kind of a suitable political ecology. The movements and NGOs that are interested in AMR generally have other issues as their core or agenda are mostly within the agriculture and animal sectors. Several of the advocacy groups and NGOs that have succeeded in raising AMR awareness are using the AMR problem as a case to support their main agenda. Seventy NGOs have been identified in this project to be working with AMR, and over 70% of them are organizations that do not deal with AMR as their main issue (ESCMID, 2012; Small, 2014; S*o et al*., 2014; WHO, 2015; European Commission, 2016b, 2016a; ReAct, 2016; Council, 2017). The first-prize award-winning NGO at the EU level in 2016 was The European Consumer Organization (BEUC) (European Commission, 2016a), which is an umbrella organization fighting for European consumer rights, and AMR is only a small part of their activity. The second and third prizes in 2016 went to Alliance to Save our Antibiotics—Compassion in World Farming—Soil Association and World Alliance Against Antibiotic Resistance WAAAR. Only WAAAR has AMR as their main agenda. The other one works with a range of issues. The NGOs that were nominated are mostly from the agriculture and animal

sectors like the French Veterinary Council, Federation of Veterinarians of Europe etc. There are two issues with these NGOs that are not similar to the ones that transferred to the CC agenda, as mentioned above. The larger organizations in the AMR list do not deal with just this one issue, and they have a range of issues to deal with. This implies that they have the ability to move between issues depending on which one they consider more important. The smaller NGOs also have either multiple topics to discuss or are alliances of many other smaller organizations. Both the larger and smaller ones do not deal with one large problem like that of the anti-nuclear movements. Additionally, these organizations are working to raise awareness, and they do not share the same strategies and methods such as arranging larger protests or going against governments or a certain class of people. This is common among many of the AMR organizations and organizations that deal with AMR as a part of one of their issues.

In 2013, the AMR problem started received unforeseen attention in the political and public domains (Podolsky, 2018; Overton *et al*., 2021). During this time, a strong advocacy emerged, where advocates like Dame Sally Davies, Otto Cars and etc. started advocating strongly for AMR. The Global Action Plan on AMR was adopted two years after the start of strong campaigns by the likes of these advocates. Since 2013 until the emergence of COVID-19 in 2019, other than World Health Organization (WHO) and efforts at the UN level, many different organizations joined the global efforts to tackle antimicrobial resistance. From the animal and agriculture sector, actors like Food and Agriculture Organization (FAO), World Organization for Animal Health (OIE), G7 initially got interested in AMR in 2015, but lost momentum until only recently in 2021, where AMR was discussed again (Brown, 2015; Lucas, 2019; G7 UK, 2021). Despite all of this, a major shift of NGOs and advocacy coalitions from another issue to AMR is not witnessed (i.e., where entire coalitions of organizations would transfer from another major world issue to AMR). Many of the major International Organizations, coalitions and international institutions have addressed AMR in one way or the other, but this has been only a small part of their activity. On the other hand, it can also be said that during the 2001–02 and 2013 until mid-2019, there was a better global environment for AMR to achieve similar attention to CC, but even those periods have not provided the kind of kick-off needed for AMR to achieve an SPE similar to CC. Since AMR does not have a very strong setup of advocacy coalitions, which would include policy entrepreneurs, advocacy groups and other individuals within and outside the immediate scope of the AMR problem, it keeps rising only to return to the shadows.

Newspaper attention to AMR started increasing in 2001, and WHO released a global strategy for the containment of AMR (WHO, 2001b). However, the so-called War on Terror after the events of

September 11 in 2001 was one of the major events that hindered the AMR problem from receiving global attention. In 2001, the War on Terror totally dashed the hopes of some of the advocates of AMR, as all of the major global attention and resources were focused on that. During the Fifty-fifth World Health General Assembly, AMR was only mentioned once as part of the efforts to eradicate malaria. Other than that, the general assembly mainly focused on issues relating to the War on Terror, entitling and focusing it on "health and medical services in times of armed conflict," followed by Malaria and HIV (WHO, 2002a). The WHO efforts were mainly shifted toward many matters relating to the War on Terror, including food safety issues and providing health in conflict settings, and the public attention shifted toward the same problem (WHO, 2002b, 2002c; Craft & Wanta, 2004).

In 2013, the War on Terror was not one of the major issues, it had even lost public interest, as opinion polls in favor of it kept dropping since 2008 (Gershkoff & Kushner, 2005; Bouton *et al.*, 2010; Melley, 2017). The global willingness to cooperate on AMR had therefore increased in this period, as several countries adopted the Global Action Plan (GAP) in 2015. However, the lack of the major advocacy setup present with CC as well as many other aspects, which will be discussed in the following sections, have been some of the reasons why AMR has not received attention similar to CC.

There are IOs (e.g., UNFCCC, IPCC) that exist only to deal with the CC problem. The green parties in Europe, which mainly developed during the 1960s as socialist movements or anti-nuclear movements, have made CC the core of their agenda. Experts and scientists have turned into devoted CC advocates and have become fully engaged both in scientific research and political advocacy for CC. Younger generations and individuals have made CC the most important part of their lives, even prioritizing it over school. All of this has contributed immensely to bringing attention to the problem of CC and has also increased investment in CC, both in the form of political investment and in funding for CC research and activities.

The newspaper data shows that some experts turned into devoted climate change activists, who have immensely contributed to scientific findings as well as politicizing the matter by blaming the companies and institutions with and for whom they worked to be misleading the public. These scientists have immensely contributed to CC research, because they have taken political action in the form of informing the public and joined groups and parties that support their fight (Monbiot, 2009; Keane, 2019; McGreal, 2021; Reuters, 2021).

Similarly, green party movements in Europe have been one of the major examples of parties who have made CC the core of their political ideology and have influenced political movements in favor of CC since their rise in the 1980s (Watanabe & Mez, 2004; Daily News, 2011).

Individuals like Greta Thunberg, who have left school and started the Fridays For Future movement, which is one of the leading topics on Twitter, have also accepted CC as a value for which they want to fight.

There is a lot of evidence on the increase of scientific research and activities on CC by the Democratic Party in the US and evidence of funding cuts for CC activities when the Republican Party is in power, especially in recent years (Chemnick & Frank, 2020; Newburger, 2021) Although CC is not the only core agenda of these two major parties in the US, it is an important issue for them both. Even though not all Democrats favor CC and all Republicans are against it, many of them do so.

Such political embeddedness cannot be witnessed with AMR. There are no major political parties (or even smaller ones) that are using AMR politically as their core value. The only parties that have shown resistance to the AMR agenda in the past have been those who strongly support the farmers and animal sector, e.g., in the UK (Harvey, 2014).

9.4 Summary

AMR has not achieved the suitable political ecology (SPE), whereas CC has. The CC problem has achieved all of the necessary and sufficient conditions, because of which there is a difference in attention between AMR and CC. The scientific basis as one of the necessary conditions to achieve the SPE is present in both AMR and CC, but this scientific basis is also different between CC and AMR. Apart from this, the CC problem has achieved all of the other necessary conditions—namely, mobilization, popularization and polarization—in all three domains. In contrast, AMR lacks polarization completely, popularization and mobilization of the AMR problem is limited to experts and to actors in the immediate scope of the problem. AMR has had moments of success in terms of global attention, such as in 2001 and from 2013 to 2019. However, even these events have not been successful in maintaining global attention to CC. The main finding here is that as long as AMR does not achieve an SPE similar to CC, it will keep rising only to return to the shadows of global attention.

Chapter 10: The discussion

The PhD monograph argues that the existence of the Suitable Political Ecology (SPE) is sufficient for generating and maintaining global attention to transboundary, complex and creeping crisis such as, AMR and CC. The analysis show that Climate Change has achieved the SPE and AMR is still struggling to do so, which explains the different in global attention between the two cases. The sufficient condition is only achievable if four necessary conditions exist all together. *Scientific basis, mobilization, popularization* and *polarization* are the necessary conditions to exist all together in order to achieve SPE. Moreover, three of the necessary conditions – namely, *mobilization, popularization* and *polarization* need to be active in the public, political and expert domains, while *scientific basis* is necessary to exist in the expert domain mainly with certain characteristics that can influence other domains. While these three conditions are important in explaining the SPE and global attention, they deal with both objective and the subjective understanding of the problem within these three domains. While this is the main argument in this monograph, it is still important to discuss these findings more to understand the nuances, strengths and shortfalls existing in it.

10.1 The development of analytical framework and its influence on findings

In this monograph, the analytical framework was developed through an iterative process - going back and forth between the theories and observations, which ultimately found that an active and effective existence of all necessary conditions to generate and maintain attention could explain the difference between global attention to AMR and CC. While the development of such analytical framework was important to analyze the two cases, it is important to understand that this analytical framework was created for analytical reasons and boundaries between some of the necessary conditions might not be as clear-cut in the real world, as it is presented in the framework. Since, the real world is different and more complicated. Despite that, the iterative process between theoretical arguments and observations has closed the gap between purely analytical purposes and reality, but still does not explain and present all the reality.

Although the monograph started by combining arguments from agenda setting and collective action theories, the analytical framework went beyond those two. This had consequence for the analysis. The combination of agenda setting and collective action theories were very helpful in understanding the happenings both inside and outside political institutions and policy venues at the global level.

Where the collective action theories helped with understanding the bottom-up process that have contributed in forming networks and collective action and the agenda setting helping with the processes mostly happening at the gates of policy venues and political institutions before and until policy response, but not including the policy responses. Even with this combination a lack of emotional understandings of matters at the global level were still identified. Both of these theories are mostly based on rationality when it comes to decision making of individuals or institutions, but the observations showed that some individual decisions might not be based on rationality. Therefore, most specific emotional aspects and concepts were added to parts of the analytical framework to capture for instance polarization and mobilization, especially within the digital media analysis. This was also considered important because both AMR and CC are complex problems and when they are dealt with as a transboundary matter at the global level the complexity of the problems and the level of analysis require multiple and differentiating perspective to explain global attention to them. However, such combination also has its weakness. It has made the systematic analysis for the data challenging. Since, several explanatory factors were approached and many different perspectives were added, the systematic and step-by-step analysis was extremely challenging. Although the analytical framework explains the difference in global attention between AMR and CC very well. A more systematic approach and more precise analytical framework would have been even more helpful. Many of the theoretical approaches within agenda setting or collective action theories could have also explained the difference between global attention to AMR and CC. Jon Kingdon's multiple stream analysis was first considered as one of the suitable theoretical approaches, but was not fully applied, because the theoretical approach was considered too rigid for these two problems. Although, it was not completely dropped, many of its aspects such as windows of opportunity and the role of policy brokers and entrepreneurs have been indirectly applied in the analytical framework. Jones and Baumgartner's theories of punctuated equilibrium (PET) was another one of the approaches, which were considered to be applied fully in this project, especially because of its ability to explain stasis and change. However, PET was very specific to national level politics and at the global level, which is more decentralized, PET was found not to capture all aspects of the global level complexities. The politics of attention, especially the intrusion of knowledge from outside the policy venue to inside and the notion of signals travelling from outside political environment to inside were indirectly merged to the framework to understand how issues transfer to problems. Collective action theories especially Olson's approaches were also considered to be applied with it's entirely to the monograph, which would have definitely explained the difference between attention to AMR and CC. However,

the pure rational approach of it and some of it's logically explanations were found to be inadequate in order to explain the development of networks and collective actions. It is important to mention that although these approaches were not fully applied, bits and pieces of each of the approaches were merged into the analytical framework to establish a much more encompassing framework suitable to the level of analysis and the nature of the problems that the monograph has dealt with.

10.2 The subjective and objective understanding and challenges associated to them

The monograph also deals with subjective and objective understanding of the problems. The subjective and objective understanding of the problem, especially when it is associated to risk and threat, is an important part understanding global attention to the problems. The subjective understanding is what is directly associated to attention and the objective understanding is important in characterizing the problems from a scientific perspective. While there is a sense of the subjective understanding within all three domains, it was challenging to identify the subjective understanding precisely relating to individual actors, form the data available. Especially from the newspaper data. The problem existed because the newspaper data was treated all together and no differentiation was made between opinion pieces, editorials and or news articles. Therefore, it was difficult to differentiate whether this subjective understanding of threat could be directly associated to the actors or to the newspaper or reporter. Although a closer analysis was carried out after the codes were identified, where they were contextualized, which somehow contributed to resolving this problem. However, a further break down of newspapers into different categories and analyzing them separately would have immensely helped with the analysis and findings, consequently. The newspaper archive, which was used in this monograph, had many different sources through which they have collected the newspaper, as it is presented in the methods chapter. However, it was difficult to identify the political orientation of these newspapers. This is important because especially with CC, which is a very polarized and politicized problem, the newspaper agencies are also divided. This could have consequences in either missing or identifying pro or anti CC news agencies. A further break down of this data could have helped with being more precise with the findings and critical of the newspaper data. However, the current findings and observations are sufficient to answer the research question, but it would have made the conclusion to this monograph more concrete.

10.3 Data types and their strengths and weaknesses

Social media data have played an important role in this monograph. The social media domain have immensely contributed in understanding the polarization existing in the CC and AMR debates. It has also helped with understanding the role advocates of these two problems and the different strategies they have used in generating attention to the problems. However, two main limitations can be associated to the social media data. (i) The issues associated to the *black box* of Application Programming Interface (APIs) and (ii) the streaming nature of the data collection. Twitter Capture and Analysis Toolset (T-CAT) was used as an API to collected the data for social media. The social media data retrieved were extremely helpful in understanding the social media domain and the differences that exist between the CC and AMR social media engagement, which has helped in explaining the difference in global attention of the two problems. Despite all the positives in the social media data, the API only collects limited number of Tweets. This limitation is dependent on many different variables. The capacity of the server that saves the data, the capacity of the API and its software programming limitations and the amount of data Twitter allowed the API to retrieve or mine. These three limitations function in a manner that is referred to by authors of social media as 'the black box of the APIs'. This means that it is not possible to have an exact understanding of the total number of Tweets and the understanding of what Tweets were hidden or were not collected because of the capacity of the server, the API or the limitations imposed by Twitter. Although the social media data was triangulated with newspaper and web data to identify and explain some of the most important aspects of the data, it is still possible that some major Tweet or happening in the Twitter environment could have been overlooked. Despite all of that, the data and observations in this monograph has still contributed enough to answer the research question.

10.4 AMR and CC as transboundary, complex and creeping crises

Both AMR and CC have been categorized as transboundary, complex and creeping crisis and it is one of the main academic areas that the findings of this monograph contributes to. These type of problems have the ability to hide in plain sight because of their periodic appearances and since the root causes of these problems are local but the costs are global it is very challenging to generate attention to them. Allocation of resources and justification of it is very difficult, because these problems are not clearly understood and the consequences and harms from these are not clearly comprehended by actors outside the expert domain. Even the experts have difficulty explaining these problems clearly to non-experts. On the other hand, these problems also last longer compared to some other urgent crisis and have a long-term time span. Therefore, there is a need for consistent and continuous attention to them,

if any solution needs to be achieved. However, the transboundary, complex and creeping nature of them makes maintaining attention to them also difficult. While generating and maintaining attention to these type of problems is challenging, they are at the same time extremely important to create consistent and continuous responses. The monograph in general contributes a lot in understanding global attention to these types of problems. The analytical framework, the types of data and a pragmatic approach to it all makes contributes with nuances associated to understanding global attention to these type of problems. The monograph has approached these problems from a variety of different perspectives and this variation in perspectives suits well with the nature of the problems and the nature of the analytical level. However, despite the fact that this monograph has placed these two problems as transboundary, complex and creeping, not all aspects these problems can be categorized as it. The monograph has not dug deeper into these aspects of CC and AMR. Although over all the problems can be categorized, as these type of problems, but a further unfolding of the different aspects of AMR and CC would have helped with the understanding and positionality of research.

10.5 The other perspective on polarization

The monograph showed that the existing of polarization in the CC problem has contributed in the establishment of the SPE, which has then contributed to generate and especially to maintain global attention. This is a positive image of the polarization as a necessary condition for generating and maintaining attention. This is also unlike the previous understanding that scholar have had on polarization, especially when it comes to studying CC. Authors trying to explain the divisions that exist in the CC debate consider polarization as a factor hindering effective and efficient policy implementations (eg Bliuc *et al.*, 2015; Hempel, 2018). In this monograph approving this and rejecting these arguments is difficult to make, since the monograph does not deal with the implementation sides of it. However, looking at the AMR problem's development, if such divisions had not existed, the CC debate would have suffered similar problems like that of AMR. It would have lacked public and political attention and even though there would have been quicker responses to the problem, it had a very high chance of being period responses – the same as AMR responses. Polarization could have slowed down the processes to quick responses, but it has contributed immensely to our current understanding of CC, which has been shaped over decades of back and forth discussions between the three domains.

Moreover, polarization to CC is mostly attributed to United States (US), because of the different political systems and social structures there (Bliuc *et al.*, 2015). Additionally, the Twitter data has

contributed to the arguments of this monograph with regards to polarization and twitter is the platform with highest number of users in the US. So, the association of polarization with the US context of the CC debate is correct. Removing the US context from the analysis would have been interesting to see how the AMR and CC's global attention is different without it. This could have had important consequences to this study. However, since the project has dealt with the global context and US is one the main actors both as a nation state and in terms of it being one of the main players within the expert and public domains. It has one of the largest populations in the world, who play an important role in global decision making and US is also one of the most important actors in terms of the scientific contributions to the CC debate and agenda at the global level. Therefore, the association of polarization to US is not only a problem, but also an important aspect that has contributed to the monograph.

10.6 The focus

Focusing on the characteristically dynamics of the problem, rather than on the nature of the problems is one of the main approaches of this monograph. This gives a better understanding of actors involved in generating and maintaining attention. However, doing so, less focus is on characteristic differences that could exist between the problems. Of course one is an environmental problem and the other is a global health one and they do differ along these lines and the fact that they might impact different groups of people in different geographies. Both of which could play an important role in perception of the problem as a threat (Maher and Sridhar, 2012). Authors like Maher and Sridhar (2012) argue that problems that impact certain minorities than general public receive less attention. The focus on geographical impact of the problem could be influential. However, bearing in mind that although most of the casualties of AMR are still in global south, the consequences of it cannot be limited only to those geographies. Given that our world is highly connected these days and infections travel fast, as it was witnessed during the COVID19 pandemic, the geographical focus was seen less important in this monograph. Furthermore, the similarities of AMR and CC along their characteristically dynamics are unavoidable and therefore the focus on this was seen more rewarding in terms of understanding the drivers of global attention.

Chapter 11: Conclusion

The PhD thesis's main goal was to answer the following research questions: How can we explain the differences in global attention between Antimicrobial Resistance (AMR) and Climate Change (CC)?

The PhD monograph identifies that global attention to AMR and CC are different and this difference can be explained by a number of necessary and sufficient conditions that exists within the expert, public and political domains. CC has achieved the *suitable political ecology (SPE)*, which in this monograph is argued to be the sufficient condition for global attention and AMR has not. For SPE to exists, it is necessary that certain necessary conditions are fulfilled and these conditions are s*cientific basis, mobilization, popularization and polarization*. Apart from the scientific basis, to fulfill the rest of the three conditions, it is important that they exist and are present in all three domains—expert, public and political all together.

As stated in the analytical framework above, *global attention* exists when there is some level of concern about an issue among the public, politicians and experts, and the level of concern is combined with some engagement. Global attention is also necessary for global response. Likewise, consistent and long-term global attention is necessary for complex and creeping crisis such as AMR and CC that require long term and consistent response. To achieve this consistent and long-term global attention, the existence of SPE is sufficient. Furthermore, to achieve the SPE all necessary conditions—namely, *scientific basis, mobilization, popularization and polarization* are required to exist.

The PhD thesis finds that global attention to CC has existed for at least the last three decades actively in all three domains together. Global attention to AMR does not exist similarly to CC, because not all domains are concerned with the problem and not all domains show consistent concern and engagement with the problem. Since there are periodic waves of global attention to AMR within the expert and political domain and almost no public interest and because many of the necessary conditions and the sufficient condition are not achieved, the monograph concludes that global attention to AMR is therefore different to CC. The figure below summarizes the conclusion of the thesis.

Figure 11.1. Visualizes the conclusion of the PhD monograph, explaining the difference in global attention between AMR and CC

Scientific basis	
Climate Change	Antimicrobial Resistance
√	√*

The necessary conditions	Mobilization		Popularization		Polarization	
The problems / The domains	AMR	CC	AMR	CC	AMR	CC
Expert	√	√	√*	√	X	√
Public	X	√	X	√	X	√
Political	√*	√	√*	√	X	√

Suitable Political Ecology	
Climate Change	Antimicrobial Resistance
√	X

Global Attention	
Climate Change	Antimicrobial Resistance
√	√*

The *scientific bases* are not only important to exist for the emergence of the problem, but their development is important for defining and redefining the problems, increasing expert and non-expert attention. The manner, in which solid scientific bases are achieved, has consequences to global attention too. CC and AMR currently both have solid scientific bases, but the path to arriving at the solid scientific basis are different between AMR and CC. This difference has had implications to the development of global attention. CC's scientific basis has been vague at the initial stages of its emergence as a global problem in the 1950s. The vagueness has fueled scientific debate, increasing expert attention to the problem. The vagueness has also helped mobilized groups to join CC advocates, because there has been room for interpretation and subjective understanding. The initial and vague scientific basis of CC and the successful framing of it have helped in uniting the environmentalists under an umbrella—the umbrella of the climate change. Especially after the redundancy of a strong anti-nuclear, anti-population growth and naturalists with aesthetic appeal to nature and many other environmental NGOs and advocacy setups that transformed their core activities toward Climate Change. This has also helped with popularization and polarization in several ways, helping individuals and groups develop their own understanding of the problem and certain types of affection to it.

CC has received global attention in all three domains, fulfilling all the necessary and sufficient conditions for global attention. AMR does not fulfill all the necessary and sufficient conditions for global attention. AMR lacks public mobilization and popularization. There are almost no major gatherings, protests or demonstrations for or against AMR, while CC has witnessed some of the world's major demonstrations, protests and gatherings over the last decade. Public is unaware of the AMR problem, there is also very little public interest to AMR. Social media engagement with the problem is very limited, and Google Trends searches for AMR are quite limited compared to CC.

Political mobilization and expert mobilization of AMR is different from CC. These domains work in isolation to one another and are not as cooperative as within the CC. The CC's political and expert domain are not only mobilized effectively by themselves, but they work cooperatively, which has resulted in both shaping the knowledge on CC and in keeping political interest to the problem. Political attention to AMR has been limited to a certain expert type of politicians, which includes ministers of health and NGOs mostly active within the public and global health. While the politicians involved in the CC debate come from different political parties, groups, NGOs and includes many

different political activists and organizations in terms of their subject of interest, age, size and etc. Political attention to AMR happens more in waves and periodically as opposed to consistent attention to CC.

AMR lacks expert, public and political polarization. The fact that polarization lacks is because of the solid scientific basis, inefficient advocacy and policy entrepreneurship activities, lack of effective mobilization and lack of cooperation between the political and expert domains. AMR advocates and expert organizations have not been able and nor willing to contribute to polarization. This is because they see polarization as a hinder to effective and efficient response. However, polarization exists because of a few important factors. When polarization exists, it means that groups and people have developed their own understanding to the problem, they have associated their own values and affection to the problem and are willing to take action in favor or against the current believes or political responses to the problem. When polarization does not exist, as in the case of AMR, the language of communication about the problem is still expert driven, difficult to the layman to understand and comprehend.

The monograph finds that Climate Change, has over the years, received more significant public, political and scientific attention than AMR. While AMR, since 2013, has gained noticed global attention, this attention is neither proportionate in terms of the nature of the crises, nor equivalent in comparison to CC. Assumption/proposition: This is because the nature of each domain (e.g., public, political, scientific), in each crises (AMR, CC) are different. The inner dynamics of each of the domains (e.g., public, political and scientific in CC) in comparison to the domains in the other crises (e.g., public, political and scientific in AMR), also function differently.

The public domain of CC, be it those favoring policy change with regards to CC or those who are denying the very existence of the CC problem, involves different layers of the society, ranging from children, youth to elderly, ordinary public to advocates, politicians and businesses and etc. On the contrary, the public domain of AMR is still characterized by mostly experts implying the AMR debate has not yet infiltrated different layers of society similar to CC.

The public domain of CC is extremely polarized politically and ideological with groups often labelled as believers and deniers. Such disagreements and polarizations are rare within the public domain on AMR and there is only disagreements between those who disagree on whether animal users of antibiotics or human users of antibiotics are the root cause of the over use of antibiotics which has resulted in development of resistant bacteria.

The global political domain of CC is also very different than that of AMR, while CC has developed organizations specifically designated to address the issue of CC, such as IPCC, UNFCCC, AMR is still being addressed as an adjoining problem as part of FAO/OIE/WHO[23]. The state of current global political domain of AMR is similar to the earlier decades of CC, when CC was slowly making its way to global agenda and organizations like UNEP and WMO were addressing it as part of other environmental problems. The global and national level political domain of CC is more politically polarized than AMR and the camps for and against CC strategies have turned into different political ideologies.

The scientific domain of AMR and CC are also characterized differently. While there are still scientific debates that range from uncertainties and disagreements among scientists on some of the matters such as the reduction of CO2 as an effective strategy to tackle CC to some scientific findings and methods applied to it, there are consensus over the scientific claims made on AMR and its disastrous nature among health experts. However, the scientific domain of CC has expanded beyond environmental scientists and experts and in some cases have merged with the political environment, especially within the IPCC setup, while the AMR scientific community is still limited to health experts.

[23] WHO: World Health Organization

FAO: Food and Agriculture Organization of the United Nations

OIE: World Organization for Animal Health

11.1 Further remarks and recommendations

Focusing on the development and improvement of the advocacy coalitions and networks that contribute in shaping the knowledge on the global problem of the antimicrobial resistance (AMR) is needed. These networks and groups must involve both expert and non-expert individuals, NGOs, and advocacy networks and coalitions, who would re-frame and redefine the AMR problem in simplified, comprehensible and emotionally attractive ways.

There is a need for transformation of the language of communication, from designated individuals and organizations working with AMR in social media, from a scientifically oriented language to common language that touches people's emotions. The scientific language and emotionless presentation of the problem has hindered public engagement, because for public to engage affectively in the debate about the problem of the AMR, there needs to be a level of emotional attachment and room to express public opinion, which would then lead to affective advocacy. Such communication can be achieved through simplified and symbolic communication strategies that would attract public and political attention, without compromising scientific facts.

Inclusion of non-expert politicians as key actors – not as outsiders in the early stages of development processes of future global agreements can contribute in both increasing political interest and in shaping the knowledge on AMR. If Non-expert politicians are involved in the early stages, they will challenge the scientific language and findings in these reports and agreements and they will search for their political interest in it. These political acts will lead to shaping a new knowledge on AMR and in political investment by non-expert politicians.

Majority of the current advocacy is directed towards the World Health Organization (WHO). However, from the analysis in this project, it can be argued that WHO has limited resources and many other problems at hand already. It is also important to realize that WHO is much more equipped responding with conventional (mostly urgent) global health crisis. However, dealing with these type of complex and creeping crisis requires more than a WHO response. It requires a set-up within and outside these expert international organizations such as WHO to generate and maintain global attention.

Chapter 12: Bibliography

Acar, J. F. and Moulin, G. (2012) 'Antimicrobial resistance: A complex issue', *OIE Revue Scientifique et Technique*, 31(1). doi: 10.20506/rst.31.1.2098.

Aidt, T. S. (2005) 'The rise of environmentalism, pollution taxes and intra-industry trade', *Economics of Governance*. doi: 10.1007/s10101-004-0087-5.

Allan, J. I. and Hadden, J. (2017) 'Exploring the framing power of NGOs in global climate politics', *Environmental Politics*, 26(4). doi: 10.1080/09644016.2017.1319017.

Amenta, E. *et al.* (2010) 'The Political Consequences of Social Movements', *Annual Review of Sociology*. Annual Reviews, 36(1), pp. 287–307. doi: 10.1146/annurev-soc-070308-120029.

AMR_STAG1_Summary (2013) 'Summary statement from meeting of 1st STAG-AMR', *Journal of Chemical Information and Modeling*.

Andersen, O. J. and Pierre, J. (2010) 'Exploring the strategic region: Rationality, context, and institutional collective action', *Urban Affairs Review*, 46(2). doi: 10.1177/1078087410367756.

Anderson, T. (2014) 'Don't fear climate change', *Daily Record: Morristown, N.N.*

Andresen, S. and Rosendal, K. (2009) 'The role of the United Nations Environment programme in the coordination of multilateral environmental agreements', in *International Organizations in Global Environmental Governance*. doi: 10.4324/9780203883150.

Ansell, C., Boin, A. and Keller, A. (2010) 'Managing Transboundary Crises: Identifying the Building Blocks of an Effective Response System', *Journal of Contingencies and Crisis Management*, 18(4), pp. 195–207. doi: 10.1111/j.1468-5973.2010.00620.x.

Antilla, L. (2005) 'Climate of scepticism: US newspaper coverage of the science of climate change', *Global Environmental Change*, 15(4). doi: 10.1016/j.gloenvcha.2005.08.003.

Anwar, M. A. *et al.* (2019) 'Climate change communication as political agenda and voters' behavior', *Environmental Science and Pollution Research*, 26(29). doi: 10.1007/s11356-019-06134-6.

Anyanwu, R. N. (2020) 'Looking through the Lens of Complexity Theory: An Evaluation of Climate Change and Coronavirus 2019 Outbreak', *Asian Journal of Interdisciplinary Research*. doi: 10.34256/ajir2034.

Assembly, S. W. H. (2015) 'Plenary 1', in *Agenda, Sixty-eigth world health assembly*, pp. 11–15. doi: 10.7882/fs.2012.006.

Augé, A. (2022) 'From scientific arguments to scepticism: Humans' place in the Greenhouse', *Public Understanding of Science*, 31(2). doi: 10.1177/09636625211035624.

Aydogdu, M. H. and Yenigün, K. (2016) 'Farmers' risk perception towards climate change: A case of the GAP-Şanliurfa Region, Turkey', *Sustainability (Switzerland)*, 8(8). doi: 10.3390/su8080806.

Badullovich, N., Grant, W. J. and Colvin, R. M. (2020) 'Framing climate change for effective communication: A systematic map', *Environmental Research Letters*. doi: 10.1088/1748-9326/aba4c7.

Baekkeskov, E. *et al.* (2020) 'Antimicrobial Resistance as a Global Health Crisis Antimicrobial Resistance as a Global Health Crisis Dimensions of Antimicrobial Resistance', 2050(October), pp. 1–26. doi: 10.1093/acrefore/9780190228637.013.1626.

Barry, J. and Frankland, E. G. (2002) *International encyclopedia of environmental politics*. Edited by J. Barry and E. G. Frankland. London Routledge.

Baumgartner, F. R. (2015) *Agendas: Political*. Second Edi, *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*. Second Edi. Elsevier. doi: 10.1016/B978-0-08-097086-8.93003-4.

Baumgartner, F. R. and Jones, B. B. (1993) *Agendas and Instability in American Politics, Choice Reviews Online*. doi: 10.5860/choice.31-0574.

Bayne, N. (2020) 'Overcoming Evil with Good : Impressions of the Gleneagles Summit , 6-8 July 2005', pp. 1–15.

Beeman, R. (1995) 'Friends of the land and the rise of environmentalism, 1940-1954', *Journal of Agricultural and Environmental Ethics*, 8(1). doi: 10.1007/BF02286398.

Bekkers, V. *et al.* (2011) 'New media, micromobilization, and political agenda setting: Crossover effects in political mobilization and media usage', *Information Society*, 27(4). doi: 10.1080/01972243.2011.583812.

Beniers, K. J. and Dur, R. (2007) 'Politicians' motivation, political culture, and electoral competition', *International Tax and Public Finance*. doi: 10.1007/s10797-006-8878-y.

Benjamin, D., Por, H. H. and Budescu, D. (2017) 'Climate Change Versus Global Warming: Who Is Susceptible to the Framing of Climate Change?', *Environment and Behavior*, 49(7). doi: 10.1177/0013916516664382.

Berkhout, J. (2008) 'The Politics of Attention: How Government Prioritizes Problems', *Acta Politica*, 43(4), pp. 504–507. doi: 10.1057/ap.2008.26.

Birkland, T. A. (1998) 'Focusing events, mobilization, and agenda setting', *Journal of Public Policy*, 18(1), pp. 53–74. doi: 10.1017/S0143814X98000038.

Birkland, T. A. (2017) 'Agenda setting in public policy', in *Handbook of Public Policy Analysis: Theory, Politics, and Methods*. doi: 10.4324/9781315093192-12.

Bliuc, A. M. *et al.* (2015) 'Public division about climate change rooted in conflicting socio-political identities', *Nature Climate Change*, 5(3). doi: 10.1038/nclimate2507.

Blondin, D. and Boin, A. (2017) 'Managing crises in europe: A public management perspective', in *The Palgrave Handbook of Public Administration and Management in Europe*. doi: 10.1057/978-1-137-55269-3_24.

Bohensky, E. L. and Leitch, A. M. (2014) 'Framing the flood: A media analysis of themes of resilience in the 2011 Brisbane flood', *Regional Environmental Change*. doi: 10.1007/s10113-013-0438-2.

Boin, A. (2009) 'The new world of crises and crisis management: Implications for policymaking and research', *Review of Policy Research*. doi: 10.1111/j.1541-1338.2009.00389.x.

Boin, A., Ekengren, M. and Rhinard, M. (2020) 'Hiding in Plain Sight: Conceptualizing the Creeping Crisis', *Risk, Hazards and Crisis in Public Policy*, 11(2). doi: 10.1002/rhc3.12193.

Boin, A., Ekengren, M. and Rhinard, M. (2021a) 'Understanding Creeping Crises: Revisiting the Puzzle', in *Understanding the Creeping Crisis*. doi: 10.1007/978-3-030-70692-0_10.

Boin, A., Ekengren, M. and Rhinard, M. (2021b) *Understanding the Creeping Crisis, Understanding the Creeping Crisis*. doi: 10.1007/978-3-030-70692-0.

Boin, A., Rhinard, M. and Ekengren, M. (2014) 'Managing transboundary crises: The emergence of European Union capacity', *Journal of Contingencies and Crisis Management*. doi: 10.1111/1468-5973.12052.

Bolin, B. (2007) *A history of the science and politics of climate change: The role of the intergovernmental panel on climate change, A History of the Science and Politics of Climate Change: The Role of the*

Intergovernmental Panel on Climate Change. doi: 10.1017/CBO9780511721731.

Bouton, M. *et al.* (2010) 'Global Views 2008: American Public Opinion and Foreign Policy', *Inter-university Consortium for Political and Social Research*.

Broadbent, J. *et al.* (2016) 'Conflicting Climate Change Frames in a Global Field of Media Discourse', *Socius*, 2. doi: 10.1177/2378023116670660.

Broecker, W. S. (1975) 'Climatic change: Are we on the brink of a pronounced global warming?', *Science*, 189(4201). doi: 10.1126/science.189.4201.460.

Brosch, T. (2021) 'Affect and emotions as drivers of climate change perception and action: a review', *Current Opinion in Behavioral Sciences*. doi: 10.1016/j.cobeha.2021.02.001.

Brown, B. and Crawford, P. (2009) '"Post antibiotic apocalypse": Discourses of mutation in narratives of MRSA', *Sociology of Health and Illness*, 31(4), pp. 508–524. doi: 10.1111/j.1467-9566.2008.01147.x.

Brown, G. W. (2015) 'The 2015 G7 summit: A missed opportunity for global health leadership', *Global Policy*, (June). Available at: http://www.globalpolicyjournal.com/sites/default/files/inline/files/Brown - The 2015 G7 summit, A missed opportunity for global health leadership.pdf.

Bruns, A. and Burgess, J. (2011) 'The use of twitter hashtags in the formation of ad hoc publics', in *European Consortium for Political Research conference, Reykjavík, 25-27 Aug. 2011*.

Bryan, A. (2020) 'Affective pedagogies: Foregrounding emotion in climate change education', *Policy and Practice*.

Bryman, A. (2006) 'Integrating quantitative and qualitative research: How is it done?', *Qualitative Research*, 6(1). doi: 10.1177/1468794106058877.

Burnham, J. P. (2021) 'Climate change and antibiotic resistance: a deadly combination', *Therapeutic Advances in Infectious Disease*. doi: 10.1177/2049936121991374.

Center for Disease Control and Prevention (2020) *Antibiotic/ Antimicrobial Resistance CDC, Center for Disease Control and Prevention*. Centers for Disease Control and Prevention, National Center for emerging and Zoonotic infectious Diseases (NCEZID). Available at: https://www.cdc.gov/drugresistance/about.html.

Chapman, D. A., Lickel, B. and Markowitz, E. M. (2017) 'Reassessing emotion in climate change communication', *Nature Climate Change*, 7(12). doi: 10.1038/s41558-017-0021-9.

Chemnick, J. and Frank, T. (2020) 'Climate Change Once Again Left Out of Trump's Federal Budget', *Scientific America*. Available at: https://www.scientificamerican.com/article/climate-change-once-again-left-out-of-trumps-federal-budget/.

Christensen, T., Lægreid, P. and Rykkja, L. H. (2016) 'Organizing for Crisis Management: Building Governance Capacity and Legitimacy', *Public Administration Review*, 76(6). doi: 10.1111/puar.12558.

CNN Library (2018) *Tsunami of 2004 Fast Facts - CNN, CNN.com*.

Cobb, R. W. and Elder, C. D. (1971) 'The politics of agenda-building: An alternative for modern democratic theory', *Journal of Politics*, 33((4)), pp. 892–915.

Collins, L. C., Jaspal, R. and Nerlich, B. (2018) 'Who or what has agency in the discussion of antimicrobial resistance in UK news media (2010–2015)? A transitivity analysis', *Health (United Kingdom)*, 22(6). doi: 10.1177/1363459317715777.

Cook, F. L. *et al.* (1983) 'Media and Agenda Setting: Effects on the Public, Interest Group Leaders, Policy Makers, and Policy', *Public Opinion Quarterly*. Oxford University Press (OUP), 47(1), p. 16. doi: 10.1086/268764.

Corner, A., Whitmarsh, L. and Xenias, D. (2012) 'Uncertainty, scepticism and attitudes towards climate change: Biased assimilation and attitude polarisation', *Climatic Change*, 114(3–4). doi: 10.1007/s10584-012-0424-6.

Council, N. (2017) *Nordic co-operation on combating antimicrobial resistance*, *Nordic Council*. doi: 10.6027/anp2017-724.

Craft, S. and Wanta, W. (2004) 'U.S. public concerns in the aftermath of 9-11: A test of second level agenda-setting', *International Journal of Public Opinion Research*, pp. 456–463. doi: 10.1093/ijpor/edh039.

Creswell, J. W. (2014) *Research Design : Quanlitative, Quantitative, and Mixed Methods Approcahes*, *SAGE Publications, Inc. 2455 Teller Road Thousand Oaks, California 91320*. doi: 10.1017/CBO9781107415324.004.

Cunningham-Burley, S. (2006) 'Public knowledge and public trust', in *Community Genetics*. doi: 10.1159/000092658.

Daily News (2011) 'Global warming, natural disasters, climate change and health', *Daily News*.

Darkin, B. (2003) 'International Relations and Global Climate Change Urs Luterbacher, Detlef F. Sprinz (Eds.), MIT Press, Massachusetts Institute of Technology, Cambridge, MA, 2001, 343 pp, Price: £15.59, ISBN: 0-262-62149-5', *Climate Policy*, 3(2). doi: 10.1016/s1469-3062(03)00026-3.

Davis, M. *et al.* (2018) 'Understanding media publics and the antimicrobial resistance crisis', *Global Public Health*. Taylor & Francis, 13(9), pp. 1158–1168. doi: 10.1080/17441692.2017.1336248.

Davis, M. *et al.* (2020) 'A year in the public life of superbugs: News media on antimicrobial resistance and implications for health communications', *Social Science and Medicine*, 256. doi: 10.1016/j.socscimed.2020.113032.

Dehghan, E. (2020) 'FROM AD HOC ISSUE PUBLICS TO DISCOURSE COMMUNITIES: A YEAR OF PUBLIC DEBATE ON TWITTER', *AoIR Selected Papers of Internet Research*. doi: 10.5210/spir.v2018i0.10479.

Demeritt, D. (2001) 'The construction of global warming and the politics of science', *Annals of the Association of American Geographers*, 91(2). doi: 10.1111/0004-5608.00245.

Denyer Willis, L. and Chandler, C. (2019) 'Quick fix for care, productivity, hygiene and inequality: Reframing the entrenched problem of antibiotic overuse', *BMJ Case Reports*, 4(4). doi: 10.1136/bmjgh-2019-001590.

DiMaggio, P. J. (1988) 'Interest and agency in institutional theory', *Institutional Patterns and Organizations: Culture and Environment*.

Downs, A. (1972) 'Up and Down with Ecology: The issue-Attention cycle', *The public interest*, 28, pp. 38–50.

Downs, A. (2016) 'Up and down with ecology: The "issue-attention cycle"', in *Agenda Setting: Readings on Media, Public Opinion, and Policymaking*. doi: 10.4324/9781315538389.

Duda, A. M. (2003) 'Integrated management of land and water resources based on a collective approach to fragmented international conventions', *Philosophical Transactions of the Royal Society B: Biological Sciences*. doi: 10.1098/rstb.2003.1410.

ECDC and EMEA (2009) *Technical report. The bacterial challenge: time to react*, *Ecdc/Emea*.

van Eck, C. W., Mulder, B. C. and van der Linden, S. (2020) 'Climate change risk perceptions of audiences in the climate change blogosphere', *Sustainability (Switzerland)*, 12(19). doi: 10.3390/su12197990.

Eisenbud, M. (1972) ‘ Inadvertent Climate Modification. Report of the Study of Man’s Impact on Climate (SMIC). ’, *The Quarterly Review of Biology*, 47(4). doi: 10.1086/407453.

Engström, A. (2021) ‘Antimicrobial Resistance as a Creeping Crisis’, in *Understanding the Creeping Crisis*. doi: 10.1007/978-3-030-70692-0_2.

ESCMID (2012) *Initiatives to fight antimicrobial resistance list by Managing Infections Promoting Science, Clinical Microbiology and Infection*. Available at: https://www.escmid.org/research_projects/fighting_resistance/all_initiatives_a_z/%0Ahttps://linkinghub.elsevier.com/retrieve/pii/S1198743X14610466 (Accessed: 8 September 2020).

Europa, H. (2022) *Strengthening Europe’s defences against antimicrobial resistance*. Available at: https://www.healtheuropa.eu/strengthening-europes-defences-against-antimicrobial-resistance/114414/ (Accessed: 30 March 2022).

European Commission (2016a) *2016 EU Health Award for NGOs, Public Heath*. Available at: https://ec.europa.eu/health/eu-health-policy/interest-groups/eu-health-award/eu-health-award-previous-editions/2016-eu-health-award-ngos_da (Accessed: 12 January 2021).

European Commission (2016b) *EU Health Award, Reducing AMR 2016*. Available at: https://ec.europa.eu/health/ngo_award/previous_editions/2016/reducing_amr_da (Accessed: 10 October 2021).

Fleming, A. (1945) ‘Nobel Lecture, December 11, 1945’.

Flint, R. F. (1959) ‘Pleistocene climates in eastern and southern Africa’, *Bulletin of the Geological Society of America*, 70(3). doi: 10.1130/0016-7606(1959)70[343:PCIEAS]2.0.CO;2.

Forsyth, T. (2014) ‘Public concerns about transboundary haze: A comparison of Indonesia, Singapore, and Malaysia’, *Global Environmental Change*, 25(1). doi: 10.1016/j.gloenvcha.2014.01.013.

Fraser, J. (2021) ‘The power of pragmatism: Knowledge production and social inquiry’, *Urban Geography*, 42(6). doi: 10.1080/02723638.2021.1950984.

Freeman, J. *et al.* (2016) ‘Global governance is a key part of the solution to antimicrobial resistance (Response to gravatt)’, *New Zealand Medical Journal*.

Frid-Nielsen, S. S., Rubin, O. and Baekkeskov, E. (2019) ‘The state of social science research on antimicrobial resistance’, *Social Science and Medicine*, 242. doi: 10.1016/j.socscimed.2019.112596.

G7 UK (2021) ‘G7 Finance Ministers’ Statement on Actions to Support Antibiotic Development’, in. Available at: https://www.g7uk.org/g7-finance-ministers-statement-on-actions-to-support-antibiotic-development/.

Gershkoff, A. and Kushner, S. (2005) ‘Shaping Public Opinion: The 9/11-Iraq Connection in the Bush Administration’s Rhetoric’, *Perspectives on Politics*, 3(3). doi: 10.1017/S1537592705050334.

Gil-Gil, T. *et al.* (2019) ‘Antimicrobial resistance: A multifaceted problem with multipronged solutions’, *MicrobiologyOpen*. doi: 10.1002/mbo3.945.

Gradmann, C. (2013) ‘Sensitive Matters : The World Health Organisation and Antibiotic Resistance Testing , 1945 – 1975’, 26(3), pp. 555–574. doi: 10.1093/shm/hkt018.

Graham, W. J. *et al.* (2016) ‘What are the threats from antimicrobial resistance for maternity units in low- and middle- income countries?’, *Global Health Action*, 9(1). doi: 10.3402/gha.v9.33381.

Gram, L., Daruwalla, N. and Osrin, D. (2019) ‘Understanding participation dilemmas in community mobilisation: Can collective action theory help?’, *Journal of Epidemiology and Community Health*, 73(1). doi: 10.1136/jech-2018-211045.

Grasland, C. *et al.* (2016) 'International agenda-setting, the media and geography: A multi-dimensional analysis of news flows', *Espace Geographique*. doi: 10.3917/eg.451.0025.

Gray, M. (1977) 'Whale of a dilemma faces company', *The Globe and mail*, 17 November. Available at: https://www.proquest.com/docview/387140159/945DAC38C2DF47B8PQ/1?accountid=13607.

Gröndal, H. (2018) 'The Emergence of Antimicrobial Resistance as a Public Matter of Concern: A Swedish History of a "Transformative Event"', *Science in Context*, 31(4). doi: 10.1017/S0269889718000315.

Hafner, T. and Shiffman, J. (2013) 'The emergence of global attention to health systems strengthening', *Health Policy and Planning*, 28(1). doi: 10.1093/heapol/czs023.

Halpern, B. N. E. and Law, T. (2010) 'ANTIBIOTICS IN FOOD ANIMALS : THE CONVERGENCE OF ANIMAL AND PUBLIC HEALTH , SCIENCE , POLICY , POLITICS AND THE LAW', 1(766).

Hamlin, A. and Reisman, D. (1991) 'Theories of Collective Action: Downs, Olson and Hirsch.', *The Economic Journal*. doi: 10.2307/2234451.

Harring, N. and Krockow, E. M. (2021) 'The social dilemmas of climate change and antibiotic resistance: an analytic comparison and discussion of policy implications', *Humanities and Social Sciences Communications*, 8(1). doi: 10.1057/s41599-021-00800-2.

Hart, P. S. *et al.* (2015) 'Extending the Impacts of Hostile Media Perceptions: Influences on Discussion and Opinion Polarization in the Context of Climate Change', *Science Communication*, 37(4). doi: 10.1177/1075547015592067.

Harvey, F. (2014) 'Antibiotic resistance in farm animals "threatened by UK cuts"', *The Guardian*. Available at: https://www.theguardian.com/environment/2014/may/19/antibiotic-resistance-farm-animals-threatened-uk-cuts.

Harvey, F. (2019) 'Antibiotic resistance as big a threat as climate change – chief medic | Society | The Guardian', *The Guardian*.

Hawkins, O. *et al.* (2022) 'Comparing public attitudes, knowledge, beliefs and behaviours towards antibiotics and antimicrobial resistance in Australia, United Kingdom, and Sweden (2010-2021): A systematic review, meta-analysis, and comparative policy analysis', *PLoS ONE*, 17(1 January). doi: 10.1371/journal.pone.0261917.

Head, M. G. *et al.* (2014) 'Systematic analysis of funding awarded for antimicrobial resistance research to institutions in the UK, 1997-2010', *Journal of Antimicrobial Chemotherapy*, 69(2), pp. 548–554. doi: 10.1093/jac/dkt349.

Hempel, M. (2018) 'AnthropoTrumpism: Trump and the politics of environmental disruption', *Journal of Environmental Studies and Sciences*. Springer New York LLC, 8(2), pp. 183–188. doi: 10.1007/s13412-018-0491-8.

Hendricks, R. (2017) 'Communicating Climate Change: Focus on the Framing, Not Just the Facts', *Climate Reality Project*.

Hermann, M. G. and Dayton, B. W. (2009) 'Transboundary crises through the eyes of policymakers: Sense making and crisis management', *Journal of Contingencies and Crisis Management*. doi: 10.1111/j.1468-5973.2009.00590.x.

Hernández, E., Anduiza, E. and Rico, G. (2021) 'Affective polarization and the salience of elections', *Electoral Studies*, 69. doi: 10.1016/j.electstud.2020.102203.

Herring, H. (2001) 'The conservation society: Harbinger of the 1970s environment movement in the UK', *Environment and History*, 7(4). doi: 10.3197/096734001129342522.

Hoffman, S. J. and Røttingen, J. (2015) 'Assessing the Expected Impact of Global Health Treaties : Evidence From 90 Quantitative Evaluations', 105(1), pp. 26–41. doi: 10.2105/AJPH.2014.302085.

Hollis, A. and Maybarduk, P. (2015) 'Antibiotic Resistance Is a Tragedy of the Commons That Necessitates Global Cooperation', *Journal of Law, Medicine and Ethics*. doi: 10.1111/jlme.12272.

IACG (2018) 'Antimicrobial resistance : Invest in innovation and research , and boost R & D and access IACG discussion paper', (June). Available at: https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_AMR_Invest_innovation_research_boost_RD_and_access_110618.pdf.

Imbrogno, S. (1994) 'A case oriented research strategy as a comparative method', *Journal of International and Comparative Social Welfare*, 10(2). doi: 10.1080/17486839408414909.

IPCC (2014a) *Climate Change 2013 - The Physical Science Basis, Climate Change 2013 - The Physical Science Basis*. doi: 10.1017/cbo9781107415324.

IPCC (2014b) *Climate Change 2014: Impacts, Adaptation and Vulnerability, Climate Change 2014: Impacts, Adaptation and Vulnerability*. doi: 10.1017/cbo9781107415386.

IPCC (2014c) *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, *Ipcc*.

IPCC (2014d) 'Climate Change 2014 Synthesis Report Summary Chapter for Policymakers', *Ipcc*.

IPCC (2014e) 'Fifth Assessment Report (AR5) Authors and Review Editors Working Group I Contribution to the AR5 Climate Change 2013 : The Physical Science Basis', (May), pp. 1–47.

IPCC (2017) *FORTY-SIXTH SESSION OF THE IPCC AD HOC TASK GROUP ON FINANCIAL STABILITY OF THE IPCC (Prepared by the Ad Hoc Task Group on Finance) (Submitted by the Secretary of the IPCC)*. Available at: https://www.ipcc.ch/site/assets/uploads/2018/04/150820170305-Doc.-8-Report-on-the-Financial-Stability-of-the-IPCC.pdf.

IPCC (2021) 'Climate Change 2021', *The Physical Science Basis. Contribution of Working Group 1 to Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.

Ipsos (2020) *Earth 2020, Earth 2020*. doi: 10.11647/obp.0193.

Islam, S., Aldstadt, J. and Aga, D. (2019) 'Global antimicrobial resistance: a complex and dire threat with few definite answers', *Tropical Medicine and International Health*. doi: 10.1111/tmi.13230.

Iyengar, S. *et al.* (2019) 'The origins and consequences of affective polarization in the United States', *Annual Review of Political Science*. doi: 10.1146/annurev-polisci-051117-073034.

Jakobsson, E. (2021) 'Political Attention in a Creeping Crisis: The Case of Climate Change and Migration', in *Understanding the Creeping Crisis*. doi: 10.1007/978-3-030-70692-0_8.

John, D. M. and Mayer, N. Z. (2018) 'Resource Mobilization and Social Movements: A Partial Theory', in *Social Movements in an Organizational Society*. doi: 10.4324/9781315129648-1.

Jones, B. D. and Baumgartner, F. R. (2004a) 'Representation and agenda setting', *Policy Studies Journal*. Blackwell Publishing Inc., 32(1), pp. 1–24. doi: 10.1111/j.0190-292X.2004.00050.x.

Jones, B. D. and Baumgartner, F. R. (2004b) 'Representation and agenda setting', *Policy Studies Journal*. doi: 10.1111/j.0190-292X.2004.00050.x.

Jones, B. D. and Baumgartner, F. R. (2005) *The politics of attention: How government prioritizes problems*. The University of Chicago Pess. Available at: https://www.press.uchicago.edu/ucp/books/book/chicago/P/bo3644482.html.

Joppke, C. (1991) 'Social Movements during Cycles of Issue Attention: The Decline of the Anti-Nuclear

Energy Movements in West Germany and the USA', *The British Journal of Sociology*, 42(1). doi: 10.2307/590834.

JPIAMR Secretariat (2017) 'Mapping of AMR Research Funding', *Joint Programming Initiative on Antimicrobial Resistance*.

Kalb, M. (2020) 'Greening Democracy: The Anti-Nuclear Movement and Political Environmentalism in West Germany and Beyond, 1968–1983 by Stephen Milder', *German Studies Review*, 43(1). doi: 10.1353/gsr.2020.0029.

Karp, P. (2019) *Scott Morrison says no evidence links Australia's carbon emissions to bushfires*, *The Guardian*.

Keane, P. (2019) 'How the oil industry made us doubt climate change', *BBC*. Available at: https://www.bbc.com/news/stories-53640382.

Keeling, C. D. (1960) 'The Concentration and Isotopic Abundances of Carbon Dioxide in the Atmosphere', *Tellus*, 12(2). doi: 10.3402/tellusa.v12i2.9366.

Keeling, C. D., Bacastow, R. B. and Bainbridge, A. E. (1976) 'Atmospheric carbon dioxide variations at Mauna Loa Observatory, Hawaii', *TELLUS*, 28(6). doi: 10.3402/tellusa.v28i6.11322.

Kenton, W. (2018) *Hypermarket*. Available at: https://www.investopedia.com/terms/h/hypermarket.asp.

Kerry, J. (2015) 'U . S . Department of State Diplomacy in Action', *U.S. Department of State Diplomacy in Action*, pp. 1–5. Available at: https://www.state.gov/r/pa/prs/ps/2017/10/274980.htm.

Kim, S. Y. *et al.* (2022) 'Updating the Institutional Collective Action Framework', *Policy Studies Journal*, 50(1). doi: 10.1111/psj.12392.

Kingdon, J. (1995) 'Agendas, alternatives and public policies (ch. 8)', *Agendas, alternatives and public policies 2nd edition*.

Kingdon, J. W. (2003) *Agendas, Alternatives, and Public Policies, 1976, 1977, 1978, 1979 [United States], John W. Kingdon*. doi: 10.3886/ICPSR28024.v1.

Koopmans, R. and Duyvendak, J. W. (1995) 'The Political Construction of the Nuclear Energy Issue and Its Impact on the Mobilization of Anti-Nuclear Movements in Western Europe', *Social Problems*, 42(2). doi: 10.1525/sp.1995.42.2.03x0112h.

Krantz, S. A. and Monroe, M. C. (2016) 'Message framing matters: Communicating climate change with forest landowners', *Journal of Forestry*, 114(2). doi: 10.5849/jof.14-057.

Kwansah-Aidoo, K. and George, A. M. (2015) 'Communication, Culture and Crisis in a Transboundary Context: Setting the Scene', in *Culture and Crisis Communication: Transboundary Cases from Nonwestern Perspectives*. doi: 10.1002/9781119081708.ch1.

Laxminarayan, R. (2016) 'The Global Challenge of Antimicrobial Resistance', *International journal of*, 7(Aug), pp. 1–71. Available at: http://www.mdpi.com/1660-4601/7/8/3141/htm.

Laxminarayan, R. (2022) 'The overlooked pandemic of antimicrobial resistance', *The Lancet*. doi: DOI:https://doi.org/10.1016/S0140-6736(22)00087-3.

Lazarus, R. J. (2009) 'Super wicked problems and climate change: Restraining the present to liberate the future', *Cornell Law Review*.

Levin, K. *et al.* (2012) 'Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change', *Policy Sciences*. doi: 10.1007/s11077-012-9151-0.

Liao, Q. *et al.* (2021) 'Drivers of global media attention and representations for antimicrobial resistance risk:

an analysis of online English and Chinese news media data, 2015–2018', *Antimicrobial Resistance and Infection Control*, 10(1). doi: 10.1186/s13756-021-01015-5.

Library of Congress (no date) *Earth Day*. Available at: https://www.loc.gov/item/today-in-history/april-22/.

Lindell, R. (2010) 'A life dedicated to peace and social justice', *The Globe and mail*. Available at: https://www.proquest.com/newspapers/life-dedicated-peace-social-justice/docview/740173261/se-2?accountid=13607.

Lineman, M. *et al.* (2015) 'Talking about climate change and global warming', *PLoS ONE*. doi: 10.1371/journal.pone.0138996.

Liu, X., Lindquist, E. and Vedlitz, A. (2011a) 'Explaining media and congressional attention to global climate change, 1969-2005: An empirical test of agenda-setting theory', *Political Research Quarterly*, 64(2), pp. 405–419. doi: 10.1177/1065912909346744.

Liu, X., Lindquist, E. and Vedlitz, A. (2011b) 'Explaining media and congressional attention to global climate change, 1969-2005: An empirical test of agenda-setting theory', *Political Research Quarterly*. doi: 10.1177/1065912909346744.

Liu, Y. *et al.* (2019) 'Analysis of Science Popularization Policies Issued by Chinese Central Government Organs and People's Organizations from 2011 to 2015', *Cultures of Science*, 2(2). doi: 10.1177/209660831900200204.

Livingston, J. (2018) *Climate Science for Policy? The knowledge politics of the IPCC after Copenhagen*. Available at: http://lup.lub.lu.se/search/ws/files/53831543/Jasmine_Livingston.pdf.

Lo, C. Y. and Thomas, N. (2018) 'The macrosecuritization of antimicrobial resistance in Asia', *Australian Journal of International Affairs*. Taylor & Francis, 72(6), pp. 567–583. doi: 10.1080/10357718.2018.1534939.

Lockyer, William. S. (1910) 'Does the Indian climate change?', *Nature Publishing Group*, 84(2128).

Lu, J., Sheldenkar, A. and Lwin, M. O. (2020) 'A decade of antimicrobial resistance research in social science fields: a scientometric review', *Antimicrobial Resistance and Infection Control*. doi: 10.1186/s13756-020-00834-2.

Lucas, B. (2019) *G7 and G20 commitments on health*. Available at: https://core.ac.uk/download/pdf/237087303.pdf.

Lundgren, M., Squatrito, T. and Tallberg, J. (2018a) 'Stability and change in international policy-making: A punctuated equilibrium approach', *Review of International Organizations*. doi: 10.1007/s11558-017-9288-x.

Lundgren, M., Squatrito, T. and Tallberg, J. (2018b) 'Stability and change in international policy-making: A punctuated equilibrium approach', *Review of International Organizations*. The Review of International Organizations, 13(4), pp. 547–572. doi: 10.1007/s11558-017-9288-x.

Maehle, N. *et al.* (2021) 'Crowdfunding for climate change: Exploring the use of climate frames by environmental entrepreneurs', *Journal of Cleaner Production*, 314. doi: 10.1016/j.jclepro.2021.128040.

Maher, A. and Sridhar, D. (2012) 'Political priority in the global fight against non-communicable diseases', *Journal of Global Health*, 2(2). doi: 10.7189/jogh.02.020403.

Majone, G. (2009) 'Agenda Setting', in *The Oxford Handbook of Public Policy*. doi: 10.1093/oxfordhb/9780199548453.003.0011.

Maltby, K. M., Simpson, S. D. and Turner, R. A. (2021) 'Scepticism and perceived self-efficacy influence fishers' low risk perceptions of climate change', *Climate Risk Management*, 31. doi: 10.1016/j.crm.2020.100267.

Martin, S. (2020) *Scott Morrison's senior ministers discuss how to reposition climate policies, The Guardian*. Available at: https://www.theguardian.com/australia-news/2020/jan/22/scott-morrisons-senior-ministers-discuss-how-to-reposition-climate-policies.

McAdam, D. (1996) 'Political Opportunities: Conceptual Origins, Current Problems, Future Directions', in *Comparative perspectives on social movements*.

McCarthy, J. D. and Zald, M. N. (1977) 'Resource Mobilization and Social Movements: A Partial Theory', *American Journal of Sociology*, 82(6). doi: 10.1086/226464.

McCarthy, J. D. and Zald, M. N. (2017) 'Resource mobilization and social movements: A partial theory', in *Social Movements in an Organizational Society: Collected Essays*. doi: 10.4324/9781315129648.

Mccright, A. M. and Dunlap, R. E. (2011) 'The Politicization Of Climate Change And Polarization In The American Public's Views Of Global Warming, 2001-2010', *Sociological Quarterly*, 52(2). doi: 10.1111/j.1533-8525.2011.01198.x.

McEvoy, D., Fünfgeld, H. and Bosomworth, K. (2013) 'Resilience and Climate Change Adaptation: The Importance of Framing', *Planning Practice and Research*, 28(3), pp. 280–293. doi: 10.1080/02697459.2013.787710.

McGreal, C. (2021) 'Big oil and gas kept a dirty secret for decades. Now they may pay the price', *The guardian*. Available at: https://www.theguardian.com/environment/2021/jun/30/climate-crimes-oil-and-gas-environment.

McGregor, S. L. T. (2020) 'Conceptualizing transdisciplinary human ecology', *Human Ecology Review*, 26(1). doi: 10.22459/HER.26.01.2020.11.

Melley, T. (2017) 'War on terror', in *American Literature in Transition, 2000-2010*. doi: 10.1017/9781316569290.019.

Monbiot, G. (2009) 'The denial industry case notes', *The Guardian*.

Morgan, G., Gomes, M. V. P. and Perez-Aleman, P. (2016) 'Transnational governance regimes in the Global South: Multinationals, states and NGOs as political actors', *RAE Revista de Administracao de Empresas*, 56(4). doi: 10.1590/S0034-759020160402.

Munkholm, L. *et al.* (2021) 'Attention to the Tripartite's one health measures in national action plans on antimicrobial resistance', *Journal of Public Health Policy*. doi: 10.1057/s41271-021-00277-y.

Murphy, K. (2019) 'Morrison responds to Greta Thunberg by warning children against "needless" climate anxiety', *The Guardian*, 25 September. Available at: https://www.theguardian.com/australia-news/2019/sep/25/morrison-responds-to-greta-thunberg-speech-by-warning-children-against-needless-climate-anxiety.

Nasiritousi, N. (2019) 'NGOs and the environment', in *Routledge Handbook of NGOs and International Relations*. doi: 10.4324/9781315268927.

Navracsics, T. *et al.* (2015) 'The challenge of resilience in a globalised world', *JRC Science for Policy Report*.

Naylor, N. R. *et al.* (2018) 'Estimating the burden of antimicrobial resistance: a systematic literature review', *Antimicrobial resistance and infection control*. doi: 10.1186/s13756-018-0336-y.

Newburger, E. (2021) 'Biden's budget proposal calls for more than $36 billion to fight climate change', *CNBC*, May. Available at: https://www.cnbc.com/2021/05/28/bidens-budget-proposal-calls-for-36-billion-to-fight-climate-change.html.

Nuzzi, O. (2014) 'Bayou State's answer to Sarah Palin thinks global warming is a "hoax," because

thermometers.', *The Daily beast; New York*. Available at: https://www.thedailybeast.com/gop-candidate-disproves-climate-change-with-simple-scientific-device.

O'Cathain, A. (2014) 'Mixed Methods Involving Qualitative Research', in *The SAGE Handbook of Qualitative Methods in Health Research*. doi: 10.4135/9781446268247.n30.

O'Connor, R. E., Bord, R. J. and Fisher, A. (1999) 'Risk perceptions, general environmental beliefs, and willingness to address climate change', *Risk Analysis*, 19(3). doi: 10.1023/A:1007004813446.

O'Neill, J (2016) *Antimicrobial Resistance : Tackling a crisis for the health and wealth of nations*, *Review on Antimicrobial Resistance*.

O'Neill, Jim (2016) *Tackling drug-resistant infections globally: final report and recommendations: the review on antimicrobial resistance; 2016 [Available from: https://amr-review. org, Publications. html*. Available at: https://amr-review.org/sites/default/files/160525_Final paper_with cover.pdf.

O'Neill, S. (2020) 'More than meets the eye: a longitudinal analysis of climate change imagery in the print media', *Climatic Change*, 163(1). doi: 10.1007/s10584-019-02504-8.

O'Neill, S. and Nicholson-Cole, S. (2009) '"fear won't do it": Promoting positive engagement with climate change through visual and iconic representations', *Science Communication*, 30(3). doi: 10.1177/1075547008329201.

O'Niel, K. (2014) 'Architects, agitators, and entrepreneurs: international and nongovernmental organizations in global environmental politics.', in VanDeveer, S. and Axelrod, R. (eds) *Axelrod R and VanDeveer SD (eds) The Global Environment: Institutions, Law, and Policy, 4th edition. Washington, DC: CQ Press, 26–52.* 4th Editio. Washington, DC: CQ Press, pp. 26–52.

O'Toole, T. (1978) 'Climate experts see a warming trend', *Washington Post*. Available at: https://www.washingtonpost.com/archive/politics/1978/02/18/climate-experts-see-a-warming-trend/7721511c-6bfe-45c5-89d3-c1b7854587eb/.

Oliver, P. E. (1993) 'Formal Models of Collective Action', *Annual Review of Sociology*. doi: 10.1146/annurev.soc.19.1.271.

Olson, M. (1965) *The logic of collective action Cambridge, Public goods and the theory of groups*. doi: 10.1007/978-3-319-20451-2_32.

Ostrom, E. (2009) 'Collective Action Theory', in *The Oxford Handbook of Comparative Politics*. doi: 10.1093/oxfordhb/9780199566020.003.0008.

Overland, I. and Sovacool, B. K. (2020) 'The misallocation of climate research funding', *Energy Research and Social Science*. doi: 10.1016/j.erss.2019.101349.

Overton, K. *et al.* (2021) 'Waves of attention: Patterns and themes of international antimicrobial resistance reports, 1945-2020', *BMJ Global Health*, 6(11). doi: 10.1136/bmjgh-2021-006909.

Painter, J. and Ashe, T. (2012) 'Cross-national comparison of the presence of climate scepticism in the print media in six countries, 2007-10', *Environmental Research Letters*, 7(4). doi: 10.1088/1748-9326/7/4/044005.

Papacharissi, Z. (2016) 'Affective publics and structures of storytelling: sentiment, events and mediality', *Information Communication and Society*. doi: 10.1080/1369118X.2015.1109697.

Papadakis, E. (2014) *The Green Movement in West Germany (RLE: German Politics), The Green Movement in West Germany (RLE: German Politics)*. doi: 10.4324/9781315727561.

Perry, J. and Kingdon, J. W. (1984) *Agendas, Alternatives and Public Policies, Journal of Policy Analysis and Management*. Little, Brown and Company, Boston, MA. doi: 10.2307/3323801.

Petersen, K. K. (2009) ‘Revisiting Downs’ Issue-Attention Cycle: International Terrorism and U.S. Public Opinion’, *Journal of Strategic Security*, 2(4). doi: 10.5038/1944-0472.2.4.1.

Peterson, H. L. (2018) ‘Political Information Has Bright Colors: Narrative Attention Theory’, *Policy Studies Journal*, 46(4), pp. 828–842. doi: 10.1111/psj.12272.

Pielke, R. A. (2000) ‘Policy history of the US Global Change Research Program: Part II. Legislative process’, *Global Environmental Change*, 10(2). doi: 10.1016/S0959-3780(00)00007-8.

Podolsky, S. H. (2018a) ‘The evolving response to antibiotic resistance (1945–2018)’, *Palgrave Communications*. Springer US. doi: 10.1057/s41599-018-0181-x.

Podolsky, S. H. (2018b) ‘The evolving response to antibiotic resistance (1945–2018)’, *Palgrave Communications*. Springer US, 4(1). doi: 10.1057/s41599-018-0181-x.

Polletta, F., Keck, M. E. and Sikkink, K. (1999) ‘Activists Beyond Borders: Advocacy Networks in International Politics’, *Contemporary Sociology*, 28(1). doi: 10.2307/2653901.

Della Porta, D. and Parks, L. (2018) ‘Social movements, the European crisis, and EU political opportunities’, *Comparative European Politics*, 16(1). doi: 10.1057/s41295-016-0074-6.

Powaski, R. (1999) ‘The Antinuclear Movement was Effective — But Not Completely’, *Oxford University Press*, 23(4), p. 4.

Powerll, A. (2021) ‘Tracing Big Oil’s PR war to delay action on climate change’, *The Harvard Gazette*. Available at: https://news.harvard.edu/gazette/story/2021/09/oil-companies-discourage-climate-action-study-says/.

Prestinaci, F., Pezzotti, P. and Pantosti, A. (2015) ‘Antimicrobial resistance: A global multifaceted phenomenon’, *Pathogens and Global Health*. doi: 10.1179/2047773215Y.0000000030.

Quiggin, J. (2008) ‘Uncertainty and Climate Change Policy’, *Economic Analysis and Policy*, 38(2), pp. 203–210. doi: 10.1016/S0313-5926(08)50017-8.

Ragin, C. C. (2014a) ‘Case-Oriented Comparative Methods’, in *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*.

Ragin, C. C. (2014b) *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. 1st edn. Univeristy of California Press. Available at: https://ebookcentral-proquest-com.ep.fjernadgang.kb.dk/lib/kbdk/detail.action?docID=1698820.

Raunio, T. (2002) ‘Why European integration increases leadership autonomy within political parties’, *Party Politics*. SAGE Publications Ltd, 8(4), pp. 405–422. doi: 10.1177/1354068802008004003.

ReAct (2016) ‘AMR Stakeholder Mapping’, *ReAct Europe*.

Reed, M. (2016) ‘“This loopy idea” an analysis of UKIP’s social media discourse in relation to rurality and climate change’, *Space and Polity*, 20(2). doi: 10.1080/13562576.2016.1192332.

Reinalda, B. and Verbeek, B. (2004) ‘The issue of decision making within international organizations’, in *Decision making within international organizations*.

Reuters (2021) ‘Reuters list of the world’s top climate scientists’, *Reuters*. Available at: https://www.reuters.com/investigates/special-report/climate-change-scientists-list/.

Revelle, R. and Suess, H. E. (1957) ‘Carbon Dioxide Exchange Between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO 2 during the Past Decades’, *Tellus*, 9(1). doi: 10.1111/j.2153-3490.1957.tb01849.x.

Rhone, N. (2019) ‘Climate Politics: How climate change turned into a crisis: As debate over the environment

evolved, so did the words used', *Teh Atlanta Journal - Constitution, Atlanta, Ga*. Available at: https://www.proquest.com/docview/2278391430/fulltext/BB2887501FE84613PQ/1?accountid=13607.

Richards, H. G. (1938) 'Marine Pleistocene of Florida', *Bulletin of the Geological Society of America*, 49(8). doi: 10.1130/GSAB-49-1267.

Robison, J. and Mullinix, K. J. (2016) 'Elite Polarization and Public Opinion: How Polarization Is Communicated and Its Effects', *Political Communication*, 33(2). doi: 10.1080/10584609.2015.1055526.

Roelvink, G. (2010) 'Collective action and the politics of affect', *Emotion, Space and Society*. doi: 10.1016/j.emospa.2009.10.004.

Rogers Van Katwyk, S. *et al.* (2020) 'Exploring Models for an International Legal Agreement on the Global Antimicrobial Commons: Lessons from Climate Agreements', *Health Care Analysis*. doi: 10.1007/s10728-019-00389-3.

Rosencranz, A. (1986) 'The Acid Rain Controversy in Europe and North America: A Political Analysis', *Springer*, 15(1), p. 5.

Di Ruggiero, E. *et al.* (2015a) 'Public health agenda setting in a global context: The international labor organization's decent work agenda', *American Journal of Public Health*. doi: 10.2105/AJPH.2014.302455.

Di Ruggiero, E. *et al.* (2015b) 'Public health agenda setting in a global context: The international labor organization's decent work agenda', *American Journal of Public Health*, 105(4), pp. e58–e61. doi: 10.2105/AJPH.2014.302455.

Ruiu, M. L. (2021) 'Persistence of Scepticism in Media Reporting on Climate Change: The Case of British Newspapers', *Environmental Communication*, 15(1). doi: 10.1080/17524032.2020.1775672.

Sabatier, P. *et al.* (2014) *Theories of the policy process, Theories of the Policy Process*. doi: 10.1081/E-EPAP2-120041405.

Schäfer, M. S., Ivanova, A. and Schmidt, A. (2014) 'What drives media attention for climate change? Explaining issue attention in Australian, German and Indian print media from 1996 to 2010', *International Communication Gazette*, 76(2), pp. 152–176. doi: 10.1177/1748048513504169.

Scharrer, L. *et al.* (2017) 'When science becomes too easy: Science popularization inclines laypeople to underrate their dependence on experts', *Public Understanding of Science*, 26(8). doi: 10.1177/0963662516680311.

Scheffran, J. (2015) *Climate Change as a Risk Multiplier in a World of Complex Crises, Planetary Security*.

Scheufele, D. A. and Tewksbury, D. (2007) 'Framing, agenda setting, and priming: The evolution of three media effects models', *Journal of Communication*. doi: 10.1111/j.0021-9916.2007.00326.x.

Schneider, C. R., Zaval, L. and Markowitz, E. M. (2021) 'Positive emotions and climate change', *Current Opinion in Behavioral Sciences*. doi: 10.1016/j.cobeha.2021.04.009.

Schneider, S. H. *et al.* (2010) *Climate change science and policy*. Island Press, Washington.

Schneiderbauer, S. *et al.* (2021) 'Risk perception of climate change and natural hazards in global mountain regions: A critical review', *Science of the Total Environment*. doi: 10.1016/j.scitotenv.2021.146957.

Shankar, Pr. (2016) 'Book review: Tackling drug-resistant infections globally', *Archives of Pharmacy Practice*, 7(3), p. 110. doi: 10.4103/2045-080x.186181.

Sheikh, K. (2017) 'Three ideas on how the new WHO DG can build health systems from the bottom up', *The Conversation*.

Shiffman, J. (2016) *Agenda Setting in Public Health Policy*. Second Edi, *International Encyclopedia of*

Public Health. Second Edi. Elsevier. doi: 10.1016/B978-0-12-803678-5.00007-2.

Shiffman, J., Beer, T. and Wu, Y. (2002) 'The emergence of global disease control priorities', *Health Policy and Planning*. doi: 10.1093/heapol/17.3.225.

Small, S. (2014) *16 Organizations Working to Raise Antibiotic Resistance Awareness*. Available at: https://foodtank.com/news/2014/05/sixteen-organizations-working-to-raise-antibiotic-resistance-awareness/.

So, A. D. *et al.* (2014) 'Consultation on a draft Global action plan to address antimicrobial resistance', pp. 1–17. Available at: http://www.who.int/drugresistance/global_action_plan/Response_CentreforHealthfromEnvironmentNUIGalway.pdf.

Spence, A. and Pidgeon, N. (2010) 'Framing and communicating climate change: The effects of distance and outcome frame manipulations', *Global Environmental Change*, 20(4). doi: 10.1016/j.gloenvcha.2010.07.002.

Spruijt, P. *et al.* (2014) 'Roles of scientists as policy advisers on complex issues: A literature review', *Environmental Science and Policy*. doi: 10.1016/j.envsci.2014.03.002.

STAG-AMR, W.- (2013) 'Strategic and Technical Advisory Group on Antimicrobial Resistance', (November), pp. 19–20.

STAG1_Meeting_report (2013) 'Strategic and Technical Advisory Group on Antimicrobial Resistance. Report of the first meeting Geneva, 19-20 September 2013.', (September), pp. 19–20.

Steede, G. M. *et al.* (2019) 'A Content Analysis of Antibiotic use in Livestock in National U.S. Newspapers', *Journal of Applied Communications*, 103(1). doi: 10.4148/1051-0834.2237.

Suh, D. (2001) 'How do political opportunities matter for social movements?: Political opportunity, misframing, pseudosuccess, and pseudofailure', *Sociological Quarterly*, 42(3). doi: 10.1111/j.1533-8525.2001.tb02409.x.

Taguchi, N. (2018) 'Description and explanation of pragmatic development: Quantitative, qualitative, and mixed methods research', *System*, 75. doi: 10.1016/j.system.2018.03.010.

The Globe and Mail (1978) 'Some think its warming up', *The Globe and Mail: Toronto, Ont.* Available at: https://www.proquest.com/docview/387035264/fulltext/2445EDB642D54074PQ/1?accountid=13607.

The Lancet Respiratory Medicine (2016) 'Antimicrobial resistance—what can we learn from climate change?', *The Lancet Respiratory Medicine*. doi: 10.1016/S2213-2600(16)30332-0.

Thrandardottir, E. (2015) 'NGO LEGITIMACY: FOUR MODELS', *Representation*, 51(1). doi: 10.1080/00344893.2015.1023102.

Thunberg, G. (2019) 'Greta Thunberg's Speech At The U.N. Climate Action Summit : NPR', *Npr*.

Timberlake, M. and Ragin, C. C. (1989) 'The Comparative Method: Moving beyond Qualitative and Quantitative Strategies.', *Social Forces*, 67(3). doi: 10.2307/2579563.

Timmerman, J. *et al.* (2017) 'Improving governance in transboundary cooperation in water and climate change adaptation', *Water Policy*, 19(6). doi: 10.2166/wp.2017.156.

Torjesen, I. (2013) 'Antimicrobial resistance presents an "apocalyptic" threat similar to that of climate change, CMO warns.', *BMJ (Clinical research ed.)*. doi: 10.1136/bmj.f1597.

Le Treut, H., Cubasch, U. and Allen, M. (2005) 'Historical Overview of Climate Change Science', *Notes*, 16.

Turner, B. (2018) 'Tackling antimicrobial resistance and climate change', *The Lancet*. doi: 10.1016/S0140-6736(18)32413-9.

Uekötter, F. (2019) ‘ S tephen M ilder . Greening Democracy: The Anti-Nuclear Movement and Political Environmentalism in West Germany and Beyond, 1968–1983 . ’, *The American Historical Review*, 124(1). doi: 10.1093/ahr/rhy557.

UN (1972) *Environment and sustainable development: United Nations Conference on the Human Environment, 5-16 June 1972, Stockholm*. Available at: https://www.un.org/en/conferences/environment/stockholm1972.

UN (2018) ‘Climate change: An “existential threat” to humanity, UN chief warns global summit’, 15 May. Available at: https://news.un.org/en/story/2018/05/1009782.

UNEP (2021) *About UN environment Programme*. Available at: https://www.unep.org/about-un-environment.

Unesco (2021) *The World in 2030: public survey report, Group*.

UNFCCC (1992) ‘United Nations Framework Convention on Climate Change United Nations’, *United Nations Frameork Convention on Climate Change*, pp. 1–33.

UNFCCC (1997) *The Kyoto Protocol*. Available at: https://unfccc.int/resource/docs/convkp/kpeng.html.

UNFCCC (2015) ‘Paris Agreement - English’, *United Nations*.

UNFCCC (2020) *What is the Kyoto Protocol?, United Nations Climate Change*.

UNFCCC (2021) *Admitted NGOs, UNFCCCC*. Available at: https://unfccc.int/process/parties-non-party-stakeholders/non-party-stakeholders/admitted-ngos/list-of-admitted-ngos.

United Nations (1992) ‘A/CONF.151/26/Vol.I: Rio Declaration on Environment and Development’, *Report of the United Nations Conference on Environment and Development*, I(August), pp. 1–5. Available at: http://www.un.org/documents/ga/conf151/aSaat ini, orang yang dimaksud adalah bank, yaitu suatu lembaga keuangan berupa perusahaan yang mewakili nasabah untuk melakukan:conf15126-1annex1.htm.

University of Oxford (2021) *Peoples’ Climate Vote, United Nations Development Programme*.

Vrana, R., Milovanović, I. and Salopek, Ž. (2021) ‘Popularization of science in public libraries in the republic of croatia’, *Vjesnik Bibliotekara Hrvatske*, 64(1). doi: 10.30754/vbh.64.1.840.

Wagner, M. (2021) ‘Affective polarization in multiparty systems’, *Electoral Studies*, 69. doi: 10.1016/j.electstud.2020.102199.

Wågström, A. (2021) ‘Masculinisation and Isolation of the Swedish Anti-Nuclear Movement After 1980: A Call for Environmentalists to Learn from the Past’, in *Palgrave Studies in the History of Science and Technology*. doi: 10.1007/978-3-030-54486-7_11.

Walgrave, S., Soroka, S. and Nuytemans, M. (2008) ‘The mass media’s political agenda-setting power: A longitudinal analysis of media, parliament, and government in Belgium (1993 to 2000)’, *Comparative Political Studies*. doi: 10.1177/0010414006299098.

Walgrave, S. and De Swert, K. (2004) ‘The making of the (issues of the) Vlaams Blok’, *Political Communication*, 21(4), pp. 479–500. doi: 10.1080/10584600490522743.

Wang, C., Geng, L. and Rodríguez-Casallas, J. D. (2021) ‘How and when higher climate change risk perception promotes less climate change inaction’, *Journal of Cleaner Production*, 321. doi: 10.1016/j.jclepro.2021.128952.

Watanabe, R. and Mez, L. (2004) ‘The Development of Climate Change Policy in Germany’, *International Review of Environmental Strategies*, 5(1).

Watts, R. (2003) ‘The man who put the environment on the nightly news’, *The Globe and Mail*. Available at:

https://www.proquest.com/docview/383957054/C945C5D45FCA4A01PQ/3?accountid=13607.

Weart, S. (2007) 'RE: The discovery of global warming.', *Isis; an international review devoted to the history of science and its cultural influences*. doi: 10.4159/9780674417557.

Weart, S. (2015) 'Climate and Climate Change: History of Scientific Work on Climate Change', in *Encyclopedia of Atmospheric Sciences: Second Edition*. doi: 10.1016/B978-0-12-382225-3.00491-6.

Weart, S. (2021) *The Discovery of Global Warming, Roger Revelle's Discovery, American Institute of Physics,*. Available at: https://history.aip.org/climate/Revelle.htm#N_23_ (Accessed: 24 October 2021).

Weaver, D. H. (2007) 'Thoughts on agenda setting, framing, and priming', *Journal of Communication*, 57(1), pp. 142–147. doi: 10.1111/j.1460-2466.2006.00333.x.

Weber, E. U. (2010) 'What shapes perceptions of climate change?', *Wiley Interdisciplinary Reviews: Climate Change*. doi: 10.1002/wcc.41.

Weible, C. M. *et al.* (2020) 'COVID-19 and the policy sciences: initial reactions and perspectives', *Policy Sciences*, 53(2). doi: 10.1007/s11077-020-09381-4.

Weiss, C. H. (1977) 'Research for Policy's Sake: The Enlightenment Function of Social Research', *Policy Analysis*.

WelcomeTrust (2014) 'Wellcome Trust CONSULTATION RESPONSE WHO draft outline of global action plan on antimicrobial resistance', (September), pp. 1–11.

Werder, O. (2002) 'Debating the Euro: Media Agenda-Setting in a Cross-National Environment', *Gazette*. doi: 10.1177/17480485020640030101.

Wernli, D. *et al.* (2017) 'Mapping global policy discourse on antimicrobial resistance', pp. 1–9. doi: 10.1136/bmjgh-2017-000378.

WHO (2001a) 'Organization World Health. Global Strategy for Containment of Antimicrobial Resistance', *World Health Organization*. doi: WHO/CDS/CSR/DRS/2001.2 99 p.

WHO (2001b) 'Organization World Health. Global Strategy for Containment of Antimicrobial Resistance', *World Health Organization*.

WHO (2002a) *FIFTY-FIFTH WORLD HEALTH ASSEMBLY GENEVA, 13-18 MAY 2002*. Geneva. Available at: https://apps.who.int/iris/bitstream/handle/10665/260200/WHA55-2002-REC3-eng.pdf?sequence=1&isAllowed=y.

WHO (2002b) *Terrorist Threats to Food: Guidane for estbalishing and strenghtening prevention and Response Systems*. Available at: file:///C:/Users/awz/OneDrive - Roskilde Universitet/Desktop/Current work/WHO 911.pdf.

WHO (2002c) *World report on violence and health: summary*. Available at: https://www.who.int/violence_injury_prevention/violence/world_report/en/summary_en.pdf.

WHO (2011) 'The World Medicines Situation 2011. Medicines prices, availability and affordability', *The World Medicines Situation*.

WHO (2015) 'Global Action Plan on Antimicrobial Resistance', in *World Health Organization*. Available at: https://www.who.int/antimicrobial-resistance/global-action-plan/en/.

WHO (2016) 'Margaret Chan', *Commision and its priorities*, pp. 2–5. Available at: https://www.who.int/dg/speeches/2016/antimicrobial-resistance-conference/en/.

WHO (2020) *Antimicrobial resistance*. Available at: https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance.

Wiest, S. L., Raymond, L. and Clawson, R. A. (2015) 'Framing, partisan predispositions, and public opinion on climate change', *Global Environmental Change*. doi: 10.1016/j.gloenvcha.2014.12.006.

Willetts, P. (1996) 'From Stockholm to Rio and beyond: The impact of the environmental movement on the United Nations consultative arrangements for NGOs', *Review of International Studies*, 22(1). doi: 10.1017/s0260210500118455.

Wittner, L. S. (2003) 'The forgotten years of the world nuclear disarmament movement, 1975-78', *Journal of Peace Research*. doi: 10.1177/00223433030404005.

Wolbers, J., Kuipers, S. and Boin, A. (2021) 'A systematic review of 20 years of crisis and disaster research: Trends and progress', *Risk, Hazards and Crisis in Public Policy*. doi: 10.1002/rhc3.12244.

Wolf, J. and Moser, S. C. (2011) 'Individual understandings, perceptions, and engagement with climate change: Insights from in-depth studies across the world', *Wiley Interdisciplinary Reviews: Climate Change*. doi: 10.1002/wcc.120.

World Economic Forum (WEF) (2013) *Global Risks Report 2013 Eighth Edition, World Economic Forum*.

World Health Organization (2015) 'Antibiotic Resistance: Multi-Country Public Awareness Survey', *World Heatlh Organization*, pp. 1–51. Available at: www.who.int.

Wu, W., Zheng, J. and Fang, Q. (2020) 'How a typhoon event transforms public risk perception of climate change: A study in China', *Journal of Cleaner Production*, 261. doi: 10.1016/j.jclepro.2020.121163.

Zahariadis, N. (2016) *Handbook of public policy agenda setting, Handbook of Public Policy Agenda Setting*. Edward Elgar Publishing. doi: 10.4337/9781784715922.

Zhang, R. *et al.* (2006) 'Globalization and Health Antibiotic resistance as a global threat : Evidence from China , Kuwait and the United States', 14. doi: 10.1186/1744-8603-2-6.

Zhu, J. H. (1992) 'Issue competition and attention distraction: A zero-sum theory of agenda-setting', *Journalism & Mass Communication Quarterly*, 69(4), pp. 825–836. doi: 10.1177/107769909206900403.